

# REPAIR OPERATION MANUAL



Second  
Edition

Incorporating TC and PI Models

Issued by  
SERVICE DIVISION  
TRIUMPH MOTORS BRITISH LEYLAND UK LIMITED

# TR6

## REPAIR OPERATION MANUAL

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*Issued by the*  
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# INTRODUCTION

The purpose of this manual is to assist skilled mechanics in the efficient repair and maintenance of British Leyland vehicles. Using the appropriate service tools and carrying out the procedures as detailed will enable the operations to be completed in the time stated in the 'Repair Operation Times'.

## Indexing

For convenience, the manual is divided into a number of divisions. Page 01-3 lists the titles and reference number of the various divisions.

A list of the operations within each division appears in alphabetical order on the page preceding each division.

## Operation Numbering

A master index of numbered operations has been compiled for universal application to all vehicles manufactured by the British Leyland Motor Corporation and, therefore, because of the different specifications of various models, continuity of the numbering sequence cannot be maintained throughout this manual.

Each operation described in the manual is allocated a number from the master index and cross-refers with an identical number in the 'Repair Operation Times'. The number consists of six digits arranged in three pairs.

Each instruction within an operation has a sequence number and, to complete the operation in the minimum time, it is essential that the instructions are performed in numerical sequence commencing at 1 unless otherwise stated. Where applicable, the sequence numbers identify the relevant components in the appropriate illustration.

## Emission Control Equipment

With the exception of Section 17, all remaining sections of this manual relate to basic vehicles not fitted with *anti-pollution* equipment. Where an operation is affected by the presence of this equipment, refer also to Anti-pollution (Section 17).

## Service Tools

Where performance of an operation requires the use of a service tool, the tool number is quoted under the operation heading and is repeated in, or following, the instruction involving its use. An illustrated list of all necessary tools is included in section 99.

## References

References to the left- or right-hand side in the manual are made when viewing from the rear. With the engine and gearbox assembly removed, the 'timing cover' end of the engine is referred to as the front. A key to abbreviations and symbols is given on page 01-5.

## Amendments

Revised and additional procedures resulting from changes in the vehicle specifications will be issued as revised or additional pages.

The circulation of amendments will be confined to Distributors and Dealers of British Leyland Motor Corporation Limited.

## REPAIRS AND REPLACEMENTS

When service parts are required it is essential that only genuine British Leyland Stanpart or Unipart replacements are used.

Attention is particularly drawn to the following points concerning repairs and the fitting of replacement parts and accessories.

Safety features embodied in the car may be impaired if other than genuine parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the vehicle manufacturer's specification. Torque wrench setting figures given in the Repair Operation Manual must be strictly adhered to. Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed. Owners purchasing accessories while travelling abroad should ensure that the accessory and its fitted location on the car conform to mandatory requirements in their country of origin.

The car warranty may be invalidated by the fitting of other than genuine British Leyland parts. All British Leyland Stanpart or Unipart replacements have the full backing of the factory warranty.

British Leyland Distributors and Dealers are obliged to supply only genuine service parts.

## ABBREVIATIONS AND SYMBOLS

|                                   |                    |                                 |                    |
|-----------------------------------|--------------------|---------------------------------|--------------------|
| Across flats (bolt size)          | A.F.               | Millimetres                     | mm                 |
| After bottom dead centre          | A.B.D.C.           | Millimetres of mercury          | mmHg               |
| After top dead centre             | A.T.D.C.           | Minimum                         | min.               |
| Alternating current               | a.c.               | Minus (of tolerance)            |                    |
| Amperes                           | amp                | Minute (of angle)               |                    |
| Ampere-hour                       | Ah                 |                                 |                    |
| **Atmospheres                     | Atm**              | Negative (electrical)           |                    |
|                                   |                    | **Newton metres                 | Nm**               |
| Before bottom dead centre         | B.B.D.C.           | Number                          | No.                |
| Before top dead centre            | B.T.D.C.           |                                 |                    |
| Bottom dead centre                | B.D.C.             | Ohms                            | ohm                |
| Brake horse-power                 | b.h.p.             | Ounces (force)                  | ozf                |
| Brake mean effective pressure     | b.m.e.p.           | Ounces (mass)                   | oz                 |
| British Standards                 | B.S.               | Ounce inch (torque)             | ozf in             |
|                                   |                    | Outside diameter                | o.dia.             |
| Carbon monoxide                   | CO                 | Overdrive                       | O/D                |
| Centigrade (Celsius)              | C                  |                                 |                    |
| Centimetres                       | cm                 | Paragraphs                      | para.              |
| Cubic centimetres                 | cm <sup>3</sup>    | Part Number                     | Part No.           |
| Cubic inches                      | in <sup>3</sup>    | Percentage                      | %                  |
| Cycles per minute                 | c/min              | Petrol Injection                | P.I.               |
|                                   |                    | Pints (Imperial)                | pt                 |
| Degree (angle)                    | deg. or °          | Pints (U.S.)                    | U.S. pt            |
| Degree (temperature)              | deg. or °          | Plus or minus                   | ±                  |
| Diameter                          | dia.               | Plus (tolerance)                | +                  |
| Direct current                    | d.c.               | Positive (electrical)           | +                  |
|                                   |                    | Pounds (force)                  | lbf                |
| Fahrenheit                        | F                  | Pounds (mass)                   | lb                 |
| Feet                              | ft                 | Pounds feet (torque)            | lbf ft             |
| Feet per minute                   | ft/min             | Pounds inches (torque)          | lbf in             |
| Fifth                             | 5th                | Pounds per square inch          | lb/in <sup>2</sup> |
| Figure (illustration)             | Fig.               |                                 |                    |
| First                             | 1st                | Radius                          | r                  |
| Fourth                            | 4th                | Ratio                           | :                  |
|                                   |                    | Reference                       | ref.               |
| Gallons (Imperial)                | gal                | Revolutions per minute          | rev/min            |
| Gallons (U.S.)                    | U.S. gal           | Right-hand                      | R.H.               |
| **Grammes (force)                 | gf                 | Right-hand steering             | R.H.Stg.           |
| Grammes (mass)                    | g**                |                                 |                    |
|                                   |                    | Second (angle)                  | "                  |
| High compression                  | h.c.               | Second (numerical order)        | 2nd                |
| High tension (electrical)         | h.t.               | Single carburetter              | SC                 |
| Horse-power                       | hp                 | Society of Automobile Engineers | S.A.E.             |
| Hundredweight                     | cwt                | Specific gravity                | sp. gr.            |
|                                   |                    | Square centimetres              | cm <sup>2</sup>    |
| Inches                            | in                 | Square inches                   | in <sup>2</sup>    |
| Inches of mercury                 | inHg               | Standard                        | std                |
| Independent front suspension      | i.f.s.             | Standard wire gauge             | s.w.g.             |
| Internal diameter                 | i.dia.             | Synchronizer/synchromesh        | synchro.           |
|                                   |                    |                                 |                    |
| Kilogrammes (force)               | kgf                | Third                           | 3rd                |
| Kilogrammes (mass)                | kg                 | Top dead centre                 | T.D.C.             |
| Kilogramme centimetre             | kgf cm             | Twin carburetters               | TC                 |
| Kilogramme metres                 | kgf m              |                                 |                    |
| Kilogrammes per square centimetre | kg/cm <sup>2</sup> | United Kingdom                  | UK                 |
| Kilometres                        | km                 |                                 |                    |
| Kilometres per hour               | km/h               | Volts                           | V                  |
| Kilovolts                         | kV                 |                                 |                    |
| King pin inclination              | k.p.i.             | Watts                           | W                  |
|                                   |                    |                                 |                    |
| Left-hand                         | L.H.               |                                 |                    |
| Left-hand steering                | L.H.Stg.           | Screw threads                   |                    |
| Left-hand thread                  | L.H.Thd.           | American Standard Taper Pipe    | N.P.T.F.           |
| Low compression                   | l.c.               | British Association             | B.A.               |
| Low tension                       | l.t.               | British Standard Fine           | B.S.F.             |
|                                   |                    | British Standard Pipe           | B.S.P.             |
| Maximum                           | max.               | British Standard Whitworth      | B.S.W.             |
| Metres                            | m                  | Unified Coarse                  | U.N.C.             |
| Microfarad                        | mfd                | Unified Fine                    | U.N.F.             |
| Midget Edison Screw               | MES                |                                 |                    |
| Miles per gallon                  | m.p.g.             |                                 |                    |
| Miles per hour                    | m.p.h.             |                                 |                    |



## LOCATION OF COMMISSION AND UNIT NUMBERS

**THE COMMISSION NUMBER** is the identification number which is required for registration and other purposes. It is stamped on a plate attached to the left hand front wheel arch (not U.S.A.) and is visible when the bonnet is raised. On vehicles for the U.S.A. type markets this plate is attached to the body adjacent to the left hand door striker plate and the Commission Number is also stamped on a small plate visible through the left hand side of the windscreen.

The significance of the Commission Numbers and suffix is as follows:

- CP/CR** this prefix denotes 'TR6' model range *AND* that a Petrol Injection engine unit is fitted.
- CC/CF** is an alternative prefix denoting model range *AND* that a Carburettor engine unit is fitted.
- 1234** — is the accumulated total build of this model.
- L** — denotes left hand steering  
(No letter is given to right hand steering models).
- U** — denotes U.S.A. type markets 1972 condition.

The Commission Number plate also bears code symbols for identification of the vehicle's exterior colour, trim material and trim colour. Refer to page 04-6.

**THE ENGINE NUMBER** is stamped on a machined flange on the left hand side of the cylinder block. The significance of the Engine Numbers and suffix is as follows:

- CP/CR** this prefix denotes model range *AND* that the engine unit is fitted with Petrol Injection.
- CC/CF** is an alternative prefix denoting model range *AND* that the engine unit is fitted with Carburettors.
- 1234** — is the accumulated total build of the type.
- H** — denotes High Compression. Alternatively.
- L** — denotes Low Compression. Alternatively.
- U** — denotes U.S.A. type markets 1972 condition.
- E** — denotes engine unit.

**THE GEARBOX NUMBER** is stamped on the left hand side of the gearbox casing. The significance of the Gearbox Numbers is as follows:

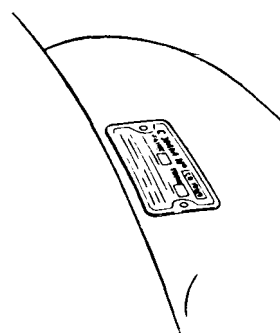
- CD** — this prefix denotes model range.
- 1234** — is the accumulated build of this type.  
There are no suffix letters.

**THE REAR AXLE NUMBER** is stamped on the bottom flange of the axle housing. The significance of the Axle Numbers is as follows:

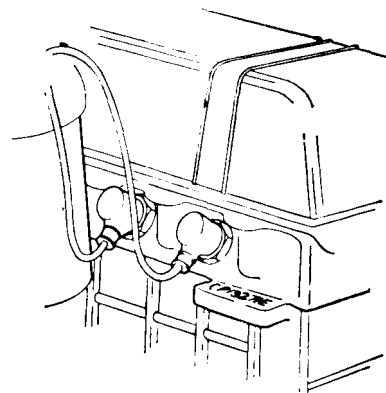
- CP/CR** this prefix denotes model range *AND* that the axle unit is for use with Petrol Injection engines.
- CD** — is an alternative prefix denoting model range *AND* that the axle unit is for use with Carburettor engines.
- 1234** — is the accumulated build of the type.  
There are no suffix numbers.

**IMPORTANT:** In all communications relating to Service and Spares it is essential to quote Commission Number, paint and trim codes and unit numbers (if applicable).

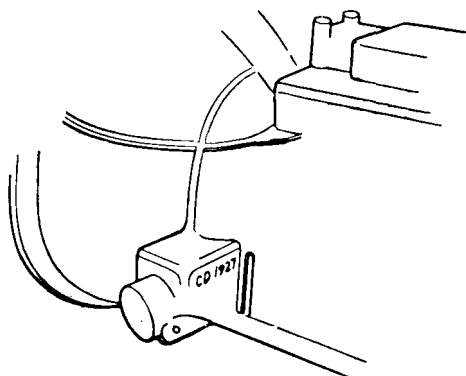
**COMMISSION NUMBER**



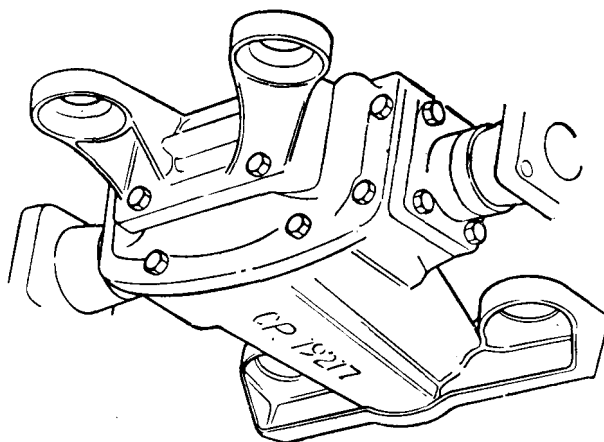
**ENGINE NUMBER**



**GEARBOX SERIAL NUMBER**



**REAR AXLE NUMBER**



## AMENDMENTS

To assist in identifying amendments on revised pages two stars (\*\*) will be inserted at the beginning and end of the amended paragraph, section, instruction or illustration.

To ensure that a record of amendments to this manual is available, this page will be re-issued with each set of revised pages. The amendment number, date of issue, appropriate instructions and revised page numbers will be quoted.

Revised pages must be inserted in place of existing pages carrying the same number, and the old pages discarded.

Additional pages or complete major assembly groups may be issued. In such cases the new pages must be inserted immediately following the existing pages carrying the next lowest number

| Date | Filing Instructions |       |                     |       | Date       | Filing Instructions |       |                  |       |
|------|---------------------|-------|---------------------|-------|------------|---------------------|-------|------------------|-------|
|      | Discard             | Issue | Insert              | Issue |            | Discard             | Issue | Insert           | Issue |
| 3/73 | 01.2                | 1     | 01.2                | 2     | 9/73       | 76.10.05            | 1     | 76.10.05         | 2     |
|      | 01.3                | 1     | 01.3                | 2     |            | 99.1                | 1     | 99.1             | 2     |
|      | 01.5                | 1     | 01.5                | 2     |            | 99.00.06            | 1     | 99.00.06         | 2     |
|      | 01.7                | 1     | 01.7                | 2     |            |                     |       |                  |       |
|      | 04.1                | 1     | 04.1                | 2     |            | 01.7                | 2     | 01.7             | 3     |
|      | 04.3                | 1     | 04.3                | 2     |            | 04.1                | 2     | 04.1             | 3     |
|      | 04.6                | 1     | 04.6                | 2     |            | 04.3                | 2     | 04.3             | 3     |
|      | 05.1                | 1     | 05.1                | 2     |            | 04.5                | 1     | 04.5             | 2     |
|      | 06.2                | 1     | 06.2                | 2     |            | 06.1                | 2     | 06.1             | 3     |
|      | 09.1                | 1     | 09.1                | 2     |            | 06.2                | 2     | 06.2             | 3     |
|      | 12.17.13 Sheet 3    | 1     | 12.17.13 Sheet 3    | 2     |            | 06.4                | 1     | 06.4             | 2     |
|      | 12.17.13 Sheet 4    | 1     | 12.17.13 Sheet 4    | 2     |            | 09.1                | 2     | 09.1             | 3     |
|      | 12.21.26            | 1     | 12.21.26            | 2     |            | 12.41.05 Sheet 1    | 1     | 12.41.05 Sheet 1 | 2     |
|      | 12.29.18 Sheet 4    | 1     | 12.29.18 Sheet 4    | 2     |            | 12.45.05 Sheet 7    | 1     | 12.41.05 Sheet 7 | 1     |
|      | 19.1 PI             | 1     | 19.1 PI             | 2     |            | 12.60.44            | 1     | 12.60.44         | 2     |
|      | 19.20.05 PI Sheet 1 | 1     | 19.20.05 PI Sheet 1 | 2     |            | 17.1                | 1     | 17.1             | 2     |
|      | —                   | —     | 19.20.05 PI Sheet 5 | 1     |            | 17.20.31            | 1     | 17.20.31         | 2     |
|      | 19.20.07 PI         | 1     | 19.20.07 PI Sheet 1 | 2     |            | —                   | —     | 17.45.01         | 1     |
|      | —                   | —     | 19.20.07 PI Sheet 2 | 1     |            | 19.20.02C           | 1     | 19.20.02C        | 2     |
|      | 19.20.26 PI         | 1     | 19.20.27 PI         | 1     |            | 30.15.02 Sheet 2    | 2     | 30.15.02 Sheet 2 | 3     |
|      | 19.35.01 PI         | 1     | 19.35.01 PI Sheet 1 | 2     |            | 33.25.12            | 1     | 33.25.12         | 2     |
|      | —                   | —     | 19.35.01 PI Sheet 2 | 1     |            | —                   | —     | 40.00.06 J       | 1     |
|      | 19.40.00 PI         | 1     | 19.40.00 PI         | 2     |            | —                   | —     | 40.00.08 J       | 1     |
|      | 19.1 C              | 1     | 19.1 C              | 2     |            | —                   | —     | 40.00.10 J       | 1     |
|      | 26.30.31            | 1     | 26.30.31            | 2     |            | —                   | —     | 40.00.12 J       | 1     |
|      | 30.1                | 1     | 30.1                | 2     |            | 51.25.19 Sheet 2    | 1     | 51.25.19 Sheet 2 | 2     |
|      | 30.10.01            | 1     | 30.10.01            | 2     |            | 76.1                | 1     | 76.1             | 2     |
|      | 30.15.01            | 1     | 30.15.01            | 2     |            | 76.10.02 Sheet 2    | 1     | 76.10.02 Sheet 2 | 2     |
|      | 30.15.02 Sheet 2    | 1     | 30.15.02 Sheet 2    | 2     |            | 76.22.15            | 1     | 76.22.15         | 2     |
|      | —                   | —     | 30.15.15            | 2     | **<br>3/74 |                     |       |                  |       |
|      | 37.12.19 Sheet 3    | 1     | 37.12.19 Sheet 3    | 2     |            | 01-5                | 2     | 01-5             | 3     |
|      | 37.16.01            | 1     | 37.16.01            | 2     |            | 01-7                | 3     | 01-7             | 4     |
|      | 37.20.04 Sheet 6    | 1     | 37.20.04 Sheet 6    | 2     |            | 04-1                | 3     | 04-1             | 4     |
|      | 40.10.01 A          | 1     | 40.10.01 A          | 2     |            | 05-1                | 2     | 05-1             | 3     |
|      | 40.16.10 A          | 1     | 40.16.10 A          | 2     |            | 06-4                | 2     | 06-4             | 3     |
|      | —                   | —     | Section 40J         | 1     |            | 09-1                | 3     | 09-1             | 4     |
|      | 51.25.19 Sheet 6    | 1     | 51.25.19 Sheet 6    | 2     |            | 12.29.18 Sheet 3    | 1     | 12.29.18 Sheet 3 | 2     |
|      | 57.60.01            | 1     | 57.60.01            | 2     |            | 12.29.18 Sheet 4    | 2     | 12.29.18 Sheet 4 | 3     |
|      | 76.3                | 1     | 76.3                | 2     |            | 12.53.03            | 1     | 12.53.03         | 2     |
|      |                     |       |                     |       |            | 37.12.01            | 1     | 37.12.01         | 2     |
|      |                     |       |                     |       |            | 37.12.04            | 1     | 37.12.04         | 2**   |



| Date       | Filing Instructions |       |                  |         | Date | Filing Instructions |       |        |       |
|------------|---------------------|-------|------------------|---------|------|---------------------|-------|--------|-------|
|            | Discard             | Issue | Insert           | Issue   |      | Discard             | Issue | Insert | Issue |
| **<br>3/74 | 37.20.01 Sheet 1    | 1     | 37.20.01 Sheet 1 | 2       |      |                     |       |        |       |
|            | 37.20.01 Sheet 2    | 1     | 37.20.01 Sheet 1 | 2       |      |                     |       |        |       |
|            | 64.15.14 Sheet 1    | 1     | 64.15.14 Sheet 1 | 2       |      |                     |       |        |       |
|            | 74.10.00 Sheet 1    | 1     | 74.10.00 Sheet 1 | 2       |      |                     |       |        |       |
|            | 76.10.05            | 2     | 76.10.05         | 3       |      |                     |       |        |       |
|            | 76.22.08            | 1     | 76.22.08         | 2       |      |                     |       |        |       |
|            | 86.35.15 Sheet 2    | 1     | 86.35.15 Sheet 2 | 2<br>** |      |                     |       |        |       |



# ENGINE

|                      |           |   |
|----------------------|-----------|---|
| Number of cylinders  | . . . . . | 6 in line                                   |
| Bore of cylinders    | . . . . . | 2.94 in (74.7 mm)                           |
| Stroke of crankshaft | . . . . . | 3.74 in (95 mm)                             |
| Capacity             | . . . . . | 152 in <sup>3</sup> (2498 cm <sup>3</sup> ) |

Compression ratio

## PETROL INJECTION

9.5:1

## CARBURETTER/U.S.A. MARKET

\*\*7.5:1 — 1974 Models  
7.75:1 — 1972/73 Models\*\*  
8.50:1 — Pre 1972 Models

# LUBRICATION

|                   |           |  |
|-------------------|-----------|--|
| Oil pump          | . . . . . | High capacity eccentric lobe type  |
| Oil filter        | . . . . . | Full flow type, replaceable element  |
| Oil warning light | . . . . . | Extinguishes at 3 to 5 lbf/in <sup>2</sup><br>(0.21 to 0.35 kgf/cm <sup>2</sup> ) oil pressure |

# COOLING SYSTEM

|             |           |   |
|-------------|-----------|---|
| Type        | . . . . . | Water, "No Loss" system   |
| Circulation | . . . . . | By impellor type pump, Vee belt drive                             |
| Pressure    | . . . . . | 13 lbf/in <sup>2</sup> (0.91 kgf/cm <sup>2</sup> )                |
| Thermostat  | . . . . . | Opens at 82°C (180°F) normal climate<br>88°C (190°F) cold climate |

# FAN

|                        |           |                                |
|------------------------|-----------|--------------------------------|
| 1974/1973 models (all) | . . . . . | 13 blades 14½ in (368 mm) dia. |
| 1972 models P.I.       | . . . . . | 7 blade 12½ in (318 mm) dia.   |
| Carb.                  | . . . . . | 13 blade 14½ in (368 mm) dia.  |
| 1971 models (all)      | . . . . . | 7 blade 12½ in (318 mm) dia.   |
| Pre 1971 models (all)  | . . . . . | 8 blade 12½ in (318 mm) dia.   |

# FUEL SYSTEM

|                               |  |  |  |
|-------------------------------|--|--|--|
| Tank                          | . . . . .  | Tank at rear   | Tank at rear   |
| Pump                          | . . . . .  | Electric lift pump<br>in luggage compartment               | 1971 only — with separate overflow tank<br>Mechanically operated diaphragm type<br>on engine   |
| Metering Distributor          | . . . . .  | Lucas  |  |
| Carburetter                   | 1974/1973 Model . . . . .<br>1972 Model . . . . .<br>1971 Model . . . . .<br>Pre 1971 Model . . . . .                              |  | 2 Stromberg 175 CDSEV sidedraught<br>2 Stromberg 175 CDSE sidedraught<br>2 Stromberg 175 CD-2-SE sidedraught<br>2 Stromberg 175 CDSE sidedraught   |
| Air cleaner                   | . . . . .  | Combined air cleaner and silencer with replaceable element | } Exhaust<br>Emissions<br>Controlled   |
| Crankcase ventilation         | 1974/73/72/71 Models } Closed circuit breathing<br>from rocker cover to<br>air collector manifold<br><br>Pre 1971 Models . . . . . |  |  |
| Evaporative emission control. | From 1971 Models . . . . .<br><br>Pre 1971 Models . . . . .  |  | Sealed tank filler cap.<br>Vapour emissions from the tank are vented,<br>— 1974/73/72 Models: via a separator canister<br>— 1971 Model: via the overflow tank to a<br>charcoal canister located in the engine<br>compartment.<br>Canister is purged by carburetter depression.<br>Not applicable |

## GENERAL SPECIFICATION DATA

### CLUTCH

|                   |                        |
|-------------------|------------------------|
| Make/type         | Laycock                |
| Release mechanism | Hydraulically operated |
| Plate diameter    | 8½ in. (216 mm)        |

### GEARBOX

#### Manual

|                                 |                           |                |                |                       |                            |      |      |      |  |
|---------------------------------|---------------------------|----------------|----------------|-----------------------|----------------------------|------|------|------|--|
| Synchromesh                     | On forward gears          |                |                |                       |                            |      |      |      |  |
|                                 | O/D Top                   | Top            | O/D 3rd        | 3rd                   | O/D 2nd                    | 2nd  | 1st  | Rev. |  |
|                                 | 'J'                       | 'A'            | 'J'            | 'A'                   | 'A' only                   |      |      |      |  |
| Gear Ratios                     | —                         | 1.00           | —              | 1.39                  | —                          | 2.10 | 2.99 | 3.37 |  |
| Overall ratios                  | Petrol Injection          | 2.75 2.83 3.45 | 3.83 3.76 4.78 | 5.69 7.25 10.33 11.62 |                            |      |      |      |  |
|                                 | Carb/U.S.A. Market        | 2.95 3.03 3.70 | 4.11 4.03 5.13 | 6.10 7.77 11.08 12.47 |                            |      |      |      |  |
| <b>Overdrive (where fitted)</b> | From Comm. No. CR567/CF1U |                |                |                       | Up to Comm. No. CR567/CF1U |      |      |      |  |
| Make/type                       | Laycock Type J            |                |                |                       | Laycock Type A             |      |      |      |  |
| Operative on                    | Top and 3rd gears         |                |                |                       | Top, 3rd and 2nd gears     |      |      |      |  |
| Overall ratios                  | 0.797:1                   |                |                |                       | 0.82:1                     |      |      |      |  |

### FINAL DRIVE

|       |                                 |
|-------|---------------------------------|
| Type  | Hypoid bevel gears in rear axle |
| Ratio | Petrol Injection 3.45:1         |
|       | Carb/U.S.A. Market 3.70:1       |

### EFFECTIVE GEARING

Engine speeds (rev/min) at road speeds of:

|           |                    | O/D Top | Top | O/D 3rd | 3rd     | O/D 2nd  | 2nd | 1st  | Rev.      |
|-----------|--------------------|---------|-----|---------|---------|----------|-----|------|-----------|
|           |                    | 'J'     | 'A' | 'J'     | 'A'     | 'A' only |     |      |           |
| 10 m.p.h. | Petrol Injection   | 376     | 386 | 471     | 523 514 | 654      | 777 | 990  | 1412 1516 |
|           | Carb/U.S.A. Market | 383     | 395 | 482     | 532 526 | 667      | 795 | 1009 | 1438 1552 |
| 10 km/h   | Petrol Injection   | 235     | 240 | 292     | 325 319 | 406      | 482 | 621  | 878 952   |
|           | Carb/U.S.A. Market | 240     | 245 | 300     | 331 327 | 414      | 494 | 627  | 893 975   |

### ROAD SPEED DATA

Road speed at 1,000 rev/min engine speed:

|          |                    |                         |            |                         |            |
|----------|--------------------|-------------------------|------------|-------------------------|------------|
| O/D Top  | Petrol Injection   | 26.6 m.p.h. (42.8 km/h) | } 'J' type | 26.9 m.p.h. (43.3 km/h) | } 'A' type |
|          | Carb/U.S.A. Market | 26.1 m.p.h. (42 km/h)   |            | 25.1 m.p.h. (40.4 km/h) |            |
| Top Gear | Petrol Injection   | 21.2 m.p.h. (34.2 km/h) |            |                         |            |
|          | Carb/U.S.A. Market | 20.7 m.p.h. (33.4 km/h) |            |                         |            |

Road speed at 2,500 ft/min piston speed

|          |                    |                      |
|----------|--------------------|----------------------|
| Top gear | Petrol Injection   | 85 m.p.h. (137 km/h) |
|          | Carb/U.S.A. Market | 83 m.p.h. (134 km/h) |

### STEERING

|                         |  |
|-------------------------|--|
| Make/type               | Alford and Alder, Rack and pinion          |
| Turning Circle          | 1974/73/72/71 Models 34 feet (10.4 metres) |
|                         | Pre 1971 Models 33 feet (10.1 metres)      |
| Steering wheel diameter | 1974/1973 Models** 14½ in. (368 mm)        |
|                         | Pre 1973 Models 15 in. (381 mm)            |
|                         | } Turns lock to lock 3¼                    |

### BRAKE SYSTEM

|              |  |
|--------------|--|
| Operation:   |  |
| Foot pedal   | Hydraulic on all four wheels   |
|              | Tandem master cylinder operates on front and rear brakes independently |
| Handbrake    | Mechanical on rear wheels only.  |
| <b>Front</b> |  |
| Type         | Caliper disc   |
| Dimensions   | Disc diameter 10.875 in. (276 mm)                                      |
| Lining area  | 20.7 in <sup>2</sup> (133.6 cm <sup>2</sup> )                          |
| Swept area   | 233.0 in <sup>2</sup> (1500 cm <sup>2</sup> )                          |
| <b>Rear</b>  |  |
| Type         | Drum with leading and trailing shoes                                   |
| Dimensions   | 9 in x 1¼ in (228 x 44.5 mm)   |
| Lining area  | 60.5 in <sup>2</sup> (390 cm <sup>2</sup> )                            |
| Swept area   | 99.0 in <sup>2</sup> (639 cm <sup>2</sup> )                            |
| Servo        | Direct acting servo providing 2.2:1 nominal boost ratio                |

**WHEELS AND TYRES**

|                       |                |  |  |
|-----------------------|----------------|--|--|
| Wheels                |                | **Steel disc type 5½J rims. Wire wheels optional (earlier models) with 5½K rims ** |  |
|                       |                | <b>PETROL INJECTION</b>  | <b>CARBURETTER/U.S.A. MARKET</b>                   |
| Tyres                 |                | 165HR – 15SP or XAS  | 185SR – 15X (red band) or G.800                    |
| Tyre pressures: front | All conditions | 22lb/in <sup>2</sup> (1·547kg/cm <sup>2</sup> )                                    | 20 lbs/in <sup>2</sup> (1·406 kg/cm <sup>2</sup> ) |
|                       | High speed     | 28lb/in <sup>2</sup> (1·969kg/cm <sup>2</sup> )                                    |  |
|                       | rear           | 26lb/in <sup>2</sup> (1·828kg/cm <sup>2</sup> )                                    | 24lb/in <sup>2</sup> (1·687kg/cm <sup>2</sup> )    |
|                       | High speed     | 32lb/in <sup>2</sup> (2·250kg/cm <sup>2</sup> )                                    |  |

**CHASSIS DATA**

|                                       |       |                                      |
|---------------------------------------|-------|--------------------------------------|
| Wheelbase                             |       | 7 ft 4 in (2240 mm)                  |
| Track: front                          |       | 4 ft 2¼ in (1276 mm)                 |
|                                       | rear  | 4 ft 1¾ in (1264 mm)                 |
| Wheel alignment: (2 up condition)     | front | 0 to 1/16 in toe in (0 to 1·5875 mm) |
|                                       | rear  | 0 to 1/16 in toe in (0 to 1·5875 mm) |
| Ground clearance: (2 up condition)    |       | 6 in (152 mm)                        |
| Camber: (2 up condition)              | front | 0° ± ½°                              |
|                                       | rear  | 1° negative ± ½°                     |
| Caster: (2 up condition)              |       | 2¾° ± ½°                             |
| King pin inclination (2 up condition) |       | 9° ± ¾°                              |

**ELECTRICAL EQUIPMENT (see electrical section for full details)**

|                   |        |                              |
|-------------------|--------|------------------------------|
| Electrical system |        | 12 volt negative earth       |
| Battery capacity  |        | 57 amp hour at 20 hour rate  |
| Alternator: type  |        | Lucas 15 ACR                 |
|                   | output | 28 amps                      |
| Starter motor     |        | Lucas M 100 pre engaged type |

USA Market 1974/73 18 ACR 1972 17 ACR  
USA Market 1974/73 43 amps 1972 36 amps

**OVERALL DIMENSIONS**

|                                       |                      |                       |                                    |
|---------------------------------------|----------------------|-----------------------|------------------------------------|
| Length                                |                      | 12 ft 11 in (3937 mm) | **1973 USA 13ft 6⅞ in. (4118 mm)** |
| Width                                 |                      | 4 ft 10 in (1470 mm)  |                                    |
| Height (unladen) to top of windscreen |                      | 3 ft 10 in (1170 mm)  |                                    |
|                                       | Soft top, hood erect | 4 ft 2 in (1270 mm)   |                                    |

**WEIGHTS (approx)**

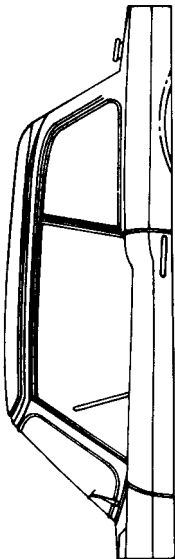
|  |                     |  |
|--|---------------------|--|
| Dry (excluding extra equipment)                  | ** Petrol Injection | 1971/72/73/74 model 20½ cwt (1035 kg) – pre 1971 model 20¾ cwt (1053 kg)                                   |
|  | Carb/U.S.A. market  | 1971/72/73/74 model 20½ cwt (1035 kg) – 1970 model 21 cwt (1067 kg) pre 1970 model 19¾ cwt (983 kg)        |
| Basic kerb (including water, oil, fuel & tools)  | Petrol Injection    | 21½ cwt (1085 kg)  |
|  | Carb/U.S.A. Market  | 1971/72/73/74 model 21½ cwt (1085 kg) 1970 model 22 cwt (1118 kg) – pre 1970 model 20¾ cwt (1034 kg)       |
| Kerb (including optional extras, water, oil etc) | Petrol Injection    | 22½ cwt (1145 kg)  |
|  | Carb/U.S.A. Market  | 1971/72/73/74 model 22½ cwt (1145 kg) – 1970 model 23 cwt (1168 kg) – pre 1970 model 21¼ cwt (1079 kg)     |
| Maximum gross vehicle weight                     | Petrol Injection    | 1970/71/72/73/74 model 26¾ cwt (1360kg) – pre 1970 model 25¾ cwt (1308 kg)                                 |
|  | Carb/U.S.A. Market  | 1971/72/73/74 model 26½ cwt (1345 kg – 1970 model 25½ cwt (1295 kg) – pre 1970 model 24·6 cwt (1257 kg) ** |

**TOWING INFORMATION**

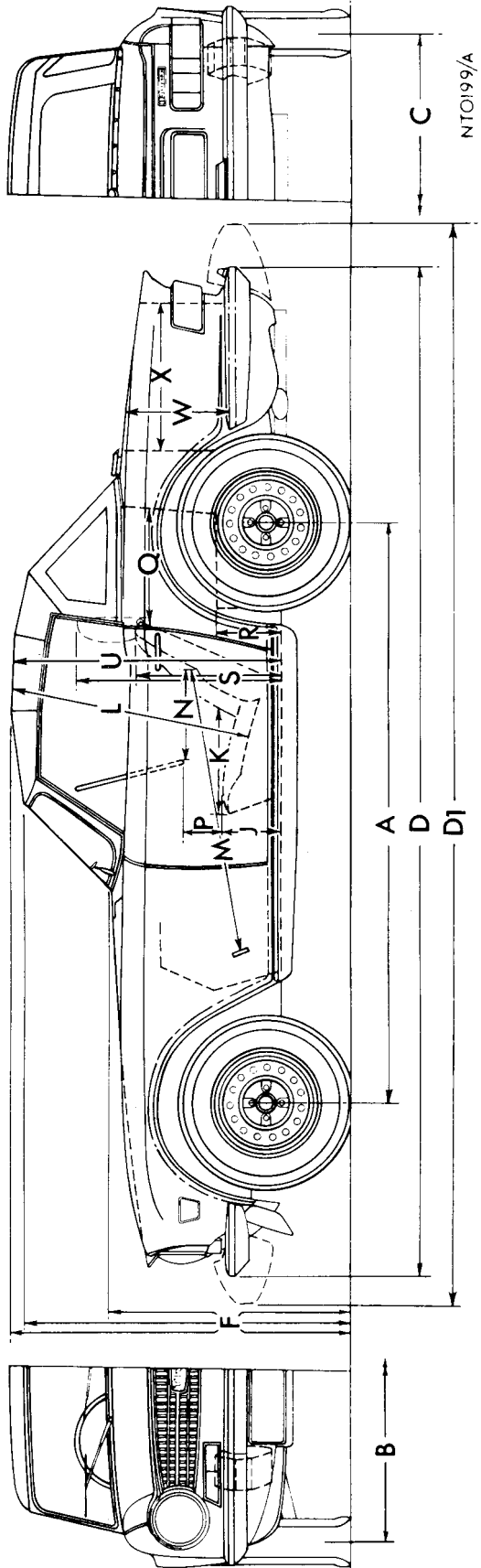
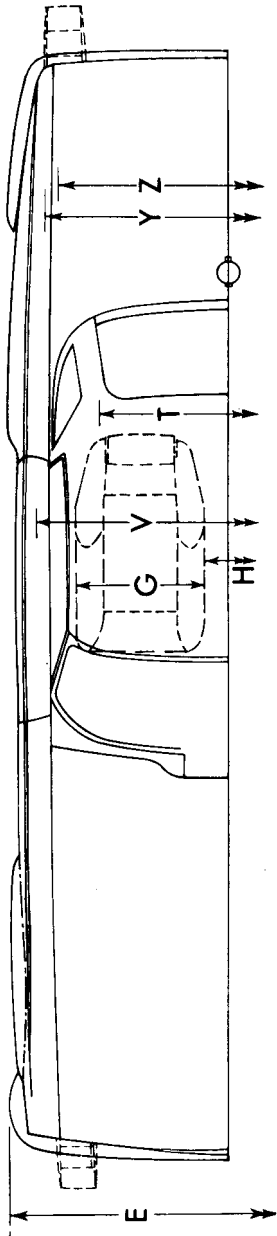
|                                    |   |
|------------------------------------|---|
| Maximum recommended trailer weight | 20 cwt (1016 kg) when the trailer being towed is equipped with brakes.<br>3·94 cwt (200 kg) when the trailer being towed is not equipped with brakes – providing that the total car and trailer laden weights do not exceed the maximum gross vehicle weight. |
|------------------------------------|---|

|  |     |                                     |
|--|-----|-------------------------------------|
| Maximum starting gradient (fully laden car and trailer)  | 5·1 | } with car engine in peak condition |
| Maximum climbable gradient (fully laden car and trailer) | 3·8 |                                     |





HARDTOP VERSION





## VEHICLE DIMENSIONS

| Dim. | Description                                  | inches | mm   | Dim. | Description                                   | inches | mm   |
|------|--|--------|------|------|---|--------|------|
| A    | Wheelbase . . . . .                          | 88·00  | 2240 | N    | Seat squab to steering wheel:                 |        |      |
| B    | Front track:                                 |        |      |      | Max. . . . .                                  | 18·50  | 470  |
|      | Disc or Wire wheels . . . . .                | 50·25  | 1276 |      | Min. . . . .                                  | 14·00  | 355  |
| C    | Rear track:                                  |        |      | P    | Seat cushion to steering wheel . . . . .      | 6·50   | 165  |
|      | Disc or Wire wheels . . . . .                | 49·75  | 1264 | Q    | Length of luggage space behind seats:         |        |      |
| D    | Overall length . . . . .                     | 155·00 | 3937 |      | Max. . . . .                                  | 21·50  | 546  |
| D1   | Overall length (1974 USA Market) . . . . .   | 162·13 | 4118 |      | Min. . . . .                                  | 17·00  | 432  |
| E    | Overall width . . . . .                      | 58·00  | 1470 | R    | Floor to luggage platform . . . . .           | 9·00   | 229  |
| F    | Height (unladen)                             |        |      | S    | Height – floor to top of seat squab . . . . . | 22·50  | 572  |
|      | Soft top – hood erect . . . . .              | 50·00  | 1270 |      | U.S.A. only                                   |        |      |
|      | to top of windscreen . . . . .               | 46·00  | 1170 |      | floor to top of seat restraint . . . . .      | 30·00  | 762  |
|      | Hood folded and windscreen removed . . . . . | 40·00  | 1020 | T    | Width between wheel arches . . . . .          | 33·50  | 850  |
| G    | Seat width . . . . .                         | 19·00  | 483  | U    | Maximum interior height . . . . .             | 40·50  | 1030 |
| H    | Width between seats . . . . .                | 6·00   | 152  | V    | Maximum interior width . . . . .              | 50·50  | 1282 |
| J    | Seat height – floor to cushion . . . . .     | 7·50   | 190  | W    | Luggage compartment height:                   |        |      |
| K    | Seat depth . . . . .                         | 16·50  | 419  |      | Max. . . . .                                  | 13·50  | 343  |
| L    | Headroom from seat cushion . . . . .         | 36·00  | 915  |      | Min. . . . .                                  | 9·50   | 242  |
| M    | Seat squab to clutch pedal:                  |        |      | X    | Luggage compartment depth . . . . .           | 20·00  | 508  |
|      | Max. . . . .                                 | 40·50  | 1030 | Y    | Luggage compartment width:                    |        |      |
|      | Min. . . . .                                 | 36·00  | 915  |      | Max. . . . .                                  | 46·00  | 1170 |
|      |  |        |      |      | Min. . . . .                                  | 44·00  | 1117 |
|      |  |        |      | Z    | Luggage compartment effective opening width   | 43·00  | 1091 |

## GENERAL SPECIFICATION DATA

### PAINT AND TRIM CODING SYSTEM

The commission number plate affixed to the scuttle side panel bears code symbols for identification of the vehicle's exterior colour, trim material and trim colour.

#### Colour Code

Nine basic colours are allocated a number as shown in the table. Shades of these colours are classified as 1st shade, 2nd shade, 3rd shade, etc. The number of each shade change prefixes the basic colour to indicate the shade colour. Dual colours are identified by two code numbers separated by a stroke, e.g. 19/26 denotes 'White' and 'Wedgwood', the predominant colour being White, this symbol being quoted first.

The main trim material is identified by prefixing the colour code number with a letter, e.g.:

- Leathercloth — No prefix letter
- Leather — Prefix letter H
- Cloth — Prefix letter C

| Basic colour | Basic colour number | 1st shade    | 2nd shade        | 3rd shade                | 4th shade         | 5th shade      | 6th shade            | 7th shade     | 8th shade     | 9th shade        | 10th shade  | 11th shade | 12th shade       |
|--------------|---------------------|--------------|------------------|--------------------------|-------------------|----------------|----------------------|---------------|---------------|------------------|-------------|------------|------------------|
| Black        | 01                  | 11           |                  |                          |                   |                |                      |               |               |                  |             |            |                  |
| Red          | 02                  | 12 Matador   | 22 Cherry        | 32 Signal                | 42 Burgundy       | 52 Scarlet     | 62 Inca Red          | 72 Pimiento   | ** 82 Carmine | 92 Magenta<br>** |             |            |                  |
| Brown        | 03                  | 13 Light Tan | 23 Sienna        | 33 New Tan               | 43 Saddle Tan     | 53 Dark Brown  | ** 63 Chestnut<br>** |               |               |                  |             |            |                  |
| Yellow       | 04                  | 14 Jonquil   | 24 Wimpey        | 34 Jasmine               | ** 44 Beige<br>** | 54 Saffron     | ** 64 Mimosa<br>**   |               |               |                  |             |            |                  |
| Green        | 05                  | 15 Cactus    | 25 Confer        | 35 Olive                 | 45 Lichfield      | 55 Laurel      | 65 Emerald           |               |               |                  |             |            |                  |
| Blue         | 06                  | 16 Midnight  | 26 Wedgwood      | 36 Dark Blue             | 46 Renoir         | 56 Royal       | 66 Valencia          | 76 Print Blue | 86 Navy Blue  | 96 Sapphire      | 106 Mallard | ** 116 Ice | 126 French<br>** |
| Purple       | 07                  | 17 Damson    | 27 Shadow Blue   |                          |                   |                |                      |               |               |                  |             |            |                  |
| Grey         | 08                  | 18 Gunmetal  | 28 Dark Grey     | 38 Phantom               | 48 Dolphin        | 58 Shadow Blue | 68 Slate             | 78 Grey       |               |                  |             |            |                  |
| White        | 09                  | 19 White     | 29 Sebring White | ** 39 Honey-suckle<br>** |                   |                |                      |               |               |                  |             |            |                  |

## ENGINE

|                            |                              |  |
|----------------------------|------------------------------|--|
| Firing order               | . . . . .                    | 1 5 3 6 2 4                                    |
| No. 1 cylinder             | . . . . .                    | at front                                       |
| Idle speed                 | Petrol Injection . . . . .   | **700 to 850 rev/min**                         |
|                            | Carb/U.S.A. market . . . . . | 800 to 850 rev/min                             |
| Fast idle speed            | Petrol Injection . . . . .   | **1300 to 1500 rev/min**                       |
|                            | Carb/U.S.A. market . . . . . | 1100 to 1300 rev/min                           |
| Valve clearance (cold)     | . . . . .                    | 0.010 in (0.25 mm)                             |
| Valve clearance adjustment | . . . . .                    | Screw and locking nut on rocker                |
| Location of timing marks   | . . . . .                    | Scale on pulley, pointer on timing cover       |
| Valve timing               |                              | Petrol Injection Carburetter/U.S.A. Market     |
|                            | **1974/73**                  | Pre 1973 **1974/73/72 Models** Pre 1972 Models |
| Inlet opens                | . . . . . 18° B.T.D.C.       | 35° B.T.D.C. 18° B.T.D.C. 10° B.T.D.C.         |
| closes                     | . . . . . 58° A.B.D.C.       | 65° A.B.D.C. 58° A.T.D.C. 50° A.T.D.C.         |
| Exhaust opens              | . . . . . 58° B.B.D.C.       | 65° B.B.D.C. 58° B.B.D.C. 50° B.B.D.C.         |
| closes                     | . . . . . 18° A.T.D.C.       | 35° A.T.D.C. 18° A.T.D.C. 10° A.T.D.C.         |
| Ignition timing:           |                              |  |
| static                     | . . . . .                    | } See 86.35.00                                 |
| dynamic                    | . . . . .                    |  |

## FUEL INJECTION

|                                     |           |  |
|-------------------------------------|-----------|--|
| Pressure from pump                  | . . . . . | 104 to 110 lbf/in <sup>2</sup> (7.31 to 7.73 kgf/cm <sup>2</sup> ) |
| Pressure at injector                | . . . . . | 50 lbf/in <sup>2</sup> (3.52 kgf/cm <sup>2</sup> )                 |
| Manifold depression at idling speed | . . . . . | 12½ in (3.81 cm) of mercury  |

## CARBURETTER

|              |           |                                    |  |
|--------------|-----------|------------------------------------|--|
| Make/type    | . . . . . | **Stromberg 175 C.D.S.E.V.**       | } Carburetters are matched to camshaft and distributor<br>See 86.35.00 |
| Main jet     | . . . . . | 0.100 in (0.254 cm)                |  |
| Needle       | . . . . . | B.I.A.F.                           |  |
| Float height | . . . . . | 0.629 to 0.669 in<br>(16 to 17 mm) |  |

## IGNITION COIL

|                            |           |                    |                 |
|----------------------------|-----------|--------------------|-----------------|
|                            |           | **1974/73 Models** | Pre 1973 Models |
| Make/type                  | . . . . . | Lucas 15 C6        | Lucas H.A.12    |
| Primary winding resistance | . . . . . | 1.30 to 1.45 ohms  | 3.0 to 3.5 ohms |

## BALLAST RESISTOR

|            |           |  |                               |
|------------|-----------|--|-------------------------------|
| Make/type  | . . . . . | **Fitted into harness – 1974/73 Models** | Not fitted to pre 1973 Models |
| Resistance | . . . . . | 1.30 to 1.45 ohms                        |                               |

## IGNITION DISTRIBUTOR

|                          |           |                                     |
|--------------------------|-----------|-------------------------------------|
| Make/type                | . . . . . | Lucas 22D6 – see 86.35.00           |
| Rotation viewed on rotor | . . . . . | Anticlockwise                       |
| Dwell angle              | . . . . . | See 86.35.00                        |
| Capacitor capacitance    | . . . . . | 0.20 Microfarads                    |
| Contact breaker gap      | . . . . . | 0.014 to 0.016 in (0.35 to 0.40 mm) |
| Centrifugal advance      | . . . . . | } See 86.35.00                      |
| Vacuum advance           | . . . . . |                                     |

## SPARKING PLUGS

|           |                              |   |
|-----------|------------------------------|---|
| Make/type | Petrol Injection . . . . .   | Champion N9Y  |
|           | Carb/U.S.A. Market . . . . . | **1974/73 Models – Champion N9Y** Pre 1973 Models – Champion UN 12Y |
| Gap       | . . . . .                    | 0.025 in (0.63 mm)  |



# TORQUE WRENCH SETTINGS

| Operation  | Description      | Specified Torque |          |
|--|------------------|------------------|----------|
|  |                  | (lbf.ft.)        | (kgf.m.) |
| <b>ENGINE</b>  |                  |                  |          |
| Alternator mounting bracket to cylinder block        | 5/16" UNF        | 22               | 3.0      |
| Alternator to mounting bracket                       | 5/16" UNF        | 22               | 3.0      |
| Alternator to adjusting link                         | 5/16" UNC        | 20               | 2.8      |
| Camshaft chainwheel attachment                       | 5/16" UNF        | 24               | 3.3      |
| Clutch attachment                                    | 5/16" UNF        | 20               | 2.8      |
| Connecting rod bolt                                  | 3/8" UNF         | 46               | 6.4      |
|  | Phosphated       | 50               | 6.9      |
|  | colour dyed      | 20               | 2.8      |
| Crankshaft cover to block                            | 5/16" UNF        | 14               | 2.0      |
| Crankshaft sealing block attachment                  | 5/16" UNF        | 80               | 11.1     |
| Cylinder head attachment                             | 7/16" UNF        | 14               | 2.0      |
| Distributor and P.I. pump pedestal attachment        | 5/16" UNF        | 20               | 2.8      |
| Distributor to pedestal                              | 5/16" UNF        | 9                | 1.2      |
| Distributor pedestal end plug                        | 1/4" UNF         | 14               | 2.0      |
| Fan attachment                                       | 5/16" UNF        | **95             | 13.1**   |
| Flywheel attachment                                  | 7/16" UNF        | 22               | 3.0      |
| Front engine plate attachment                        | 5/16" UNF        | 22               | 3.0      |
| Front engine plate and cam locating plate attachment | 5/16" UNF        | 65               | 9.0      |
| Main bearing bolts                                   | 7/16" UNF        | 32               | 4.4      |
| Mounting rubber bracket to engine                    | 3/8" UNF         | 32               | 4.4      |
| Mounting rubber to engine bracket                    | 3/8" UNF         | 32               | 4.4      |
| Mounting rubber to frame                             | 3/8" UNF         | 25               | 3.5      |
| Manifold attachment                                  | 3/8" UNF         | 25               | 3.5      |
| Manifold to exhaust pipe                             | 3/8" x 16 N.C.   | 8                | 1.1      |
| Oil gallery seal                                     | 1/8" N.P.S.I.    | 35               | 4.8      |
| Oil gallery plug                                     | 3/4" UNF         | 14               | 2.0      |
| Oil gallery plug                                     | 1/4" N.P.S.I.    | 20               | 2.8      |
| Oil filter attachment                                | 7/16" UNC        | 35               | 4.8      |
| Oil pressure relief valve                            | 5/8" UNF         | 7                | 1.0      |
| Petrol injection nozzle attachment                   | 1/4" UNC         | 9                | 1.2      |
| Petrol pump attachment                               | 1/4" UNF         | 14               | 2.0      |
| Petrol pump attachment                               | 5/16" UNF        | 22               | 3.0      |
| Rear engine plate attachment                         | 5/16" UNF        | 22               | 3.0      |
| Rear engine plate and gearbox to block               | 5/16" UNF        | 34               | 4.7      |
| Rocker pedestal attachment                           | 3/8" UNF         | 2                | 0.3      |
| Rocker cover attachment                              | 5/16" UNF        | 5                | 0.7      |
| Rocker shaft locating screw                          | No. 12 x 28 UNF  | 20               | 2.8      |
| Rocker oil feed plug                                 | 5/16" UNF        | 25               | 3.5      |
| Spark plug attachment                                | 14 mm            | 20               | 2.8      |
| Starter motor attachment                             | 3/8" UNF         | 34               | 4.7      |
| Sump attachment                                      | 5/16" UNF        | 20               | 2.8      |
| Sump drain plug                                      | 3/8" x 18        | 16               | 2.2      |
| Timing cover attachment                              | 5/16" UNF Stud   | 20               | 2.8      |
| Timing cover attachment                              | 5/16" UNF x 7/8" | 10               | 1.4      |
| Timing cover attachment                              | 5/16" UNF x 3/8" | 20               | 2.8      |
| Water valve adaptor to cylinder head                 | 3/8" B.S.P.      | 14               | 2.0      |
| Water pump pulley attachment                         | 5/16" UNF        | 14               | 2.0      |
| Water pump attachment                                | 5/16" UNF        | 20               | 2.8      |
| Water pump to cylinder head                          | 5/16" UNF        | 25               | 3.5      |
| Water pump plug                                      | 3/8" UNF         | 35               | 4.8      |
| Water pump plug                                      | 5/8" UNF         |                  |          |



## ENGINE

|                            |                    |   |
|----------------------------|--------------------|---|
| Firing order               | . . . . .          | 1 5 3 6 2 4   |
| No. 1 cylinder             | . . . . .          | at front  |
| Idle speed                 | Petrol Injection   | 750 to 800/850 rev/min  |
|                            | Carb/U.S.A. market | 800 to 850 rev/min  |
| Fast idle speed            | Petrol Injection   | 1100 to 1300/1500 rev/min   |
|                            | Carb/U.S.A. market | 1100 to 1300 rev/min  |
| Valve clearance (cold)     | . . . . .          | 0.010 in (0.25 mm)  |
| Valve clearance adjustment | . . . . .          | Screw and locking nut on rocker                                       |
| Location of timing marks   | . . . . .          | Scale on pulley, pointer on timing cover                              |
| Valve timing               |                    | Petrol Injection      Carburettor/U.S.A. Market                       |
|                            |                    | ** 1973      Pre 1973 **      1973/1972 Model      Pre 1972 Model     |
| Inlet opens                | . . . . .          | ** 18° B.T.D.C.      35° B.T.D.C.      18° B.T.D.C.      10° B.T.D.C. |
| closes                     | . . . . .          | 58° A.B.D.C.      65° A.B.D.C.      58° A.T.D.C.      50° A.T.D.C.    |
| Exhaust opens              | . . . . .          | 58° B.B.D.C.      65° B.B.D.C.      58° B.B.D.C.      50° B.B.D.C.    |
| closes                     | . . . . .          | 18° A.T.D.C.      35° A.T.D.C.      18° A.T.D.C. **      10° A.T.D.C. |
| Ignition timing:           |                    |   |
| static                     | . . . . .          | } See 86.35.00  |
| dynamic                    | . . . . .          |   |

## FUEL INJECTION

|                                     |           |  |
|-------------------------------------|-----------|--|
| Pressure from pump                  | . . . . . | 104 to 110 lbf/in <sup>2</sup> (7.31 to 7.73 kgf/cm <sup>2</sup> ) |
| Pressure at injector                | . . . . . | 50 lbf/in <sup>2</sup> (3.52 kgf/cm <sup>2</sup> )                 |
| Manifold depression at idling speed | . . . . . | 12½ in (3.81 cm) of mercury  |

## CARBURETTER

|              |           |                                    |   |
|--------------|-----------|------------------------------------|---|
| Make/type    | . . . . . | ** Stromberg 175 C.D.S.E. (V)      | } Carburettors<br>are matched<br>to camshaft<br>and distributor<br>See 86.35.00 |
| Main jet     | . . . . . | 0.100 in (0.254 cm) **             |   |
| Needle       | . . . . . | B.I.A.F.                           |   |
| Float height | . . . . . | 0.629 to 0.669 in<br>(16 to 17 mm) |   |

## IGNITION COIL

|                            |           |                      |                      |
|----------------------------|-----------|----------------------|----------------------|
|                            |           | ** 1973 Model        | ** Pre 1973 Model ** |
| Make/type                  | . . . . . | Lucas 15 C6          | Lucas H.A.12         |
| Primary winding resistance | . . . . . | 1.30 to 1.45 ohms ** | 3.0 to 3.5 ohms      |

## BALLAST RESISTOR

|            |           |                                      |                                     |
|------------|-----------|--------------------------------------|-------------------------------------|
| Make/type  | . . . . . | ** Fitted into harness – 1973 Models | ** Not fitted to pre 1973 Models ** |
| Resistance | . . . . . | 1.30 to 1.45 ohms **                 |                                     |

## IGNITION DISTRIBUTOR

|                          |           |                                     |
|--------------------------|-----------|-------------------------------------|
| Make/type                | . . . . . | Lucas 22D6 – see 86.35.00           |
| Rotation viewed on rotor | . . . . . | Anticlockwise                       |
| Dwell angle              | . . . . . | See 86.35.00                        |
| Capacitor capacitance    | . . . . . | 0.20 Microfarads                    |
| Contact breaker gap      | . . . . . | 0.014 to 0.016 in (0.35 to 0.40 mm) |
| Centrifugal advance      | . . . . . | } See 86.35.00                      |
| Vacuum advance           | . . . . . |                                     |

## SPARKING PLUGS

|           |                    |           |                              |                                     |
|-----------|--------------------|-----------|------------------------------|-------------------------------------|
| Make/type | Petrol injection   | . . . . . | Champion N9Y                 |                                     |
|           | Carb/U.S.A. Market | . . . . . | ** 1973 Model – Champion N9Y | Pre 1973 Model – ** Champion UN 12Y |
| Gap       | . . . . .          | . . . . . | 0.025 in (0.63 mm)           |                                     |



# TORQUE WRENCH SETTINGS

| Operation  |                     | Description               | Specified Torque<br>(lbf.ft.) | (kgf.m.) |
|--|---------------------|---------------------------|-------------------------------|----------|
| ENGINE   |                     |                           |                               |          |
| Alternator mounting bracket to cylinder block        |                     | 5/16" UNF                 | 22                            | 3.0      |
| Alternator to mounting bracket                       |                     | 5/16" UNF                 | 22                            | 3.0      |
| Alternator to adjusting link                         |                     | 5/16" UNC                 | 20                            | 2.8      |
| Camshaft chainwheel attachment                       |                     | 5/16" UNF                 | 24                            | 3.3      |
| Clutch attachment                                    |                     | 5/16" UNF                 | 20                            | 2.8      |
| **   | Connecting rod bolt | 3/8" UNF                  | 46                            | 6.4      |
|  |                     | Phosphated<br>colour dyed | 50                            | 6.9      |
| Crankshaft cover to block                            |                     | 5/16" UNF                 | 20                            | 2.8      |
| Crankshaft sealing block attachment                  |                     | 5/16" UNF                 | 14                            | 2.0      |
| Cylinder head attachment                             |                     | 7/16" UNF                 | 80                            | 11.1     |
| Distributor and P.I. pump pedestal attachment        |                     | 5/16" UNF                 | 14                            | 2.0      |
| Distributor to pedestal                              |                     | 5/16" UNF                 | 20                            | 2.8      |
| Distributor pedestal end plug                        |                     | 1/4" UNF                  | 9                             | 1.2      |
| Fan attachment                                       |                     | 5/16" UNF                 | 14                            | 2.0      |
| Flywheel attachment                                  |                     | 7/16" UNF                 | 75                            | 10.4     |
| Front engine plate attachment                        |                     | 5/16" UNF                 | 22                            | 3.0      |
| Front engine plate and cam locating plate attachment |                     | 5/16" UNF                 | 22                            | 3.0      |
| Main bearing bolts                                   |                     | 7/16" UNF                 | 65                            | 9.0      |
| Mounting rubber bracket to engine                    |                     | 3/8" UNF                  | 32                            | 4.4      |
| Mounting rubber to engine bracket                    |                     | 3/8" UNF                  | 32                            | 4.4      |
| Mounting rubber to frame                             |                     | 3/8" UNF                  | 32                            | 4.4      |
| Manifold attachment                                  |                     | 3/8" UNF                  | 25                            | 3.5      |
| Manifold to exhaust pipe                             |                     | 3/8" x 16 N.C.            | 25                            | 3.5      |
| Oil gallery seal                                     |                     | 1/8" N.P.S.I.             | 8                             | 1.1      |
| Oil gallery plug                                     |                     | 3/4" UNF                  | 35                            | 4.8      |
| Oil gallery plug                                     |                     | 1/4" N.P.S.I.             | 14                            | 2.0      |
| Oil filter attachment                                |                     | 7/16" UNC                 | 20                            | 2.8      |
| Oil pressure relief valve                            |                     | 5/8" UNF                  | 35                            | 4.8      |
| Petrol injection nozzle attachment                   |                     | 1/4" UNC                  | 7                             | 1.0      |
| Petrol pump attachment                               |                     | 1/4" UNF                  | 9                             | 1.2      |
| Petrol pump attachment                               |                     | 5/16" UNF                 | 14                            | 2.0      |
| Rear engine plate attachment                         |                     | 5/16" UNF                 | 22                            | 3.0      |
| Rear engine plate and gearbox to block               |                     | 5/16" UNF                 | 22                            | 3.0      |
| Rocker pedestal attachment                           |                     | 3/8" UNF                  | 34                            | 4.7      |
| Rocker cover attachment                              |                     | 5/16" UNF                 | 2                             | 0.3      |
| Rocker shaft locating screw                          |                     | No. 12 x 28 UNF           | 5                             | 0.7      |
| Rocker oil feed plug                                 |                     | 5/16" UNF                 | 20                            | 2.8      |
| Spark plug attachment                                |                     | 14 mm                     | 20                            | 2.8      |
| Starter motor attachment                             |                     | 3/8" UNF                  | 34                            | 4.7      |
| Sump attachment                                      |                     | 5/16" UNF                 | 20                            | 2.8      |
| Sump drain plug                                      |                     | 3/8" x18                  | 25                            | 3.5      |
| Timing cover attachment                              |                     | 5/16" UNF Stud            | 16                            | 2.2      |
| Timing cover attachment                              |                     | 5/16" UNF x 7/8"          | 20                            | 2.8      |
| Timing cover attachment                              |                     | 5/16" UNF x 3/8           | 10                            | 1.4      |
| Water valve adaptor to cylinder head                 |                     | 3/8" B.S.P                | 20                            | 2.8      |
| Water pump pulley attachment                         |                     | 5/16" UNF                 | 14                            | 2.0      |
| Water pump attachment                                |                     | 5/16" UNF                 | 14                            | 2.0      |
| Water pump to cylinder head                          |                     | 5/16" UNF                 | 20                            | 2.8      |
| Water pump plug                                      |                     | 3/8" UNF                  | 25                            | 3.5      |
| Water pump plug                                      |                     | 5/8" UNF                  | 35                            | 4.8      |

| Operation  | Description    | Specified Torque |         |
|--|----------------|------------------|---------|
|  |                | (lbf.ft)         | (kgf.m) |
| <b>FUEL INJECTION PIPE SYSTEM</b>                              |                |                  |         |
| Flexible pipe to filter  | 1/2" UNF       | 9                | 1.2     |
| Flexible pipe to metering unit                                 | 3/8" B.S.P.    | 20               | 2.8     |
| Flexible pipe to motor pump                                    | 3/8" B.S.P.    | 20               | 2.8     |
| Flexible pipe to relief valve                                  | 3/8" B.S.P.    | 20               | 2.8     |
| Flexible pipe to relief valve                                  | 1/4" B.S.P.    | 20               | 2.8     |
| In line relief valve assembly relief valve to strainer housing | 3/8" B.S.P.    | 40               | 5.5     |
| Pipe to motor pump   | 3/8" B.S.P.    | 20               | 2.8     |
| Pipe to filter   | 1/2" UNF       | 9                | 1.2     |
| Relief valve assembly to Tee-piece                             | 3/8" B.S.P.    | 40               | 5.5     |
| <b>ENGINE (CARBURETTOR VERSION ONLY)</b>                       |                |                  |         |
| Carburettor attachment   | 5/16" UNF      | 14               | 2.0     |
| Distributor pedestal attachment                                | 5/16" UNF      | 14               | 2.0     |
| Distributor to pedestal  | 1/4" UNF       | 9                | 1.2     |
| Inlet manifold plug  | 3/4" S.A.E.    | 35               | 4.8     |
| Manifold attachment  | 5/16" UNF      | 20               | 2.8     |
| Manifold hose adaptor  | 1/2" P.T.F.    | 32               | 4.4     |
| Manifold to front pipe   | 3/8" x 16 N.C. | 25               | 3.5     |
| Servo adaptor to manifold                                      | 5/8" UNF       | 32               | 4.4     |
| <b>GEARBOX</b>   |                |                  |         |
| Change speed lever to top cover                                | 1/4" UNF       | 9                | 1.2     |
| Clutch housing cover attachment                                | 5/16" UNF      | 20               | 2.8     |
| Clutch slave cylinder attachment                               | 5/16" UNF      | 20               | 2.8     |
| Countershaft end cover to gearbox                              | 5/16" UNC      | 20               | 2.8     |
| Countershaft and Reverse shaft to gearbox                      | 5/16" UNC      | 14               | 2.0     |
| Extension to gearbox   | 5/16" UNC      | 20               | 2.8     |
| Front cover to gearbox   | 5/16" UNC      | 20               | 2.8     |
| Gearbox to engine  | 5/16" UNF      | 20               | 2.8     |
| Mounting rubber to gearbox extension                           | 1/2" UNF       | 65               | 9.0     |
| Mounting rubber to frame crossmember                           | 7/16" UNF      | 46               | 6.4     |
| Overdrive adaptor plate  | 5/16" UNC      | 20               | 2.8     |
| Propshaft flange to mainshaft                                  | 3/4" UNF       | 120              | 16.6    |
| Propshaft attachment   | 3/8" UNF       | 34               | 4.7     |
| Sealing ring cover plate attachment                            | 1/4" UNF       | 9                | 1.2     |
| Selectors and forks to shaft                                   | 5/16" UNF      | 9                | 1.2     |
| Speedo bearing locking screw                                   | 5/16" UNC      | 9                | 1.2     |
| Top cover to gearbox   | 5/16" UNC      | 20               | 2.8     |
| Top up and drain plugs   | 3/8" UNF       | 25               | 3.5     |
| <b>OVERDRIVE ** -- 'A' TYPE</b>                                |                |                  |         |
| Cap to top cover and overdrive switch bracket                  | 1/4" UNF       | 9                | 1.2     |
| Overdrive unit retaining                                       | 5/16" UNC      | 20               | 2.8     |
| Speedo driven gear to rear cover                               | 5/16" UNC      | 9                | 1.2     |

## TORQUE WRENCH SETTINGS

| Operation   | Description           | Specified Torque<br>(lbf.ft)   | (kgf.m) |
|---|-----------------------|--|---------|
| <b>OVERDRIVE – 'J' TYPE</b>                                 |                       |  |         |
| Adaptor to gearbox  | ¼" U.N.F. setscrew    | 9  | 1.2     |
| Overdrive to adaptor  | ¾" stud               | 7  | 1.0     |
| Overdrive to rear engine mounting                           | ¾" U.N.F./U.N.C. stud | 25   | 3.5     |
| Rear engine mounting attachment                             | 7/16" U.N.F. bolt     | 38   | 5.2     |
| Steady strap to overdrive unit                              | 5/16" U.N.F. stud     | 20   | 2.8     |
| <b>REAR AXLE</b>  |                       |  |         |
| Bearing caps to housing                                     | ¾" UNF                | 38   | 5.2     |
| Crown wheel to housing                                      | ¾" UNF                | 46   | 6.4     |
| Cover and rear mounting plate attachment                    | ¾" UNF                | 32   | 4.4     |
| Controlled rebound mounting to bracket                      | 5/16" UNF             | 20   | 2.8     |
| Hypoid housing to rear cover                                | 5/16" UNF             | 20   | 2.8     |
| Inner driving flange to inner axle                          | 5/8" UNF              | 120  | 16.6    |
| Nose plate to axle  | ¾" UNF                | 38   | 5.2     |
| Oil seal housing to hypoid housing                          | 5/16" UNF             | 20   | 2.8     |
| Oil level plug  | ¾" UNF                | 25   | 3.5     |
| Prop shaft flange to pinion                                 | 5/8" UNF              | 120  | 16.6    |
| Rear mounting plate to frame                                | ¾" UNF                | 25   | 3.5     |
| <b>FRONT SUSPENSION</b>                                     |                       |  |         |
| Anti-roll bar mounting bracket to lower wishbone            | ¾" UNF                | 32   | 4.4     |
| Anti-roll bar fixing  | 5/16" UNF             | 4  | 0.6     |
| Anti-roll bar link to lower wishbone                        | 7/16" UNF             | 38   | 5.2     |
| Anti-roll bar to link                                       | ¾" UNF                | 16   | 2.2     |
| Brake disc attachment                                       | ¾" UNF                | 34   | 4.7     |
| Brake caliper and shield attachment                         | 7/16" UNF             | 65   | 9.0     |
| Brake caliper mounting bracket and tie rod lever attachment | ¾" UNF                | 34   | 4.7     |
| Damper to spring pan mounting                               | 7/16" UNF             | 65   | 9.0     |
| Lockstop bolts to trunnion                                  | 5/16" UNF             | 20   | 2.8     |
| Lower wishbone mounting bracket to frame                    | ¾" UNF                | 25   | 3.5     |
| Lower wishbone to mounting bracket                          | 1/2" UNF              | 46   | 6.4     |
| Lower wishbone to vertical link                             | 9/16" UNF             | 65   | 9.0     |
| Lower wishbone to spring pan                                | ¾" UNF                | 32   | 4.4     |
| Shock absorber mounting to spring pan                       | ¾" UNF                | 25   | 3.5     |
| Stub axle to front hub                                      | 1/2" UNF              | Tighten to 5 lbf.ft. Unscrew one flat and insert split pin to give .003in to .005in (0.076 to 0.127 mm) end float. |         |
| Stub axle to vertical link                                  | 1/2" UNF              |  |         |
| Top ball joint to upper wishbone                            | ¾" UNF                | 32   | 4.4     |
| Top ball joint to vertical link                             | 1/2" UNF              | 50   | 6.9     |
| Upper wishbone to fulcrum pin                               | 7/16" UNF             | 40   | 5.5     |
| Upper wishbone fulcrum to chassis frame                     | ¾" UNF                | 32   | 4.4     |
| Wheel stud  | 7/16" UNF             | 80   | 11.1    |



# TORQUE WRENCH SETTINGS

| Operation  | Specified Torque |  |         |
|--|------------------|--|---------|
|  | (lbf.ft)         | (kgf.m)  |         |
| REAR SUSPENSION                                  |                  |  |         |
| Bump rubber attachment . . . . .                 | 3/8" UNF         | 20   | 2.8     |
| Damper mounting to bracket . . . . .             | 7/16" UNF        | 65   | 9.0     |
| Damper link attachment . . . . .                 | 3/8" UNF         | 20   | 2.8     |
| Damper arm to link . . . . .                     | 7/16" UNF        | 46   | 6.4     |
| Inner driven flange to outer axle . . . . .      | 3/8" UNF         | 34   | 4.7     |
| Outer driven flange to axle and hub . . . . .    | 1 3/8" UNF       | To be tightened to give .002 in to .005 in. (0.051 to 0.127 mm) End float. |         |
| Rear hub assembly . . . . .                      | 5/8" UNF         | 120  | 16.6    |
|  | Nylok Nut        | 120  | 16.6†** |
|  | Castellated Nut  |  |         |
| Trailing arm to mounting bracket . . . . .       | 7/16" UNF        | 46   | 6.4     |
| Trailing arm mounting bracket to frame . . . . . | 3/8" UNF         | 34   | 4.7     |
| Trailing arm to brake plate . . . . .            | 5/16" UNF        | 16   | 2.2     |
| Wire wheel extension attachment . . . . .        | 7/16" UNF        | 65   | 9.0     |
| Wheel attachment . . . . .                       | 7/16" UNF        | 80   | 11.1    |

\*\* †Tighten to 90lb.f.ft. (12.5 Kgf.m.) Then continue tightening until split pin can be inserted\*\*.

## STEERING

|                                      |                    |    |     |
|--------------------------------------|--------------------|----|-----|
| Adaptor to upper and lower column    | 5/16" UNF          | 20 | 2.8 |
| Adaptor to rubber coupling           | 5/16" UNF          | 20 | 2.8 |
| Ball joint to tie rod lock nut       | 1/2" UNF           | 38 | 5.2 |
| Ball joint tie rod to steering lever | 7/16" UNF          | 38 | 5.2 |
| Lower clamp to outer column and body | 1/4" UNF           | 10 | 1.4 |
| Outer column tie rod to body         | 1/4" UNF           | 10 | 1.4 |
| Rack to chassis                      | 5/16" UNF          | 16 | 2.2 |
| Safety clamp to column               | 1/4" UNF           | 9  | 1.2 |
| Safety clamp grub screw              | 7/16" UNF          | 20 | 2.8 |
| Steering wheel attachment            | 9/16" UNF          | 34 | 4.7 |
| Top clamp to outer column            | 5/16" UNF          | 20 | 2.8 |
| Top clamp to body                    | 1/4" UNF Setscrew  | 10 | 1.4 |
| Top clamp to body                    | 1/4" UNF Weld bolt | 8  | 1.1 |
| Universal joint attachment           | 5/16" UNF          | 20 | 2.8 |

## CHASSIS

|   |             |    |     |
|---|-------------|----|-----|
| Cross tube to front suspension turrets              | 3/8" UNF    | 34 |     |
| Chassis to axle nose plate front of rear suspension | 3/8" UNF    | 25 | 3.5 |
| Chassis to axle back plate back of rear suspension  | 3/8" UNF    | 25 | 3.5 |
| Gearbox mounting crossmember to chassis             | 3/8" UNF    | 34 | 4.7 |
| Radiator shield attachment                          | 3/8" UNF    | 32 | 4.4 |
| Radiator to chassis                                 | 3/8" UNF    | 14 | 2.0 |
| Radiator drain tap                                  | 1/4" P.T.F. | 9  | 1.2 |



## TORQUE WRENCH SETTINGS

| Operation  | Description | Specified Torque |         |
|--|-------------|------------------|---------|
|  |             | (lbf.ft)         | (kgf.m) |
| BODY   |             |                  |         |
| Brake servo attachment . . . . .                       | 5/16" UNF   | 14               | 2.0     |
| Brake limiting valve to body . . . . .                 | 1/4" UNF    | 9                | 1.2     |
| Brake master cylinder to servo . . . . .               | 3/8" UNF    | 24               | 3.3     |
| Body mounting to rear suspension crossmember . . . . . | 3/8" UNF    | 14               | 2.0     |
| Door hinge attachment . . . . .                        | 5/16" UNF   | 20               | 2.8     |
| Door lock striker attachment . . . . .                 | 1/4" UNF    | 9                | 1.2     |
| Door lock to door . . . . .                            | 1/4" UNF    | 9                | 1.2     |
| Front bumper side fixing . . . . .                     | 5/16" UNF   | 20               | 2.8     |
| Front bumper centre to support bracket . . . . .       | 3/8" UNF    | 25               | 3.5     |
| Front bumper support bracket to chassis . . . . .      | 3/8" UNF    | 32               | 4.4     |
| Fuel tank drain plug . . . . .                         | 5/8" UNF    | 32               | 4.4     |
| Handbrake fulcrum pin . . . . .                        | 3/8" UNF    | 24               | 3.3     |
| Hard top to screen attachment . . . . .                | 5/16" UNF   | 9                | 1.2     |
| Hard top bracket to tie bar . . . . .                  | 5/16" UNF   | 9                | 1.2     |
| Hard top to rear deck . . . . .                        | 1/4" UNF    | 9                | 1.2     |
| Rear bumper outrigger brackets to shackles . . . . .   | 3/8" UNF    | 32               | 4.4     |
| Rear bumper support bracket to chassis . . . . .       | 3/8" UNF    | 32               | 4.4     |
| Rear bumper front and side to bracket fixing . . . . . | 3/8" UNF    | 32               | 4.4     |
| Safety harness pivot bolt . . . . .                    | 7/16" UNF   | 32               | 4.4     |
| Safety harness eye bolt . . . . .                      | 7/16" UNF   | 32               | 4.4     |
| Seat slides to floor . . . . .                         | 1/4" UNF    | 9                | 1.2     |
| Seat to slide . . . . .                                | 5/16" UNF   | 7                | 1.0     |



# RECOMMENDED LUBRICANTS, FUELS AND FLUID-CAPACITIES

## RECOMMENDED LUBRICANTS – BRITISH ISLES

(The products recommended are not listed in order of preference)

| COMPONENT  | BP                       | CASTROL           | DUCKHAMS           | ESSO                        | MOBIL  | PETROFINA                             | REGENT                    | SHELL                  |
|--|--------------------------|-------------------|--------------------|-----------------------------|--|---------------------------------------|---------------------------|------------------------|
| ENGINE AND OIL CAN   | Super Visco-static 20-50 | Castrol GTX       | Duckhams Q20-50    | Uniflo                      | Mobiloil Super 10W/50 or Mobiloil Special 20W/50 | Fina Super Grade Motor Oil SAE 20W/50 | Havoline Motor Oil 20W-50 | Shell Super Multigrade |
| GEARBOX AND OVERDRIVE REAR AXLE AND LOWER STEERING SWIVELS | BP Gear Oil SAE 90 EP    | Castrol Hypoy     | Duckhams Hypoid 90 | Esso Gear Oil GX 90/140     | Mobilube HD 90                                   | Fina Pontonic XP 90-140               | Multigear Lubricant EP 90 | Shell Spirax 90 EP     |
| FRONT & REAR HUBS BRAKE CABLES GREASE GUN                  | Energrease L2            | Castrol LM Grease | Duckhams LB 10     | Esso Multi-purpose Grease H | Mobilgrease MP                                   | Fina Marson HTL 2                     | Marfak All purpose        | Shell Retinex A        |

## RECOMMENDED LUBRICANTS – OVERSEAS

(The products recommended are not listed in order of preference)

| COMPONENT   | Air temp. |          | API Designation | BP   | CASTROL  | DUCK-HAMS          | ESSO                        | MOBIL   | PETRO-FINA                       | SHELL                                   | TEXACO                    |  |
|---|-----------|----------|-----------------|--|--|--------------------|-----------------------------|---|----------------------------------|---|---------------------------|--|
|   | °C        | °F       |                 |  |  |                    |                             |   |                                  |   |                           |  |
| ENGINE  | over 30   | over 80  | SD or SE        | *BP Super Visco-Static                       | Castrol GTX Castrol Super 20W/50 or XLR (USA only) | Q20/50             | Esso Extra Motor Oil 20W/50 | Mobiloil Super 10W/50 Mobiloil Special 20W/50 | Fina Supergrade Motor Oil 20W/50 | Shell Super Motor Oil                   | Havoline 20W/50           |  |
| CARB. DASHPOTS (USA Markets)                      | 30 to 0   | 80 to 30 | SD or SE        |  | Castrolite or Castrol GTZ                          | Q10-40             | Esso Extra Motor Oil 10W/30 | Mobiloil Super 10W/50                         | Fina Supergrade Motor Oil 10W/40 |   | Havoline 10W/30           |  |
| OIL CAN   | 0 to -20  | 30 to -4 | SD or SE        |  |  |                    |                             |   |                                  |   | Havoline 5W/20            |  |
|   | below -20 | below -4 | SD or SE        |  | Castrol 5W/20                                      | Q5-30              | Esso Extra Motor Oil 5W/20  | Mobiloil 5W/20                                | Fina Supergrade 5W/30            |   | Havoline 5W/20            |  |
| GEARBOX AND OVERDRIVE REAR AXLE                   | over 0    | over 30  | GL4             | BP Gear Oil SAE 90 EP                        | Castrol Hypoy                                      | Duckhams Hypoid 90 | Esso Gear Oil GX 90         | Mobilube HD 90                                | Fina PONTONIC MP SAE 90          | Shell Spriax 90 EP                      | Multigear Lubricant EP 90 |  |
| LOWER STEERING SWIVELS                            | below 0   | below 30 | GL4             | BP Gear Oil SAE 80 EP                        | Castrol Hypoy 80                                   | Duckhams Hypoid 80 | Esso Gear Oil GX 80         | Mobilube HD 80                                | Fina PONTONIC MP SAE 80          | Shell Spirax 80 EP                      | Multigear Lubricant EP 80 |  |
| FRONT AND REAR HUBS<br>BRAKE CABLES<br>GREASE GUN |           |          |                 | BP Energrease L2 or Energrease MP (USA only) | Castrol LM Grease or MP Grease (USA only)          | Duckhams LB 10     | Esso Multi-purpose Grease H | Mobilgrease MP                                | Fina Marson HTL 2                | Shell Retinax A or Darina AX (USA only) | Marfak All-purpose        |  |

\* OILS MARKED THUS ARE AVAILABLE IN MULTIGRADE FORMS WITH VISCOSITY CHARACTERISTICS APPROPRIATE TO THE AMBIENT TEMPERATURE RANGE IN INDIVIDUAL MARKETS.

\*\* WHERE CIRCUIT RACING OR OTHER SEVERE COMPETITIVE EVENTS ARE CONTEMPLATED IT IS ADVISABLE, IN VIEW OF THE INCREASED OIL TEMPERATURE ENCOUNTERED, TO USE OILS OF HIGH VISCOSITY.

### RECOMMENDED LUBRICANTS AND ANTI-FREEZE SOLUTIONS – U.S.A. MARKET

| COMPONENT                                   | SERVICE CLASSIFICATION  | AMBIENT TEMPERATURE RANGE       | SAE VISCOSITY CLASSIFICATION         |
|---|---|---------------------------------|--------------------------------------|
| Engine                                      | API - SE  | Above 14°F (-10°C)              | 10W/50<br>10W/40<br>20W/50<br>20W/40 |
|   |   | 5°F to 50°F<br>(-20°C to +10°C) | 10W/50<br>10W/40<br>10W/30           |
|   |   | Below 14°F (-10°C)              | 5W/30<br>5W/20                       |
| Gearbox and Overdrive Final Drive           | API - GL4   | Above 32°F (0°C)                | Hypoid 90                            |
|   |   | Below 32°F (0°C)                | Hypoid 80                            |
| Steering Rack, Hubs & Chassis Grease Points | NLG1 2 multi-purpose grease   |                                 |                                      |
| Brake & Clutch Fluid                        | DOT 3 Type Brake Fluid (FMVSS No. 116) also meeting SAE J1703d                      |                                 |                                      |
| Anti-Freeze                                 | Permanent type ethylene glycol base with suitable inhibitor for mixed metal systems |                                 |                                      |
| Windshield Washer                           | Windshield Washer Anti-freeze fluid (Proprietary Brands)                            |                                 |                                      |



# RECOMMENDED LUBRICANTS, FUELS AND FLUID CAPACITIES

## \*\* RECOMMENDED HYDRAULIC FLUIDS

Clutch and Brake Reservoirs: Castrol Girling Brake and Clutch Fluid – Crimson or Unipart 550 Brake Fluid.  
Where these proprietary brands are not available, other fluids which meet the S.A.E. J.1703 specification may be used.

## RECOMMENDED FUEL

The Triumph TR6 engine is designed to operate on fuel having a minimum octane rating of 97 (High compression engines) OR 91 (Lower compression engines): this is equivalent to the British 4 star and 2 star rating respectively.  
Where such fuels are not available and it is necessary to use fuels of lower or unknown rating, the ignition timing must be retarded from the specified setting, just sufficiently to prevent audible detonation (pinking) under all operating conditions, otherwise damage to the engine may occur.

**IMPORTANT:** When cars for the U.S.A. market enter the “United States” the ignition timing must be set to suit the use of the recommended grade of fuel AND TO COMPLY WITH REGULATIONS ON EMISSIONS FROM THE CRANKCASE AND EXHAUST.

## ANTI-FREEZE SOLUTIONS

Only solutions which meet B.S.I. 3151 or 3152 specifications may be used.

| ANTI-FREEZE CONCENTRATION                   |   | 25%            | 30%            | 35%            | 50%            |
|---|---|----------------|----------------|----------------|----------------|
| SPECIFIC GRAVITY OF COOLANT AT 15.5° (60°F) |   | 1.039          | 1.048          | 1.054          | 1.076          |
| ANTI-FREEZE QUANTITY                        | PINTS IMP.  | 2.8            | 3.3            | 3.9            | 5.5            |
|   | PINTS U.S.A.  | 3.3            | 4.0            | 4.7            | 6.6            |
|   | LITRES  | 1.6            | 1.9            | 2.2            | 3.2            |
| DEGREE OF PROTECTION                        | Complete<br>Car may be driven away immediately from cold  | -12°C<br>10°F  | -16°C<br>3°F   | -20°C<br>-4°F  | -36°C<br>-33°F |
|   | Safe Limit<br>Coolant in mushy state. Engine may be started and driven away after short warm-up period          | -18°C<br>0°F   | -22°C<br>-8°F  | -28°C<br>-18°F | -41°C<br>-42°F |
|   | Lower Protection<br>Prevents frost damage to cylinder head, block and radiator. Thaw out before starting engine | -26°C<br>-15°F | -32°C<br>-26°F | -37°C<br>-35°F | -47°C<br>-53°F |

## CAPACITIES

|                                   |                            |                           |                  |
|-----------------------------------|----------------------------|---------------------------|------------------|
| Fuel tank                         | USA 1974/1973 condition    | 9½ gal (11.4 US gal)      | (43 Litres)      |
|                                   | 1974/1973 other markets PI | 10¾ gal (12.9 US gal)     | (48.6 Litres)    |
|                                   | Pre 1973 other Markets PI  | 11¼ gal (13.5 US gal)     | (51 Litres)      |
|                                   | and Pre 1972 USA condition |                           |                  |
|                                   | U.S.A. 1972 condition      | 10¼ gal (12.3 US gal)     | (46.5 Litres)    |
| Engine sump and oil filter        |                            | 9 pints (10.8 US pints)   | (5.10 Litres)    |
| Engine sump (drain and refill)    |                            | 8 pints (9.6 US pints)    | (4.25 Litres)    |
| Gearbox (from dry)                |                            | 2 pints (2.4 US pints)    | (1.13 Litres)    |
| Gearbox and overdrive (from dry)  | 'A' type                   | 3½ pints (4.2 US pints)   | (2.0 Litres)     |
|                                   | 'J' type                   | 2.66 pints (3.2 US pints) | (1.5 Litres)     |
| Rear axle (from dry)              |                            | 2¼ pints (2.7 US pints)   | (1.27 Litres)    |
|                                   | U.S.A. pre 1970 condition  | 2½ pints (3.0 US pints)   | (1.42 Litres)    |
| Cooling system (including heater) |                            | 11 pints (13.2 US pints)  | (6.21 Litres)    |
| Heater                            |                            | 1 pint (1.2 US pints)     | (0.57 Litres) ** |





MAINTENANCE OPERATIONS

|                                    |          |
|------------------------------------|----------|
| Lubrication Chart                  | 10.00.01 |
| Pre-Delivery Inspection            | 10.10.01 |
| Routine Maintenance Operation      |          |
| 1,000 miles (1600 km) Free Service | 10.10.03 |
| 3,000 miles (5000 km) Service      | 10.10.06 |
| 6,000 miles (10000 km) Service     | 10.10.12 |
| 12,000 miles (20000 km) Service    | 10.10.24 |
| Summary Chart                      | 10.00.02 |



# LUBRICATION CHART

## Weekly or before a long journey

1. Check/top up cooling system level.
2. Check/top up engine oil level.

## Every 3,000 miles (5,000 km)

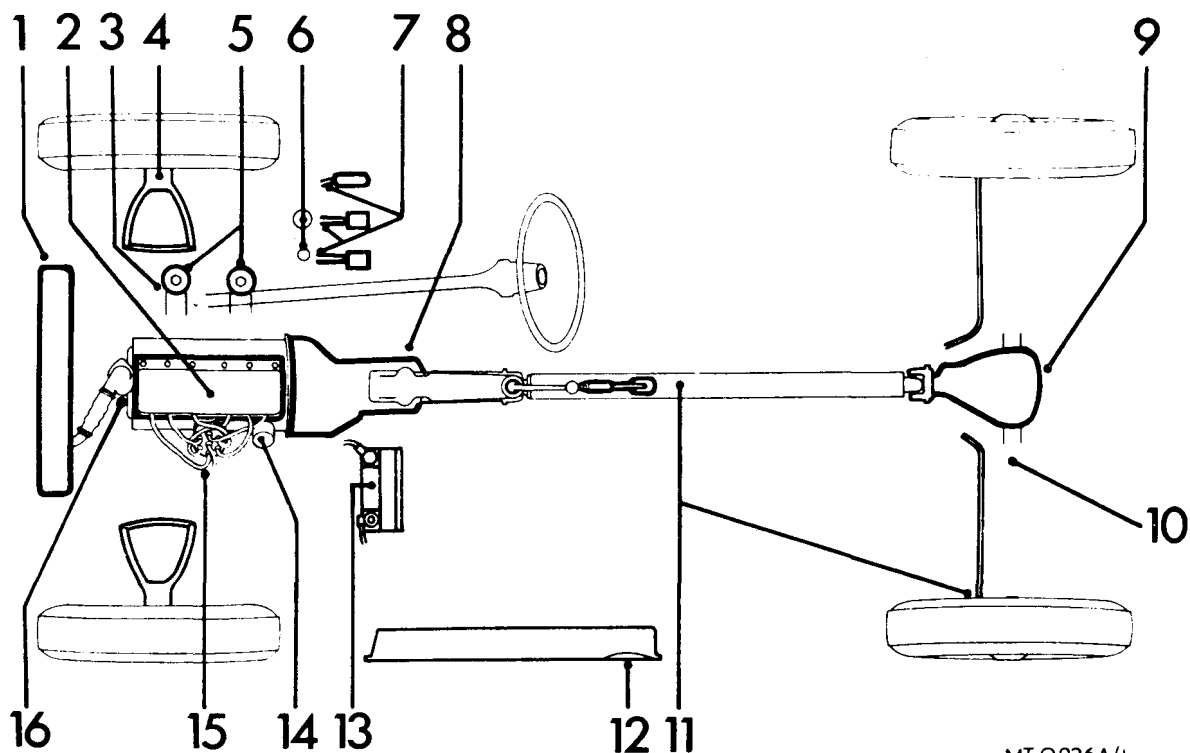
1. Check/top up cooling system level.
2. Check/top up engine oil level.
3. Check/top up brake and clutch fluid reservoirs.

## Every 6,000 miles (10,000 km)

1. Check/top up cooling system level.
2. Change engine oil.
3. Lubricate steering rack and pinion.
4. Using OIL lubricate lower steering swivels.  
Grease suspension upper ball joints.
5. Check/top up carburettor piston damper(s) and lubricate throttle linkage.
6. Check/top up brake and clutch fluid reservoirs.
7. Lubricate accelerator, brake and clutch pedal pivots.
8. Check/top up gearbox oil level.
9. Check/top up rear axle oil level.
10. Lubricate inner drive shaft universal joints.
11. Lubricate handbrake linkage and cable.
12. Lubricate all door, bonnet and boot locks and hinges.
13. Lubricate battery terminals (petroleum jelly).
15. Lubricate distributor.

## Every 12,000 miles (20,000 km)

1. Check/top up cooling system level.
2. Change engine oil.
3. Lubricate steering rack and pinion.
4. Using OIL lubricate lower steering swivels.  
Grease suspension upper ball joints.
5. Check/top up carburettor piston damper(s) and lubricate throttle linkage.
6. Check/top up brake and clutch fluid reservoirs.
7. Lubricate accelerator, brake and clutch pedal pivots.
8. Check/top up gearbox oil level.
9. Check/top up rear axle oil.
10. Lubricate inner drive shaft universal joints.
11. Lubricate handbrake linkage and cable.
12. Lubricate all door, bonnet and boot locks and hinges.
13. Lubricate battery terminals (petroleum jelly).
14. Renew oil filter element.
15. Lubricate distributor.
16. Lubricate water pump.



MT O936A/1

# MAINTENANCE

## SUMMARY CHART

The Summary Chart below lists general recommendations for Service Operations and Intervals. Overseas Service Engineers are advised to consult the 'Passport to Service' booklet supplied with the car for amendments to these recommendations that may be specially applicable to their local operating conditions OR that may be obligatory to meet Regulations for a specific Country.

| Operation Number<br>Interval in miles x 1,000<br>Interval in Kilometres x 1,000   | 10.10.03<br>1<br>1-6 | 10.10.06<br>3<br>5 | 10.10.12<br>6<br>10 | 10.10.24<br>12<br>20 |
|---|----------------------|--------------------|---------------------|----------------------|
| <b>Operation Description</b>  |                      |                    |                     |                      |
| <b>ENGINE COMPARTMENT</b>   |                      |                    |                     |                      |
| 1. Check/top up engine oil level (E) .....  |                      | X                  |                     |                      |
| 2. Check/top up cooling system (E) .....  | X                    | X                  | X                   | X                    |
| 3. Check/top up brake fluid reservoir .....   | X                    | X                  | X                   | X                    |
| 4. Check/top up clutch fluid reservoir .....  | X                    | X                  | X                   | X                    |
| 5. Check/top up windscreen washer fluid reservoir .....   | X                    | X                  | X                   | X                    |
| 6. Check/top up battery .....   | X                    | X                  | X                   | X                    |
| 7. Check/top up carburettor piston(s) damper(s)(E) .....  | X                    |                    | X                   | X                    |
| 8. Drain engine oil and refill (E) .....  | X                    |                    | X                   | X                    |
| 9. Renew oil filter element (E) .....   |                      |                    |                     | X                    |
| 10. Clean fuel pump sediment bowl .....   | X                    |                    |                     | X                    |
| 11. Lubricate distributor and check automatic advance (E) .....   | X                    |                    | X                   | X                    |
| 12. Check/adjust/report condition of distributor points (E) .....   | X                    |                    | X                   |                      |
| 13. Distributor points – renew (E) .....  |                      |                    |                     | X                    |
| 14. Check/adjust ignition timing using electronic equipment (E) .....   | X                    |                    | X                   | X                    |
| 15. Check/report ignition wiring for fraying, chafing and deterioration (E) .....   | X                    |                    | X                   | X                    |
| 16. Condensor and coil check for breakdown on oscilloscope tune (E) .....   |                      |                    | X                   | X                    |
| 17. Clean/adjust sparking plugs (E) .....   |                      |                    | X                   |                      |
| 18. Renew sparking plugs (E) .....  |                      |                    |                     | X                    |
| 19. Check/adjust torque of cylinder head nuts/bolts (E) .....   | X                    |                    |                     |                      |
| 20. Check/report cylinder compression (E) .....   |                      |                    | X                   | X                    |
| 21. Check/adjust valve rocker clearances (E) .....  | X                    |                    |                     | X                    |
| 22. Clean engine oil filler cap (E) .....   |                      |                    |                     | X                    |
| 23. Clean carburettor air cleaner elements (E) .....  |                      |                    | X                   |                      |
| 24. Renew carburettor air cleaner elements (E) .....  |                      |                    |                     | X                    |
| 25. Check/adjust/report condition of all driving belts (E) .....  | X                    | X                  | X                   | X                    |
| 26. Check security of starter motor and alternator retaining bolts .....  | X                    |                    |                     |                      |
| 27. Check security of engine mountings .....  | X                    |                    |                     |                      |
| 28. Check/adjust carburettor settings (E) .....   | X                    |                    | X                   | X                    |
| 29. Carburettor – overhaul – at 24,000 miles (E) .....  |                      |                    |                     |                      |
| 30. Fuel filter – change (E) .....  |                      |                    |                     | X                    |
| 31. Fuel system – check for leaks (E) .....   | X                    |                    |                     | X                    |
| 32. Lubricate accelerator linkage/pedal fulcrum and check operation .....   | X                    |                    | X                   | X                    |
| 33. Check battery condition: clean and grease connections .....   |                      |                    | X                   | X                    |
| 34. Check/report for oil/fuel/fluid leaks (general) (E) .....   | X                    | X                  | X                   | X                    |
| 35. Check/report leaks from cooling and heater systems (E) .....  | X                    |                    | X                   | X                    |
| 36. Evaporative and crankcase ventilations systems – check hoses and restrictors for blockage, security and deterioration (E) ..... |                      |                    | X                   | X                    |
| 37. Carbon canister – renew filter (E) .....  |                      |                    |                     | X                    |
| 38. Carbon canister – renew 48,000 miles (E) .....  |                      |                    |                     |                      |
| 39. Lubricate water pump .....  |                      |                    |                     | X                    |

| <div> <b>Operation Number</b><br/> <b>Interval in miles x 1,000</b><br/> <b>Interval in Kilometres x 1,000</b> </div> |   | <div> <b>10.10.03</b><br/> <b>1</b><br/> <b>1.6</b> </div> | <div> <b>10.10.06</b><br/> <b>3</b><br/> <b>5</b> </div> | <div> <b>10.10.12</b><br/> <b>6</b><br/> <b>10</b> </div> | <div> <b>10.10.24</b><br/> <b>12</b><br/> <b>20</b> </div> |
|---|---|--|--|---|--|
| <b>Operation Description</b>  |   |  |  |   |  |
| <b>UNDERBODY</b>  |   |  |  |   |  |
| 40.   | Check/top up level of gearbox and overdrive oil.....  | X  |  | X   | X  |
| 41.   | Check/top up level of final drive unit oil.....   | X  |  | X   | X  |
| 42.   | Lubricate lower steering swivel .....   | X  |  | X   | X  |
| 43.   | Lubricate all grease points except hubs .....   | X  |  | X   | X  |
| 44.   | Lubricate steering rack and pinion .....  |  |  | X   | X  |
| 45.   | Lubricate handbrake linkage and cable guides.....   |  |  | X   | X  |
| 46.   | Check transmission, engine, final drive, suspension and steering unit for oil leaks and report.....                               | X  | X  | X   | X  |
| 47.   | Check visually brake, fuel and clutch pipes, hoses and unions for chafing, leaks and corrosion and report.....                    | X  | X  | X   | X  |
| 48.   | Check/report exhaust system for leakage and security (E) .....  |  | X  | X   | X  |
| 49.   | Check security of suspension fixings, tie-rod levers, steering unit attachments and steering universal joint coupling bolts ..... | X  |  |   | X  |
| 50.   | Check security of propeller shaft and drive shaft universal coupling bolts.....   |  |  |   | X  |
| 51.   | Check security of sub-frame or body mountings .....   | X  |  |   | X  |
| 52.   | Check/report condition of steering unit/joints for security, backlash and gaiter condition .....                                  | X  | X  | X   | X  |
| <b>EXTERIOR</b>   |   |  |  |   |  |
| 53.   | Adjust front hubs.....  |  |  |   | X  |
| 54.   | Check/adjust front and rear wheel alignment with tracking equipment.....  | X  |  |   |  |
| 55.   | Check/report front and rear wheel alignment with tracking equipment .....   |  |  | X   | X  |
| 56.   | Inspect brake pads for wear, and discs for condition.....   |  | X  | X   | X  |
| 57.   | Inspect and report brake linings for wear and drums for condition .....   |  |  |   | X  |
| 58.   | Check security of road wheel fastenings.....  | X  | X  | X   | X  |
| 59.   | *Check that tyres are in accordance with manufacturers specification.....   |  | X  | X   | X  |
| 60.   | *Check visually and report depth of tread, cuts in tyre fabric, exposure of ply or cord structure, lumps or bulges .....          | X  | X  | X   | X  |
| 61.   | Check/adjust tyre pressures (including spare wheel).....  | X  | X  | X   | X  |
| 62.   | Check/adjust headlamp alignment.....  | X  |  |   |  |
| 63.   | Check/report headlamp alignment .....   |  | X  | X   | X  |
| 64.   | Check, if necessary replace windscreen wiper blades .....   |  | X  | X   | X  |
| 65.   | Fuel tank filler cap – check seal for security (E) .....  | X  |  | X   | X  |
| <b>INTERIOR</b>   |   |  |  |   |  |
| 66.   | Check brake pedal travel and hand brake operation adjust if necessary.....  | X  |  |   |  |
| 67.   | Check/report brake pedal travel and handbrake operation.....  |  | X  | X   | X  |
| 68.   | Check operation of window controls, locks and bonnet release .....  | X  |  |   |  |
| 69.   | Check function of all electrical systems and windscreen washer.....   | X  | X  | X   | X  |
| 70.   | Lubricate clutch and brake pedal pivots.....  |  |  | X   | X  |
| 71.   | Lubricate all locks, door hinges, strikers and bonnet release .....   | X  |  | X   | X  |
| 72.   | Check/report condition and security of seats and seat belts .....   |  | X  | X   | X  |
| 73.   | Check/report rear view mirrors for looseness, cracks and crazing .....  |  | X  | X   | X  |
| <b>ROAD TEST</b>  |   |  |  |   |  |
| 74.   | Road/roller test and report additional work required.....   | X  |  | X   | X  |
| 75.   | Ensure cleanliness of controls, door handles, steering wheels etc .....   | X  | X  | X   | X  |

**\*Important** — If the tyres do not conform with legal requirements report to the owner.

Items marked (E) are particularly relevant to the emission and evaporative control systems and must receive attention at the recommended intervals to keep these systems in good order.



## MAINTENANCE

The maintenance summary list on pages 10.00.02 and 10.00.03 gives details of mile and kilometer intervals for the following operations. The figure in parenthesis to the left of each heading refers to the item number on the summary list.

### (1) Check/top up engine oil level

**NOTE:** Allow time for oil to drain back into sump after running engine.

Stand vehicle on level ground.

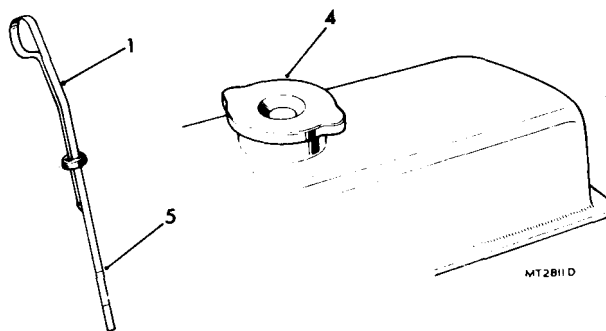
1. Withdraw dipstick, wipe it clean and replace in position.
2. Withdraw dipstick again and note oil level.
3. Wipe dipstick clean and replace in position.

If topping up is necessary:-

4. Remove oil filler cap.
5. Add recommended grade of oil, via filler cap, to bring level just below high mark on dipstick.

**DO NOT OVERFILL**

6. Replace filler cap.
7. Allow time for added oil to drain into sump, then check final oil level using the procedure in 1 to 3 above.



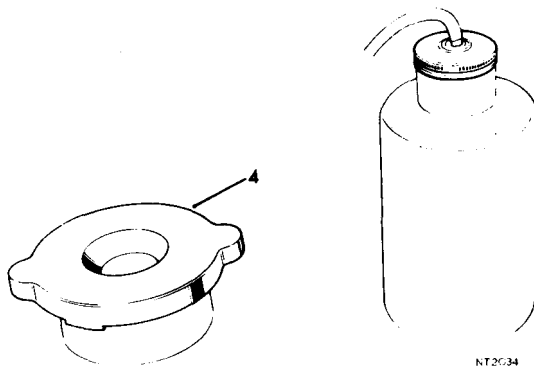
### (2) Check/top up cooling system

**WARNING:** Do NOT remove cooling system filler caps or plugs when engine is hot.

1. Remove radiator expansion tank cap.
2. If necessary, top up expansion tank with soft water to maintain level at approximately half full.
3. Replace cap.

If the expansion tank is empty:-

4. Remove the cooling system filler cap.
5. Add soft water, via filler cap, until the system is full.
6. Replace filler cap.
7. Half fill expansion tank with soft water using the procedure in 1 to 3 above.
8. Run the engine until normal operating temperature is reached, allow engine to cool and re-check cooling system level.



**(3) Check/top up brake fluid reservoir**

1. Check fluid level against mark on side of reservoir.

If topping up is necessary:-

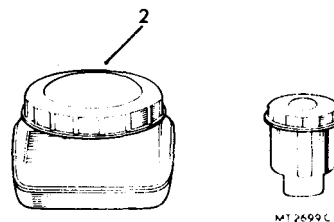
2. Wipe clean the reservoir cap and surrounding area.
3. Remove the reservoir cap.
4. Add fluid to bring level above danger mark on side of reservoir.

**WARNING:** Use only new fluid of the correct specification.

**Do NOT use fluid of unknown origin,  
or fluid that has been exposed to the atmosphere,  
or fluid that has been discharged during bleeding  
operations.**

5. Replace reservoir cap.
6. Remove any spilled fluid with a clean cloth.

**CAUTION:** Paintwork can be damaged by direct contact with brake fluid.



**(4) Check/top up clutch fluid reservoir**

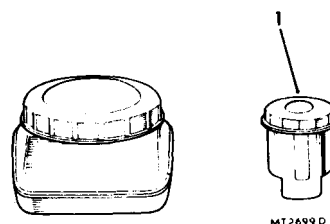
1. Wipe clean the reservoir cap and surrounding area.
2. Remove the reservoir cap.
3. Check fluid level against mark on side of reservoir.
4. If necessary, add fluid to bring level up to mark on side of reservoir.

**WARNING:** Use only new fluid of the correct specification.

**Do NOT use fluid of unknown origin,  
or fluid that has been exposed to the atmosphere,  
or fluid that has been discharged during bleeding  
operations.**

5. Replace reservoir cap.
6. Remove any spilled fluid with a clean cloth.

**CAUTION:** Paintwork can be damaged by direct contact with clutch fluid.



## MAINTENANCE

### (5) Check/top up windscreen washer fluid level

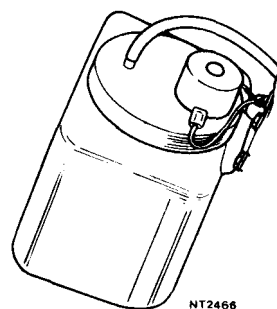
1. Check fluid level in translucent reservoir.

If topping up is necessary:-

2. Wipe clean the reservoir cap and surrounding area.
3. Remove the reservoir cap.
4. Add soft water to bring level up to approximately 1 in (25.4 mm) from top of reservoir.
5. Replace reservoir cap.

**CAUTION:** As a precaution against freezing conditions, fill the reservoir with a mixture of one part methylated spirits and two parts water.

Do NOT use glycol anti-freeze solutions in the washer reservoir, as these may discolour paintwork and damage wiper blades and sealing rubbers.



### (6) Check/top up battery

**NOTE:** Alternative procedures are given for each of the two battery types that may be fitted.

1. Lift and tilt battery cover.
2. Check electrolyte level, which if correct should just cover the separators.

If topping up is necessary:-

3. Add DISTILLED WATER until the filler tubes are full and the trough is just covered.
4. Replace battery cover.

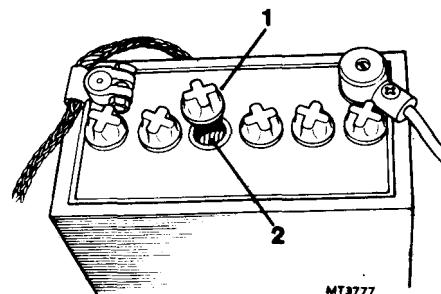
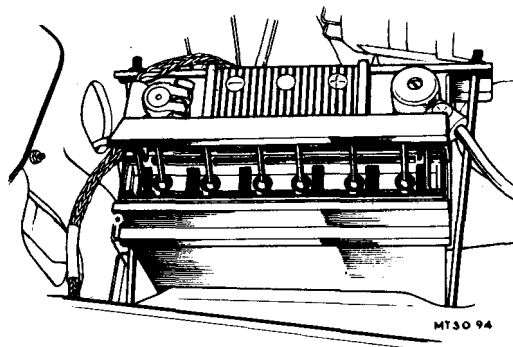
*Alternatively:-*

1. Remove battery filler plugs.
2. Check electrolyte level, which if correct should just cover the separators.

If topping up is necessary:-

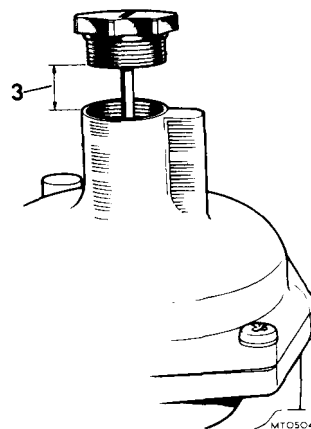
3. Add DISTILLED WATER until the separators are just covered. DO NOT OVERFILL.
4. Replace filler plugs.

**CAUTION:** Paintwork can be damaged by direct contact with the base of filler plugs.



(7) Check/top up carburettor piston(s) damper(s)

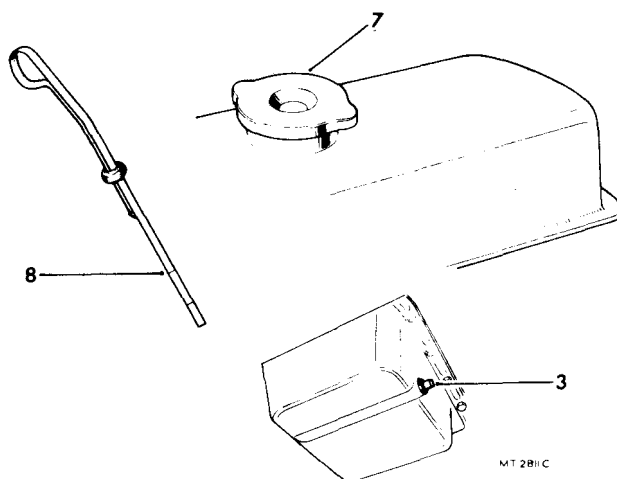
1. Unscrew hexagon plug from top of carburettor.
2. Withdraw plug and damper assembly from carburettor.
3. Replace plug and damper assembly to check oil level, which if correct will offer resistance to the assembly when the bottom of the plug threads are  $\frac{1}{4}$  in (6 mm) above the rim of the dashpot.
4. If necessary, again withdraw plug and damper assembly and add a recommended engine oil, using an oil can, until the oil level is correct.
5. Replace plug and damper assembly.
6. Screw hexagon plug firmly in position.



(8) Drain engine oil and refill

**NOTE:** This operation is best carried out when the engine is warm and with the vehicle standing level on a ramp or over a pit.

1. Wipe clean the engine drain plug and surrounding area.
2. Place a suitable receptical under the drain plug.
3. Unscrew the drain plug slowly until oil begins to escape.
4. When the rate of oil flow lessens, remove drain plug from sump and allow oil to drain completely.
5. Wipe clean the drain plug and replace it in sump.
6. Tighten drain plug to 20 to 25 lbf ft. (2.8 to 3.5 kgf m).
7. Remove oil filler cap.
8. Add a recommended engine oil, via filler cap, to bring level just below high mark on dipstick. **DO NOT OVERFILL.**
9. Replace oil filler cap.
10. Allow time for added oil to drain into sump, then check final oil level on dipstick.





## MAINTENANCE

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### (9) Renew oil filter element

See 12.60.01 and 12.60.08.

### (10) Clean fuel pump sediment bowl

See 19.45.05

### (11) Lubricate distributor and check automatic advance

Lubricate distributor – See 86.35.18

#### *Check automatic advance*

1. Fit a strobe Timing Light in accordance with the Timing Light manufacturers instructions.
2. Disconnect vacuum pipe between distributor and induction side of engine.
3. Start engine.

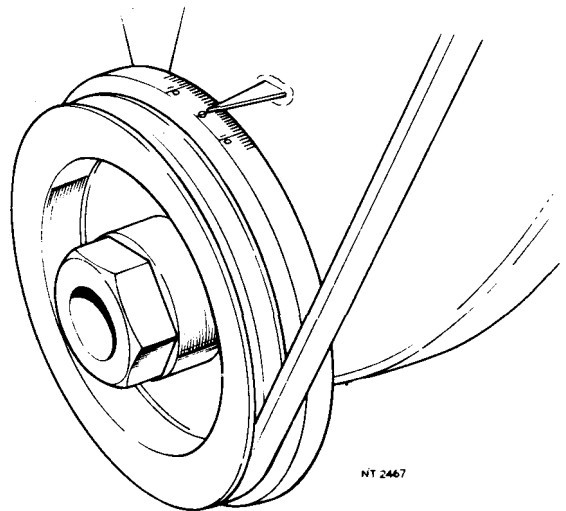
#### *Check centrifugal advance.*

4. Using a second operator to vary engine speed, check apparent movement of timing marks under strobe light.
5. Reconnect vacuum pipe.

#### *Check vacuum advance*

6. Repeat the procedure in 4 above, comparing engine timing with and without vacuum pipe connected.
7. Stop engine.

**NOTE:** If more accurate results are required electronic tuning equipment may be used in conjunction with the data on page 86.35.00. This is extra to normal service requirements.



(12) Check/adjust/report condition of distributor points

See 86.35.14.

(13) Renew distributor points

See 86.35.13

(14) Check/adjust ignition timing

See 86.35.16

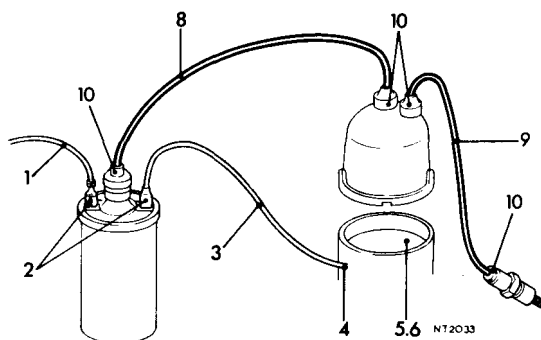
(15) Check/report ignition wiring for fraying, chaffing and deterioration

*Low tension circuit.*

1. Check exposed wiring between coil and ignition switch.
2. Check ignition coil connections.
3. Check wiring between coil and distributor.
4. Check distributor external connections.
5. Remove distributor cap and check internal wiring.
6. Check internal distributor connections.
7. Replace distributor cap.

*High tension circuit.*

8. Check lead between coil and distributor.
9. For each sparking plug in turn: –  
Check lead between plug and distributor.
10. Check high tension lead connections.
11. Report wiring condition.



(16) Check condenser and coil for breakdown on oscilloscope tune

*Using proprietary electronic testing equipment*

1. Check distributor condenser performance.
2. Check ignition coil performance.

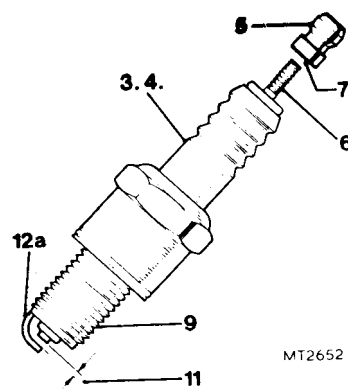
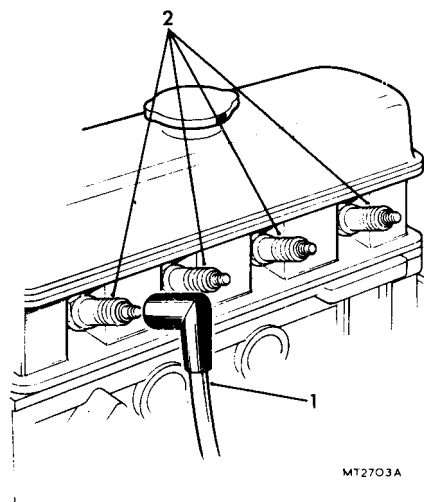
## (17) Clean/adjust sparking plugs

*For each sparking plug in turn*

1. Remove ignition high tension lead from plug.
2. Unscrew plug from engine using a special plug spanner or a box type spanner.
3. Wipe clean ceramic body of plug.
4. Visually check plug body for cracks, and renew plug if cracks are present.
5. Unscrew end terminal cap from plug.
6. Clean plug terminal threads with a wire brush.
7. Clean cap threads using a low pressure air line.
8. Screw end terminal cap firmly into position on plug.
9. Clean electrode area and plug threads with a wire brush or sand blasting machine.
10. Visually check electrode surfaces for damage, and renew plug if damage is present.
11. Check electrode gap, which if correct will just allow a 0.025 in (0.64 mm) feeler gauge to slide slowly between the electrodes under light pressure.

*If adjustment is necessary.*

12. (a) Using a suitable tool, carefully move the side electrode.  
(b) Recheck the gap and repeat this procedure until the gap is correct.
13. Check sealing washer for cracks and distortion, and renew washer if necessary.
14. Refit sparking plug to engine.
15. Tighten plug to 14 to 20 lbf ft (1.9 to 2.8 kgf m).
16. Refit high tension lead to plug.



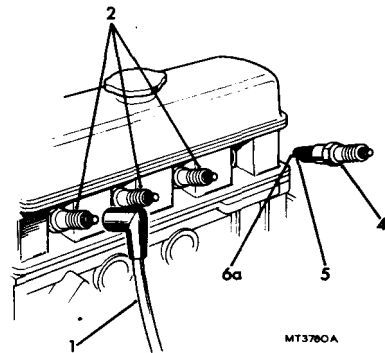
(18) Renew sparking plugs

*For each sparking plug in turn*

1. Remove ignition high tension lead from plug.
2. Unscrew plug from engine using a special plug spanner or a box type spanner.
3. Discard plug.
4. Visually check new plug for damage to body and electrodes, discard plug if damage is present.
5. Check electrode gap on new plug, which if correct will just allow a 0.025 in (0.64 mm) feeler gauge to slide slowly between the electrodes under light pressure.

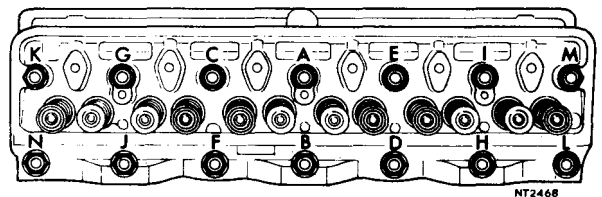
*If adjustment is necessary.*

6. (a) Using a suitable tool, carefully move the side electrode.  
(b) Recheck the gap and repeat this procedure until the gap is correct.
7. Check sealing washer for cracks and distortion, and renew washer if necessary.
8. Fit new sparking plug to engine.
9. Tighten plug to 14 to 20 lbf ft (1.9 to 2.8 kgf m).
10. Refit high tension lead to plug.



(19) Check/adjust torque of cylinder head nuts/bolts

1. Remove rocker cover – See 12.29.42.
2. Using the sequence shown, tighten cylinder head nuts to 60 to 80 lbf ft (8.3 to 11.1 kgf m).
3. Check/adjust valve rocker clearances – See 12.29.48.
4. Check rocker cover gasket for damage, and renew if necessary.
5. Refit rocker cover – See 12.29.42.
6. With gears in neutral, handbrake on, start engine and check for leaks from rocker cover gasket.



(20) Check/report cylinder compression

See 12.25.01

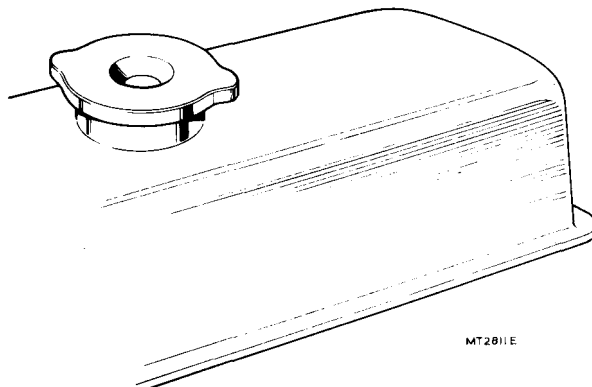
(21) Check/adjust valve rocker clearances

See 12.29.48

## MAINTENANCE

### (22) Clean engine oil filler cap

1. Remove filler cap.
2. Clean cap with clean petrol.
3. Allow to dry.
4. Refit filler cap.



### (23) Clean carburettor air cleaner elements

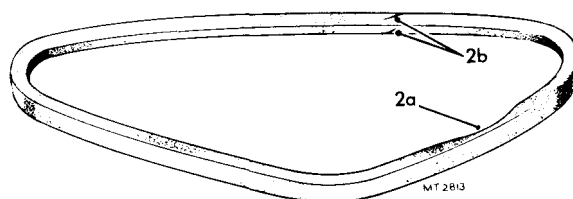
See 19.10.08

### (24) Renew carburettor air cleaner elements

See 19.10.08

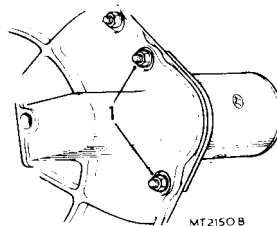
### (25) Check/adjust/report condition of driving belts

1. Check and adjust – See 26.20.01
2. Report condition where belt is visibly  
(a) worn or  
(b) damaged.



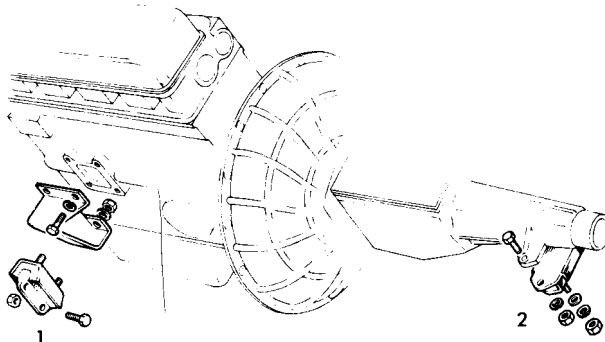
### (26) Check security of starter motor and alternator retaining bolts

1. Check security of starter motor retaining bolts, which if correct should be tightened to 26 to 34 lbf ft (3.6 to 4.7 kgf m).
2. Check security of alternator to adjusting link bolt, which if correct should be tightened to 15 to 20 lbf ft (2.1 to 2.8 kgf m).
3. Check security of alternator mounting bracket bolt, which if correct should be tightened to 16 to 22 lbf ft (2.2 to 3.0 kgf m).



### (27) Check security of engine mountings

1. Check security of front engine mountings, which if correct should be tightened to 24 to 32 lbf ft (3.3 to 4.4 kgf m).
2. Check security of rear engine mountings, which if correct should be tightened to 50 to 60 lbf ft (6.9 to 9.0 kgf m). Mounting rubber to gearbox AND 38 to 46 lbf ft (5.2 to 6.4 kgf m) mounting rubber to cross member.



**(28) Check/adjust carburetter settings**

See 19.15.02

**(29) Overhaul carburetter**

See 19.15.18.

**(30) Change fuel filter**

See 19.25.01

**(31) Check fuel system for leaks**

1. Check for leaks from fuel system connections.
2. Check fuel pipes for fractures and damage.
3. Check for leaks from fuel tank(s), pump and carburetter(s)/metering distributor.  
On vehicles fitted with an evaporative control system, additional checks are given under 17.15.01.

**(32) Lubricate accelerator linkage/pedal fulcrum and check operation**

1. Lubricate accelerator linkage on carburetter(s)/metering distributor, using an oil can.
2. Wipe away surplus oil from linkage.
3. Check for roughness in linkage operation.
4. Lubricate accelerator pedal fulcrum, using an oil can.
5. Wipe away surplus oil from pedal fulcrum.

**CAUTION:** Surplus oil on the pedal fulcrum can cause staining of the carpet.

6. Check carburetter/metering distributor throttle response to initial movement of the accelerator pedal.

*If adjustment is necessary – see 19.20.05*

7. Check carburetter/metering distributor throttle position with accelerator pedal fully depressed.

*If adjustment is necessary – See 19.20.05.*

## MAINTENANCE

### (33) Check battery condition: clean and grease connections

With battery in location

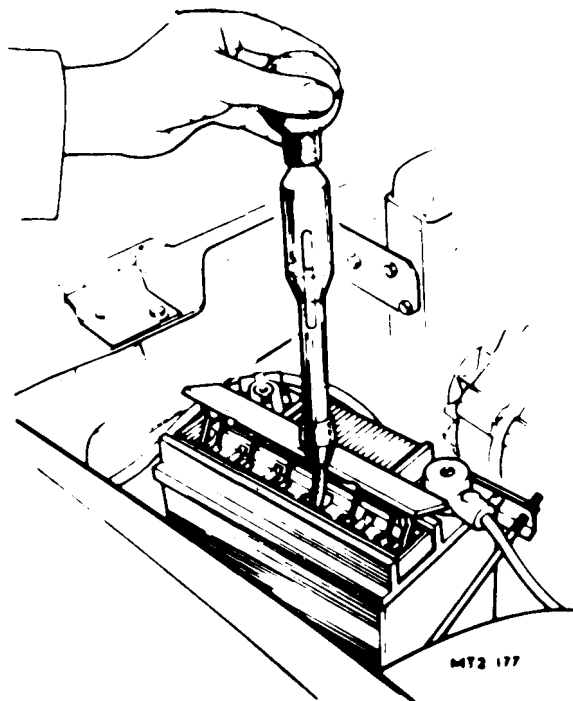
1. Check battery and surrounding area for corrosion from battery chemicals.
2. Clean off any corrosion found.
3. Check visually for cracks in battery case.
4. Report any case cracks found.
5. Check security of terminal connections.
6. Coat terminals with petroleum jelly.

For each cell in turn:-

7. Check electrolyte specific gravity, using an hydrometer, which if correct will approximate to the tabled readings below.

**NOTE** (a) Do NOT check S.G. immediately after adding distilled water as a false reading may be obtained.

(b) S.G. readings approximately equal for each cell indicate a battery in good condition. Conversely, if one or more cells show a reading lower than the others the battery is approaching the end of its useful life.

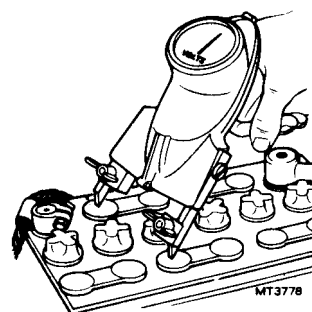


| Charge condition of cell – temperate climate |                                 |              |            |
|--|---------------------------------|--------------|------------|
| Ambient Temperature<br>°C                    | Specific Gravity of Electrolyte |              |            |
|  | Charged                         | Half-Charged | Discharged |
| 5  | 1.287                           | 1.207        | 1.117      |
| 15   | 1.280                           | 1.200        | 1.110      |
| 25   | 1.273                           | 1.193        | 1.103      |
| 35   | 1.226                           | 1.186        | 1.096      |
| Charge condition of cell – tropical climate  |                                 |              |            |
| 15   | 1.250                           | 1.180        | 1.100      |
| 25   | 1.243                           | 1.173        | 1.093      |
| 35   | 1.236                           | 1.166        | 1.086      |
| 52   | 1.224                           | 1.154        | 1.074      |

8. Check voltage, using a heavy discharge tester, which if correct will give approximately equal readings for each cell.

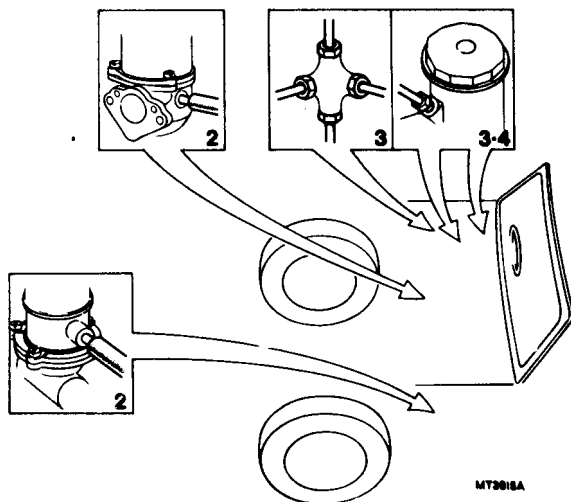
**CAUTION:** This check should NOT be made on a battery in a low state of charge as shown by procedure 7 as damage to the battery can result.

**NOTE**(a) Before making this check on a battery that has just completed an operational journey, the headlamps should be switched on for 2 or 3 minutes to remove any surface charge. (b) Voltage readings approximately equal for each cell indicate a battery in good condition. Conversely, if one or more cells show a reading lower than the others, or a reading that falls during the test, the battery is approaching the end of its useful life.



**(34) Check/report oil/fuel/fluid leaks**

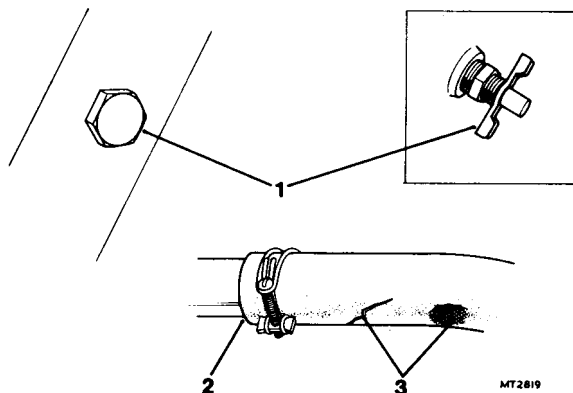
1. Check for oil leaks from engine and transmission.
2. Check for fuel leaks from pump, carburettor/metering distributor, pipes, joints and unions.
3. Check for fluid leaks from brake master cylinder, pipes, joints and unions.
4. Check for fluid leaks from clutch master cylinder, pipes, joints and unions.
5. Report any leaks found.



MT2018A

**(35) Check/report leaks from cooling and heater systems.**

1. Check for leaks from engine and radiator drain taps/plugs, (where fitted).
2. Check for leaks from water hose joints.
3. Check for leaks from water hoses through damage or porosity.
4. Check for leaks from water pump, thermostat housing, radiator and heater unit.
5. Report any leaks found.



MT2019

**(36) Evaporative and crankcase ventilation systems-check hoses and restrictors for blockage, security and deterioration.**

See 17.15.01 and 17.15.36

**(37) Carbon canister –renew filter**

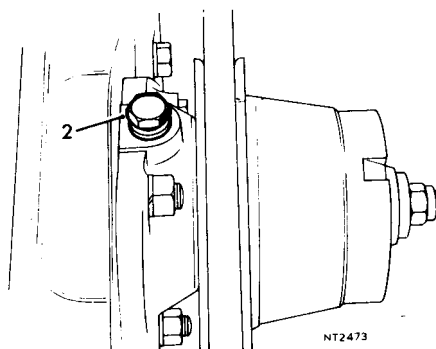
See 17.15.07

**(38) Carbon canister – renew at 48,000 miles**

See 17.15.13.

**(39) Lubricate water pump**

1. Wipe clean sealing plug and surrounding area.
2. Remove plug and fit a suitable grease nipple
3. Apply a grease gun until grease exudes from the pressure release hole in the side of the pump.
4. Remove grease nipple and replace blanking plug.
5. Wipe away surplus grease.



NT2473

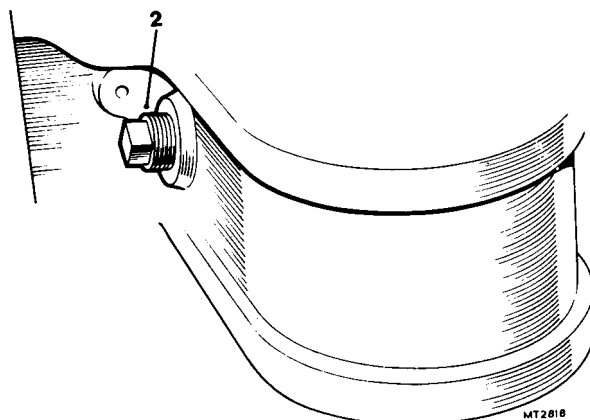


**NOTE: OPERATIONS 40 to 52 ARE BEST CARRIED OUT WITH THE CAR ON A RAMP OR OVER A PIT.**

### (40) Check/top up level of gearbox and overdrive oil

*With vehicle standing level*

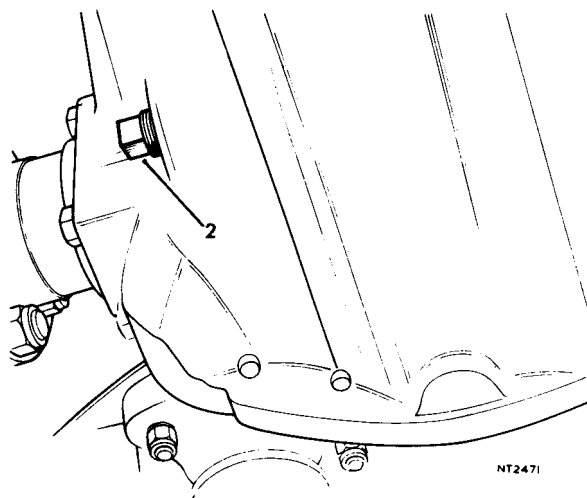
1. Wipe clean gearbox filler plug and surrounding area.
2. Remove filler plug.
3. Add new oil of the recommended grade, via the filler plug hole, until the oil level reaches the bottom of the hole.
4. Allow surplus oil to drain.
5. Replace filler plug.
6. Tighten plug to 20 to 25 lbf ft (2.8 to 3.5 kgf m).
7. Wipe away surplus oil.



### (41) Check/top up level of final drive unit oil

*With vehicle standing level*

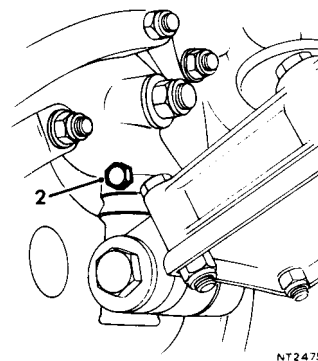
1. Wipe clean final drive unit filler plug and surrounding area.
2. Remove filler plug.
3. Add new oil of the recommended grade, via the filler plug hole, until the oil level reaches the bottom of the hole.
4. Allow surplus oil to drain.
5. Replace filler plug.
6. Tighten plug to 20 to 25 lbf ft (2.8 to 3.5 kgf m).
7. Wipe away surplus oil.



### (42) Lubricate lower steering swivel

**WARNING: OIL must be used for the operation. Do NOT use grease.**

1. Wipe clean the plug and surrounding area.
2. Remove the plug.
3. Fit a suitable grease nipple to the plug hole.
4. Using a grease gun, **CHARGED WITH A RECOMMENDED OIL**, lubricate the lower steering swivel, via the grease nipple, until oil exudes from the bearing.
5. Remove grease nipple
6. Refit plug.
7. Wipe away surplus oil.



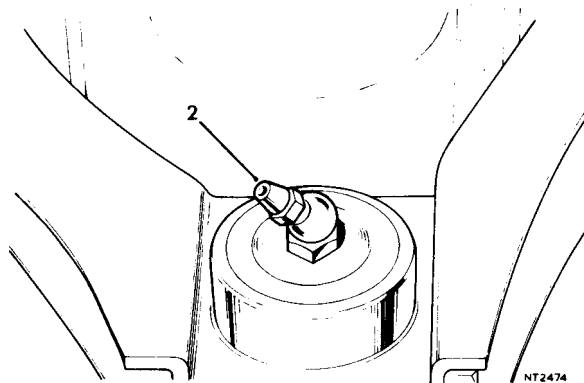
**(43) Lubricate all grease points except hubs**

*Suspension upper ball joint*

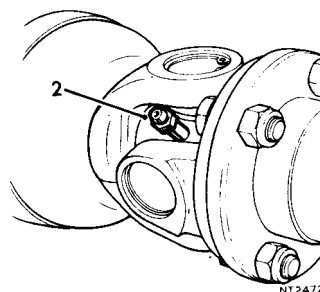
1. Wipe clean the sealing plug and surrounding area
2. Remove plug and fit a suitable grease nipple.
3. Apply a grease gun until grease exudes from the joint.
4. Remove grease nipple and replace sealing plug.
5. Wipe away surplus grease.

*Inner drive shaft universal joint*

1. Wipe clean the grease nipple and surrounding area.
2. Apply a grease gun and give **5 STROKES ONLY**.
3. Wipe away surplus grease.



NT2474



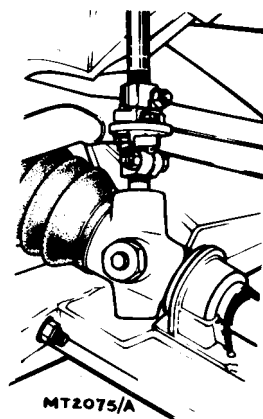
NT2472

**(44) Lubricate steering rack and pinion**

1. Wipe clean the plug and surrounding area.
2. Remove the plug.
3. Fit a suitable grease nipple to the plug hole.
4. Apply a grease gun to nipple and stroke for 5 times only.

**CAUTION:** Over greasing can cause damage to the rubber bellows.

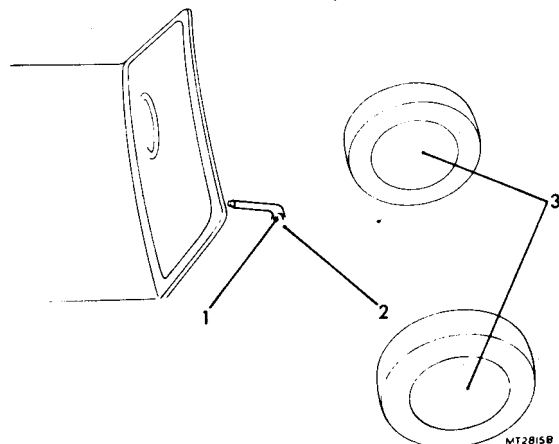
5. Remove grease nipple.
6. Refit plug.
7. Wipe away surplus grease.



MT2075/A

**(45) Lubricate handbrake linkage and cables**

1. Lubricate handbrake pivot.
2. Smear grease around handbrake lever cable connections, working it well into the clevis pin.
3. Smear grease around brake drum cable connections, working it well into the clevis pin.
4. Grease exposed sections of inner cable to resist corrosion.



NT2815B



## MAINTENANCE

- (46) Check engine, transmission, final drive, suspension and steering unit for oil leaks and report.

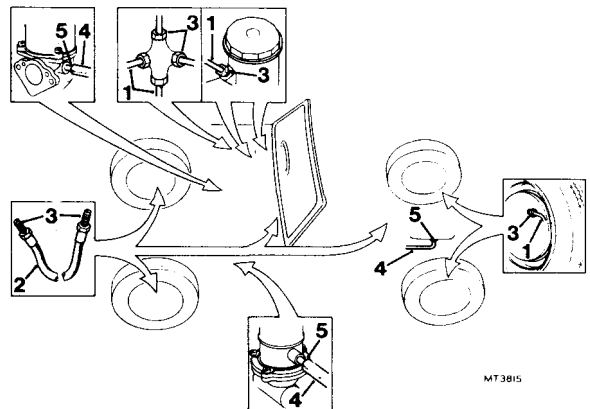
- (47) Check visually brake, fuel and clutch pipes, hoses and unions for chaffing leaks and corrosion and report.

*Check visually*

1. Brake and clutch pipes.
2. Brake and clutch hoses.
3. Brake and clutch pipe and hose unions.
4. Fuel pipes.
5. Fuel pipe unions.

*for chaffing leaks and corrosion.*

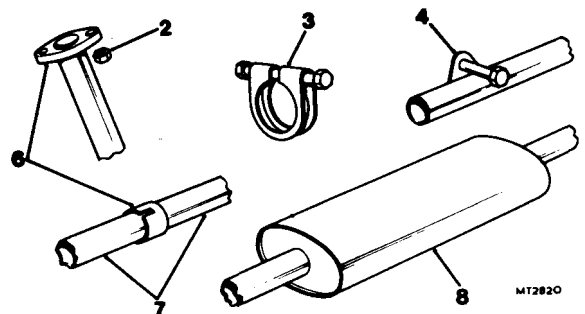
6. Report any defects found.



MT3815

- (48) Check/report exhaust system for leakage and security

1. Place car on ramp or over a pit.
2. Check security of exhaust pipe to manifold nuts, which if correct should be tightened to 20 to 25 lbf ft (2.8 to 3.5 kgf m).
3. Check security of exhaust pipe joint clips.
4. Check security of exhaust system mounting bolts.
5. Using a second operator, run engine at fast idle speed.
6. Check exhaust system joints for leaks.
7. Check exhaust pipes for leaks arising from damage or deterioration.
8. Check exhaust silencers for leaks arising from damage or deterioration.
9. Stop engine.
10. Report any defects found.



MT2820

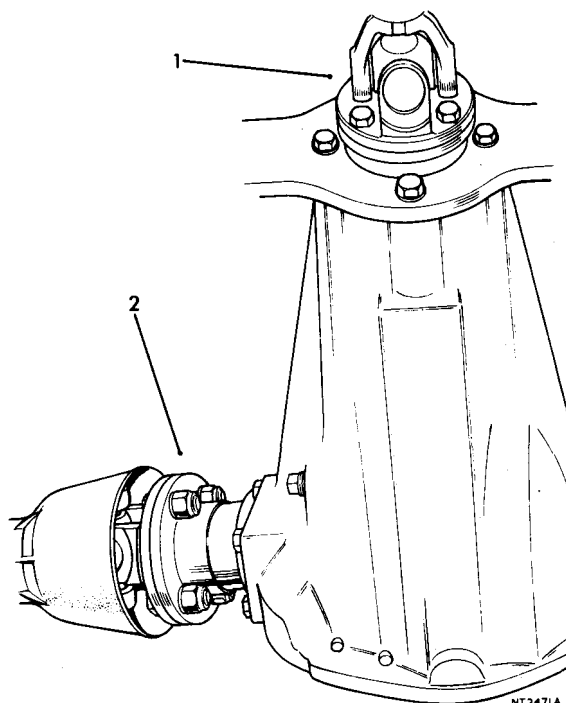
- (49) Check security of suspension fixings, tie-rod levers, steering unit attachment and steering universal joint coupling bolts.

*Check security of*

1. Suspension fixings,
2. Tie-rod levers,
3. Steering unit attachment,
4. Steering universal joint coupling bolts.

- (50) Check security of propeller shaft and drive shaft universal coupling bolts

1. Check security of propeller shaft coupling bolts, which if correct should be tightened to 26 to 34 lbf ft (3.6 to 4.7 kgf m).
2. Check security of half shaft to final drive unit coupling bolts, which if correct should be tightened to 26 to 34 lbf ft (3.6 to 4.7 kgf m).



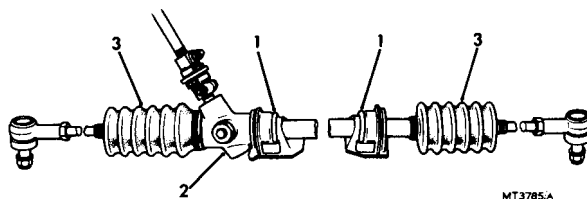
- (51) Check security of sub-frame or body mountings

*Using page 06 as a guide*

1. Check security of sub-frame mounting bolts/nuts.

- (52) Check/report condition of steering unit/joints for security, backlash and gaiter condition

1. Check security of steering unit mounting and steering joints, using page 06 as a guide.
2. Check steering for backlash.
3. Check condition of steering gaiters.
4. Report any defects found.



- (53) Adjust front hubs

See 60.25.13

- (54)(55) Check/adjust/report front and rear wheel alignment with tracking equipment.

Front wheel alignment – See 57.65.01

Rear wheel alignment – See 64.25.17

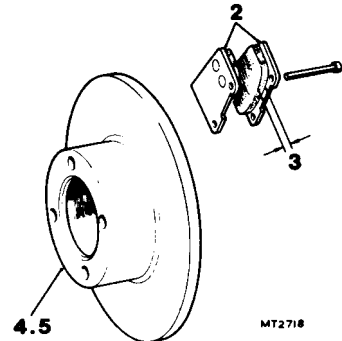
## (56) Inspect brake pads for wear and discs for condition

### *Front brakes*

1. Jack up front of car and place safely on stands.
2. Remove front brake pads – See 70.40.02

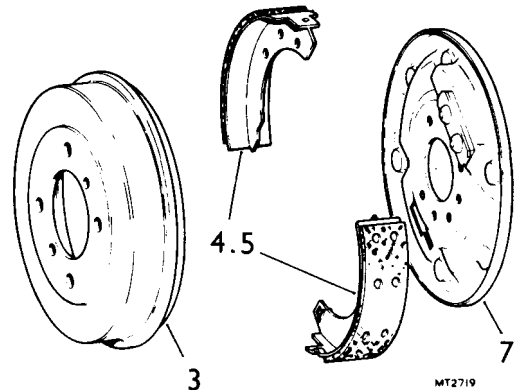
**CAUTION:** Do NOT depress the brake pedal while pads are removed.

3. Report pad condition if the friction lining has been reduced to 0.125 inch (3 mm) or if there is not sufficient material to provide a thickness of 0.125 in (3 mm) at the completion of a further 3,000 miles (5,000 km) motoring.
4. Check brake discs for excessive scoring and report this if present.
5. Check brake discs for run out and report this if it exceeds 0.007 in (0.178 mm).
6. Refit front brake pads – See 70.40.02
7. Lower car off stands.



## (57) Inspect and report brake linings for wear and drums for condition

1. Jack up car and place safely on stands.
2. Remove road wheel – See 74.20.01.
3. Remove brake drum – See 70.10.02 (front) or 70.10.03 (rear).
4. Check brake linings for wear and report if linings are excessively worn.
5. Check brake linings for damage and contamination by oil or grease and report if linings are damaged or contaminated.
6. Check brake drums for wear, scoring or other damage and report if drums are excessively worn, scored or damaged.
7. Remove dust, oil and grease from brake drum and backplate.
8. Refit brake drum – See 70.10.02 (front) or 70.10.03 (rear).
9. Refit road wheel – See 74.20.01.
10. Lower car off stands.



**(58) Check security of road wheel fastenings.**

*Disc Wheels*

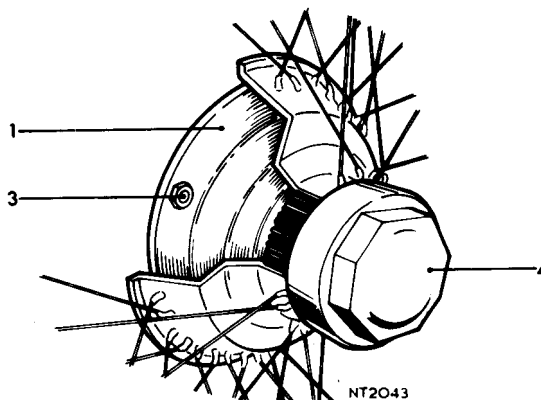
*For each wheel in turn:-*

1. Check tightness of road wheel securing nuts, which if correct should be tightened to 60 to 80 lbf ft (8.3 to 11.1 kgf m).

*Wire Wheels*

*For each wheel in turn*

1. Visually check that adaptor is fitted on the correct side.
2. Remove road wheel – See 74.20.01.
3. Check tightness of the adaptor securing nuts, which if correct should be tightened to 55 to 65 lbf ft (7.6 to 9.0 kgf m).
4. Replace road wheel – See 74.20.01 ensuring that the centre nut is correctly secured.



**(59) Check that tyres are in accordance with manufacturers specification**

*For each road wheel and spare wheel:-*

1. Check that tyres are in accordance with vehicle manufacturers recommendations for type and size and report any deviation.
2. Check for mixing of cross ply and radial ply tyres and report if both types are present on the vehicle (including spare wheel).

**WARNING:** It is illegal in the U.K. and highly dangerous to mix cross ply and radial ply tyres on the same axle or to fit radial ply tyres to the front wheels only.

- (60) Check visually and report depth of tread, cuts in tyre fabric, exposure of ply or cord structure, lumps or bulges

*For each road wheel and spare wheel:-*

1. Check tread depth, which if correct should show 1 mm (0.039 in) of tread (excluding wear bars) over three quarters of the breadth for the entire circumference of the tyre.

**WARNING:** It is illegal in the U.K. to use a car of this type fitted with tyres that have a tread depth below this minimum or tyres on which the tread is worn level with the wear indicator bars.

*Check for*

2. Cuts in the tyre fabric.
3. Exposure of ply or cord structure.
4. Lumps or bulges on tyre circumference.
5. Lumps, bulges or other damage on tyre walls.

**WARNING:** It is illegal in the U.K. to use a car fitted with tyres in a damaged condition.

- (61) Check/adjust tyre pressures (including spare wheel)

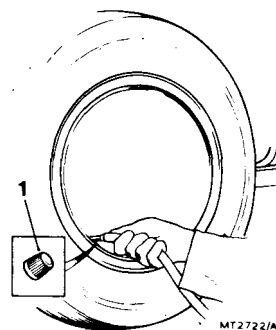
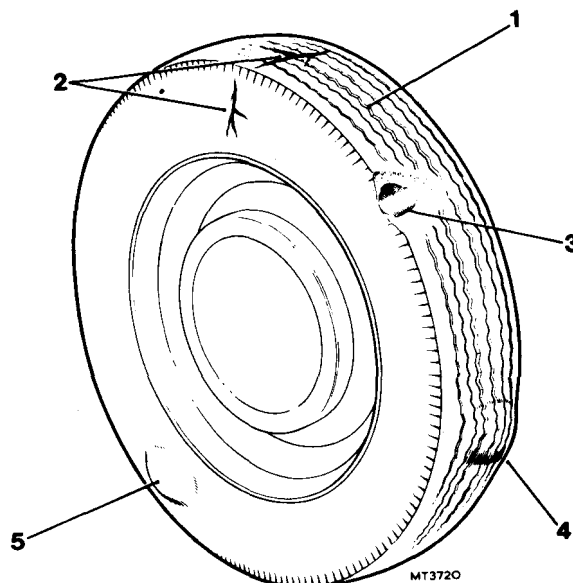
*With all tyres at ambient temperature:-*

1. Remove protective dust cap.
2. Using a tyre pressure gauge, tested for accuracy, check tyre pressure.

Recommended tyre pressures for the different tyre types that may be fitted are shown on page 04-3

3. Adjust tyre pressure as necessary.
4. Replace dust cap or renew if missing.

**WARNING:** It is illegal in the U.K. to use a car with the tyres inflated to a pressure that is not suitable for the use to which the vehicle is put.

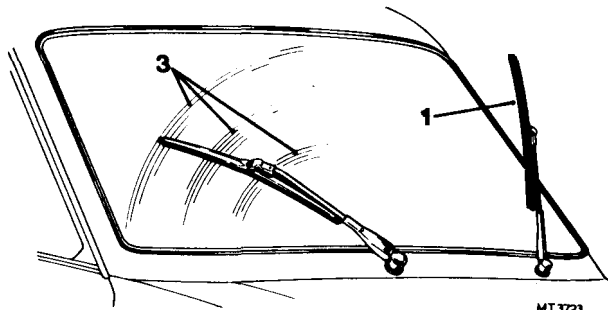


**(62)(63) Check/adjust/report headlamp alignment**

See 86.40.18

**(64) Check, if necessary replace windscreen wiper blades**

1. Examine each wiper blade in turn for damage.
2. With wiper blades in position and windscreen wet, operate wiper motor.
3. Check wiper blade operation for smearing and adequate removal of dirt.
4. Stop wiper motor.
5. If the checks in procedures 1 and 3 are not satisfactory, replace one or both wiper blades as necessary – See 84.15.05.

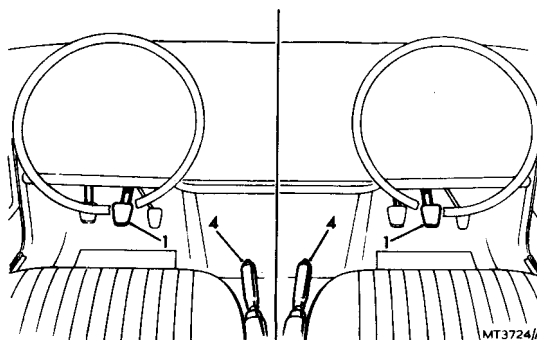


**(65) Fuel tank filler cap – check seal for security**

See 17.15.01

**(66) Check brake pedal travel and handbrake operation, adjust if necessary.**

1. With handbrake in 'off' position, check brake pedal for sponginess and excessive travel.
2. If brake pedal has spongy operation, bleed and adjust brakes – See 70.25.01.
3. If brake pedal travel is excessive, adjust brakes – See 70.25.03.
4. With foot clear of brake pedal, check handbrake for excessive travel.
5. If handbrake travel is excessive, adjust handbrake – See 70.35.10.



**(67) Check/report brake pedal travel and handbrake operation.**

1. With handbrake in 'off' position, check brake pedal for spongy operation and excessive travel.
2. Report brake pedal condition.
3. With foot clear of brake pedal, check handbrake for excessive travel.
4. Report handbrake operation.



## MAINTENANCE

---

### (68) Check operation of window controls, locks and bonnet release.

*Check operation of:-*

1. Window raising and lowering controls.
2. Internal door locks.
3. External door locks.
4. Luggage compartment lock.
5. Bonnet release controls.
6. Report any defects found.

### (69) Check function of all electrical systems and windscreen washer.

*In sequence, check operation of:-*

1. Side, tail and headlamps (including headlamp dip/main beam and 'flash' controls).
2. Instrument panel illumination.
3. Interior light.
4. Horn(s).
5. Auxiliary lights.

*With ignition circuits energised, check operation of:*

6. All warning lights (including 'hazard' warning lights if fitted).
7. Fuel level indicator.
8. Heater blower motor.
9. Windscreen washers.
10. Windscreen wipers.
11. Direction indicators.
12. Brake lights.
13. Reversing lights.
14. Start engine and note that oil pressure warning light has extinguished.

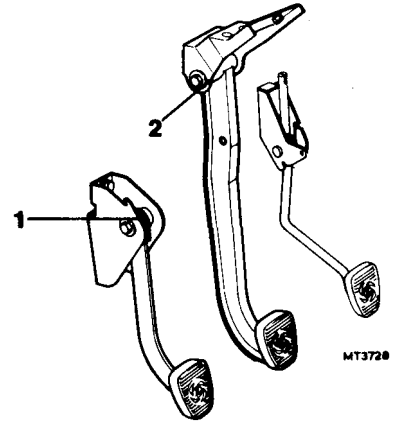
*Check operation of:-*

15. Charging system warning light in relation to engine speed.
16. Temperature indicator.
17. Radio (if fitted),
18. Switch off engine and return ignition switch to the auxiliary position, then recheck the function of any fitted accessories e.g. a radio, that are supplied with power from this switch position.
19. Report any defects found.

(70) Lubricate clutch and brake pedal pivots.

*Using an oil can, lubricate*

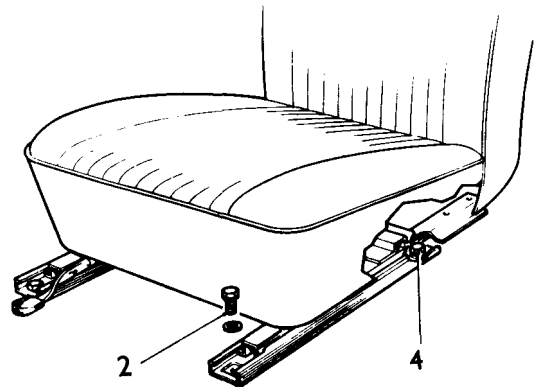
1. Clutch pedal pivot.
2. Brake pedal pivot.
3. Wipe away surplus oil to prevent staining the carpet.



(71) Lubricate all locks, door hinges, strikers and bonnet release.

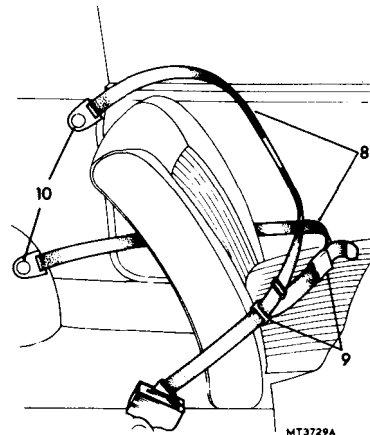
*Using an oil can, lubricate*

1. Door locks.
2. Door hinges.
3. Door strikers.
4. Luggage compartment lock.
5. Bonnet release mechanism.
6. Wipe away surplus oil.



(72) Check/report condition and security of seats and seat belts.

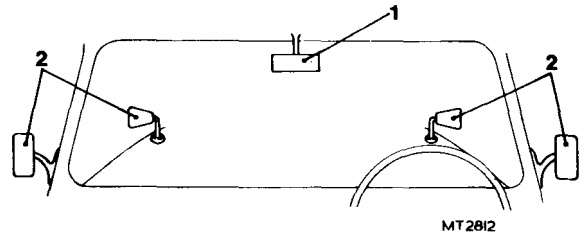
1. Move driver's seat back to its fullest extent.
2. Check security of front bolts holding seat runner to floor.
3. Move driver's seat forward to its fullest extent.
4. Check security of rear bolts holding seat runner to floor.
5. With seat in middle position, check security of seat in runner.
6. Repeat the procedure in 1 to 5 for passenger seat.
7. Check seat tipping and lock mechanisms.
8. Check seat belts for wear and damage.
9. Check seat belt connections for wear and damage.
10. Check security of seat belt anchorage bolts, which if correct should be tightened to 24 to 32 lbf ft (3.3 to 4.4 kgf m).
11. Report any defects found.



## MAINTENANCE

### (73) Check/report rear view mirrors for looseness, cracks and crazing.

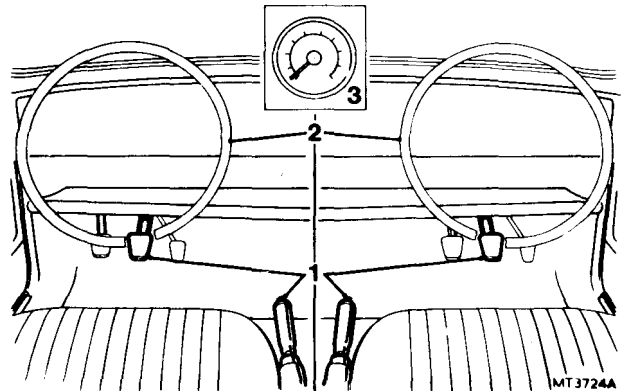
1. Check interior mirror for looseness, cracks and crazing.
2. Check external mirrors (when fitted) for looseness, cracks and crazing.
3. Report on condition of mirrors.



### (74) Road/Roller test and report additional work required

In addition to the general road test, pay particular attention to:-

1. The efficiency and function of the footbrake and handbrake.
2. The function of the steering mechanism.
3. The function of the speedometer.



### (75) Ensure cleanliness of controls, door handles, steering wheel etc.

1. Check steering wheel, gear lever, bonnet release control and fascia controls etc. for dirt and damage attributable to the service just completed.
2. Check door trims, locks and window controls for dirt and damage attributable to the service just completed.
3. Check seats, carpets and pedal rubbers for dirt and damage attributable to the service just completed.

## ENGINE OPERATIONS

|   |          |
|---|----------|
| Cam followers — set — remove and refit . . . . .                                    | 12.29.57 |
| Camshaft — remove and refit . . . . .   | 12.13.01 |
| Connecting rod bearing  |          |
| — set — remove and refit . . . . .  | 12.17.16 |
| — one — remove and refit . . . . .  | 12.17.17 |
| — extra each — remove and refit . . . . .   | 12.17.18 |
| Connecting rods and pistons   |          |
| — remove and refit . . . . .  | 12.17.01 |
| — Overhaul . . . . .  | 12.17.10 |
| Crankcase front sealing block . . . . .   | 12.25.11 |
| Crankshaft — remove and refit . . . . .   | 12.21.33 |
| Crankshaft end-float — check and adjust . . . . .                                   | 12.21.26 |
| Crankshaft pulley — remove and refit . . . . .                                      | 12.21.01 |
| Crankshaft rear oil seal — remove and refit . . . . .                               | 12.21.20 |
| Cylinder block drain plug — remove and refit . . . . .                              | 12.25.07 |
| Cylinder block front mounting plate gasket — remove and refit . . . . .             | 12.25.10 |
| Cylinder block — rebore . . . . .   | 12.25.23 |
| Cylinder head   |          |
| — overhaul . . . . .  | 12.29.18 |
| — remove and refit . . . . .  | 12.29.10 |
| Cylinder head gasket — remove and refit . . . . .                                   | 12.29.01 |
| Cylinder head nuts — tighten . . . . .  | 12.29.27 |
| Cylinder pressures — check . . . . .  | 12.25.01 |
| Decarbonize, reface all valves and seats, grind-in valves,<br>tune engine . . . . . | 12.29.21 |
| Distributor drive shaft — carburettor model — remove and refit . . . . .            | 12.10.22 |
| Distributor drive shaft — P.I. model — remove and refit . . . . .                   | 12.10.22 |

*Continued*

## ENGINE

Continued

|  |          |
|--|----------|
| Oil sump — remove and refit . . . . .                      | 12.60.44 |
| Pedestal seals — PI. . . . .                               | 12.10.24 |
| Piston and/or rings  |          |
| — engine set — remove and refit . . . . .                  | 12.17.03 |
| — extra each — remove and refit . . . . .                  | 12.17.06 |
| Push-rods — set — remove and refit . . . . .               | 12.29.59 |
| Rocker adjusting screws — set — remove and refit . . . . . | 12.29.56 |
| Rocker cover — remove and refit . . . . .                  | 12.29.42 |
| Rocker shaft assembly — overhaul . . . . .                 | 12.29.55 |
| Rocker shaft — remove and refit . . . . .                  | 12.29.54 |
| Spigot bush — remove and refit . . . . .                   | 12.21.45 |
| Starter ring gear — remove and refit . . . . .             | 12.53.19 |
| Timing chain — remove and refit . . . . .                  | 12.65.14 |
| Timing chain and gears — remove and refit . . . . .        | 12.65.12 |
| Timing chain tensioner — remove and refit . . . . .        | 12.65.28 |
| Timing cover oil seal — remove and refit . . . . .         | 12.65.05 |
| Timing chain cover — remove and refit . . . . .            | 12.65.01 |
| Valve clearance — check and adjust . . . . .               | 12.29.48 |
| Valve guides   |          |
| — exhaust — remove and refit . . . . .                     | 12.29.71 |
| — inlet — remove and refit . . . . .                       | 12.29.70 |
| Valve timing — check . . . . .                             | 12.65.08 |
| Valves   |          |
| — exhaust — remove and refit . . . . .                     | 12.29.60 |
| — inlet and exhaust — remove and refit . . . . .           | 12.29.62 |
| — inlet — remove and refit . . . . .                       | 12.29.63 |

## ENGINE

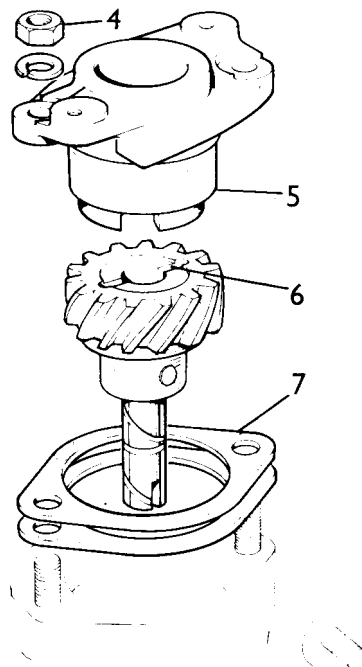
### DISTRIBUTOR DRIVE SHAFT – CARBURETTOR ENGINE

#### – Remove and refit

12.10.22

#### Removing

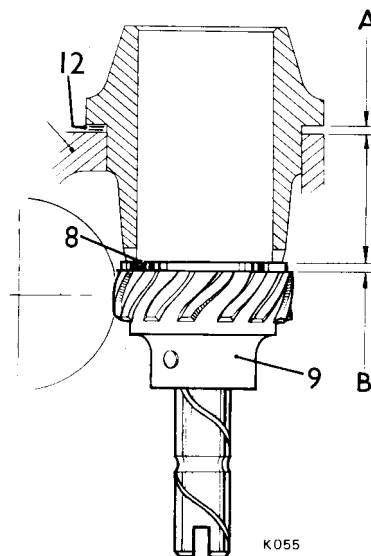
1. Isolate the battery.
2. Turn the engine over until the pointer on the timing cover coincides with the 4° A.T.D.C. mark on the crankshaft pulley, number one cylinder firing.
3. Remove the distributor 86.35.20.
4. Remove the two nuts and spring washers securing the pedestal to the cylinder block.
5. Remove the pedestal.
6. Check that the position of the distributor drive slot is correct (see instruction 13) and lift out the distributor drive shaft and gear.
7. Remove the gaskets.



#### Establishing the distributor drive shaft end-float

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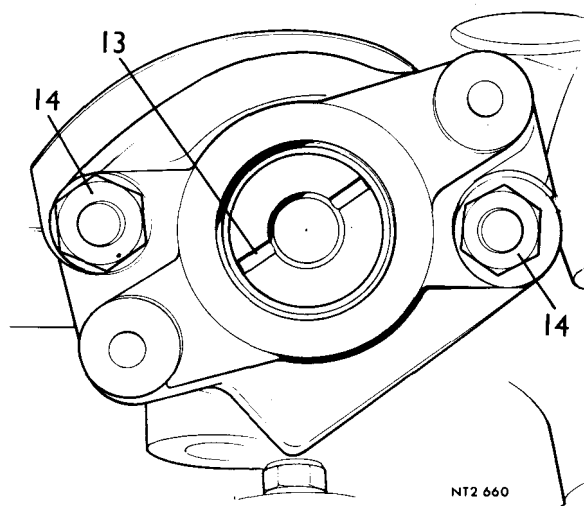
8. Place a flat washer on top of the oil pump shaft bush.
  9. Fit the distributor drive shaft and gear in position over the washer ensuring that the oil pump drive dog is engaged.
  10. Fit the pedestal without gaskets and using a feeler gauge measure and note the gap A between the pedestal and cylinder block flange.
  11. Remove the pedestal and distributor drive shaft and measure the thickness of the washer with a micrometer.
  12. Allowing 0.005 in (0.127 mm) end-float assess the required number and thickness of gaskets needed as in the following examples a and b.
- |    |                                  |                         |
|----|----------------------------------|-------------------------|
| a. | Washer thickness B               | 0.075 in (1.905 mm)     |
|    | Measured gap A                   | 0.074 in (1.880 mm)     |
|    | End float                        | 0.001 in (0.025 mm)     |
|    | Gaskets required to the value of | 0.004 in (0.102 mm)     |
| b. | Washer thickness B               | 0.075 in (1.905 mm)     |
|    | Measured gap A                   | 0.080 in (2.032 mm)     |
|    | Pre-load                         | – 0.005 in (– 0.127 mm) |
|    | Gasket required to the value of  | 0.010 in (0.254 mm)     |



Continued

**Refitting**

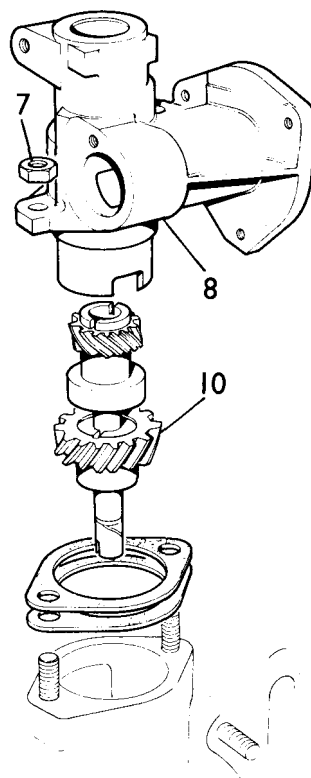
13. Fit the distributor drive shaft and gear ensuring that the oil pump drive dog engages correctly and the distributor drive off-set slot is towards the engine.
14. Fit the gaskets as calculated and assemble the pedestal to the cylinder block and secure with the two nuts and spring washers.
15. Refit the distributor and check the ignition timing.

**DISTRIBUTOR DRIVE SHAFT – P.I.****– Remove and refit****12.10.22****Removing**

1. Isolate the battery.
2. Disconnect the main fuel feed union to the fuel metering distributor.
3. Disconnect the tachometer drive from the ignition distributor.
4. Disconnect the fuel distributor unit lubricate return pipe.
5. Turn the crankshaft to bring numbers one and six pistons to T.D.C. number one firing.
6. Note the position of the rotor arm and remove the distributor complete with the cap and leads.
7. Remove the two nuts and washers securing the pedestal to the cylinder block.
8. Remove the pedestal complete with the fuel metering distributor whilst preventing the ignition distributor drive shaft from being removed as well.

**NOTE:** Take care not to allow the fuel metering distributor drive pinion to rotate so that the necessity to retime will be prevented.

9. Check that the position of the ignition distributor gear drive slot is correct for reassembly purposes.
10. Remove the distributor drive shaft and gear complete and note the position of the oil pump drive dog.

*Continued*

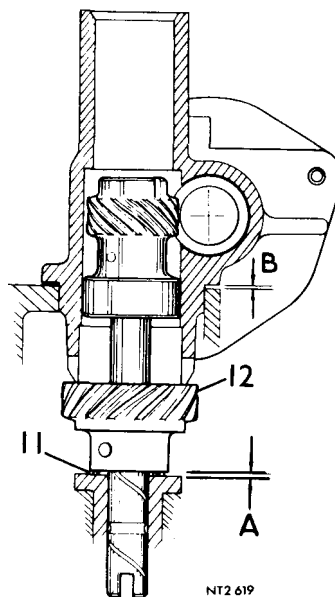


## ENGINE

### Establishing distributor drive shaft end-float

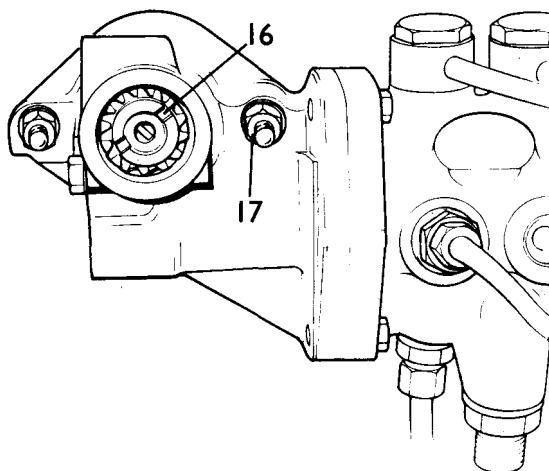
11. Place a flat washer on top of the oil pump shaft bush.
12. Fit the distributor drive shaft and gear in position over the washer ensuring that the oil pump drive dog is engaged.
13. Fit the pedestal without gaskets and using a feeler gauge measure and note the gap 'B' between the pedestal and the cylinder block flange.
14. Remove the pedestal and the distributor drive shaft. Remove the measure the thickness of the washer with a micrometer.
15. Allowing 0.005 in (0.127 mm) end float assess the required number and thickness of gaskets needed as in the following examples a and b:—

- |    |                                  |                        |
|----|----------------------------------|------------------------|
| a. | Washer thickness A               | 0.075 in (1.905 mm)    |
|    | Measured gap B                   | 0.074 in (1.880 mm)    |
|    | End-float                        | 0.001 in (0.025 mm)    |
|    | Gaskets required to the value of | 0.004 in (0.102 mm)    |
| b. | Washer thickness A               | 0.075 in (1.905 mm)    |
|    | Measured gap B                   | 0.080 in (2.032 mm)    |
|    | Pre-load                         | -0.005 in (- 0.127 mm) |
|    | Gaskets required to the value of | 0.010 in (0.254 mm)    |



### Refitting

16. Fit the distributor drive shaft and gear ensuring that the shaft engages properly with the oil pump drive shaft and the distributor drive off-set slot is towards the engine.
17. Fit the gaskets as calculated and assemble the pedestal and metering unit to the cylinder block and secure with the two nuts and washers.
18. Check the fuel metering distributor timing instructions 3 to 6 19.35.01 and adjust instructions 7 to 11 19.35.01 if necessary.
19. Reverse instructions 1 to 4 and run the engine.



### DATA

Distributor drive shaft end-float 0.003 to 0.007 in (0.076 to 0.177 mm).

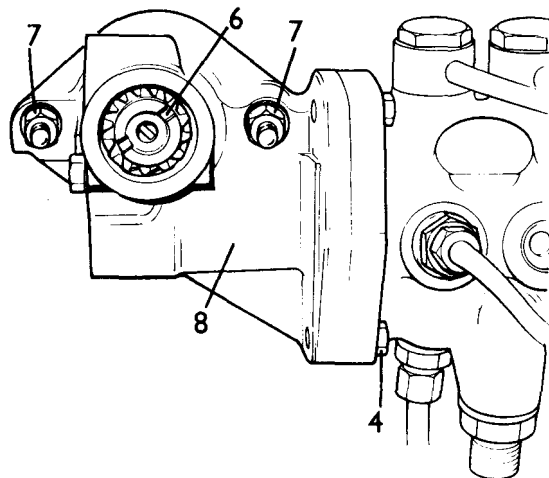
## PEDESTAL OIL SEALS – P.I. ONLY

– Remove and refit

.12.10.24

## Removing

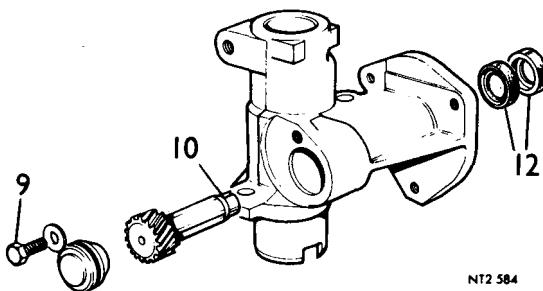
1. Isolate the battery.
2. Turn the engine over until number one piston is at T.D.C. on the firing stroke and the ignition distributor rotor arm is pointing to number one cylinder electrode in the distributor cap. Do not turn the engine again until completion of the operation.
3. Remove the ignition distributor.
4. Remove the three bolts securing the fuel metering distributor to the pedestal flange and move the unit away from the pedestal. Instruction 8 19.35.07.
5. Remove the plastic drive dog and rubber 'O' ring.
6. Check that the position of the distributor drive shaft off-set slot is correct for the purposes of reassembly.
7. Remove the two nuts securing the pedestal to the cylinder block.
8. Withdraw the pedestal complete with the drive shaft ensuring that the gaskets between the pedestal and the cylinder block are left in position since they are necessary to maintain the correct end-float on the distributor drive shaft. See operation 12.10.22.



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0.097 = A  
 0.049 = B.  
 48 thou endfloat.

9. Remove the plug retaining bolt from the pinion housing.
10. Using a soft drift gently tap the drive end of the pinion shaft to release the plug and 'O' ring.
11. Continue tapping the pinion to remove it from the pedestal.
12. Using a suitable hooked tool remove the two seals taking care not to damage the pedestal bore.



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Continued

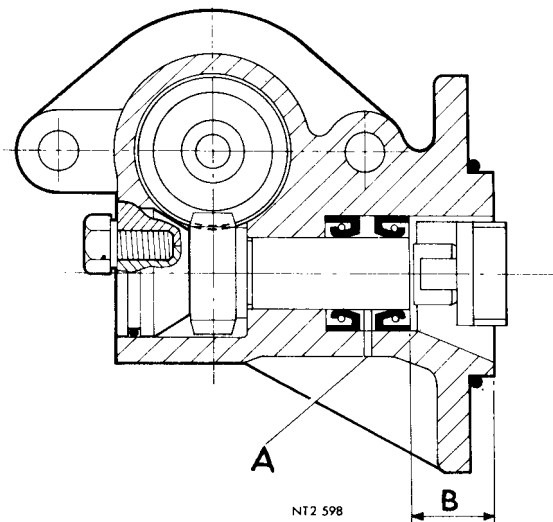
## ENGINE

### Refitting

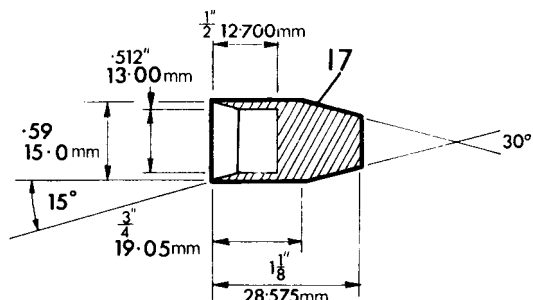
13. Degrease and clean all components to be refitted.

**NOTE:** The two lip type seals are fitted 'back to back' i.e. the lips facing away from each other. The function of the seals is to prevent cross pollution of the engine oil and the fuel from the metering distributor. A leak bleed hole A is provided between the seals to enable a leak from either seal to be noticed. It is therefore important that the seals are correctly located there-by preventing the hole from being covered by the seals.

14. Lubricate the first oil seal and with the lip face leading press-in the seal squarely, using a 29/32 in (22.9 mm) drift, to the end of the bore leaving the bleed hole uncovered.
15. Lubricate the second seal and with the lip face trailing press in the seal until flush with the end of the inner bore and 0.71 in (18 mm) from the flange boss — dimension B
16. Check that the bleed hole is clear since rubber flashings from the seals may cause an obstruction.



17. To prevent damage being caused to the seals when fitting the pinion, make up a protective cover to the dimensions shown.
18. With the protective cover in position press the pinion through the oil seals.



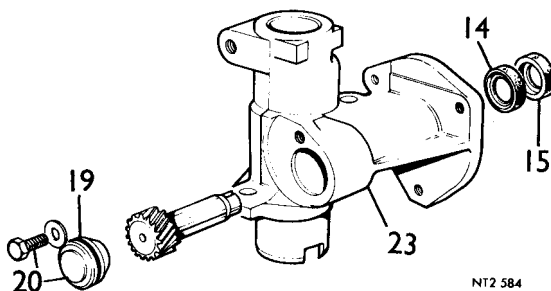
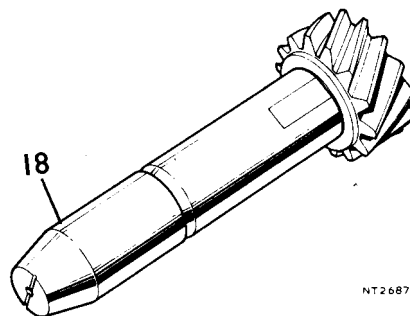
19. Fit a new 'O' ring to the plug and lubricate before fitting to the pedestal.
20. Secure the plug with the retaining bolt and washer and remove the protective cover from the pinion.
21. Refit the distributor drive shaft ensuring that the off-set slot in the drive member is correct — instruction 6.
22. Check that the gaskets between the pedestal and cylinder block mating faces are in position.

**CAUTION:** Should the gaskets be damaged or lost the drive shaft end-float must be re-established. See operation 12.10.22.

23. Refit the pedestal to the cylinder block ensuring that the pinion drive slot is in the vertical position. Secure with the nuts and washers. See instruction 13 — 19.35.07.

**NOTE:** It may be necessary to remove and refit the pedestal several times in order to turn the pinion to achieve the correct position of the slot.

24. Refit the metering distributor — instructions 14 to 18. 19.35.07.
25. Refit the ignition distributor checking that the conditions are the same as in instructions 2.
26. Reconnect the battery.



## CAMSHAFT

## – Remove and refit

12.13.01

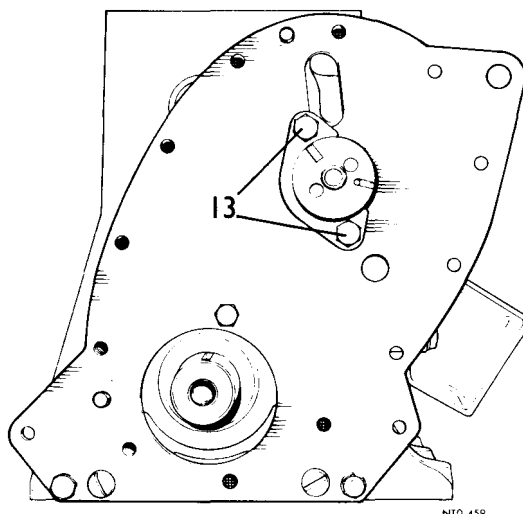
Special tool S341

## Removing

1. Remove the radiator grille 76.55.03.
2. Remove the cylinder head 12.29.10.
3. Withdraw the camfollowers, identifying them for reassembly.

**NOTE:** Instructions 4 to 6 – Carburettor engines and Instructions 7 to 11 for P.I. engines.

4. Remove the mechanical fuel pump 19.45.08.
5. Disconnect the tachometer drive and remove the two nuts securing the pedestal to the cylinder block and withdraw the ignition distributor and pedestal complete.
6. Check that the position of the distributor drive slot is correct for reassembly purposes and remove the drive gear.
7. Disconnect the tachometer drive.
8. Slacken the ignition distributor clamp bolt and remove the distributor.
9. Disconnect the main fuel feed to the metering distributor.
10. Remove the two nuts and withdraw the pedestal complete with the metering distributor.
11. Check that the position of the ignition distributor drive slot is correct for reassembly purposes and remove the drive gear shaft.
12. Remove the timing chain and sprockets 12.65.12.
13. Remove the two bolts and withdraw the camshaft keeper plate.

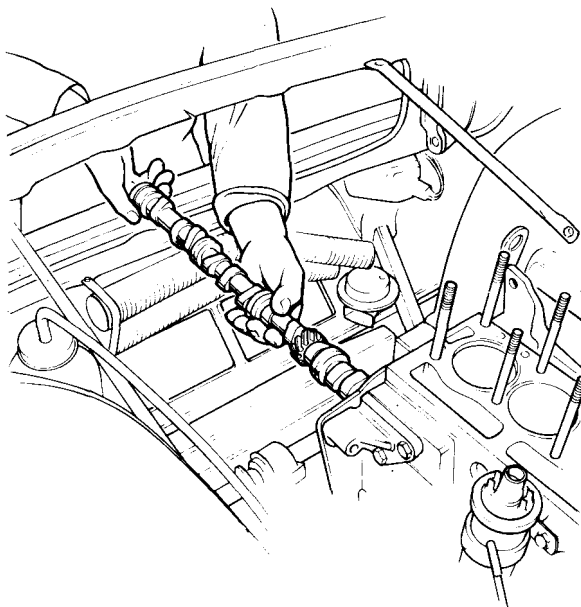


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14. Remove the two nuts and bolts and disconnect the L.H. engine mounting from the chassis bracket. Raise the engine sufficiently to withdraw the camshaft through the grille aperture.

**CAUTION:** Ensure that before raising the engine the speedometer cable is repositioned so that it will not become trapped between the bell housing and the bulkhead.

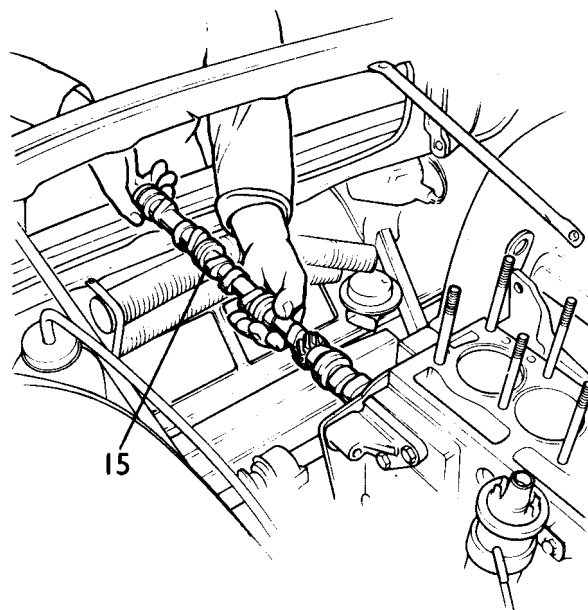
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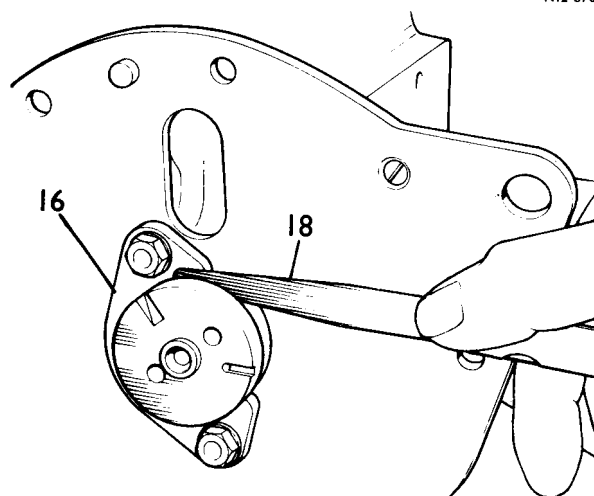
NT2 678

## Refitting

15. With the flat end leading and the spigot end trailing pass the camshaft through the radiator grille and insert it into the cylinder block taking care not to damage the camshaft bearing surfaces in the block.
16. Secure the camshaft in position with the keeper plate and tighten the retaining bolts.
17. Lower the engine and reconnect the L.H. engine mounting.
18. Check the camshaft end float by pulling the camshaft out against the keeper plate and measuring the gap between the camshaft and the keeper plate with a feeler gauge — See Data. Renew the keeper plate if the gap is outside the limits.
19. Check the camshaft and crankshaft sprocket alignment — instructions 8 and 9 12.65.12.
20. Check that numbers one and six pistons are at T.D.C. number one firing.
21. Fit the camfollowers.
22. Fit the cylinder head, push rods and rocker shaft assembly.
23. Time the valves and refit the timing chain and sprockets — instructions 79 to 87, 12.41.05.
24. Reverse instructions 4 to 6 or 7 to 11.
25. Reverse instructions 1 to 4, 12.65.12.
26. Refit the radiator grille.



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## DATA

|                  |   |
|------------------|---|
| End float        | 0.004 – 0.008 in (0.102 – 0.20 mm)        |
| Journal diameter | 1.8402 – 1.8407 in (46.7411 – 46.7538 mm) |

## CONNECTING RODS AND PISTONS

## — Remove and refit

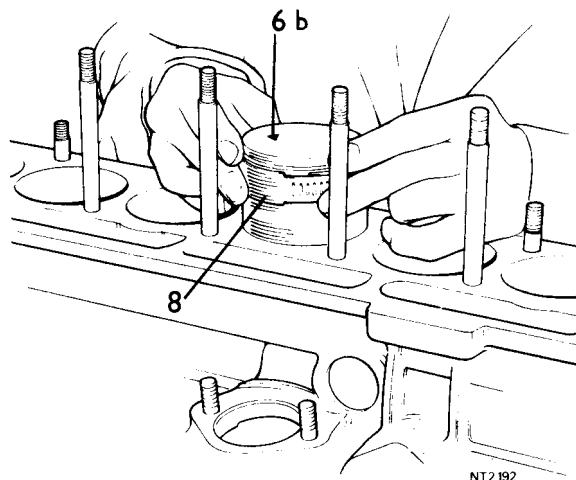
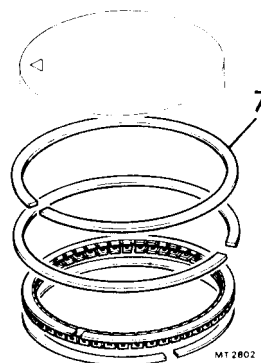
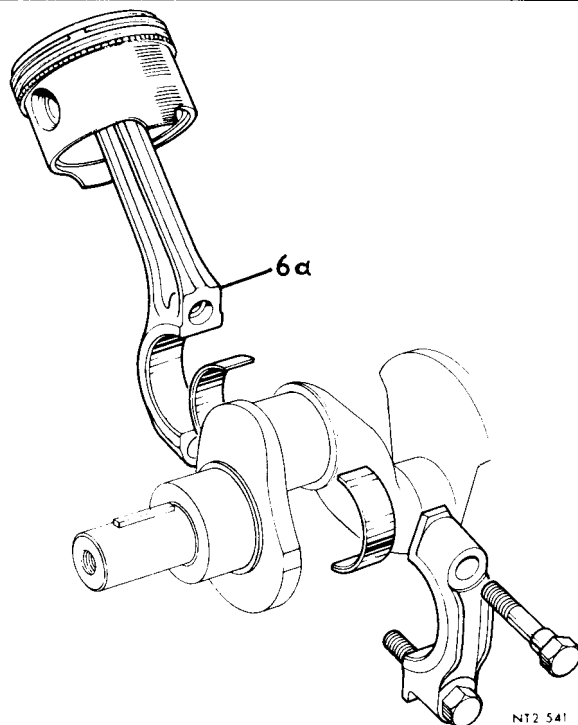
12.17.01

## Removing

1. Isolate the battery.
2. Remove the cylinder head 12.29.10.
3. Drain and remove the sump 12.60.44.
4. Remove the connecting rod bearings — instructions 3 to 8, 12.17.16.
5. Push the connecting rods and pistons up the cylinder bores and extract the assemblies from the cylinder block.

## Refitting

6. Dealing with each piston and connecting rod in turn, lubricate the bores and carefully insert the assembly into the respective cylinder ensuring:-
  - a. that the open face of the connecting rod big-end bearing is towards the non-thrust side of the engine i.e. facing the camshaft.
  - b. the arrow ▲ on top of the piston is pointing to the front of the engine.
7. Stagger the piston ring gaps avoiding a gap on the thrust side of the piston.
8. Using a piston ring compressor gently push the piston into the bore.
9. Repeat instructions 6 to 8 on the remaining pistons.
10. Fit the upper bearing shells to the connecting rods, pull the connecting rods on to the crankpins and fit the bearing caps and lower shells — instructions 9 — 13, 12.17.16.
11. Refit the sump.
12. Refit the cylinder head.
13. Ensure that the sump is refilled with the correct grade of new oil to the high mark on the dipstick before reconnecting the battery.



## ENGINE

### PISTONS AND/OR RINGS – ENGINE SET

– Remove and refit 12.17.03

Pistons and/or rings – extra each 12.17.06

See operation 12.17.10.

### CONNECTING RODS AND PISTONS

– Overhaul 12.17.10.

Gudgeon pin bush – each – remove and refit 12.17.13

Special tools: S335, S336-4

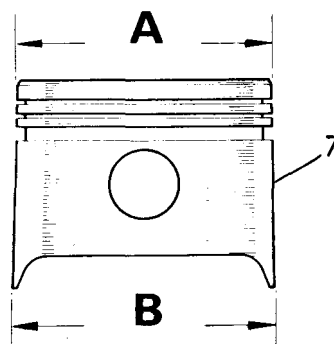
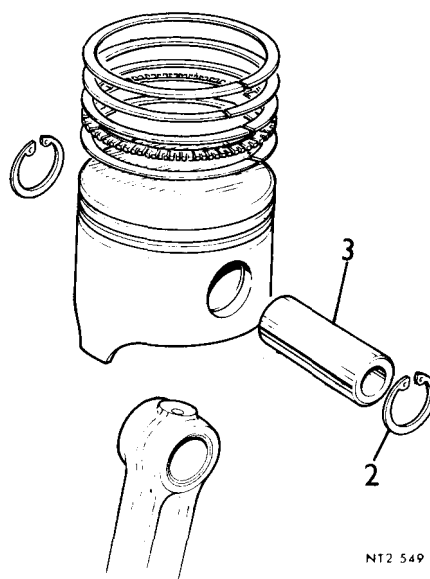
**NOTE:** Do not mix any of the components during this operation.

#### Removing

1. Remove the connecting rods and pistons 12.17.01.

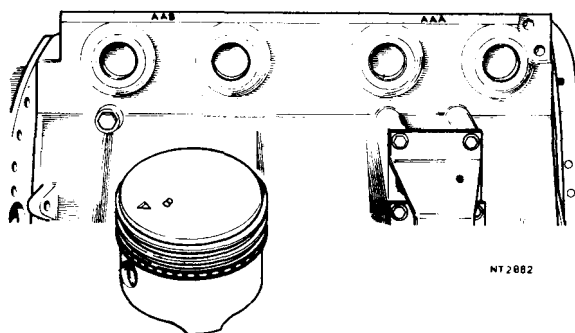
#### Dismantling

2. Remove the two circlips retaining the gudgeon pin in the piston.
3. Push out the gudgeon pin and separate the piston from the connecting rod but mark for reassembly.
4. Remove from the piston the two compression rings and the oil control ring.
5. Repeat operations 2 to 4 on the remaining pistons and connecting rod assemblies.
6. Degrease all components and remove carbon deposits from the pistons.



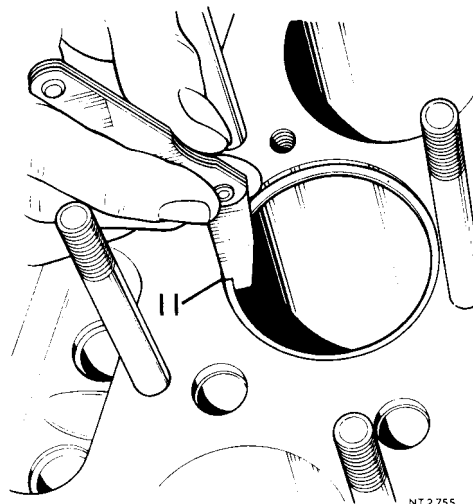
#### Examination and checking

7. Check the top dimension (A) of the pistons across the ring lands at right angles to the gudgeon pin – see Data.
  8. Check the dimension (B) of the pistons across the skirt at right angles to the gudgeon pin – see Data.
- NOTE:** The grade of each bore i.e. (A) or (B) is stamped on the cylinder block. The piston grade (A) or (B) is stamped on the piston crown, as illustrated.
9. Check the dimensions of the piston ring grooves and the gap between the piston ring and piston groove – see Data.
  10. Examine the gudgeon pin for scores and pitting. Check for wear – see data, and note that the gudgeon pin should be a light finger push fit in the piston at a temperature of 68°F.

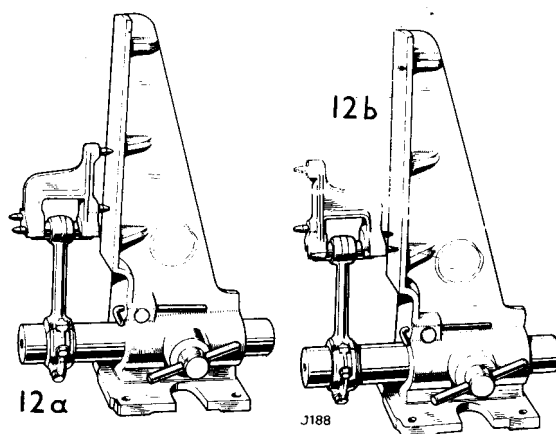


*Continued*

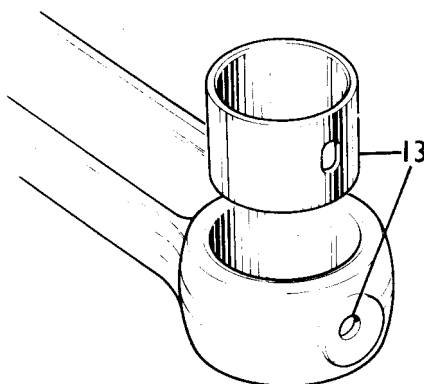
11. Check the piston ring gaps when inserted squarely into the bores – see data.



12. Using special tool S335 and adaptor arbor S336-4, check the connecting rods for  
 a) bend and  
 b) twist –  
 see data. Rods that exceed the tolerances in both conditions should be re-aligned or renewed.



13. Check the gudgeon pin bush in the connecting rods for wear and if necessary remove the old bush and fit a new one using a suitable hand press. Ensure that the oil hole in the bush corresponds with the hole in the connecting rod. Ream the new bush to size – see Data.



*Continued*

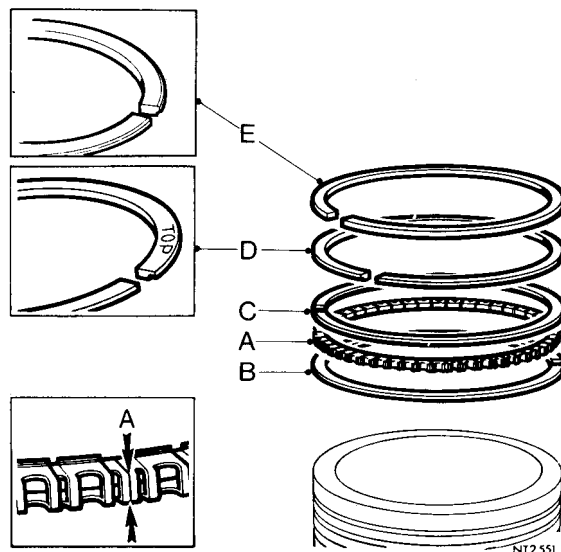


## Reassembling

14. Fit the piston rings in the following order

**NOTE:** The oil control ring comprises three parts (A), (B) and (C) namely the centre expander rail flanked by two identical chrome rails.

- A Fit the expander rail into the bottom groove ensuring that the ends butt, not overlap.
  - B Fit the bottom chrome rail to bottom groove.
  - C Fit the top chrome rail to bottom groove.
  - \*\* D Fit the second compression ring to the centre groove in the piston, with the words 'TOP' uppermost. \*\*
  - E Fit the top compression chrome ring with the groove downwards.
15. Refit the pistons to the connecting rods ensuring that:
- a. When assembled the relationship is as described and illustrated in instruction 6, 12.17.01.
  - b. The gudgeon pins are properly located by the circlips.
  - c. The oil holes in the piston gudgeon pin bosses are clear.
16. Refit the connecting rods and pistons to the engine, instructions 6 to 14, 12.17.01 ensuring that the sump is refilled with new oil to the high mark on the dipstick before the battery is reconnected.



*Continued*

## DATA

## Piston grades and dimensions

|                              |                 |   |   |   |   |   |   |   |   |
|------------------------------|-----------------|---|---|---|---|---|---|---|---|
| Bore size:                   | Grade A         | . | . | . | . | . | . | . | 2.9405 – 2.9410 in (74.689 – 74.701 mm) |
|                              | Grade B         | . | . | . | . | . | . | . | 2.9411 – 2.9416 in (74.704 – 74.717 mm) |
| Piston top dia.              | Grade A         | . | . | . | . | . | . | . | 2.9363 – 2.9368 in (74.582 – 74.595 mm) |
|                              | Grade B         | . | . | . | . | . | . | . | 2.9369 – 2.9374 in (74.597 – 74.610 mm) |
| Piston bottom dia.           | Grade A         | . | . | . | . | . | . | . | 2.9380 – 2.9385 in (74.625 – 74.638 mm) |
|                              | Grade B         | . | . | . | . | . | . | . | 2.9386 – 2.9391 in (74.640 – 74.653 mm) |
| Pistons available – oversize |                 | . | . | . | . | . | . | . | +0.020 in (+0.508 mm)                   |
| Groove width:                | top compression | . | . | . | . | . | . | . | 0.064 – 0.065 in (1.625 – 1.650 mm)     |
|                              | 2nd compression | . | . | . | . | . | . | . | 0.064 – 0.065 in (1.625 – 1.650 mm)     |
|                              | Oil control     | . | . | . | . | . | . | . | 0.157 – 0.158 in (4. – 4. mm)           |

## Piston rings

## Top compression

|   |   |   |   |   |   |   |   |   |                                       |
|---|---|---|---|---|---|---|---|---|---------------------------------------|
| – width                                 | . | . | . | . | . | . | . | . | 0.130 – 0.123 in (3.302 – 3.124 mm)   |
| – thickness                             | . | . | . | . | . | . | . | . | 0.0615 – 0.0625 in (1.562 – 1.588 mm) |
| – diameter                              | . | . | . | . | . | . | . | . | 2.9405 in (74.689 mm)                 |
| – gap when fitted to above<br>dia. bore | . | . | . | . | . | . | . | . | 0.012 – 0.017 in (0.304 – 0.431 mm)   |
| – free gap                              | . | . | . | . | . | . | . | . | 0.390 – 0.516 in (9.9 – 13.1 mm)      |

## 2nd compression

|   |   |   |   |   |   |   |   |   |                                       |
|---|---|---|---|---|---|---|---|---|---------------------------------------|
| – width                                 | . | . | . | . | . | . | . | . | 0.123 – 0.130 in (3.124 – 3.302 mm)   |
| – thickness                             | . | . | . | . | . | . | . | . | 0.0615 – 0.0625 in (1.562 – 1.588 mm) |
| – diameter                              | . | . | . | . | . | . | . | . | 2.9405 in (74.7 mm)                   |
| – gap when fitted to above<br>dia. bore | . | . | . | . | . | . | . | . | 0.008 – 0.013 in (0.203 – 0.254 mm)   |
| – free gap                              | . | . | . | . | . | . | . | . | 0.460 in (11.68 mm)                   |

## Oil control – chrome rail

|   |   |   |   |   |   |   |   |   |                                       |
|---|---|---|---|---|---|---|---|---|---------------------------------------|
| – width                                 | . | . | . | . | . | . | . | . | 0.135 – 0.141 in (3.43 – 3.58 mm)     |
| – thickness                             | . | . | . | . | . | . | . | . | 0.0230 – 0.0250 in (0.584 – 0.635 mm) |
| – diameter                              | . | . | . | . | . | . | . | . | 2.9405 in (74.7 mm)                   |
| – gap when fitted to above<br>dia. bore | . | . | . | . | . | . | . | . | 0.015 – 0.055 in (0.381 – 1.397 mm)   |

## Oil control – expander \*\*rail\*\*

|                   |   |   |   |   |   |   |   |   |                                       |
|-------------------|---|---|---|---|---|---|---|---|---------------------------------------|
| – width           | . | . | . | . | . | . | . | . | 0.125 in (3.17 mm)                    |
| – thickness       | . | . | . | . | . | . | . | . | 0.1415 – 0.1515 in (3.594 – 3.838 mm) |
| – gap when fitted | . | . | . | . | . | . | . | . | NIL – ends to butt                    |

|                |   |   |   |   |   |   |   |   |  |
|----------------|---|---|---|---|---|---|---|---|--|
| Oversize rings | . | . | . | . | . | . | . | . | +0.010 in (0.254 mm) +0.020 in (+0.508 mm) |
|                | . | . | . | . | . | . | . | . | +0.030 in (+0.762)                         |

## Gudgeon pin

|            |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|
| – length   | . | . | . | . | . | . | . | . | 2.447 – 2.451 in (62.153 – 62.774 mm)   |
| – diameter | . | . | . | . | . | . | . | . | 0.8123 – 0.8125 in (20.632 – 20.645 mm) |

## Connecting rod

|  |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|
| – small end bush fitted<br>internal dia.     | . | . | . | . | . | . | . | . | 0.8122 – 0.8126 in (20.624 – 20.640 mm) |
| – external diameter                          | . | . | . | . | . | . | . | . | 0.937 – 0.938 in (23.79 – 23.82 mm)     |
| – bend and twist in length<br>of gudgeon pin | . | . | . | . | . | . | . | . | 0.0015 in Max. (0.038 mm Max.)          |

## CONNECTING ROD BEARINGS – SET

– Remove and refit 12.17.16

Connecting rod bearings – one 12.17.17

Connecting rod bearings – extra each 12.17.18

## Removing

1. Isolate the battery.
2. Drain and remove the sump 12.60.44.
3. Dealing with each connecting rod bearing in turn and starting with number one, turn the crankshaft until the bearing is in an accessible position.

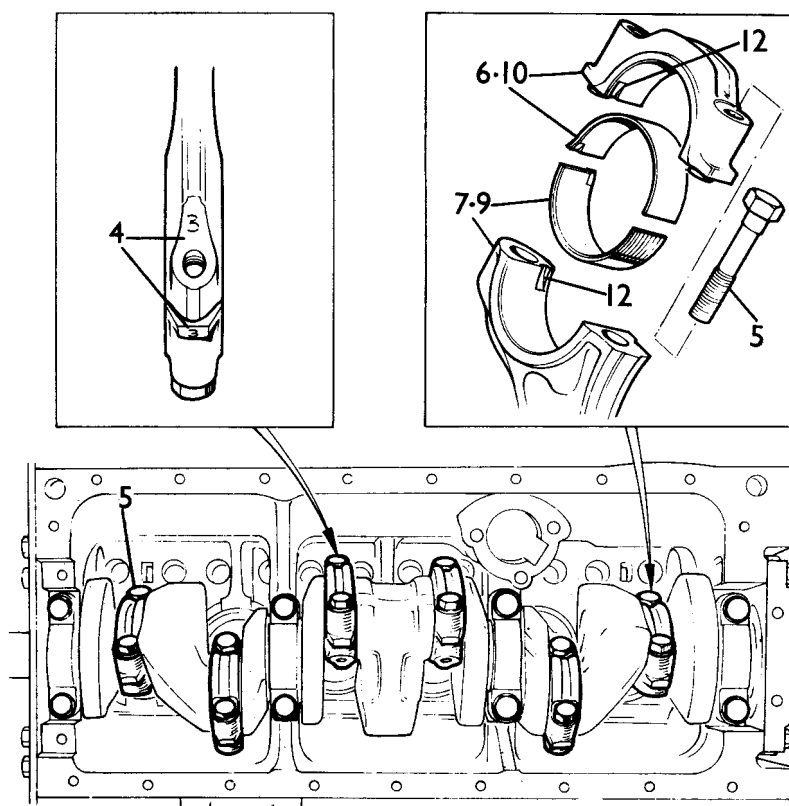
**NOTE:** So that the connecting rods and caps may be identified with their respective cylinder bores, each rod and cap is numbered from one to six starting at the front of the engine. Furthermore the number on the cap and rod are adjacent and must always be refitted this way round.

4. Check that the connecting rods and caps are numbered in accordance with the above note.
5. Remove the bolts securing the cap to the connecting rod.
6. Withdraw the cap complete with the bearing shell and extract the shell.
7. Push the connecting rod and piston up the bore just sufficiently to enable the upper bearing shell to be removed.

8. Repeat operations 3 to 7 on the remaining bearings, keeping the bearing shells identified with their respective connecting rods and caps if the original shells are to be refitted.

## Refitting

9. Lubricate and fit the upper bearing shell to the connecting rod ensuring that the tag locates properly in the recess.
10. Fit the lower bearing shell to the connecting rod cap locating the tag in the recess.
11. Clean the connecting rod and cap mating faces and check that the dowels are in position.
12. Lubricate the bearing and crank pin and fit the cap, ensuring that it is positioned the correct way round – see note preceeding instruction 4. A further check to ensure correct assembly is that the two shell bearing recesses are on the same side.
13. Pull the connecting rod on to the crankpin and using **NEW BOLTS** secure the bearing cap to the connecting rod tightening evenly to 38 to 46 lbf ft (5.2 to 6.4 kgf m).
14. Repeat instructions 9 to 13 on the remaining bearings.
15. Refit the sump and fill with new oil to the high mark on the dipstick.
16. Reconnect the battery.



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## CRANKSHAFT PULLEY

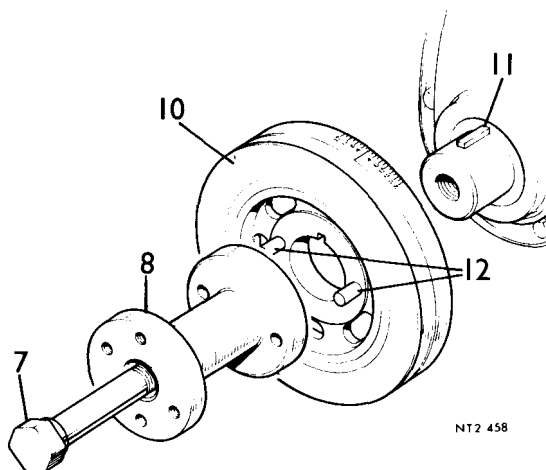
– Remove and refit

12.21.01

Special tool S341

### Removing

1. Isolate the battery.
2. Remove the radiator 26.40.01.
3. Remove the fan blades.
4. Remove the fan adaptor – Carburettor engines only 26.25.06.
5. Remove the chassis cross tube, 76.10.05.
6. Remove the fan belt.
7. Remove the special bolt securing the fan extension.
8. Remove the fan extension by tapping it with a hammer to free it from its locating dowels.
9. Remove the steering rack 'U' bolts and ease the rack forward sufficiently to withdraw the pulley without fouling, 57.25.01 instructions 5 and 6.
10. Withdraw the crankshaft pulley.



### Refitting

11. Check that the crankshaft key is in position and the key-way in the pulley is free from burrs. Drift the pulley on to the crankshaft squarely until it butts against the oil seal sleeve in the timing cover.
12. Check that the two fan extension location dowels are in position and their locating holes are free from burrs. Fit the extension and secure with the special bolt.
13. Refit the steering rack using special tool S341, 57.25.01 instructions 11 to 16.
14. Refit and adjust the fan belt 26.20.07.
15. Reverse instructions 1 to 5.

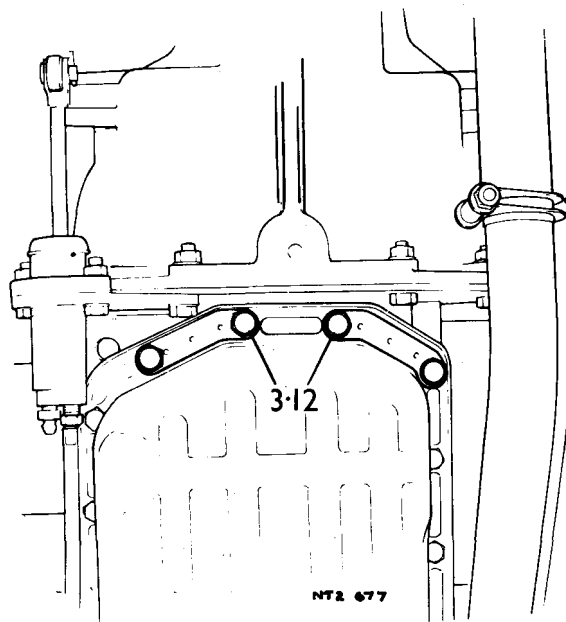
## CRANKSHAFT REAR OIL SEAL

## — Remove and refit

12.21.20

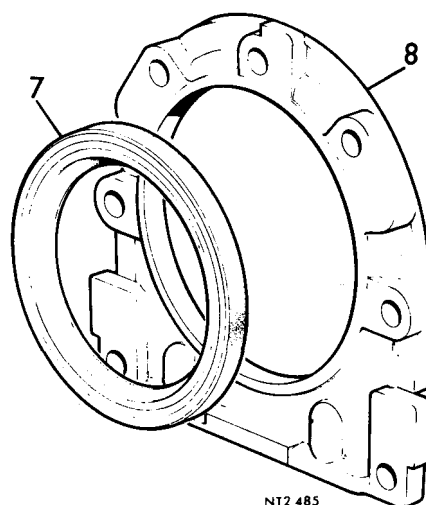
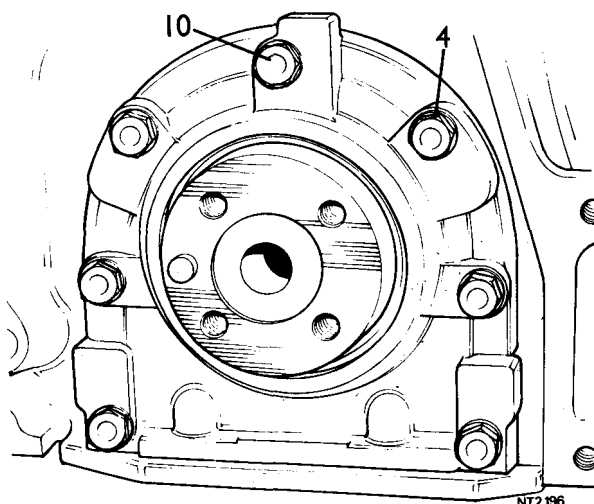
## Removing

1. Remove the gearbox assembly, 37.20.01.
2. Remove the rear adaptor plate instructions 2 and 3, 12.53.03.
3. Remove the two rear centre sump bolts.
4. Remove the seven bolts and spring washers securing the oil seal housing to the crankcase and remove the housing complete with the seal, taking care not to damage the sump gasket.
5. Press out the oil seal taking care not to damage or distort the housing.



## Refitting

6. Clean the oil seal housing and crankcase mating faces ensuring all traces of old gasket and jointing are removed.
7. Place the oil seal housing on a flat surface with the machined face uppermost. Smear the outside diameter of a new oil seal with grease and with the lip side trailing press in the seal. Remove surplus grease from the housing.
8. Apply sealing compound to the crankcase and oil seal housing mating faces and fit a new gasket.
9. Lubricate the oil seal inner diameter and the crankshaft with clean engine oil and carefully ease the oil seal and housing over the crankshaft and locate it on the crankcase face.
10. Secure the housing to the crankcase noting that the top bolt has a copper washer under the head to prevent oil seepage due to the bolt protruding into the crankcase.
11. Use spring washers under the remaining bolt heads and tighten evenly. Ensure that any surplus sealing compound is removed.
12. Refit the two sump bolts.
13. Refit the adaptor plate instructions 4 and 5, 12.53.03.
14. Refit the gearbox assembly, 37.20.01.



## ENGINE

### CRANKSHAFT END-FLOAT

#### – Check and adjust

12.21.26

#### Check

1. Isolate the battery.
2. Attach a magnetic type dial gauge stand to a convenient place on the cylinder block, place a dial in position so that the stylus rests squarely against the crankshaft pulley.
3. Raise the car on a ramp and lever the crankshaft back towards the rear of the engine.
4. Zero the dial gauge and lever the crankshaft forward and note the reading on the gauge. See data.
5. Repeat instructions 3 and 4 two or three times to ensure a constant reading.
6. Remove the dial gauge and stand, lower the ramp and reconnect the battery.

#### Adjusting

7. Isolate the battery.
8. Drain and remove the sump 12.60.44.
9. Remove the two bolts securing the rear main bearing cap to the crankcase, and withdraw the cap and lower shell.
10. Rotate the crankshaft to facilitate the removal of the thrust washers.
11. Fit new thrust washers feeding them into the recesses in the crankcase. If necessary, rotate the crankshaft to assist the fitting. Ensure that the thrust washers are installed the correct way i.e. the oil grooves bearing against the crankshaft journal sides.
12. Attach a dial gauge to the crankcase so that the stylus rests squarely against a crankshaft web.
13. Lever the crankshaft forward or rearward, zero the dial gauge and lever the crankshaft in the reverse direction and note the end-float reading.

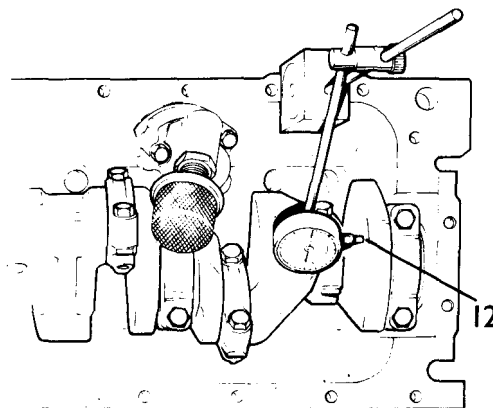
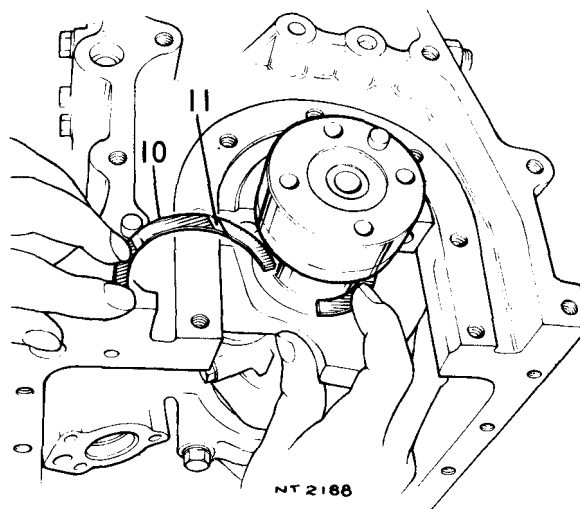
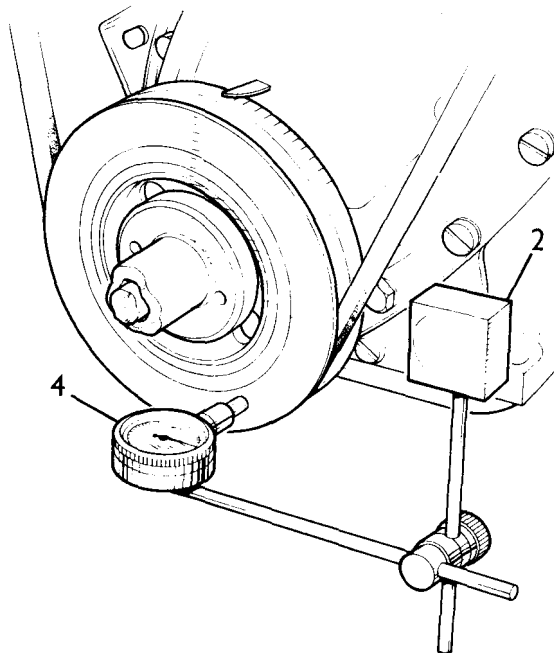
#### Refitting

14. Fit the rear main bearing cap and lower shell ensuring that the cap and shell are fitted correctly. Secure with the main bearing bolts and tighten to 50 to 65 lbf ft (6.9 to 9.0 kgf m).
15. Refit the sump 12.60.44 ensuring that it is filled with a recommended grade of oil to the high mark on the dipstick.
16. Reconnect the battery, and remove the car from the ramp.

#### DATA

Crankshaft end-float 0.006 – 0.008 in (0.1524 – 0.2032 mm)

\*\* Oversize thrust washers are available – 0.005 in (0.127 mm)\*\*



## CRANKSHAFT

## – Remove and refit

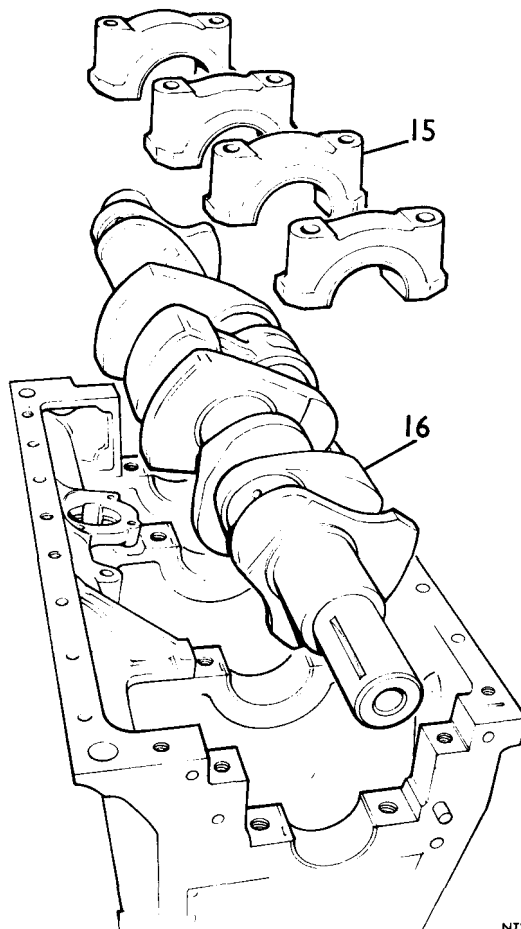
12.21.33

## Removing

1. Remove the engine and gearbox assembly, 12.37.01.
2. Remove the gearbox from the engine.
3. Remove the clutch assembly.
4. Remove the flywheel.
5. Remove the engine rear adaptor plate.
6. Remove the crankshaft pulley – instructions 5 to 7 and instruction 9, 12.21.01.
7. Remove the timing chain and sprockets – instructions 5 to 7, 12.65.12.
8. Remove the alternator.
9. Remove the engine front mounting plate.
10. Remove the sump – instruction 4, 12.60.44.
11. Remove the front sealing block.
12. Remove the rear main oil seal and housing – instruction 4, 12.21.20.
13. Remove the six connecting rod caps complete with lower shells. Instructions 3 to 8, 12.17.16.
14. Remove the oil pump.
15. Remove the four main bearing caps complete with lower shells – instructions 9 to 10, 12.21.39.
16. Withdraw the crankshaft, leaving the thrust bearing and upper shells in position.

## Refitting

17. Reverse instructions 15 and 16.
18. Check the crankshaft end-float and if necessary adjust – instruction 54 12.41.05.
19. Refit the six connecting rods to the crankpins – instructions 9 to 14, 12.17.16.
20. Refit the oil pump.
21. Refit the rear main oil seal and housing – instructions 5 to 10, 12.21.20.
22. Refit the front sealing block – instructions 5, 12.41.05.
23. Refit the sump.
24. Refit the engine front mounting plate and gasket.
25. Refit the timing chain and sprockets – instructions 8 to 11, 12.65.12 – ensuring that the crankshaft is first turned so that numbers one and six pistons are at T.D.C. with number one firing.
26. Refit the timing cover – instructions 16 to 18, 12.65.01.
27. Refit the alternator.
28. Refit the crankshaft pulley and fan extension.
29. Reverse instructions 1 to 5.



NT2.760

## ENGINE

### MAIN BEARINGS – SET

– Remove and refit 12.21.39

Main bearing – each 12.21.40

Main bearing – front – instructions 1 to 4, 6 to 14 and 16 12.21.41

Main bearings centre and rear – instructions 1 to 3, 5 to 13, 15 and 16 12.21.42

#### Removing

1. Isolate the battery.
2. Drain the oil and remove the sump 12.60.44.
3. Release the drive belt tension.
4. Remove the crankcase front sealing block, instructions 4 to 8, 12.25.11
5. Remove the oil pump to enable access to be gained to the rear centre main bearing, instruction 4, 12.60.26.
6. Dealing with each main bearing in turn, slacken the two bearing cap bolts.

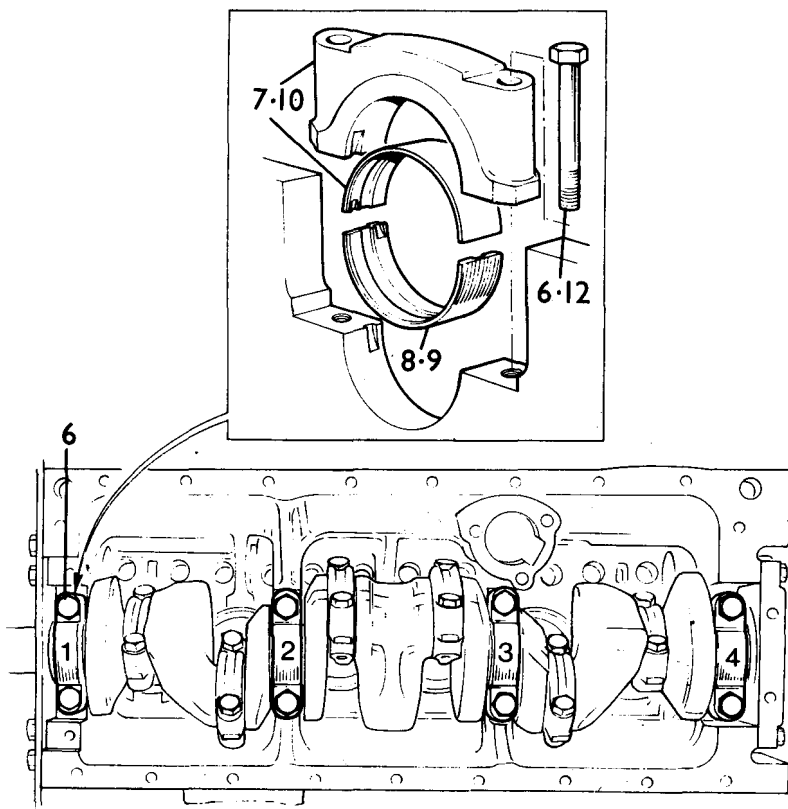
**NOTE:** The bearing caps are numbered from 1 to 4, beginning at the front of the engine and it is important that these are checked before the caps are removed and mixed.

7. Withdraw the bearing cap with the lower shell.
8. With the tag end leading, slide the upper bearing shell out from between the crankcase and crankshaft journal.

**CAUTION** Do not permit the crankshaft to remain unsupported for longer than is necessary since compression of the timing cover and rear main oil seals may cause subsequent leakage.

#### Refitting

9. Dealing with each main bearing in turn, lubricate and feed the upper bearing shell – tag end trailing – between the crankcase bearing bore and the crankshaft journal. Ensure that the tag locates properly into the corresponding recess in the crankcase bore.
10. Select the correct bearing cap – see note following instruction 6 – and fit the bearing shell ensuring that the tag locates in the corresponding recess in the cap.
11. Fit the cap to its corresponding journal noting that the side of the cap containing the shell location recess is fitted adjacent to the recess in the crankcase bearing bore i.e. opposite side to the camshaft.
12. Using NEW BOLTS tighten evenly to 50 to 65 lbf ft (6.9 to 9.0 kgf m).
13. Check and if necessary adjust crankshaft end float 12.21.26.
14. Refit the crankcase front sealing block – instructions 9 to 16, 12.25.11
15. Refit the oil pump.
16. Reverse instructions 1 to 3, ensuring that the sump is filled with new oil to the high mark on the dipstick.



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12.21.39  
12.21.42

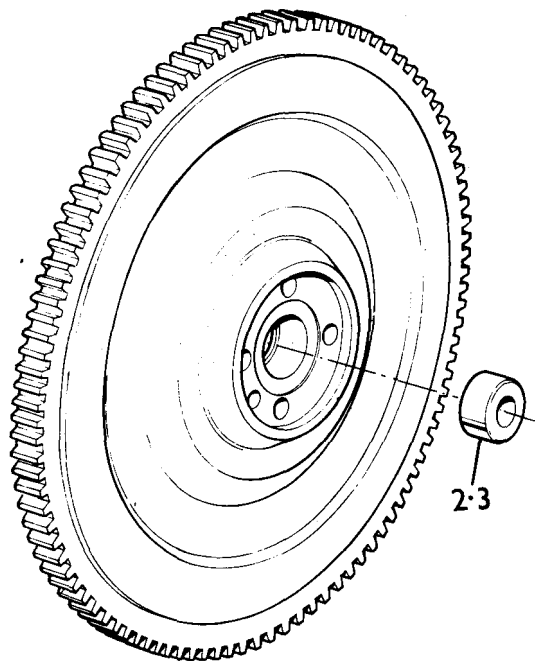


**SPIGOT BUSH****– Remove and refit****12.21.45****Removing**

1. Remove the flywheel 12.53.07.
2. From the back of the flywheel remove the spigot bush.

**Refitting**

3. Fit the spigot bush into the back of the flywheel ensuring that it is a loose fit.
4. Refit the flywheel – instruction 8 to 14, 12.53.07.



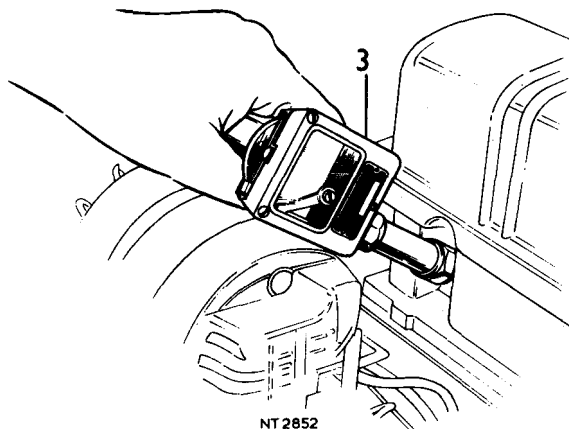
NT2 41

**CYLINDER PRESSURES****– Check****12.25.01**

1. Start and run the engine until the normal operating temperature is attained as indicated by the temperature gauge on the control panel.
2. Stop the engine and remove the spark plugs.
3. Fit a compression gauge to number one cylinder.
4. Turn the engine over with the starter motor only with the throttles wide open.
5. Record the gauge reading – See DATA.
6. Repeat instructions 3 to 5 on the remaining cylinders.
7. Remove the gauge and refit the spark plugs.

**DATA**

All cylinders should have pressures within 10 lb/in<sup>2</sup> (0.70 kg/cm<sup>2</sup>) of each other.



NT 2852

## ENGINE

### CYLINDER BLOCK DRAIN PLUG

— Remove and refit

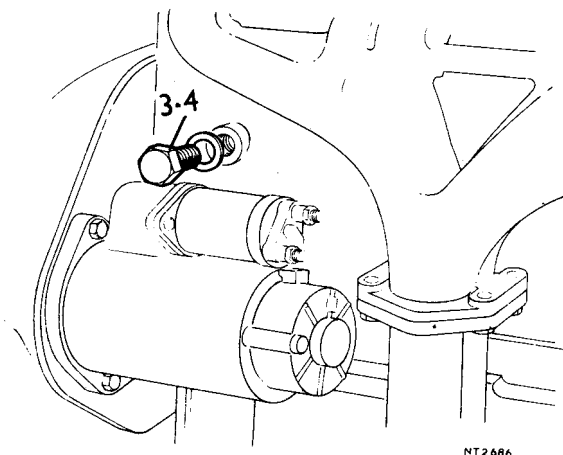
12.25.07

#### Removing

1. Isolate the battery.
2. Place a receptacle under the drain plug to catch the coolant.
3. Remove the plug from the cylinder block with the sealing washer.

#### Refitting

4. Clean the plug and cylinder block threads, fit a new sealing washer and refit the plug.
5. Refill the cooling system 26.10.01.
6. Reconnect the battery, start the engine and check for coolant leaks from the plug.



NT2 686

### CYLINDER BLOCK FRONT MOUNTING PLATE GASKET

— Remove and refit

12.25.10

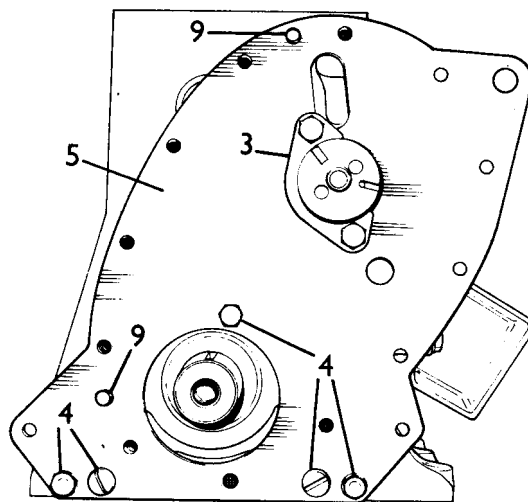
Special tool S341

#### Removing

1. Remove the timing chain and sprockets 12.65.12.
2. Remove the alternator 86.10.02.
3. Remove the camshaft keeper plate.
4. Remove the three bolts and two screws securing the front mounting plate to the cylinder block.
5. Remove the mounting plate from the locating dowels and studs.
6. Remove the old gasket.

#### Refitting

7. Clean the engine and mounting plate mating faces, ensuring that all traces of the old gasket and jointing compound are removed.
8. Coat both sides of the new gasket with jointing compound and place it in position. Ensure that the gasket locates properly over the dowels and lies perfectly flat on the engine face.
9. Locate the mounting plate in position over the dowels and studs.
10. Secure the mounting plate with the three bolts and two screws.
11. Refit the camshaft keeper plate.
12. Reverse instructions 1 and 2.



NT0 459

12.25.07

12.25.10

## CRANKCASE FRONT SEALING BLOCK

– Remove and refit

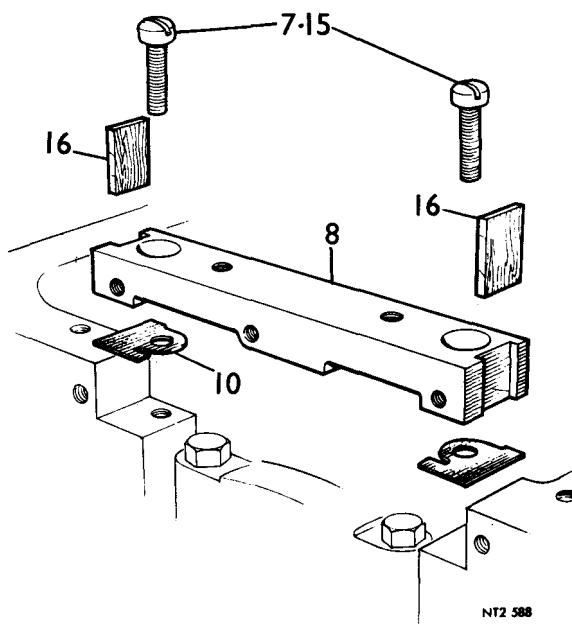
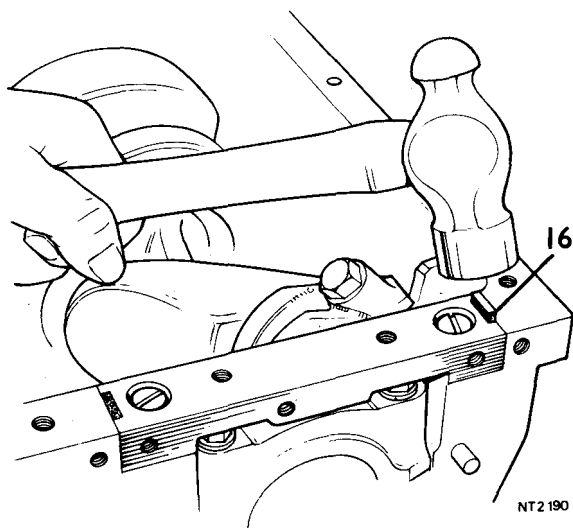
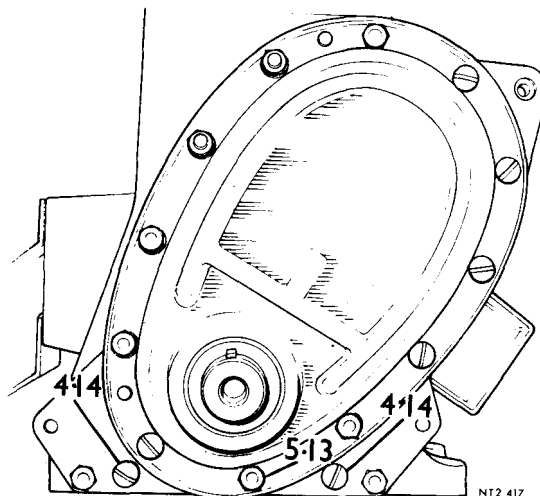
12.25.11

## Removing

1. Place the car on a ramp and isolate the battery.
2. Drain the sump oil.
3. Remove the sump 12.60.44.
4. Remove the two screws from the front mounting plate.
5. Remove the lowest bolt from the timing chain cover.
6. Remove the two retaining screws from the sealing block.
7. Using a thin blade knife, carefully ease the front mounting plate gasket away from the sealing block.
8. Carefully withdraw the sealing block.

## Refitting

9. Clean the sealing block and crankcase mating faces.
10. Coat the sealing block gaskets and the exposed part of the front mounting plate gasket with sealing compound.
11. Fit the gaskets to the crankcase.
12. Fit the sealing block and loosely secure with the retaining screws.
13. Fit and tighten the timing cover bolt.
14. Fit and tighten the front mounting plate to sealing block screws.
15. Finally tighten the sealing block retaining screws.
16. Smear the wedges with sealing compound and drive them into the slots. Trim the protruding ends of the wedges flush with the sealing block but do not undercut.
17. Refit the sump.
18. Refill the sump with oil to the high mark on the dipstick.
19. Reconnect the battery and remove the car from the ramp.



# ENGINE

## CYLINDER BLOCK

### – Rebore

12.25.23

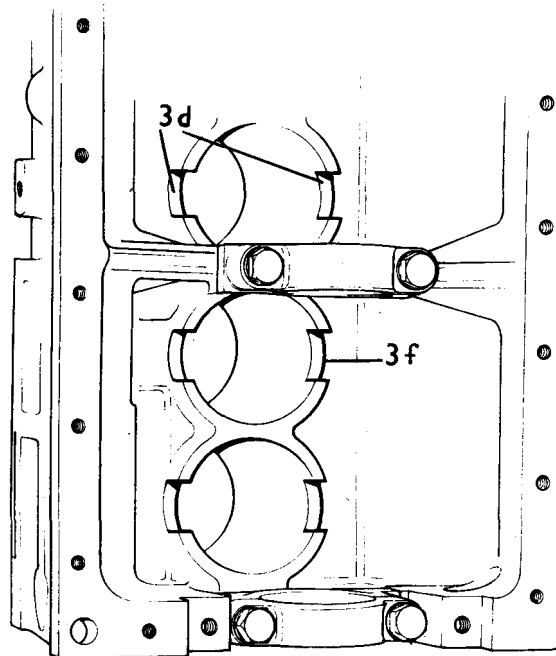
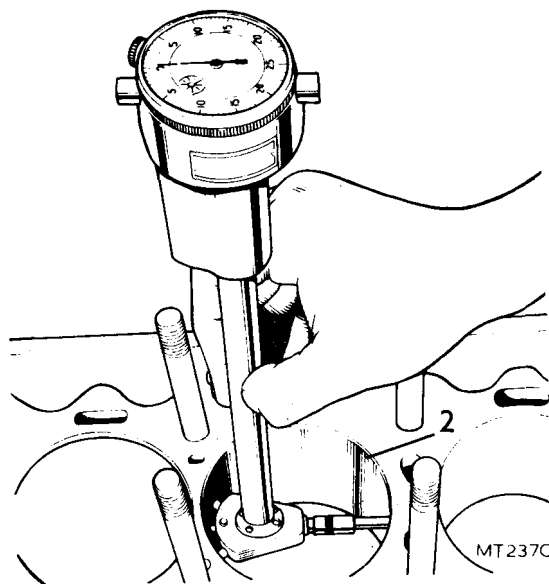
1. Strip the engine 12.41.05.
2. Measure the cylinder bores for taper, ovality and maximum wear.
3. Rebore and hone to dimensions in data.

**NOTE:** Maximum rebore oversize from standard is +0.020 in. Cylinders that cannot be satisfactorily rebored within this limit may be sleeved to restore them to the original size as follows:

- a. Bore out the cylinders to 3.059 to 3.062 in (77.699 – 77.775 mm).
- b. Remove sharp edges from top of cylinders.
- c. Lightly oil the outside diameter of the sleeve – **DO NOT GREASE.**
- d. Insert the sleeve into the cylinder so that the cut-aways in the sleeve line up with the corresponding slots in the bottom of the cylinder bore.
- e. Press the sleeve into the bore squarely with a minimum pressure of 2 ton f. until it is flush with the top of the cylinder block.

**NOTE:** Whilst the sleeve is flush with the top face of the cylinder block the sleeve will never-the-less be proud of the recess surrounding each bore. Therefore it will be necessary to machine the top of the sleeve down flush with the bottom of the recess. This note relates to later engines.

- f. True-up the cut-aways with a file so that no overlap of the cylinder block slots remain.
  - g. Bore and hone the sleeve bores to size – see data.
4. Rebuild the engine 12.41.05 fitting:
    - a. new oversize pistons to rebored dimensions or
    - b. standard graded pistons to sleeved bores



### DATA

|                                    |   |
|------------------------------------|---|
| Standard bore size – Grade A       | 2.9405 – 2.9410 in (74.689 – 74.701 mm) |
| Standard bore size – Grade B       | 2.9411 – 2.9416 in (74.704 – 74.717 mm) |
| Maximum rebore size –              | +0.020 in (+0.508 mm)                   |
| Diameter of sleeve –               | 3.066 – 3.067 in (77.876 – 77.901 mm)   |
| Bore-out cylinder to accept sleeve | 3.059 – 3.062 in (77.698 – 77.774 mm)   |
| Minimum sleeve fitting pressure    | 2 ton f.                                |
| Length of sleeve                   | 5.770 in (136.558 mm)                   |

## CYLINDER HEAD GASKET

## – Remove and refit 12.29.01

See 12.29.10.

## CYLINDER HEAD

## – Remove and refit 12.29.10

which includes – Cylinder head gasket –  
remove and refit 12.29.01

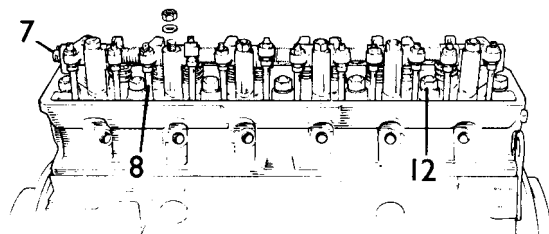
## Removing

1. Isolate the battery.
2. Drain the cooling system 26.10.01.
3. Disconnect the following:–
  - a. The servo hose at the induction manifold.
  - b. The breather pipe at the rocker cover.
  - c. H.T. leads to spark plugs.
  - d. The water temperature sensor connection
  - e. Fuel pipes at the injectors (Petrol injection engines only) 19.60.14.
  - f. The water hoses at the thermostat housing and water pump housing.
  - g. The air intake hose (P.I. engines only).
  - h. The heater hose to the heater control valve.
  - i. The throttle linkage at the bulkhead cross shaft (carburettor engines only) and the cable at the induction manifold (P.I. only).
  - j. The mixture control or cold start cable and spring.
  - k. The heater control cable at heater valve.
  - l. The metering unit vacuum hose at the manifold (P.I. engines).
4. Remove the fan belt and disconnect the alternator adjustment link at the cylinder head, slacken the pivot bolt nut and swing the alternator away from the engine.
5. Remove the water pump complete with water pump housing 26.50.03.
6. Remove the rocker cover 12.29.42.
7. Remove the rocker shaft 12.29.54.
8. Withdraw the push rods and identify for reassembly.
9. Disconnect the exhaust manifold from the cylinder head leaving the exhaust pipe attached.
10. Remove the P.I. induction manifold or the inlet manifold complete with carburetters and air cleaner.
11. Pull and fasten the exhaust manifold away from the cylinder head studs.
12. Release the cylinder head nuts in the reverse rotation as shown in operations 12.29.27.
13. Lift off the cylinder head.
14. Remove and discard the cylinder head gasket.

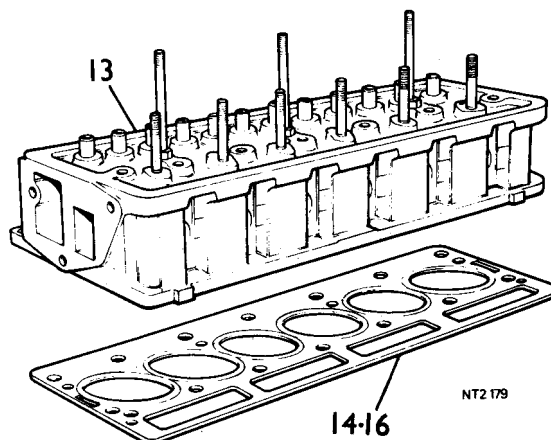
## Refitting

15. Clean the cylinder block and cylinder head mating faces removing all traces of carbon deposit and old gasket.
16. Fit a new cylinder head gasket.
17. Fit the cylinder head and tighten the cylinder head retaining nuts in the sequence shown in operation 12.29.27, and tighten progressively to 60 – 80 lbf ft (8.3 – 11.1 kgf m).
18. Reverse instructions 1 to 11.

**NOTE:** Later engines that have a recess round the top of each bore must have the correct cylinder head gasket fitted. These gaskets have a tag at the rear end marked 'TOP' which protrudes from the cylinder head.



NT0 460



NT2 179

## ENGINE

### CYLINDER HEAD

— Overhaul 12.29.18

Which includes

Valves — exhaust — remove and refit 12.29.60

Valves inlet and exhaust — remove and refit 12.29.62

Valves — inlet — remove and refit 12.29.63

Valve guide — inlet — remove and refit 12.29.70

Valve guide — exhaust — remove and refit 12.29.71

Inlet valve seat — remove and refit 12.29.76

Exhaust valve seat — remove and refit 12.29.77.

Special tools: S60A-2, 6118B

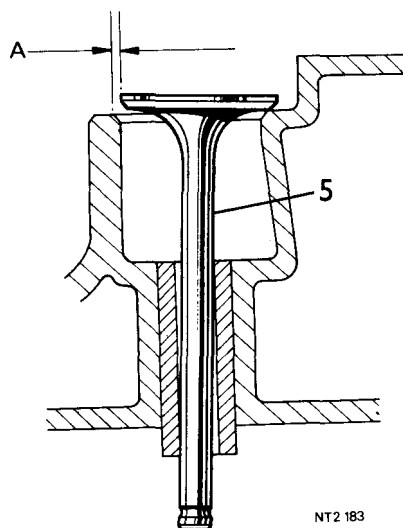
#### Removing

1. Remove the cylinder head 12.29.10.
2. Remove the spark plugs.
3. Remove the water valve adaptor complete with water valve.
4. Using valve spring compressor 6118B, remove the inlet and exhaust valves, and springs, and identify for reassembly.

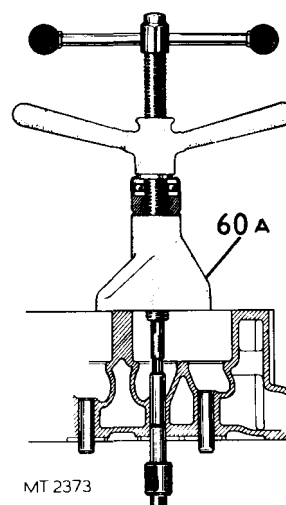
#### Valve guides

5. Check the inlet and exhaust valve guides for wear. Insert a new valve in each guide in turn and tilt the valve diametrically. If movement across the valve seat — dimension (A) — exceeds 0.20 in (0.508 mm), the valve guide should be replaced.

*continued*

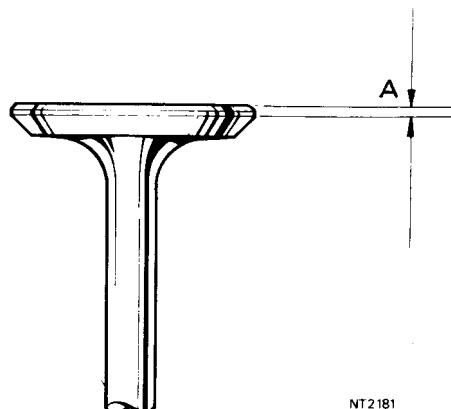


6. The replacement of valve guides is best carried out using special tool 60A with the appropriate adaptor, to ensure the correct height of the guide above the cylinder head — see Data. Assemble the new valve guide in the tool with the chamfered end leading. Position the tool on the combustion chamber face and draw the new guide into position whilst withdrawing the old one.



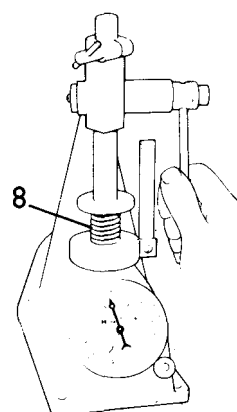
### Valves

7. Examine the valves and discard any with worn or bent stems and badly pitted or burnt heads. Valves that have the head thickness reduced to  $1/32$  in (0.8 mm) dimension (A), should also be discarded. Valves in an otherwise satisfactory condition may be refaced.



### Valve springs

8. Examine valve springs (inner and outer — see Data) for cracks and distortion. Check the springs for free and load length against the information in Data. Discard any springs that do not meet the required standard.

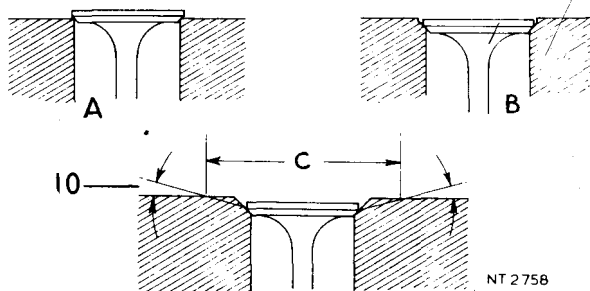


*continued*

## Valve seats

9. Check valve seats for wear, pits, scores and pocketing. Reface where necessary removing only the minimum of material, to avoid a gas tight seal and a correctly seating valve.
  - a. Correctly seating valve
  - b. Incorrectly seating valve
10. If it has been necessary to remove more material than desirable, a  $15^\circ$  cutter may be used to reduce the width of the seating.

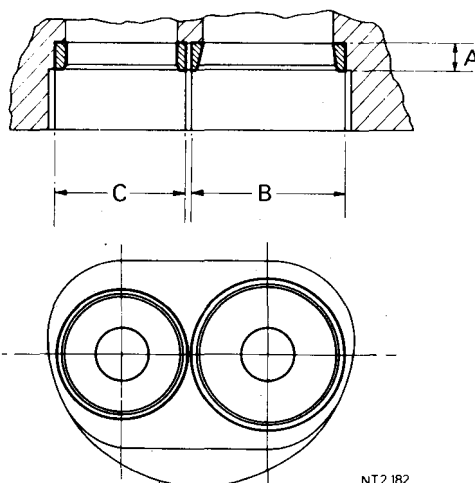
**CAUTION:** It is important to observe that when using this cutter the machined diameter C must not exceed 1.43 in (36.21 mm) for the inlet port seat and 1.26 in (31.23 mm) for the exhaust. Failure to heed this precaution may render the cylinder head useless for the fitting of valve seat inserts at a later date.



## Valve seat inserts

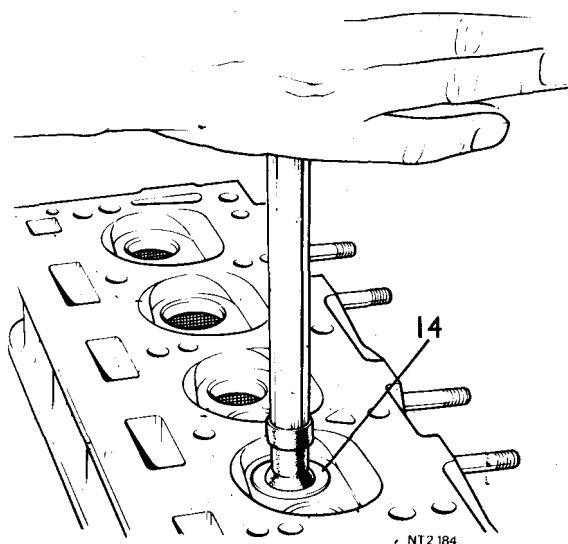
11. Where valve seats cannot be restored by machining. Valve seat inserts may be fitted. In instances where a valve seat insert is already fitted and requires renewing the old insert should be ground away until thin enough to be cracked and levered out. Care, however, should be used to avoid damaging the insert pocket during this operation otherwise difficulty may be encountered in fitting the new insert.
12. Machine the cylinder head to dimensions A, B and C given in Data. Remove burrs and swarf and carefully press the insert squarely into the cylinder head. Secure the insert by peening over the surrounding cylinder head material.
13. Cut the insert seat faces at an inclusive angle of  $89^\circ$  providing a chamfer of 0.040 – 0.045 in (1.016 – 1.14 mm) dimension D.

\*\*See data page 12.29.18 Sheet 5.\*\*



## Grinding in valves

14. Use coarse followed by fine carborundum paste to lap-in the valves. Employ the diabolo action until a continuous narrow line is obtained on the valve seating.
15. Clean off all traces of grinding compound from the valve and seating. Smear a small quantity of engineers' blue on the seating and revolve the valve against its seating about  $\frac{1}{4}$  in (6 mm) in both directions. A good seal in indicated by a continuous band of marking on the valve and its seat.
16. After lapping-in identify each valve for reassembly to its respective seating.



*continued*



**Reassembly**

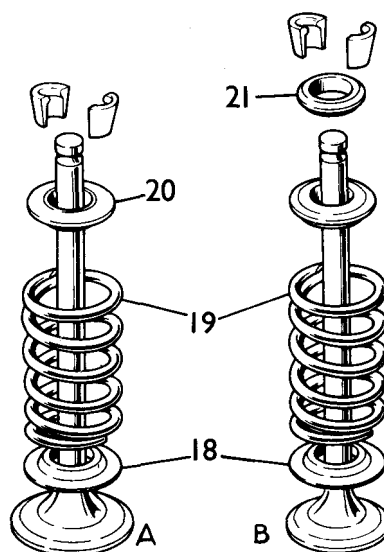
17. Lubricate the valve stems with clean engine oil and assemble them to the cylinder head.
18. Fit the valve spring seats over the valve stems.
19. Place the valve springs over the valve stems ensuring that they locate correctly in the seats. (See Data for engines fitted with double valve springs.)

**NOTE:** On later P.I. models the valve collar arrangement on both inlet and exhaust valves is as shown on valve (A).

20. Place the valve spring collar(s) over the valve (A) and using valve spring compressor 6118B fit the split valve cotters to secure the valve. *and/or*
21. Place the top outer collar in position on the valve spring. – Valve B.
22. Place the top inner valve collar in position and using the valve spring compressor secure the valve with the split valve cotters.

**NOTE:** Repeat operation 20, 21 and 22 on the remaining valves.

23. Reverse instructions 1 to 3.



NT 2754

| VALVES                  | INLET                                  | EXHAUST                                       |   |
|-------------------------|--|---|---|
| Petrol Injection Engine |  | Up to Eng. No. CR 2844                        | Intermittent from Eng. No. CR 2845 to CR 2851 |
| Carburettor Engine      |  | Intermittent from Eng. No. CR 2845 to CR 2935 | Complete from Eng. No. CR 2936                |
|                         |  | Up to Eng. No. CF 12500                       | From Eng. No. CF 12501                        |
| Head diameter           | 1.443 – 1.447in<br>(36.65 – 36.75mm)   | 1.256 – 1.260in<br>(31.90 – 32.00mm)          | 1.193 – 1.197in<br>(30.30 – 30.40mm)          |
| Stem diameter           | 0.3107 – 0.3113in<br>(7.87 – 7.90mm)   | 0.3100 – 0.3105in<br>(7.87 – 7.88mm)          | 0.3100 – 0.3106in<br>(7.87 – 7.89mm)          |
| Length                  | 4.598 – 4.606in<br>(116.79 – 116.99mm) | 4.590 – 4.613in<br>(116.58 – 117.17mm)        | 4.597 – 4.607in<br>(116.76 – 117.01mm)        |
| Seat angle              | 90° inclusive $\pm 30'$                | 90° inclusive $\pm 30'$                       | 90° inclusive $\pm 30'$ **                    |

**Valve guides**

|                   |  |  |
|-------------------|--|--|
| Length            | 2.06in<br>(52.386 mm)                      | 2.25 in<br>(57.15 mm)                      |
| External diameter | 0.5015 – 0.5020 in<br>(12.725 – 12.751 mm) | 0.5015 – 0.5020 in<br>(12.725 – 12.751 mm) |
| Bore diameter     | 0.312 – 0.313 in<br>(7.925 – 7.95 mm)      | 0.312 – 0.313 in<br>(7.925 – 7.95 mm)      |
| Height above head | 0.63 in<br>(16.0 mm)                       | 0.63 in<br>(16.0 mm)                       |

Continued

## VALVE SPRINGS

| Engine No.  | Petrol Injection Engine  | Carburetter Engine   | Engine No.  |
|---|--|--|---|
| From<br>Eng. No.<br>CP 25001<br><br>to Eng. No.<br>CP 75000 | Double springs   | Single spring  | From<br>Eng. No.<br>CC 25001<br><br>to Eng. No.<br>CC 75000 |
|   | <b>Inner</b><br>- Free length . . . . . 1.56 in (39.624 mm)<br>- Solid length (compressed) 0.730 in (18.542 mm)<br>- Outer diameter . . . . . 0.730 in (18.542 mm)<br>- Wire diameter . . . . . 0.076 in (1.930 mm)<br>- Rate when fitted . . . . . 28.5 lb/in<br>- Working coils . . . . . 6<br><br><b>Outer</b><br>- Free length . . . . . 1.57 in (39.878 mm)<br>- Solid length (compressed) 0.918 in (23.32 mm)<br>- Inner diameter . . . . . 0.795 in (20.193 mm)<br>- Wire diameter . . . . . 0.136 in (3.454 mm)<br>- Rate when fitted . . . . . 150 lb/in<br>- Working coils . . . . . 4 | - Free length . . . . . 1.59 in (40.386 mm)<br>- Solid length (compressed) 0.96 in (24.384 mm)<br>- Inner diameter . . . . . 0.795 in (20.193 mm)<br>- Wire diameter . . . . . 0.148 in (3.759 mm)<br>- Rate when fitted . . . . . 235 lb/in<br>- Working coils . . . . . 3½ |   |
| From<br>Eng. No.<br>CP75001                                 | Single spring  |  | From<br>Eng. No.<br>CC75001                                 |
|   | - Free length . . . . . 1.52 in (38.60 mm)<br>- Solid length (compressed) 0.875 in (22.22 mm)<br>- Inner diameter . . . . . 0.795 in (20.19 mm)<br>- Wire diameter . . . . . 0.152 in (3.86 mm)<br>- Rate when fitted . . . . . 240 lb/in<br>- Working coils . . . . . 3½  |  |   |
| From<br>Eng. No.<br>CR 1<br><br>and future                  | Double springs   |  | From<br>Eng. No.<br>CF 1<br><br>and future                  |
|   | <b>Inner</b><br>- Free length . . . . . 1.14 in (28.96 mm)<br>- Solid length (compressed) 0.552 in (14.021 mm)<br>- Inner diameter . . . . . 0.578 in (14.68 mm)<br>- Wire diameter . . . . . 0.92 in (23.68 mm)<br>- Rate when fitted . . . . . 85.6 lb/in<br>- Working coils . . . . . 4<br><br><b>Outer</b><br>As single spring fitted from Engines No. CP 75001/CC 75001   |  |   |

### Valve seat inserts

#### Inlet

|                            |   |
|----------------------------|---|
| Outside diameter . . . . . | 1.4875 - 1.4885 in (37.783 - 37.808 mm) |
| Height . . . . .           | 0.247 - 0.250 in (6.274 - 6.35 mm)      |

#### Exhaust

|                            |   |
|----------------------------|---|
| Outside diameter . . . . . | 1.2845 - 1.2855 in (32.626 - 32.652 mm) |
| Height . . . . .           | 0.247 - 0.250 in (6.274 - 6.35 mm)      |

### Cylinder head machining dimensions

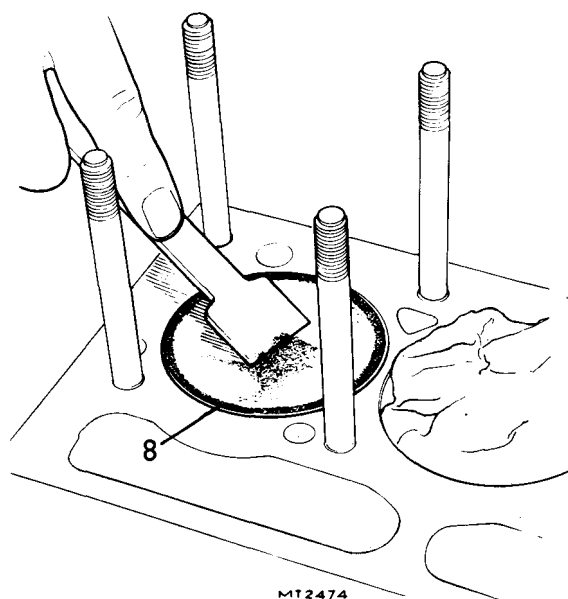
|   |   |
|---|---|
| Depth of bore into head - Dimension (A) . . . . . | 0.250 - 0.255 in (6.35 - 6.45 mm)         |
| Inlet - dimension (B) . . . . .                   | 1.484 - 1.485 in dia. (37.69 - 37.72 mm)  |
| Exhaust - dimension (C) . . . . .                 | 1.281 - 1.282 in. dia. (32.54 - 32.56 mm) |
| Radius at base of pocket . . . . .                | 0.03 in (0.76 mm)                         |
| Valve seat angle . . . . .                        | 89° inclusive                             |
| Valve seat chamfer - dimension (D) . . . . .      | 0.040 - 0.045 in (1.016 - 1.143 mm)       |

## DECARBONIZE, REFACE ALL VALVES AND SEATS GRIND IN VALVES, TUNE ENGINE

12.29.21

### Dismantling

1. Remove the cylinder head 12.29.10.
2. Remove the inlet and exhaust valves and identify for reassembly 12.29.62
3. Remove carbon deposits from the cylinder head combustion chambers and ports.
4. Clean the face of the cylinder head, removing all traces of carbon and high spots. Clean out the water ways.
5. Reface the valve seats removing only the minimum of material – instructions 9 and 10, 12.29.18.
6. Degrease the valves and remove all traces of carbon. Reface the valves to the correct seat angle – see Data.
7. Grind-in the valves to their respective seats in the cylinder head – instructions 14 to 16, 12.29.18.
8. Turn the crankshaft until numbers one and six pistons are at T.D.C. Fill the remaining cylinder bores with rag and blank off the water passages and camfollower apertures. Using a wooden spatular remove carbon from the piston crowns leaving a band of carbon round the periphery of the piston crown.
9. Repeat instruction 8 on numbers two to five pistons.
10. Remove the blanking material from the cylinder bores, water passages and camfollower apertures and clean the cylinder block face removing carbon and high spots.



### Reassembling

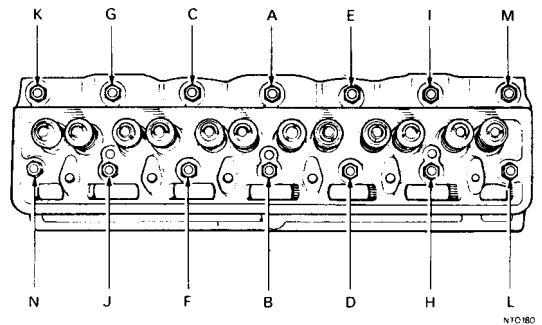
11. Lubricate and refit the valves to their respective guides – instructions 17 to 22, 12.29.18.
12. Refit the cylinder head 12.29.10.
13. Tune the engine 12.49.02.

## CYLINDER HEAD NUTS

### – Tighten

12.29.27

1. Remove the rocker cover 12.29.42.
2. Remove the rocker shaft 12.29.54.
3. To avoid distortion tighten the cylinder head nuts progressively to 60 to 80 lbf ft (8.3 to 11.1 kgf m) in the following sequence: A, B, C, D, E, F, G, H, I, J, K, L, M, N.
4. Refit the rocker shaft 12.29.54.
5. Refit the rocker cover 12.29.42.



## ROCKER COVER

### – Remove and refit

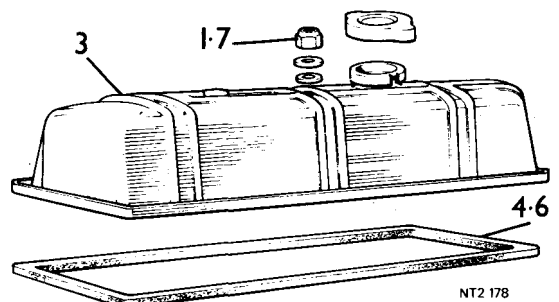
12.29.42

#### Removing

1. Remove the three nuts complete with plain and fibre washers securing the rocker cover to the cylinder head.
2. Disconnect the breather pipe from the rocker cover.
3. Lift off the rocker cover.
4. Remove the gasket.

#### Refitting

5. Clean the cylinder head and rocker cover mating faces.
6. Fit a new rocker cover gasket.
7. Fit the rocker cover and secure with the washers and nuts, ensuring that the fibre washer is fitted first – next to the rocker cover. Tighten the nuts to 1 to 2 lbf ft (0.15 to 0.3 kgf m). To avoid distortion do not over tighten.
8. Reconnect the breather pipe to the rocker cover.

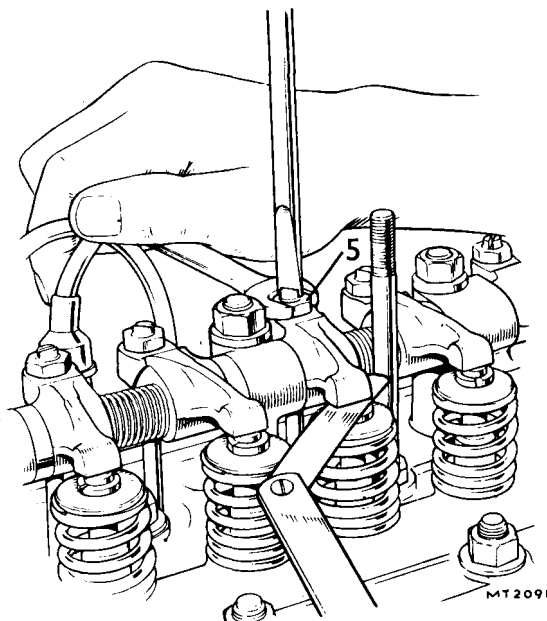


## VALVE CLEARANCE

## – Check and adjust

12.29.48

1. Isolate the battery and remove the spark plugs.
2. Remove the rocker cover 12.29.42.
3. Counting from the front of the engine, turn the crankshaft until 10 and 12 valves are open, i.e. valve springs fully compressed.
4. Using a feeler gauge, check the gap between the rocker pad and valve tip of numbers 1 and 3 valves.
5. If adjustment is required insert a screwdriver blade in the slot in the adjustment pin and slacken the locknut. Turn the adjustment pin to increase or decrease the gap and tighten the locknut.
6. Check and if necessary adjust the remaining valve clearances in the following sequence.  
Check or adjust No. 8 and 11 valves with Nos. 2 and 5 valves open  
Check or adjust No. 4 and 6 valves with Nos. 7 and 9 valves open  
Check or adjust No. 10 and 12 valves with Nos. 1 and 3 valves open  
Check or adjust No. 2 and 5 valves with Nos. 8 and 11 valves open  
Check or adjust No. 7 and 9 valves with Nos. 4 and 6 valves open
7. Reverse instructions 1 and 2.



## DATA

Valve clearance 0.010 in (0.25 mm)

## ROCKER SHAFT

## – Remove and refit

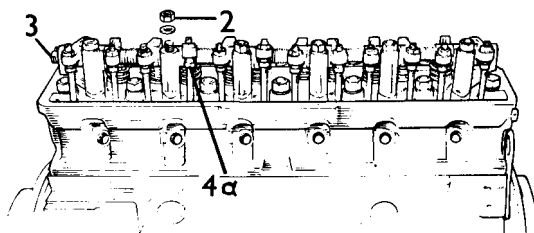
12.29.54

## Removing

1. Remove the rocker cover 12.29.42.
2. Remove the six nuts and washers securing the rocker shaft pedestals to the cylinder head.
3. Lift off the rocker shaft.

## Refitting

4. Reverse instructions 1 to 3 ensuring:—
  - a. The rocker adjustment screw ball ends locate properly in the push rod cups.
  - b. The pedestal securing nuts are tightened evenly to 26 to 34 lbf ft (3.6 to 4.7 kgf m).
5. Adjust the valve clearances 12.29.48.



## ENGINE

### ROCKER SHAFT ASSEMBLY

#### — Overhaul

12.29.55

#### Dismantling

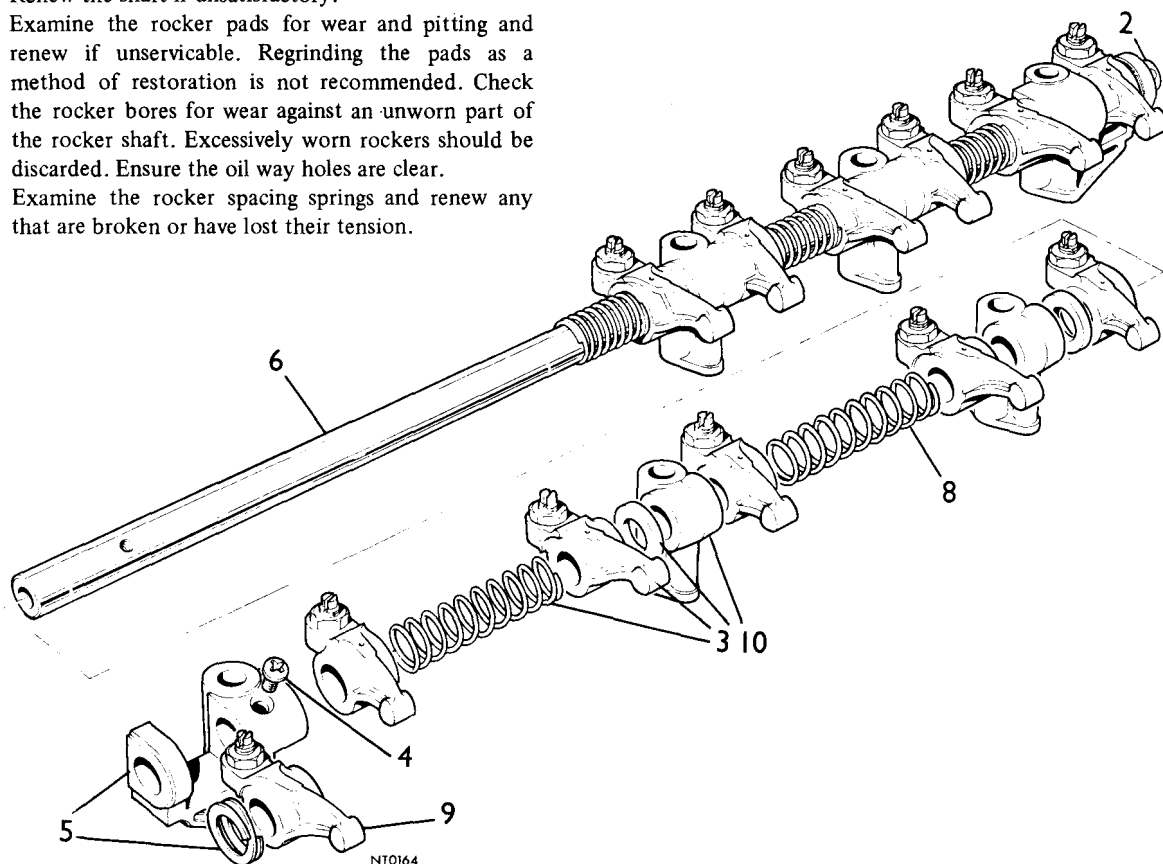
1. Remove the rocker shaft assembly 12.29.42.
2. Withdraw the split pin from the front end of the rocker shaft.
3. Remove the rockers, pedestals, springs and spacers from the front end of the shaft noting the order for reassembly.
4. Remove the screw locating the shaft to number six pedestal.
5. Remove number six pedestal with number twelve rocker and flat spring.

#### Examination

6. Check the rocker shaft for wear on the rocker running areas using the unworn parts of the shaft as a guide. Examine the shaft for scores and pitting. Renew the shaft if unsatisfactory.
7. Examine the rocker pads for wear and pitting and renew if unservicable. Regrinding the pads as a method of restoration is not recommended. Check the rocker bores for wear against an unworn part of the rocker shaft. Excessively worn rockers should be discarded. Ensure the oil way holes are clear.
8. Examine the rocker spacing springs and renew any that are broken or have lost their tension.

#### Reassembling

9. Assemble number twelve rocker and number six pedestal to the rocker shaft ensuring that the flat spring is correctly positioned between the rocker and pedestal.
10. Fit the remaining rockers, spacers, and spacer springs as illustrated. Ensure that the flat spring is positioned correctly between number one rocker and pedestal. Secure with a new split pin.
11. Refit the rocker shaft and lubricate with clean engine oil before fitting the rocker cover.



#### DATA

|                        |           |                                       |
|------------------------|-----------|---------------------------------------|
| Diameter of shaft      | . . . . . | .5607 – .5612 in (14.242 – 14.254 mm) |
| Bore size of rockers   | . . . . . | .563 – .564 in (14.300 – 14.325 mm)   |
| Bore size of pedestals | . . . . . | .563 – .564 in (14.300 – 14.325 mm)   |
| Spring free length     | . . . . . | 2.71 in (68.8 mm)                     |

## ROCKER ADJUSTING SCREWS

– Remove and refit

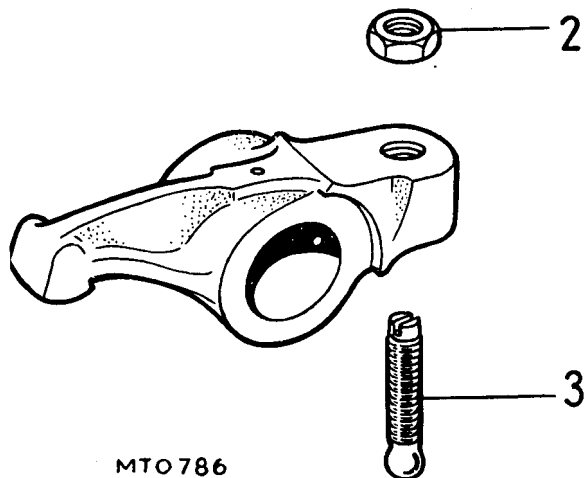
12.29.56

## Removing

1. Remove the rocker shaft assembly 12.29.54.
2. Remove the rocker adjusting screw locknuts.
3. Remove the rocker adjusting screws.

## Refitting

4. Reverse instructions 1 to 3.
5. Adjust the valve clearances 12.29.48.



## CAM FOLLOWERS

– Remove and refit

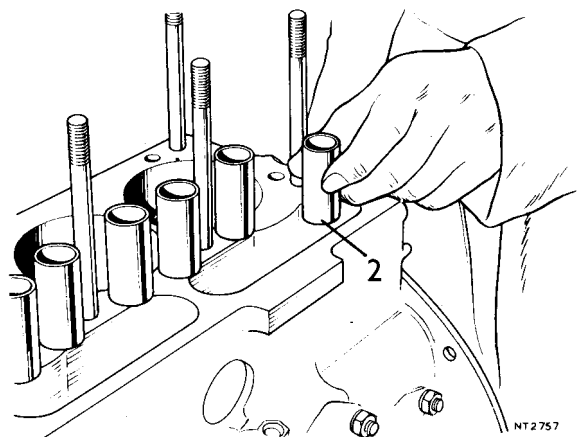
12.29.57

## Removing

1. Remove the cylinder head 12.29.10.
2. Lift out the eight cam followers and identify for reassembly.

## Refitting

3. Reverse instructions 1 and 2 ensuring:—
  - a. Worn or pitted cam followers are renewed.
  - b. Each follower is free to slide and rotate in its respective bore.



## DATA

|                        |   |
|------------------------|---|
| Cam follower dia.      | 0.799 in – 0.80 in (20.31 – 20.32 mm)   |
| Bore in cylinder block | 0.8002 in – 0.8009 (20.325 – 20.343 mm) |

## ENGINE

### PUSH RODS

#### – Remove and refit

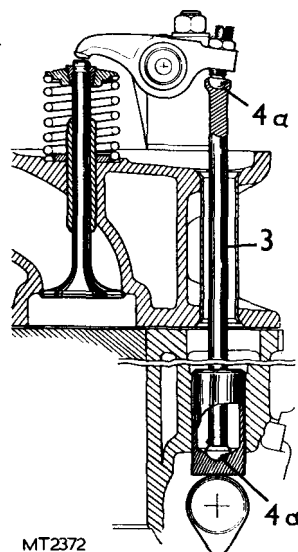
12.29.59

#### Removing

1. Remove the rocker cover 12.29.42.
2. Remove the rocker shaft assembly 12.29.54.
3. Lift out the push rods and identify for reassembly.

#### Refitting

4. Reverse instructions 1 to 3 ensuring:—
  - a. Push rods with worn or pitted cup and ball ends and bent shaft are renewed.
  - b. The cup ends are located correctly in the rocker adjusting screw ball and the ball end of the push rods seat properly in their respective cam followers.
5. Adjust the valve clearances 12.29.48



#### Valves – exhaust – remove and refit

12.29.60

#### Valves inlet and exhaust – remove and refit

12.29.62

#### Valves – inlet – remove and refit

12.29.63

#### Valve guide – inlet – remove and refit

12.29.70

#### Valve guide – exhaust – remove and refit

12.29.71

#### Inlet valve seat – remove and refit

12.29.76

#### Exhaust valve seat – remove and refit

12.29.77

See 12.29.18.



## ENGINE AND GEARBOX ASSEMBLY

## — Remove and refit

12.37.01

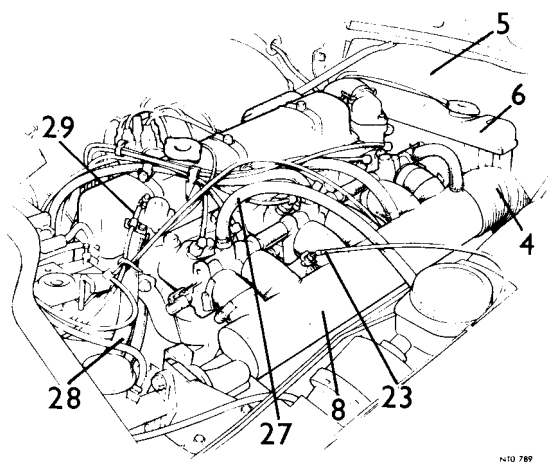
## Removing

1. Isolate the battery.
2. Remove the bonnet 76.16.01.
3. Drain the radiator.
4. Remove the air cleaner to air intake manifold hose — P.I. only.
5. Remove the radiator cowling.
6. Remove the radiator.
7. Remove the bottom hose from the water pump.
8. Remove the air intake manifold 19.70.01 — P.I. engine.
9. Remove the air cleaner — carburettor engine.
10. Drain the engine coolant.
11. Remove the chassis cross tube 76.10.05.
12. Disconnect the alternator.
13. Disconnect the coil.
14. Disconnect the alternator multi-socket connector
15. Disconnect the oil warning light.
16. Disconnect the oil gauge pipe.
17. Disconnect the fuel main feed pipe.
18. Disconnect the metering unit spill-off pipe — P.I.
19. Disconnect the excess fuel lever — P.I.
20. Disconnect the earth strap from the rear lifting eye end, refit the bolt.
21. Disconnect the water temperature transmitter lead.
22. Disconnect the tachometer drive.
23. Disconnect the throttle cable.
24. Disconnect the fast idle cable — P.I.
25. Disconnect the mixture control cable — carburettor model.
26. Disconnect the fast idle return spring — P.I.
27. Disconnect the brake servo pipe.
28. Disconnect the two heater hoses.
29. Disconnect the heater control cable.
30. Disconnect the starter motor leads.
31. Jack-up the car and support it on chassis stands and disconnect the clutch slave cylinder and bracket from the bell housing.
32. Disconnect the exhaust pipe from the manifold.
33. Remove the chassis stands and lower the car.
34. Remove the gearbox tunnel cover 76.25.07.
35. Remove the gear lever 37.16.04.
36. Disconnect the leads from the transmission switches.
37. Disconnect the propeller shaft from the transmission.
38. Remove the engine and gearbox rear mounting bolts.
39. Disconnect the speedometer cable from the gearbox.
40. Attach a lifting sling to a hoist and attach the sling to the engine lifting eyes and ease the weight of the engine off the front mountings.

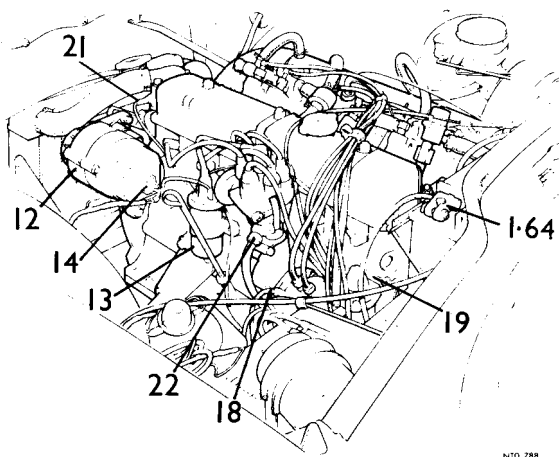
41. Disconnect the engine mounting from the engine bracket on the drivers' side.
42. Remove the engine mounting from the chassis frame on the passengers' side.
43. Raise the engine, pull forward to clear the bulkhead, raise the front of the engine and hoist clear of the car.
44. Drain the engine oil.
45. Remove the sling.

## Refitting

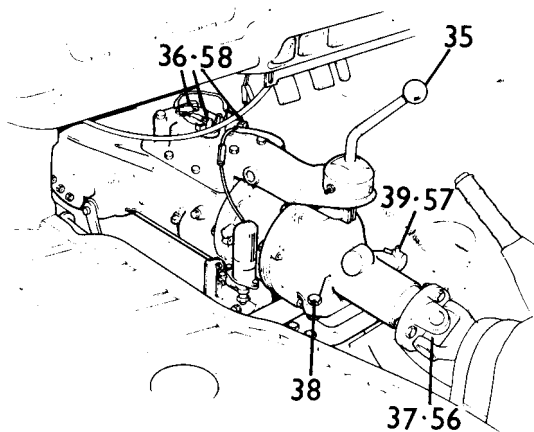
46. Attach a sling to the engine lifting eyes and attach the sling to the hoist.
47. Raise the engine and gearbox assembly and move it towards the engine compartment. Lift the front of the engine so as to enable the transmission end to enter the bulkhead aperture and lower the assembly vertically into position.
48. Loosely connect the R.H. and L.H. engine mountings.
49. Place the rear mounting bolts in position and lower the engine and remove the sling.
50. Secure the L.H. and R.H. front mountings.
51. Raise the car on a jack and support the car on chassis stands.
52. Fit the exhaust pipe to the manifold using a new gasket.
53. Fit the clutch slave cylinder and bracket to the bell housing and lower the car.
54. Secure the R.H. rear mounting bolt to the exhaust pipe bracket captive nut.
55. Tighten the L.H. rear mounting bolt with the nut and spring washer.
56. Connect the propeller shaft to the transmission drive flange.
57. Connect the speedometer drive.
58. Connect the leads to the transmission switches.
59. Fit and adjust the gear lever 37.16.04.
60. Fit the gearbox tunnel cover.
61. Reverse instructions 2 to 31.
62. Refit the engine sump with new oil to the high mark on the dipstick.
63. Check the gearbox oil level.
64. Reconnect the battery.



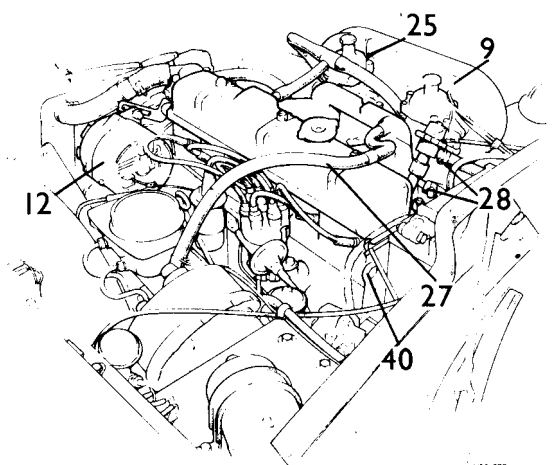
NT0 789



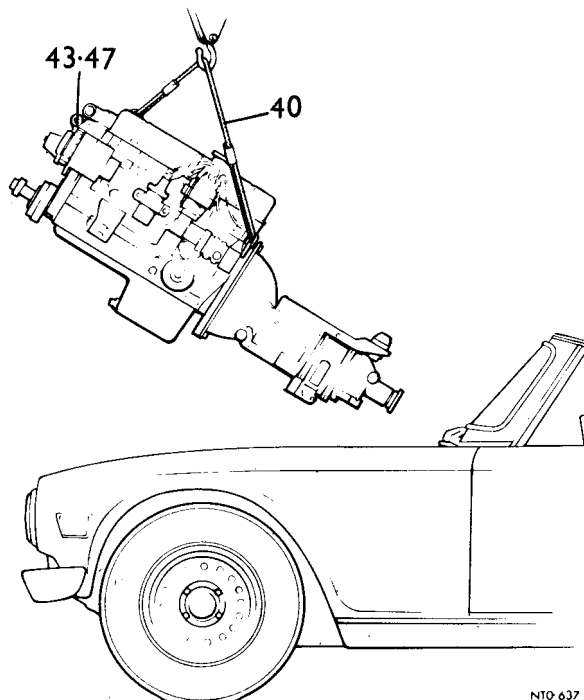
NT0 788



NT3 792

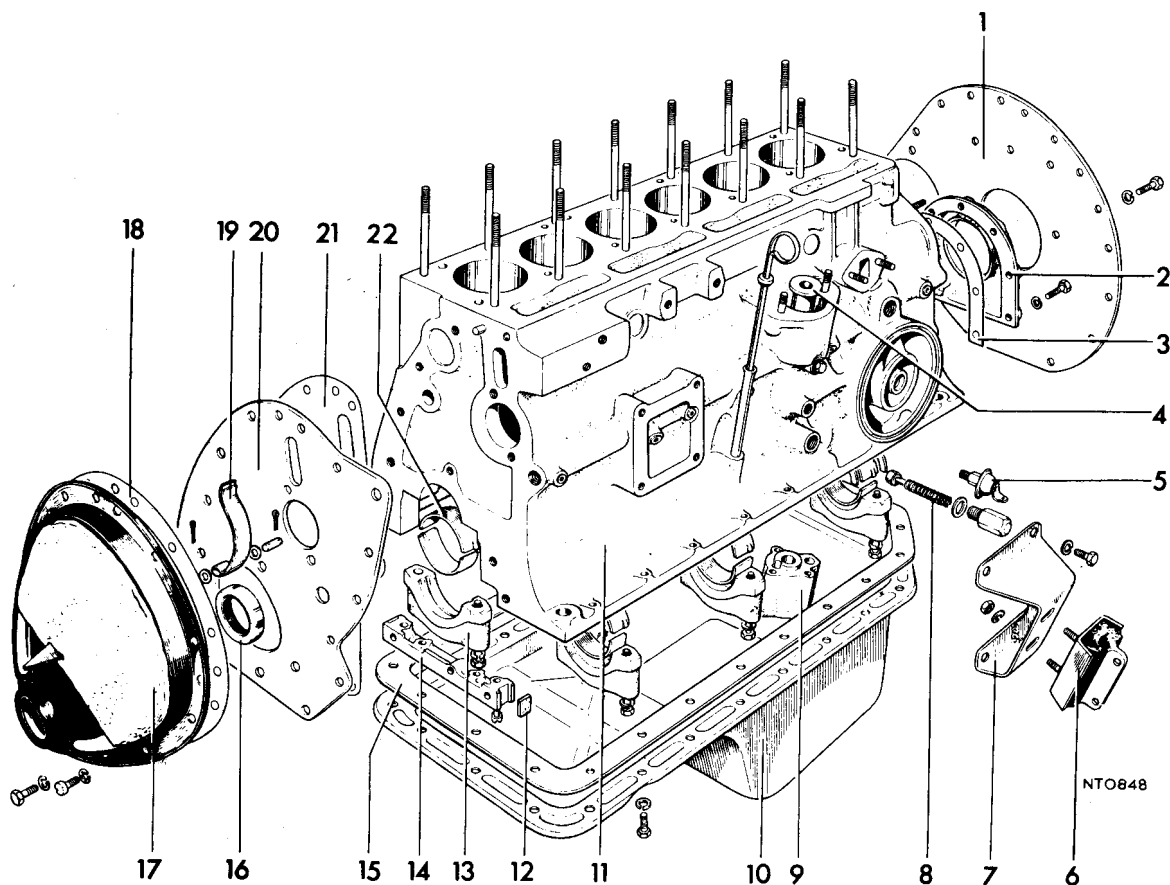


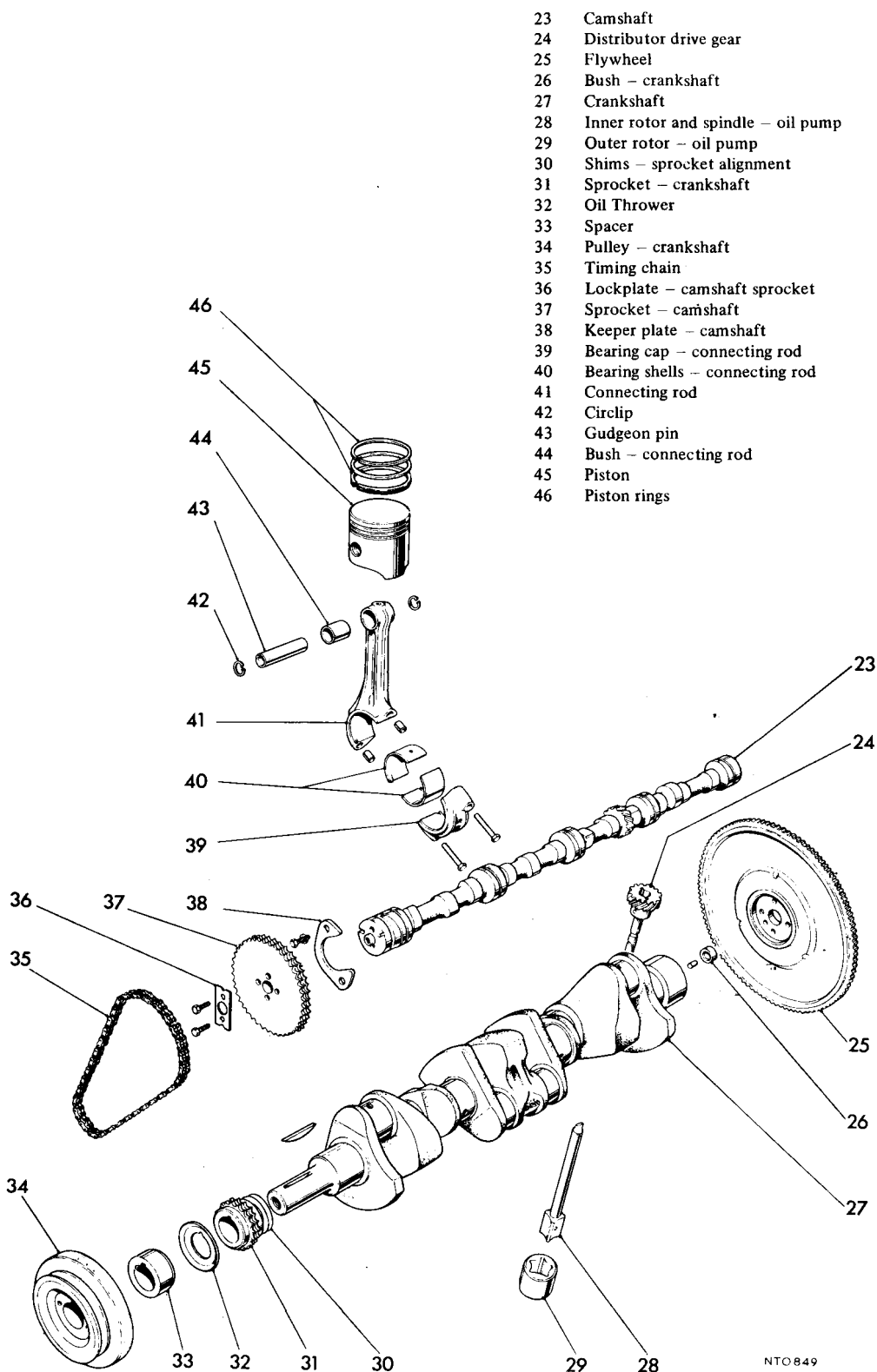
NT0 790



NT0 637

- |   |                                  |
|---|----------------------------------|
| 1. Engine backplate                             | 12. Packing—front sealing block. |
| 2. Crankshaft rear oil seal housing.            | 13. Main bearing cap.            |
| 3. Gasket—crankshaft rear oil seal housing.     | 14. Front sealing block.         |
| 4. Bush—oil pump spindle and distributor drive. | 15. Gasket—sump.                 |
| 5. Oil switch.                                  | 16. Oil seal— timing cover.      |
| 6. Engine mounting.                             | 17. Timing cover.                |
| 7. Bracket—engine mounting.                     | 18. Gasket—timing cover.         |
| 8. Relief valve—oil pressure.                   | 19. Tensioner—timing chain.      |
| 9. Body—oil pump.                               | 20. Engine front plate.          |
| 10. Sump.                                       | 21. Gasket—engine front plate.   |
| 11. Cylinder block.                             | 22. Main bearing shells.         |





NT0849

## ENGINE ASSEMBLY

## — Strip and rebuild

12.41.05

## Stripping

1. Remove the engine and gearbox assembly from the car 12.37.01.
2. Remove the gearbox from the engine.
3. Remove the following carburettor engine
  - a. the inlet manifold complete with carburetters.
  - b. the fuel pump and outlet pipe.
  - c. the ignition distributor 86.35.20.
  - d. the pedestal and distributor drive shaft
4. Remove the following P.I. engine
  - a. the injector pipes from the injectors.
  - b. the metering unit vacuum pipe.
  - c. the ignition distributor complete with the pedestal distributor drive shaft and fuel metering distributor.
  - d. the inlet manifold complete.
  - e. the air intake manifold support bracket.
5. Remove the alternator and drive belt.
6. Remove the water pump complete with the housing.
7. Remove the exhaust manifold and gasket.
8. Remove the oil filter assembly and dipstick.
9. Remove the oil pressure relief valve.
10. Remove the ignition coil and earth strap. Noting the location of the suppressor on latter USA market engines.\*\*
11. Remove the starter motor.
12. Remove the engine mounting brackets.
13. Remove the oil pressure switch.
14. Remove the fan blades.
15. Remove the crankshaft pulley and fan extension, instructions 6, 7 and 9, 12.21.01.
16. Remove the clutch assembly.
17. Remove the rocker cover.
18. Remove the six pedestal nuts and lift off the rocker shaft assembly.
19. Slacken the cylinder head securing nuts in the reverse order as in operation 12.29.27.
20. Lift off the cylinder head.
21. Remove and discard the cylinder head gasket.
22. Remove the twelve push rods and cam followers and identify for reassembly.
23. Remove the five bolts, two nuts and five set screws securing the timing cover and carefully ease the cover off the two dowels and two studs.
24. Withdraw the crankshaft collar and oil thrower.
25. Straighten the lock tabs and remove the two bolts securing the camshaft sprocket and remove the crankshaft and camshaft sprocket complete with the timing chain.
26. Remove the two bolts securing the camshaft keeper plate to the cylinder block and remove the plate.
27. Carefully withdraw the camshaft from the cylinder block.
28. Remove the three bolts and two set screws from the engine front mounting plate and withdraw the plate and gasket.
29. Remove the four bolts holding the flywheel assembly to the crankshaft and lift-off the flywheel.
30. Remove the spigot bush from the back of the flywheel.
31. Remove the seven bolts and remove the engine rear mounting plate.
32. Remove the twenty three bolts and withdraw the sump and gasket.
33. Remove the three bolts and withdraw the oil pump.
34. Remove the two screws securing the front sealing block to the crankcase and withdraw the block.
35. Remove the seven bolts securing the rear main oil seal housing to the crankcase and remove the housing and seal.

**CAUTION:** It is vital that during the following operations, 36 to 39, that no intermixing of components is allowed to occur. The Connecting rod big-ends and the main bearings are numbered for identification purposes and their respective bolts, caps and bearings must not lose their identity.

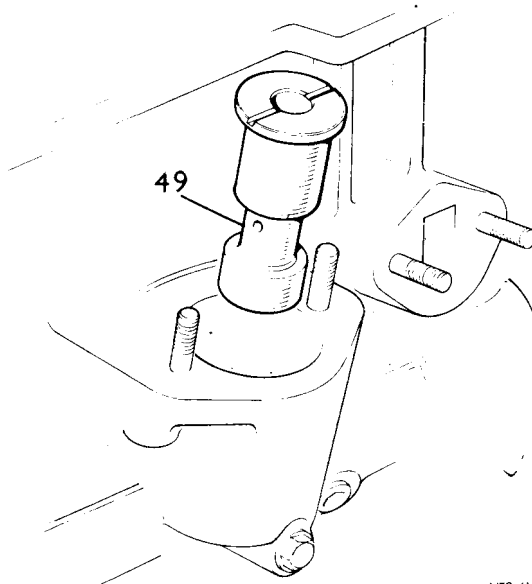
36. Remove the connecting rod bolts and withdraw the caps and lower shells.
37. Push the pistons and connecting rods up the bores and withdraw from the top of the cylinder block.
38. Assemble the caps and bearings to their respective connecting rods.
39. Remove the main bearing bolts and withdraw the caps and lower bearing shells.
40. Lift out the crankshaft.
41. Remove the thrust bearings from the rear main bearing.
42. Remove the main bearing upper shells.
43. If necessary, drive the oil pump shaft bush out from the underside of the cylinder block using a suitable drift with a pilot.
44. If necessary, remove the cylinder head holding down studs from the block.
45. Remove: a. the rear sling eye, b. the front sling eye, and c. the alternator bracket.
46. Overhaul the cylinder head 12.29.18.
47. Overhaul the connecting rods and pistons 12.17.10 instructions 2 to 15.
48. Overhaul the oil pump instructions 4 to 11. 12.60.32.

*Continued*

## Rebuilding

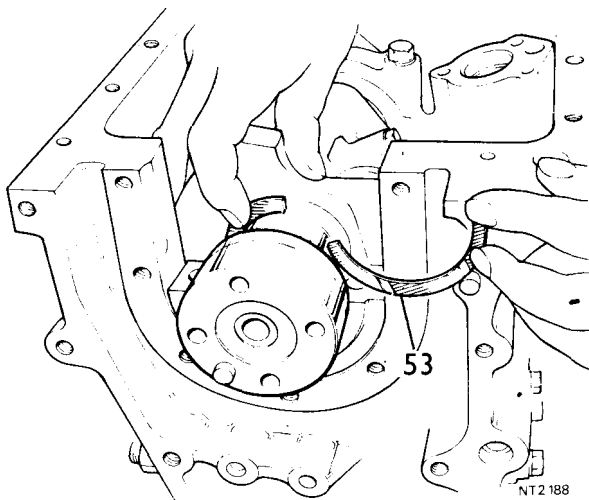
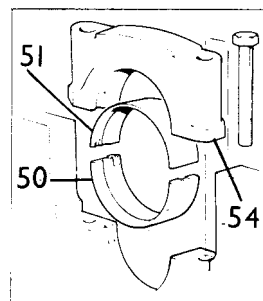
**NOTE:** The following rebuilding instructions assume that all the individual components and assemblies have been examined, worn parts renewed and assemblies reconditioned.

49. Drive the oil pump shaft bush into the cylinder block using a drift with a pilot.

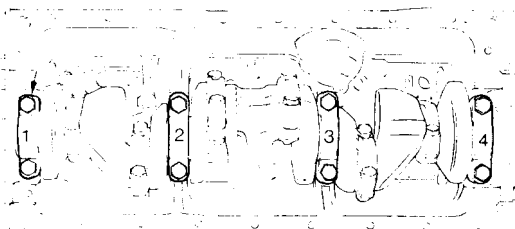


NT2 616

50. Fit the upper main bearing shells to the cylinder block ensuring that the tags locate in the recesses.
51. Fit the lower bearing shells to the bearing caps ensuring that the tags locate in the recesses.
52. Lubricate and lower the crankshaft into the crankcase.
53. Insert the thrust bearings into the grooves in the cylinder block ensuring that the oil grooves face towards the sides of the crankshaft journal.
54. Fit the bearing caps to their respective bearings as indicated by the numbers stamped on the caps and ensure that they are fitted the correct way round i.e. the shell bearing recesses in the block and cap adjacent. Tighten the retaining bolts evenly to 50 to 65 lbf ft (6.9 to 9.0 kgf m).



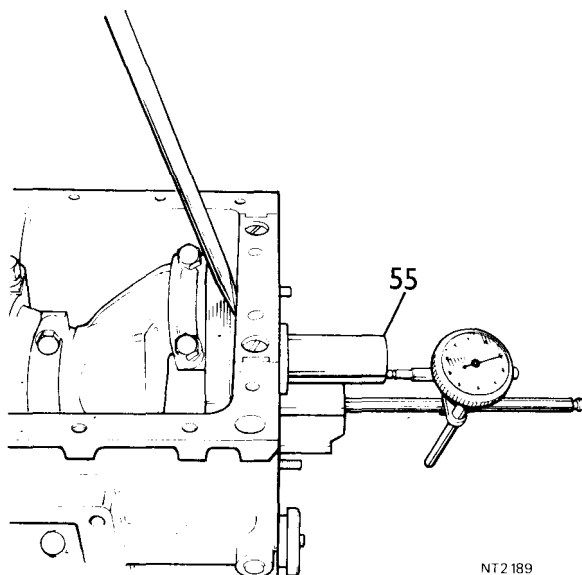
NT2 188



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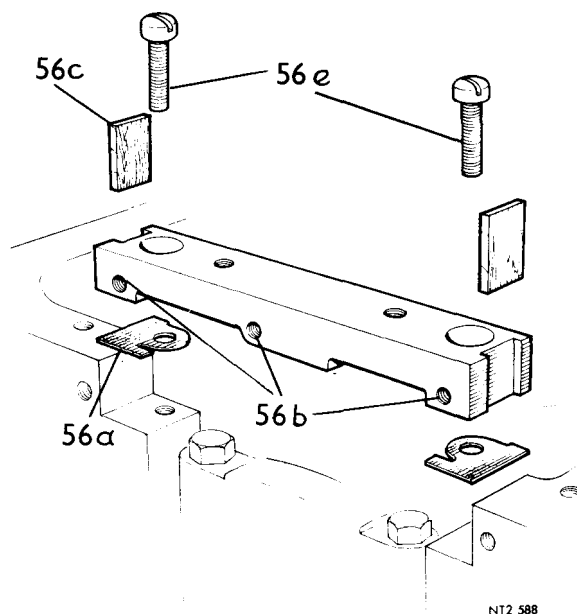
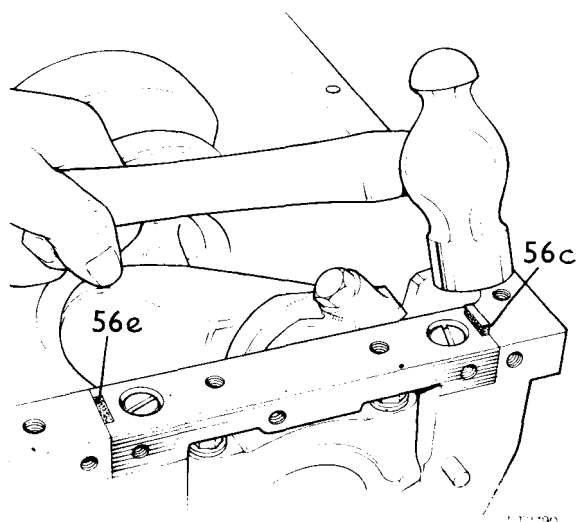
55. Check the crankshaft end float by attaching a dial gauge to the cylinder block so that the stylus rests in a loaded condition squarely on the end of the crankshaft. Lever the crankshaft forward or rearward and zero the gauge. Lever the crankshaft in the opposite direction and note the reading. See data for correct end float.



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56. Assemble the front sealing block to the crankcase as follows:

- Fit a gasket to both sides of the cylinder block mating face using jointing compound.
- Fit the sealing block with the three tapped holes facing outwards and loosely secure with the two set screws.
- Drive wedges into the slots having first coated them with jointing compound.
- Line up the front face of the sealing block with the crankcase using a straight edge.
- Finally tighten the set screws and trim the protruding ends of the wedges flush with the crankcase taking care not to undercut them, thereby causing a passage for oil leakage.



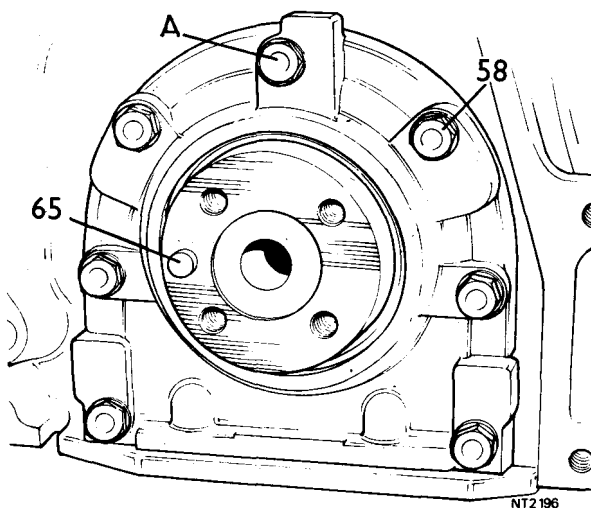
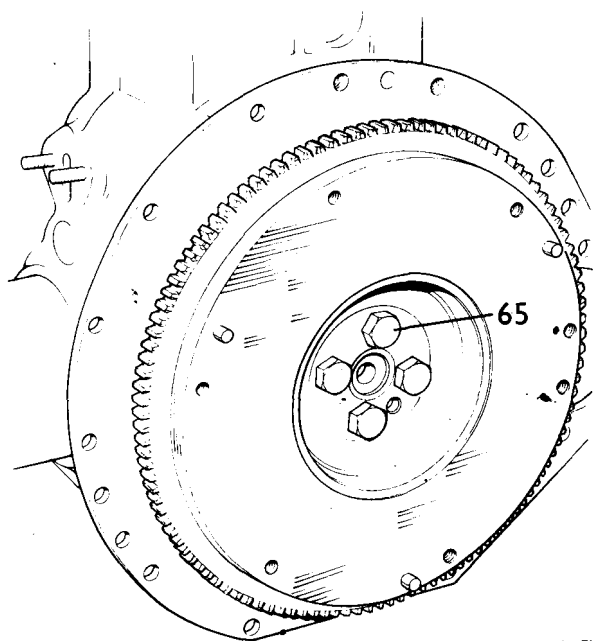
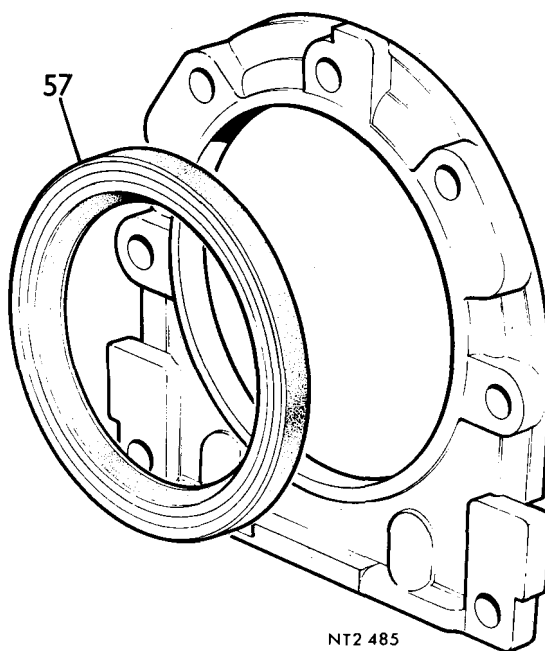
NT2 588

*Continued*

57. Coat a new oil seal with grease and press it into the rear main oil seal housing with the lip face towards the crankshaft. Remove surplus grease.
58. Fit a gasket to the cylinder block mating face using jointing compound and carefully slide the seal and housing over the crankshaft and secure in position with the seven bolts and six spring washers.

**NOTE:** The top bolt A has a copper washer under the head to prevent oil seepage since the bolt protrudes into the crankcase

59. Fit the connecting rods and pistons, instructions 6 to 10, 12, 17, 01.
60. Fit the oil pump complete with the strainer.
61. Place a sump gasket into position on the crankcase and fit the sump noting that the four longer bolts are fitted to the rear reinforcement plates.
62. Fit the engine rear adaptor plate ensuring that it locates over the dowel.
63. Secure the plate with the seven bolts and spring washers.
64. Insert the spigot bush into the back of the flywheel.
65. Fit the flywheel to the crankshaft locating it over the dowel. Secure with the four bolts tightening evenly to 50 – 75 lbf ft (6.9 – 10.4 kgf m).
66. Attach a dial gauge stand to the cylinder block and position a dial gauge so that the stylus rests 4.0 in (102 mm) from the centre of the flywheel. Check the flywheel run-out which must not exceed 0.004 in (0.1016 mm) – See 12.53.07.



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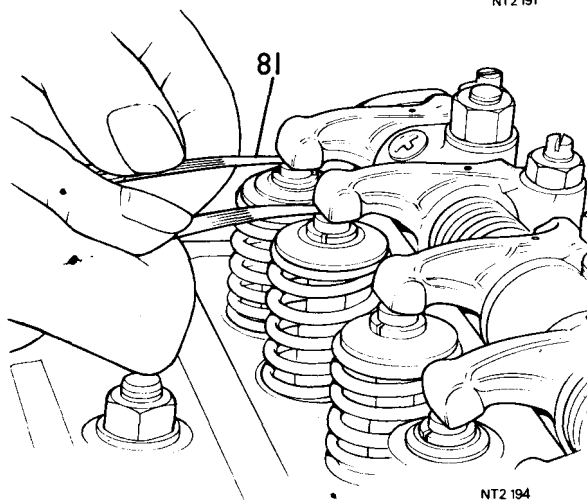
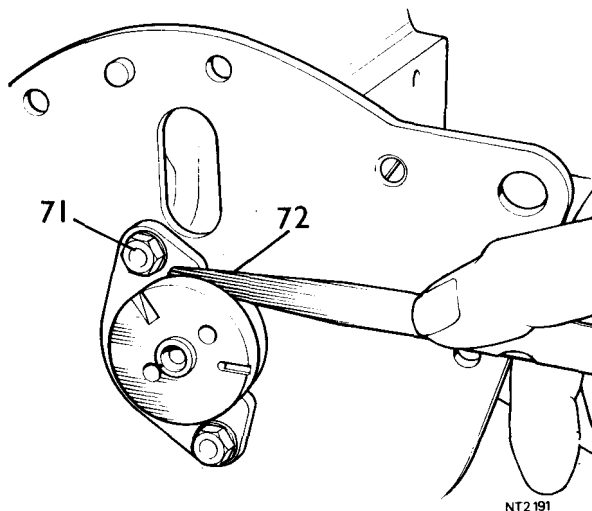
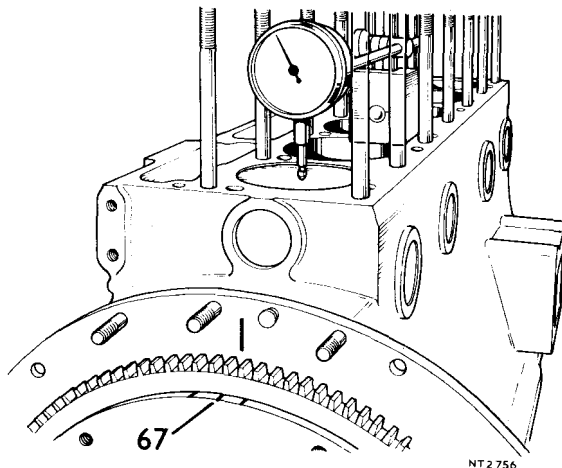


67. To obtain the true T.D.C. mark on the flywheel, attach a dial gauge stand to the cylinder block top face and position a dial gauge so that the stylus rests on top of number one piston. Turn the crankshaft in a clockwise direction until the piston reaches the highest point as indicated by the dial gauge. Make a scribe mark on the flywheel outer edge opposite the line on the engine rear adaptor plate. Turn the crankshaft in an anti-clockwise direction until the piston again reaches its highest point and make a further mark on the flywheel opposite the line on the adaptor plate. To obtain the true T.D.C. mark bisect the gap between the two scribe lines with a chisel.
68. Fit the engine front mounting plate gasket using jointing compound and fit the mounting plate locating it over the two dowels.
69. Secure the plate with the three bolts and two screws.
70. With the flat end leading and the spigot end trailing, insert the camshaft into the cylinder block.
71. Secure the camshaft with the keeper plate and two bolts. -
72. Check the camshaft end-float.
73. Turn the crankshaft so that number one and six pistons are at true T.D.C.
74. Turn the camshaft so that the milled cut-a-way is positioned at twenty - past - four which is approximately the correct position for timing.
75. Fit the camfollowers.
76. Re-stud the block and fit the cylinder head, ensuring:-
  - a. A new gasket is fitted.
  - b. The retaining nuts are tightened to the correct torque and in the correct sequence 12.29.27.
77. Fit the push rods ensuring that the ball ends locate properly in the camfollowers.
78. Fit the rocker shaft assembly and secure with the six nuts and spring washers.
79. Adjust all valve clearances 12.29.48.
80. Adjust numbers eleven and twelve valve clearances to 0.120 in.

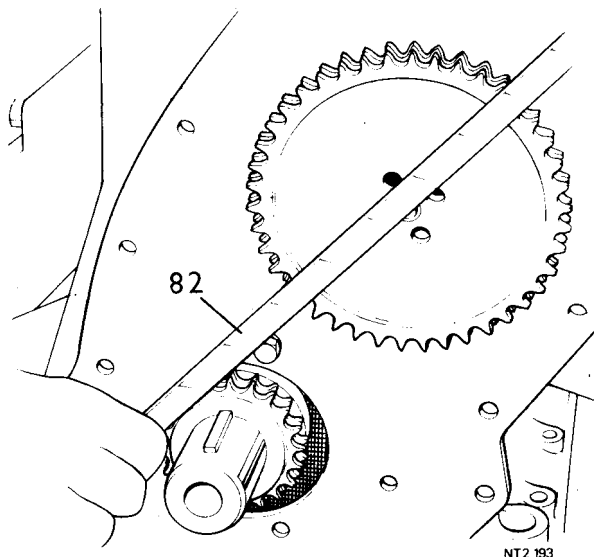
**NOTE:** This clearance may vary according to the lift of the camshaft employed. The clearance should be sufficient to enable feeler gauges of reasonable thickness to be inserted when the valves are on the 'rock'.

81. Oscillate the camshaft a few degrees so that numbers eleven and twelve valves are on the 'rock' whilst checking both valve clearances with two feeler gauges of the same value. When the clearances are the same the camshaft and crankshaft are in their correct relationship.

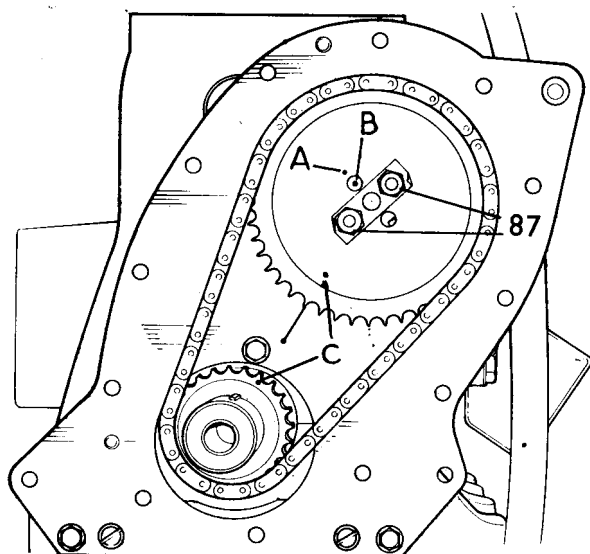
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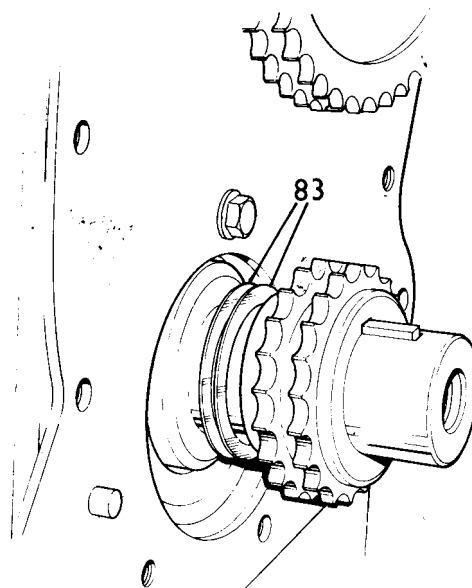
82. Temporarily fit the camshaft and crankshaft sprockets and check their alignment with a straight edge.
83. Adjust the alignment by fitting shims behind the crankshaft sprocket.
84. Encircle the sprockets with the timing chain and fit the sprockets to the engine.
85. If the original sprockets and camshaft are being fitted check that punch marks A and B coincide and punch marks C line up.
86. If new sprockets and camshaft are being fitted make the appropriate punch marks.
87. Secure the camshaft sprocket with the two bolts and lock with the tab washer.



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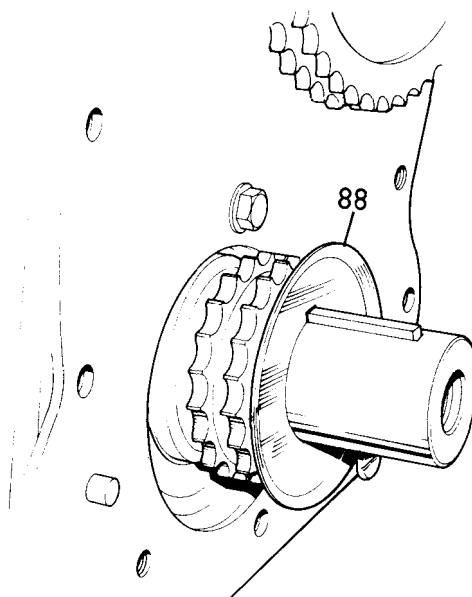
NT0 420



NT2 422

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88. Fit the oil thrower ensuring that the dished surface faces away from the crankshaft sprocket.
89. Using a new gasket and jointing compound, fit the timing chain cover - instructions 15 to 18, 12.65.01.

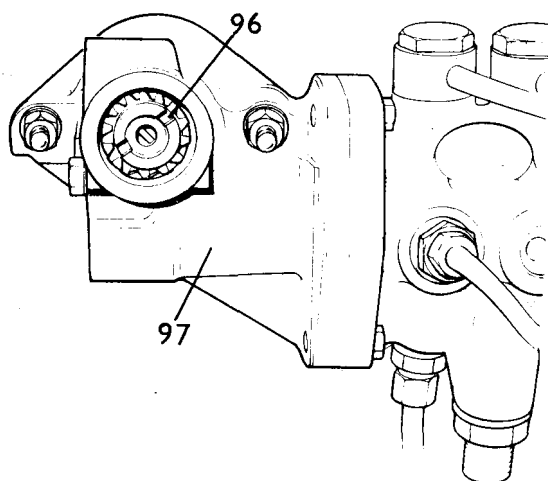


NT2 423

90. Fit the oil pressure relief valve assembly.
91. Fit the oil filter assembly and dipstick.
92. Fit the crankshaft pulley and fan extension, instructions 10 and 11, 12.21.01.
93. Fit the rocker cover using a new gasket and ensuring that fibre washers are fitted first and plain washers under the retaining nuts.

**NOTE:** The following instructions, 94 to 97, relate to P.I. engine.

94. Establish the distributor drive shaft end-float - instructions 11 to 15, 12.10.22.
95. Turn the crankshaft until number one and six pistons are at T.D.C. with number one firing.
96. Fit the distributor drive shaft so that the off-set slot is positioned as illustrated. Ensure however that the slot at the bottom end of the shaft engages properly in the oil pump drive dog.
97. Fit the pedestal complete with the fuel metering distributor and time the metering distributor to the engine - instructions 7 to 10, 19.35.01

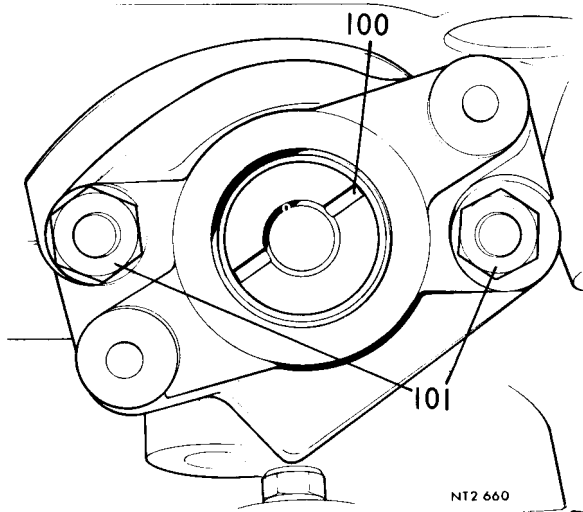


NT2 638

*Continued*

**NOTE:** The following instructions, 96 to 99, relate to the carburettor engine.

98. Establish the distributor drive shaft end-float – instructions 8 to 12, 12.10.22. (Carburettor engine).
99. Turn the crankshaft until number one and six pistons are at T.D.C. with number one firing.
100. Fit the distributor drive gear with the offset slot in the position illustrated.
101. Fit and secure the pedestal with the two nuts and washers.
102. Fit the ignition distributor leaving the clamp bolt slack until the ignition is timed when the engine is refitted to the car.
103. Fit the front and rear lifting eyes.
104. Fit the exhaust manifold and gasket.
105. Fit the inlet manifold complete with carburettors or
106. Fit the P.I. inlet manifold.
107. Connect the injector pipes to their respective injectors – P.I. only.
108. Connect the vacuum hose from the metering unit to the inlet manifold – P.I. only.
109. Fit the air intake manifold support bracket – P.I. only.
110. Fit the mechanical fuel pump and delivering pipe to the carburettors.
111. Fit the water pump complete with its housing instructions 11 to 14, 26.50.63.
112. Fit the clutch assembly, instructions 4 to 7, 33.10.01.
113. Fit the starter motor.
114. Fit the ignition coil and earth strap and (later USA market engines only) the ignition suppressor.\*\*
115. Fit the alternator and drive belt and adjust the belt tension.
116. Fit the engine mounting brackets.
117. Fit the fan blades.
118. Fit the gearbox to the engine.
119. Re-fit the engine and gearbox assembly to the car ensuring:—
  - a. The engine sump is replenished with new oil of the correct grade to the high mark on the dipstick.
  - b. The gear box oil level is checked.
  - c. The cooling system is re-filled.
120. Time the ignition 86.35.15.
121. Tune and adjust the carburettors 19.15.02, or check and adjust the butterflies – P.I. engines 19.20.05.
122. Check the engine and cooling system for oil and water leaks.



## ENGINE MOUNTING – FRONT – L.H.

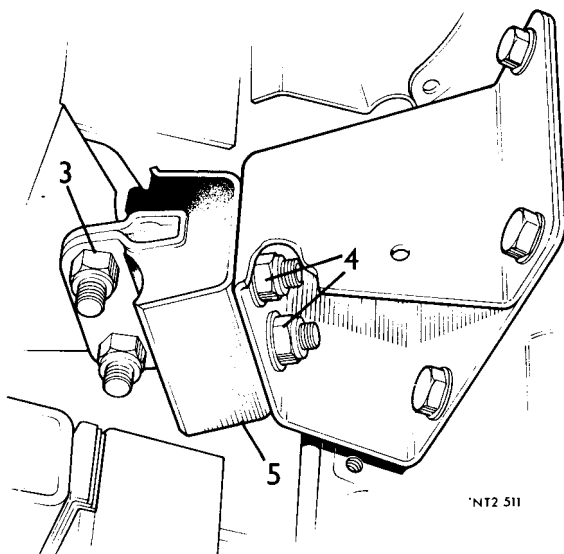
- Remove and refit 12.45.01
- Front – R.H. 12.45.03
- Front – Set 12.45.04

## Removing

1. Isolate the battery.
2. Support the weight of the engine under the sump.
3. Remove the two nuts and bolts securing the mounting to the chassis bracket.
4. Remove the two nuts and spring washers securing the mounting to the engine bracket.
5. Remove the engine mounting from the car.

## Refitting

6. Reverse instructions 1 to 5.



## ENGINE

### ENGINE MOUNTING – REAR CENTRE

#### – WITH OVERDRIVE FITTED

##### – Remove and refit

12.45.08

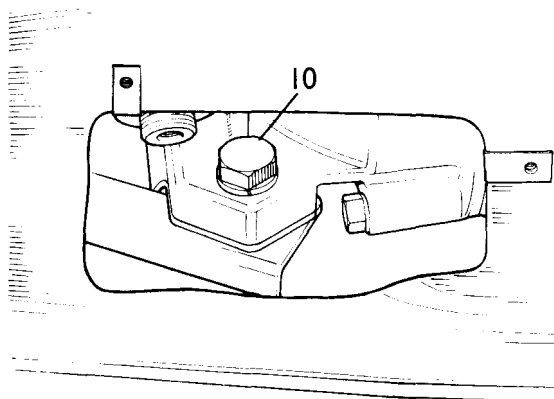
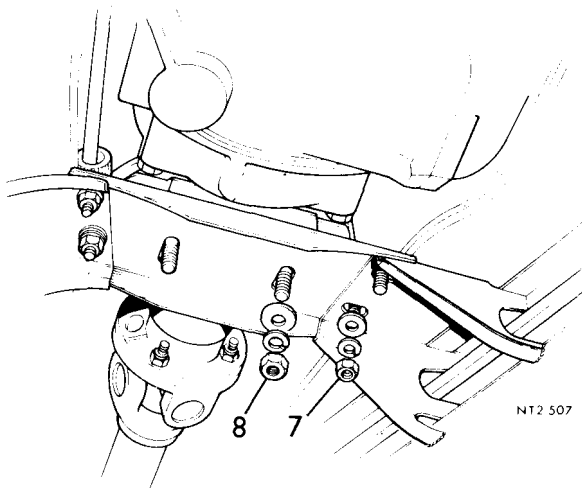
##### Removing

1. Isolate the battery.
2. Remove the fascia support bracket 76.46.09.
3. Turn back the carpets on the transmission cover, remove the speedometer drive access cover and disconnect the speedometer cable from the angle drive.
4. Remove the speedometer angle drive from the overdrive.
5. Slacken off all the bolts securing the transmission cover to the floor and ease the cover off the floor in order to provide sufficient space between the transmission and the cover when the overdrive or gearbox extension is raised as in instruction 9.
6. Raise the car on a ramp and remove the front exhaust pipe together with the inner and outer intermediate exhaust pipe assembly.
7. Remove the four nuts, bolts, plain and spring washers securing the chassis plate to the chassis brackets

**NOTE:** The rear R.H. bolt can be removed after instruction 9.

8. Remove the two nuts complete with plain and spring washers securing the mounting rubber to the mounting plate.
9. Place a jack under the overdrive and raise it sufficiently to allow the chassis plate to be removed from the studs in the rubber mounting.

10. Working within the car, release the R.H. bolt from the captive nut welded to the exhaust pipe hanger bracket and remove the bracket. Leave the bolt complete with spring washer in position.



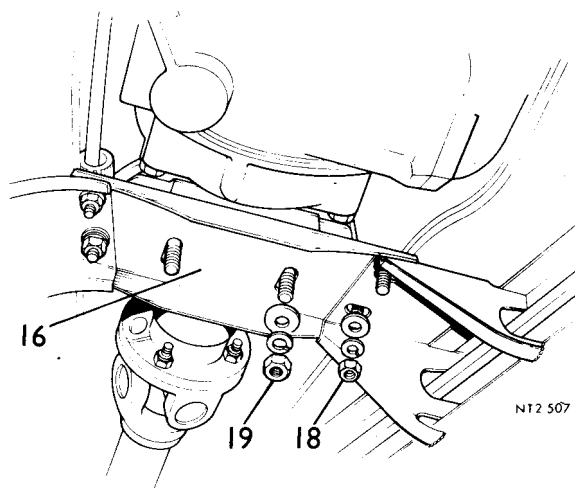
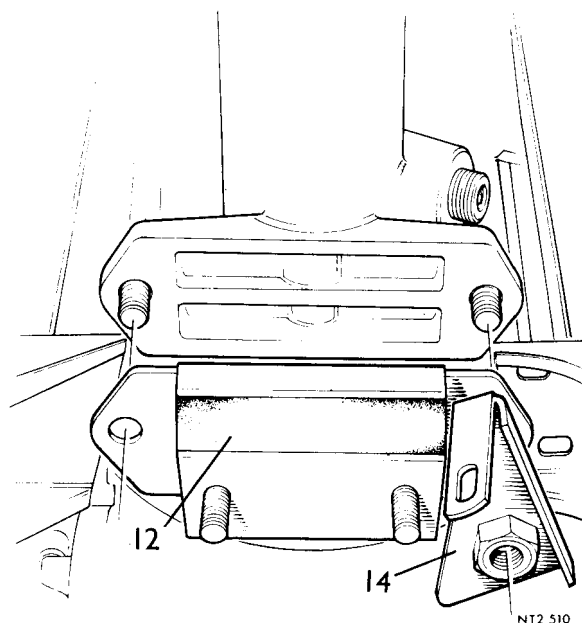
*Continued*

11. Working under the car, remove the L.H. nut and spring washer from the bolt securing the rubber mounting to the overdrive. Leave the bolt in position.
12. Remove the mounting from the chassis.

### Refitting

- 13.- Clean the overdrive and the mounting mating faces and offer-up the mounting to the securing bolts. Fit and loosely tighten the L.H. nut and spring washer.
14. Fit the exhaust pipe hanger bracket with the captive nut to the R.H. side and secure with the bolt and spring washer.
15. Finally tighten the L.H. and R.H. bolts evenly.
16. Place the chassis plate in position with the narrowest width towards the rear of the car and attach it to the chassis brackets with the four bolts, but do not fit the nuts at this stage.
17. Lower the overdrive unit so that the mounting studs pass through the two elongated holes. To achieve this, movement of the mounting plate is possible within the limits of the four elongated holes.
18. Secure the chassis plate to the chassis brackets with the four nuts, bolts, spring and plain washers.
19. Fit and tighten the two nuts with plain and spring washers to the mounting studs.
20. Reverse instructions 1 to 6.

*continued*



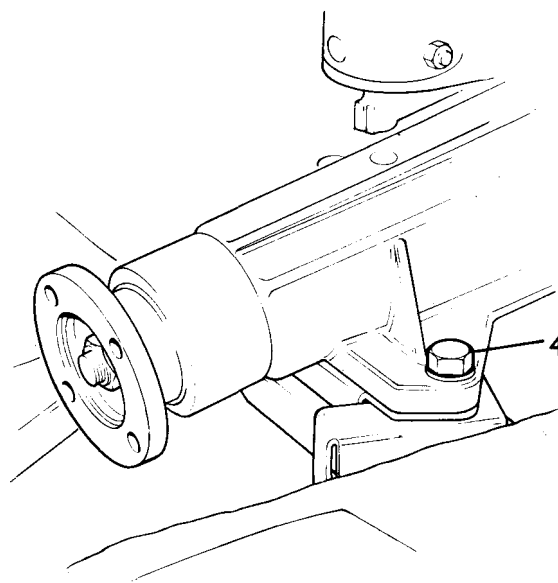
## ENGINE MOUNTING – REAR CENTRE – WITHOUT OVERDRIVE

### – Remove and refit

12.45.08

#### Removing

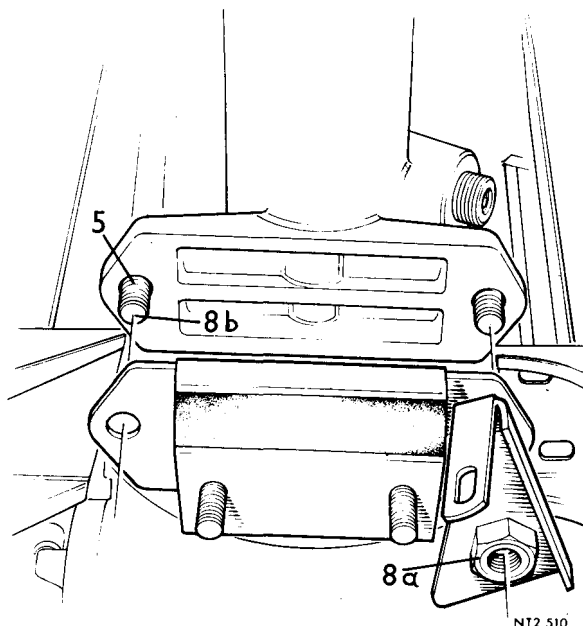
1. Isolate the battery.
2. Remove the transmission cover 76.25.07.
3. Place the car on a ramp and disconnect the exhaust assembly from the centre hanger bracket.
4. Working within the car, remove the R.H. mounting bolt and withdraw the hanger bracket and captive nut.
5. Remove the L.H. mounting bolt and nut.
6. Working beneath the car, remove the two nuts securing the mounting to the gearbox extension.
7. Raise the gearbox extension with a jack sufficiently to withdraw the mounting from the chassis.



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#### Refitting

8. With gearbox extension still in the raised position fit the mounting and secure to the extension with:—
  - a. The captive nut and hanger bracket on the R.H. side and
  - b. The nut, bolt and spring washer on the L.H. side.
9. Lower the gearbox extension allowing the mounting fixing studs to pass through the holes in the chassis cross-member.
10. Secure the mounting to the cross-member with the two nuts and spring washers.
11. Reconnect the exhaust pipe assembly to the hanger bracket.
12. Refit the transmission cover 76.25.07.
13. Reconnect the battery.
14. Remove the car from the ramp.



NT2 510



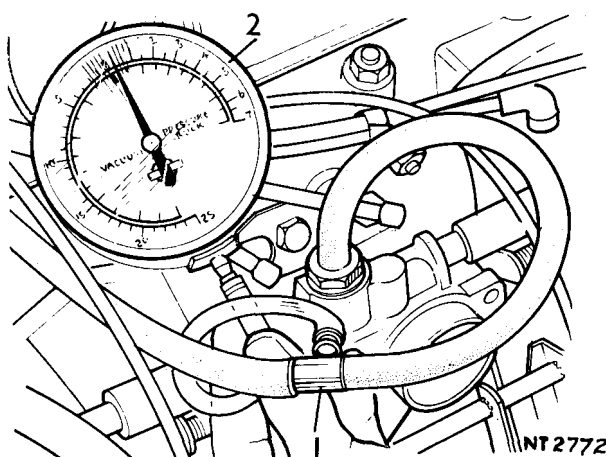
## ENGINE TUNE

- check and adjust distributor points
- check and adjust spark plugs
- check and adjust ignition timing
- check and adjust valve clearances
- tune carburettors
- check and adjust throttle butterflies – P.I.
- clean fuel pump filter – carburetter engine 12.49.02
- spray check fuel injectors – P.I.
- check fuel metering distributor timing – P.I.
- clean fuel metering distributor inlet filter – P.I.
- check the manifold depression – P.I.
- road test

1. Examine and measure the gap of the distributor points and adjust or renew as necessary 86.35.13.
2. Remove the spark plugs, examine their condition and renew if necessary. Otherwise clean and adjust the gaps 86.35.01.
3. Check the ignition timing and adjust if required 86.35.16.
4. Check and if necessary adjust the valve clearances in the correct sequence 12.29.48.
5. Tune the carburettors 19.15.02.
6. Carburetter Cars – clean the fuel pump filter 19.45.05.
7. Petrol Injection Cars: check and adjust the throttle butterflies 19.20.05.
8. Petrol Injection Cars: check the spray pattern of all six injectors and clean and renew as necessary 19.60.02.
9. Petrol Injection Cars: check the timing of the fuel metering distributor and re-time if required.
10. Petrol Injection Cars: remove and clean or renew the fuel metering distributor inlet filter 19.35.15.
11. Petrol Injection Cars – check the manifold depression 12.00.00.
12. Road test the car.

## MANIFOLD DEPRESSION – P.I.

- Check 12.49.03
1. Connect a T piece between the inlet manifold and metering distributor control unit vacuum hose.
  2. Connect a vacuum gauge to the T piece.
  3. Start the engine and set it to idle at 800 to 850 r.p.m. and note and compare the reading on the gauge with the figure in data.
  4. Stop the engine, remove the gauge and T piece and connect the vacuum hose to the manifold.



## DATA

Manifold depression . . . . . 7 to 8 in. Hg. (237 – 271 m bar) at 800 r.p.m.

## ENGINE REAR GEARBOX ADAPTOR PLATE

— Remove and refit

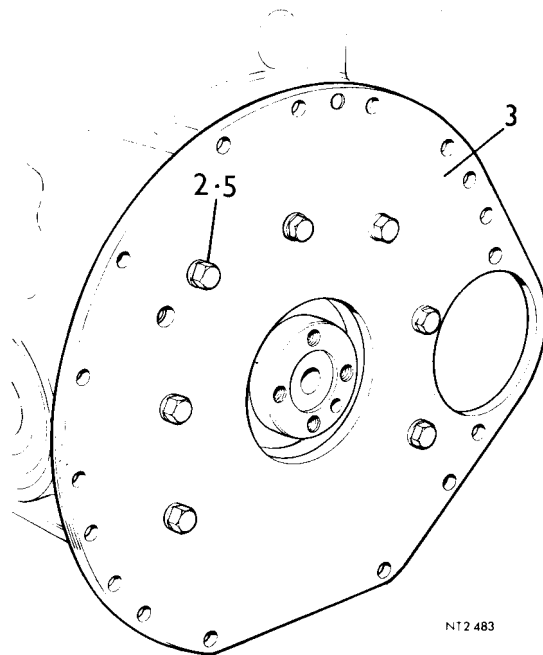
12.53.03

### Removing

1. Remove the starter motor 86.60.01.
2. Remove the flywheel 12.53.07.
3. Remove the seven bolts and spring washers securing the adaptor plate to the cylinder block.
4. Remove the plate carefully easing it off the two locating dowels.

### Refitting

5. Clean the cylinder block and adaptor mating faces and fit the plate to the cylinder block ensuring that it locates squarely over the two dowels.
6. Secure the plate to the cylinder block with the seven bolts and spring washers.
7. Refit the flywheel — instructions 7 to 14, 12.53.07.
8. Refit the starter motor 86.60.01.



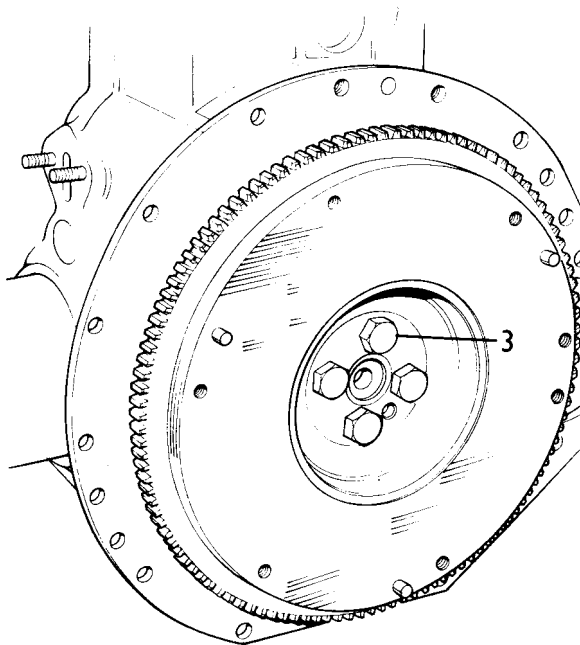
## FLYWHEEL

— Remove and refit

12.53.07

### Removing

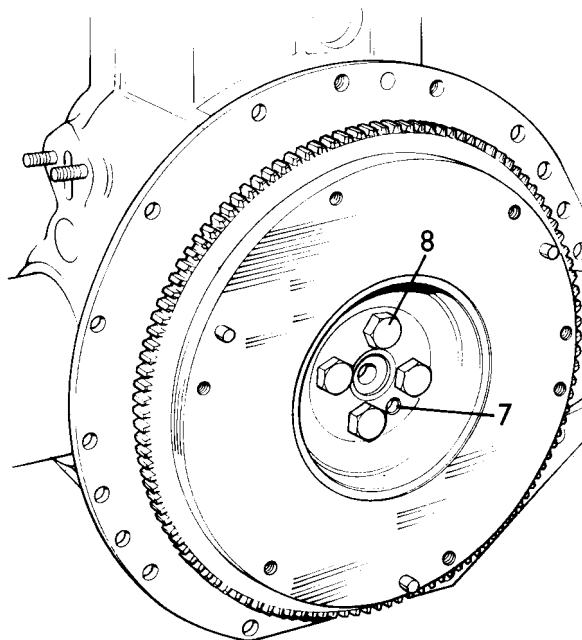
1. Remove the gearbox assembly from the car 37.20.01.
2. Remove the clutch from the flywheel — instructions 2 and 3, 33.10.01
3. Remove the four bolts securing the flywheel to the crankshaft.
4. Lift off the flywheel.
5. Remove the spigot bush from the back of the flywheel — instruction 2, 12.21.45.



*Continued*

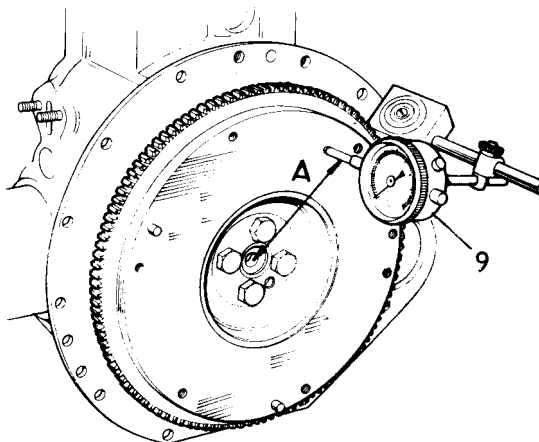
**Refitting**

6. Fit the spigot bush – instruction 3, 12.21.45.
7. Clean the crankshaft and flywheel mating faces and fit the flywheel to the crankshaft ensuring that the dowel in the crankshaft locates properly in the flywheel.
8. Secure the flywheel with the four bolts and tighten evenly to 50 – 75 lbf ft (6.9 to 10.4 kgf m).



NT0 476

9. Using a dial gauge at dimension A from centre, check the flywheel for run-out, see Data.
10. Refit the clutch – instructions 4 to 7, 33.10.01.
11. Refit the gearbox. 37.20.01.



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**DATA**

Flywheel run out not to exceed . . . . . 0.004 in (0.101 mm) at a radius of  
4.0 in (101 mm) from the centre dimension A.

## ENGINE

### STARTER RING GEAR

#### – Remove and refit

12.53.19

#### Removing

1. Remove the flywheel 12.53.07.
2. Place the flywheel assembly on a bench and drill a  $\frac{1}{4}$  in (6.35 mm) hole midway between the root diameter of any two teeth and the inside diameter of the ring gear.
3. Hold the flywheel assembly in a soft jawed vice and place a heavy cloth over the ring gear for protection against flying fragments.

**WARNING: ENSURE ADEQUATE PROTECTION, PARTICULARLY FOR THE EYES, TO PREVENT INJURY FROM FLYING FRAGMENTS WHEN THE RING GEAR IS SPLIT**

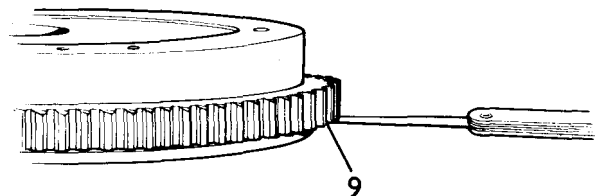
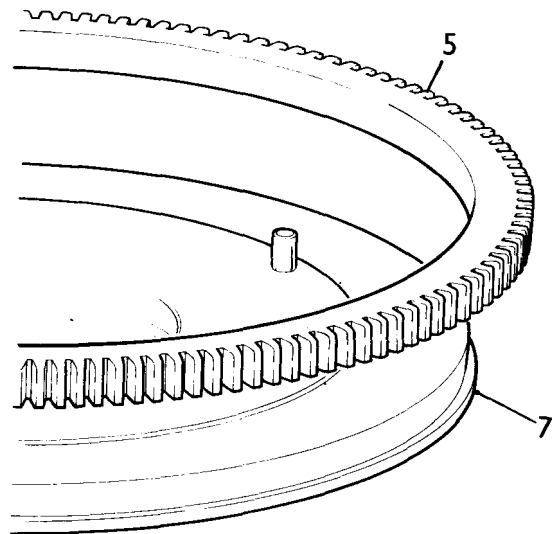
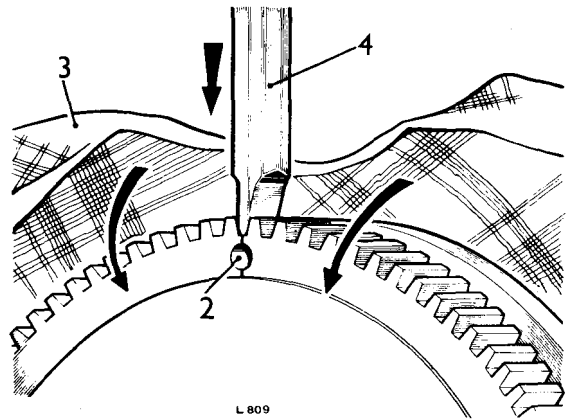
4. Place a cold chisel above the drilled hole between the two teeth and strike the chisel sharply to split the ring gear.

#### Refitting

5. Heat the replacement ring gear uniformly to a maximum temperature of  $200^{\circ}\text{C}$ .
6. Place the flywheel on a flat surface, clutch face side uppermost and clean the ring location.
7. Fit the ring gear to the flywheel ensuring that it locates against the shoulder on the flywheel round the entire circumference.
8. Hold the ring gear in position until it contracts sufficiently to grip the flywheel and allow it to cool gradually to avoid distortion.
9. Check, with a feeler gauge, the gap that may exist between the ring gear and the flywheel shoulder and ensure that it does not exceed 0.025 in (0.635 mm) in any one area of 6 in (15 cm) around the circumference.
10. Refit the flywheel to the engine and secure with the four bolts – instructions 7 and 8, 12.53.07.
11. Check the flywheel for run-out and eccentricity – instructions 10 and 11, 12.53.07.
12. Check the ring gear for eccentricity using a dial gauge – see Data.
13. Refit the gearbox and if fitted the overdrive to the engine.
14. Refit the gearbox and overdrive assembly to the car.

#### DATA

|  |                     |
|--|---------------------|
| Maximum fitting temperature for ring gear  | 200°C               |
| Maximum gap between flywheel shoulder and ring gear in any one area of 6 in (15 cm) around the circumference | 0.025 in (0.635 mm) |
| Maximum ring gear eccentricity when attached to flywheel   | 0.010 in (0.254 mm) |
| Flywheel and ring gear assembly balance to be within   | 0.20 oz. in         |



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## ENGINE LUBRICATION

## — Description

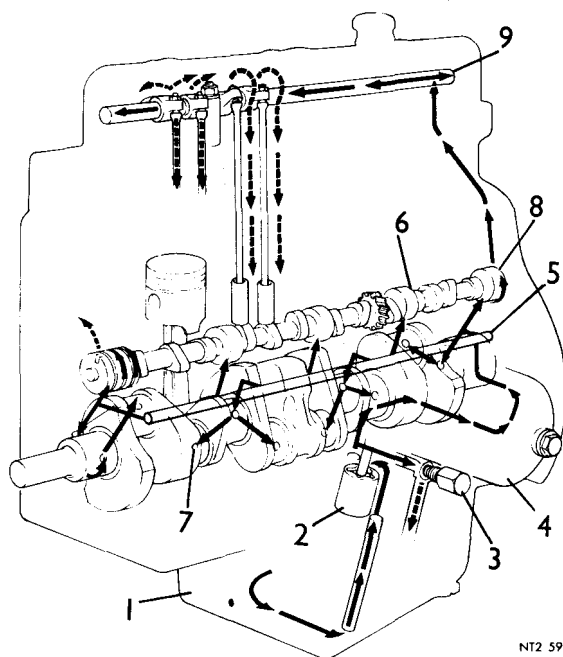
12.60.00

## Oil circulation

Oil drawn from the engine sump by a rotor type pump, is delivered via a non-adjustable pressure relief valve to a full flow type oil filter. Oil, by-passed from the relief valve, is returned to the engine sump, and the filtered oil passes to the engine main oil gallery. From the gallery, oil is distributed to the camshaft and crankshaft journals. Drillings, in the crankshaft allow oil to pass to the crankpins and surplus oil from the crankpins lubricates the cylinder walls by splash action thrown-up by the crankshaft.

The camshaft rear bearing supplies a reduced flow of oil to the hollow rocker shaft and valve assembly. Reduction of the flow is achieved by means of two machined flats on the camshaft rear journal. The flats present an increased volume to the oil supply to the camshaft rear bearing thus reducing the overall flow to the cylinder head. Oil spillage from the valve assembly lubricates the camfollowers, cams and the distributor drive shaft and gears before returning to the sump.

The timing chain and sprockets are lubricated via a scroll on the camshaft front journal and by oil mist from the crankcase. Oil leakage from the crankcase is prevented by lip type seals fitted to the front and rear of the crankshaft.



NT2 597

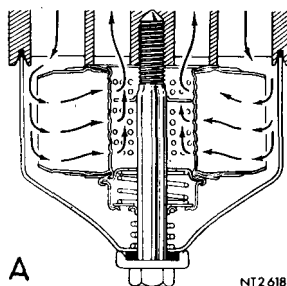
1. Sump
2. Oil pump
3. Pressure relief valve
4. Oil filter
5. Engine main oil gallery
6. Camshaft
7. Crankcase oil drilling
8. Camshaft rear bearing
9. Rocker shaft

## Oil filtration

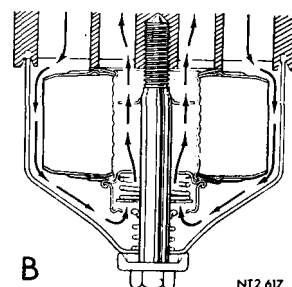
A full flow replaceable element type oil filter is fitted to the crankcase and secured by a single bolt. Sealing of the unit is achieved by a rubber ring between the filter body and crankcase and a rubber washer under bolt head.

Oil delivered from the pressure relief valve to the filter body passes through and out of the centre of the filter element into the engine main oil gallery — A.

In the event of the filter element becoming blocked, due to neglect, lubrication of the engine is never-the-less assured by a by-pass valve which allows unfiltered oil to flow through the filter body direct to the main oil gallery — B.



NT2 618



NT2 617

## ENGINE

### OIL FILTER ELEMENT

#### — Remove and refit

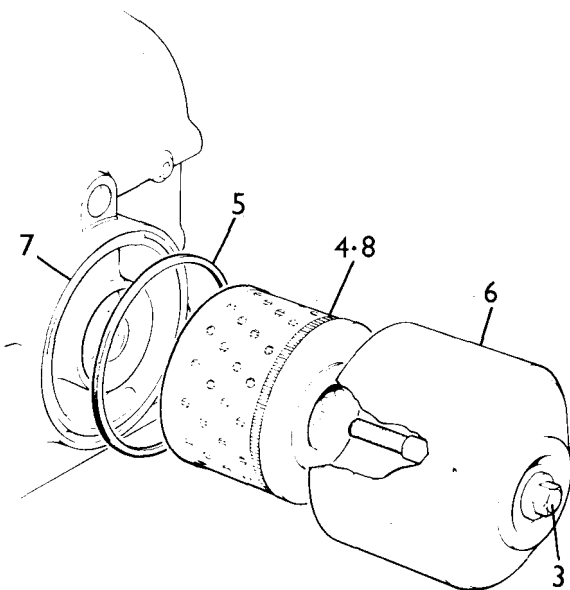
12.60.02

#### Removing

1. Isolate the battery.
2. Place a suitable receptacle under the oil filter to prevent oil leakage onto the floor.
3. Unscrew the central securing bolt and withdraw the filter assembly from the engine.
4. Remove and discard the filter element.
5. Remove the crankcase sealing ring.

#### Refitting

6. Clean the filter body and renew the seals if necessary.
7. Clean the crankcase and fit a new sealing ring.
8. Insert a new filter element in the filter body and secure the assembly to the crankcase, tightening the central bolt to 15 – 20 lbf ft (2.1 to 2.8 kgf m).
9. Reconnect the battery, start the engine and check:
  - a. for oil leaks from the filter
  - b. the low oil pressure warning light on the control panel goes out
  - c. that the oil pressure gauge registers the normal pressure.



NT2 615

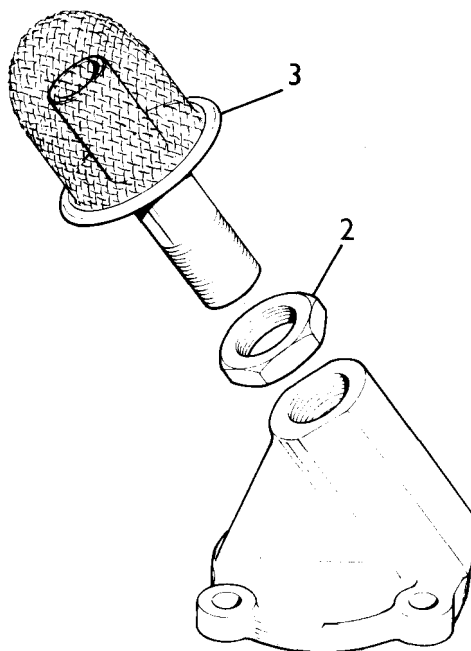
### OIL PICK-UP STRAINER

#### — Remove and refit

12.60.20

#### Removing

1. Remove the sump 12.60.44.
2. Slacken the lock nut.
3. Unscrew the strainer from the pump cover plate.

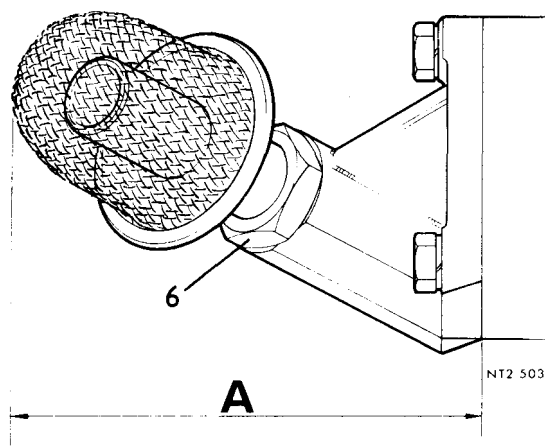


NT2 217

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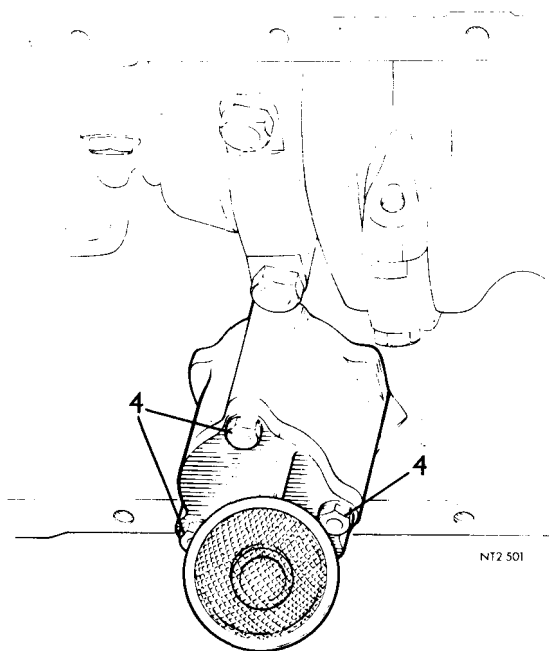
**Refitting**

4. Wash the strainer gauze in petrol and allow to dry.
5. Screw the strainer into the pump cover plate until the measurement A between the pump body face and the end of the strainer gauze is 4.25 in (~~100 mm~~). **108 mm**
6. Tighten the locknut to 20 – 24 lbf ft (2.8 – 3.3 kgf m).
7. Refit the sump 12.60.44.

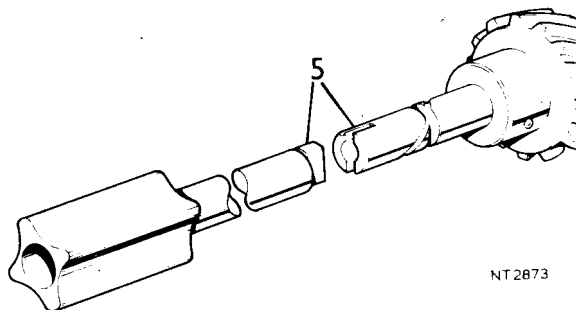
**OIL PUMP****– Remove and refit****12.60.26****Removing**

1. Isolate the battery.
2. Drain the oil sump.
3. Remove the sump 12.60.44.
4. Slacken the three bolts retaining the pump to the crankcase and whilst holding the pump cover in position slacken the bolts completely and remove the pump.

**NOTE:** If the pump is not to receive attention use 'slave' nuts on the bolts to keep the pump cover in position to prevent the ingress of foreign matter.

**Refitting**

5. Clean the crankcase and oil pump mating faces and offer up the pump to the crankcase ensuring that the oil pump spindle engages positively into the distributor drive gear shaft before evenly tightening the bolts and spring washers to 7 – 9 lbf ft (1.0 – 1.2 kgf m).
6. Reverse instructions 1 to 3.



## OIL PUMP

### — Overhaul

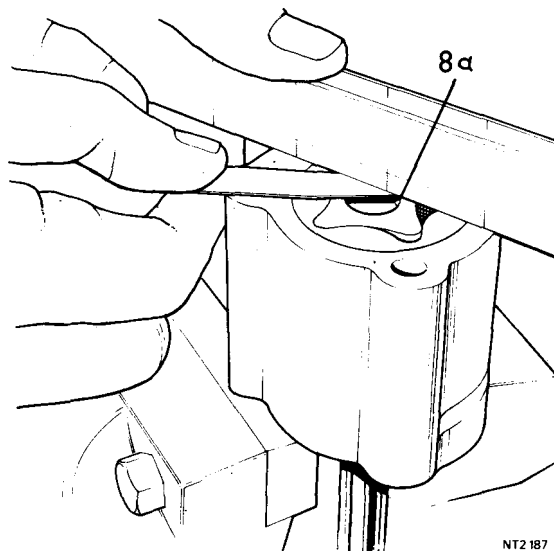
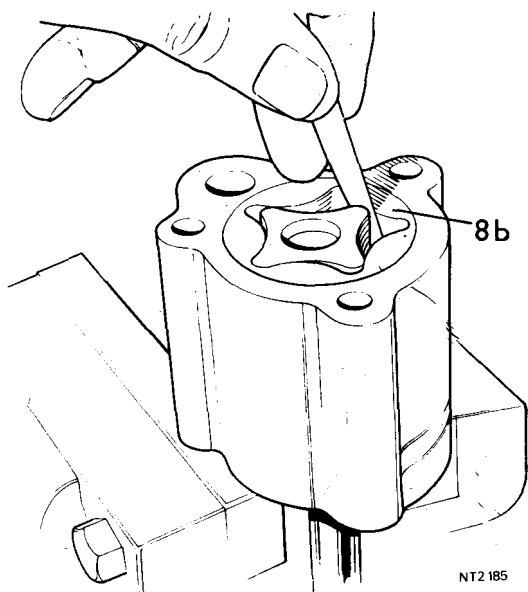
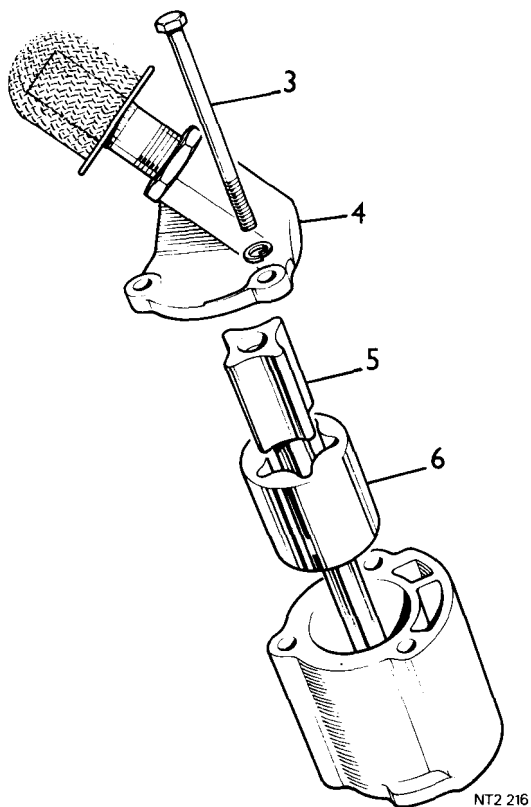
12.60.32

1. Remove the oil pump 12.60.26.
2. Remove the pick-up strainer 12.60.20.
3. Remove the three securing bolts and washers.
4. Lift off the pump cover.
5. Remove the inner rotor and shaft assembly.
6. Remove the outer rotor.

### Examination

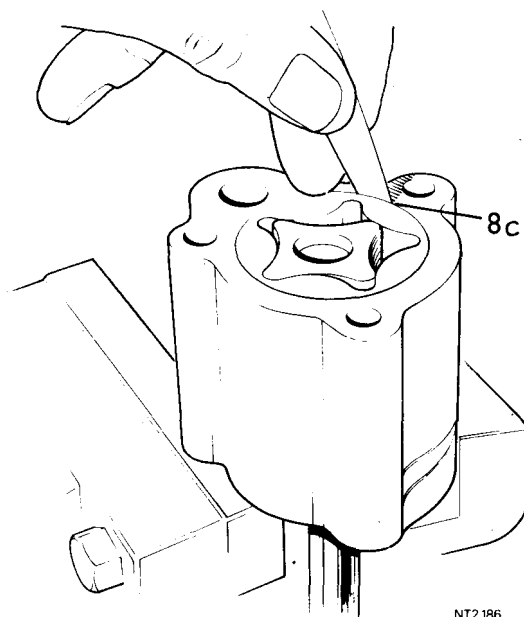
7. Clean oil from the body and rotors, examine the components for wear, pitting and corrosion.
8. Place the pump in a vice and using a feeler gauge check as follows:
  - a. With a straight edge across the pump body face check the clearance between the rotors and the straight edge. See Data.
  - b. Check the clearance between the inner and outer rotors. See Data.

*Continued*





- c. Check the clearance between the outer rotor and the body. See Data.
9. Examine the cover plate for scoring and test on a surface plate for distortion.



NT2186

10. Reassemble the pump fitting any new parts necessary to satisfy the above quoted tolerances. Renew any components that are unsatisfactory due to pitting, scoring or corrosion.

**CAUTION:** The inner rotor and spindle and the outer rotor are supplied only as an assembly and under no circumstances must they be separated and fitted as individual replacements to a worn pump.

11. Refit the oil pick-up strainer 12.60.20.
12. Refit the pump to the crankcase instructions 5 and 6, 12.60.26.

## DATA

|  |  |
|--|--|
| Pump capacity (approx.)  | 3.00 GP/min at 1000 r.p.m. using<br>SAE 30 oil at 80°C |
| Maximum clearance between<br>outer rotor and pump body                     | 0.010 (0.254 mm)                                       |
| Maximum clearance between<br>outer and inner rotors                        | 0.001 – 0.004 (0.0254 – 0.102 mm)                      |
| Maximum clearance between<br>the cover plate and rotors<br>(end clearance) | 0.004 (0.102 mm)                                       |

## OIL SUMP

### — Remove and refit

12.60.44

#### Removing

1. Place the car on a ramp.
2. Isolate the battery.
3. Remove the drain plug and drain the oil.

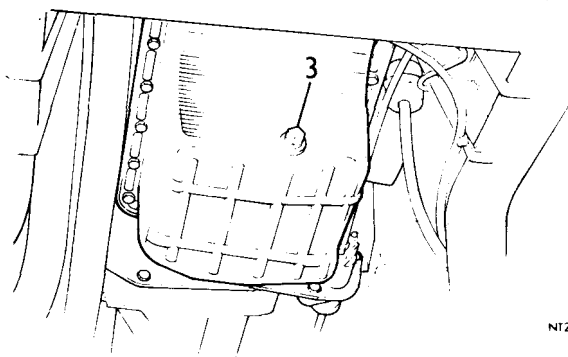
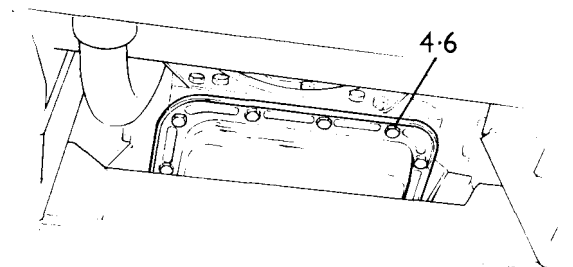
**NOTE:** The illustration shows the position of the drain plug on earlier engines.

On later engines the plug is situated to the rear left hand side of the sump.

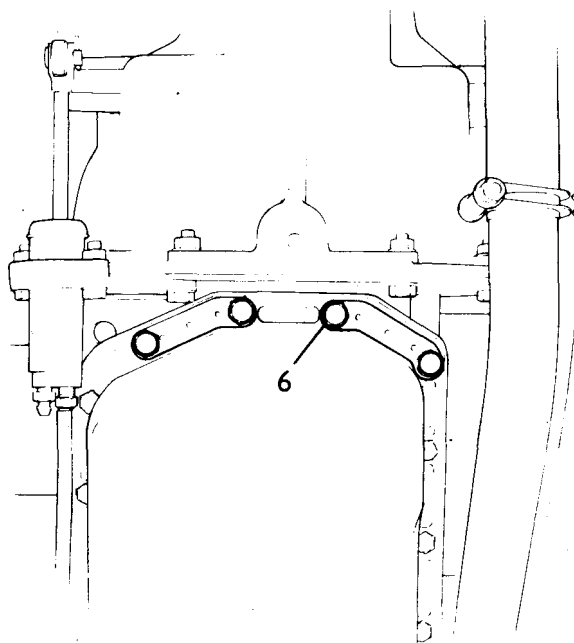
4. Remove the twenty three bolts and spring washers and withdraw the sump.

#### Refitting

5. Clean the sump inside and out and remove all traces of old gasket from the sump and crankcase mating faces.
6. Place a new gasket in position and offer up the sump to the crankcase and secure it with the bolts and washers, noting that the four longest bolts fit at the rear through the reinforced plates.
7. Refit the drain plug and refill the sump with a recommended grade of oil and check for leaks.



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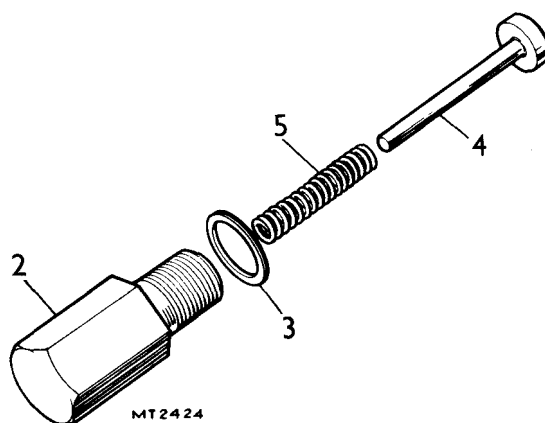
NT2 677

**OIL PRESSURE RELIEF VALVE****— Remove and refit****12.60.56****Removing**

1. Isolate the battery.
2. Unscrew the pressure relief valve body from the cylinder block.
3. Remove the washer.
4. Take out the plunger.
5. Remove the spring.

**Refitting**

6. Examine all components for pitting and corrosion and renew if necessary.
7. Check the free length of the spring and renew if not in accordance with data.
8. Clean the components and reverse instructions 1 to 5.

**DATA**

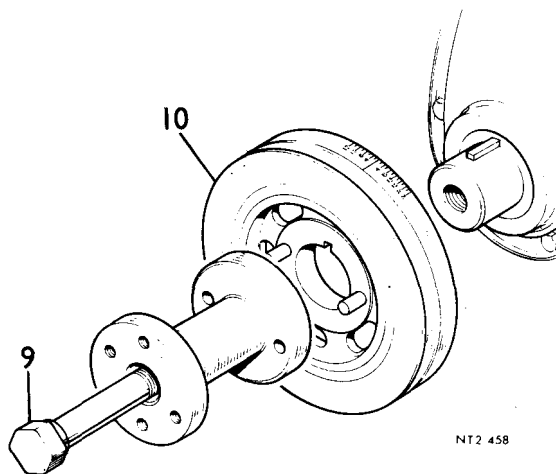
|             |           |                         |
|-------------|-----------|-------------------------|
| Spring rate | . . . . . | 53 lb/ins               |
| Free length | . . . . . | 1.53 in approx. (40 mm) |

**TIMING CHAIN COVER****— Remove and refit****12.65.01**

Special tool S341

**Removing**

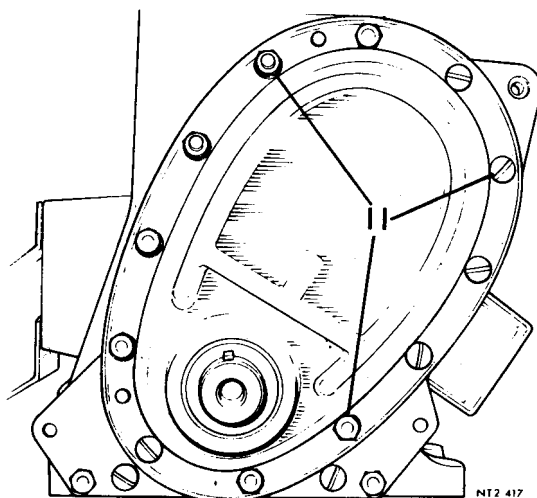
1. Isolate the battery.
2. Drain the cooling system 26.10.01.
3. Remove the radiator cowl.
4. Remove the radiator 26.40.01.
5. Remove the fan blades.
6. Remove the chassis cross tube 76.10.05.
7. Remove the fan belt 26.20.07.
8. Remove the steering rack 'U' bolts and ease the rack forward 57.25.01, instructions 5 and 6.
9. Remove the centre bolt securing the fan extension and crankshaft pulley and remove the extension by tapping it with a hammer to free it from its locating dowels.
10. Withdraw the crankshaft pulley 12.21.01.

*Continued*

11. Remove the set screws, bolts and nuts and spring washers securing the timing chain cover to the cylinder block and engine front plate.

**NOTE:** The timing chain cover is located by two dowels and two studs.

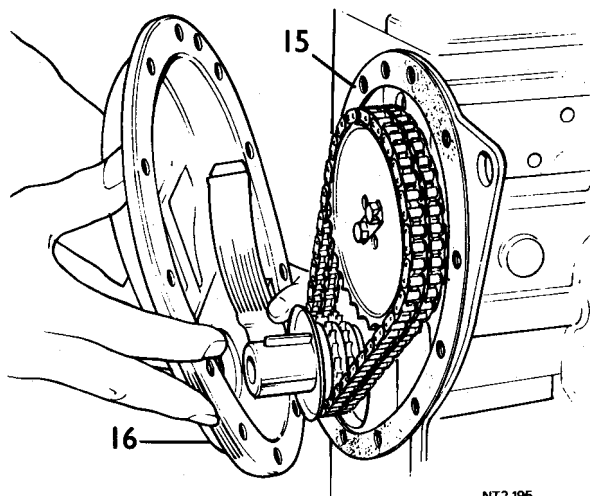
12. Prise the timing chain cover from the engine taking care not to damage or distort the cover.
13. Remove the oil seal sleeve.
14. Remove the gasket.



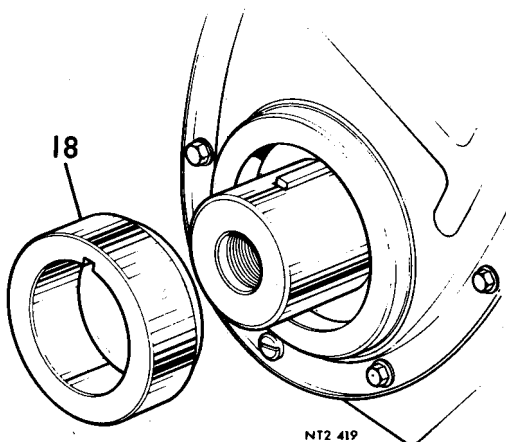
## Refitting

15. Clean the timing chain cover and engine mating faces and fit a new gasket.
16. Fit the timing cover locating it over the studs and dowels. Fit the screws and bolts on their correct positions as illustrated and tighten evenly.

**NOTE:** To facilitate the fitting of the timing chain cover, compress the timing chain tensioner with a suitable length of wire. Care however, should be taken when withdrawing the rod not to tear the gasket.



18. Smear the timing cover oil seal and sleeve with oil and with the chamfered end leading, gently press the sleeve on to the crankshaft and through the timing cover oil seal.
19. Reverse instructions 9 and 10.
20. Reposition the steering rack and fit and tighten the 'U' bolts 57.25.01 instructions 11 to 16, using special tool S341.
21. Reverse instructions 1 to 7.



## TIMING COVER OIL SEAL

## – Remove and refit

12.65.05

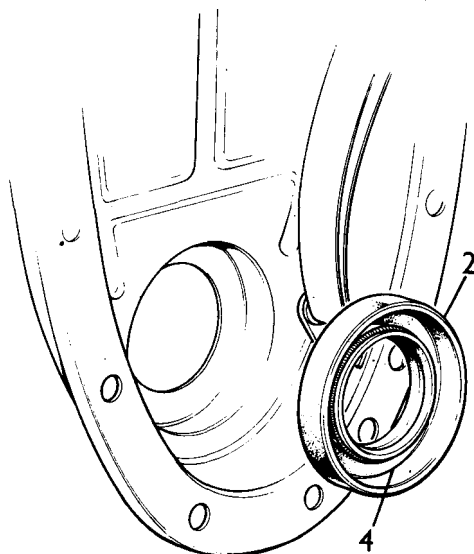
Special tool S341

## Removing

1. Remove the timing chain cover 12.65.01.
2. Carefully prise out the seal, avoiding damage to the timing cover seal location.

## Refitting

3. Clean the timing cover, smear the oil seal with oil.
4. With the lip face trailing press the seal squarely into the timing cover.
5. Refit the timing chain cover 12.65.01.



NT2 726

## VALVE TIMING

## – Check

12.65.08

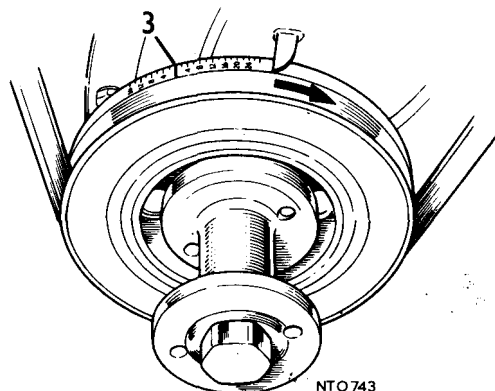
1. Remove the rocker cover 12.29.47.
2. Adjust the rocker clearances of numbers eleven and twelve valves to 0.120 in (3.04 mm) to give a working clearance.

**NOTE:** This clearance may vary according to the lift of the camshaft employed. The clearance should be sufficient to enable feeler gauges of reasonable thickness to be inserted when the valves are on the 'rock'.

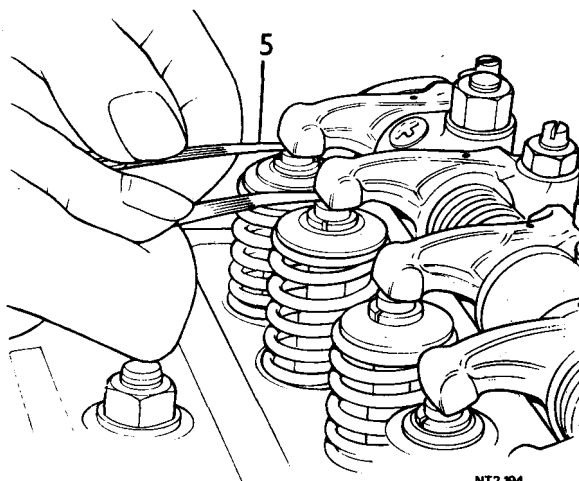
3. Turn the crankshaft in the normal running direction until number one piston is at T.D.C. on the compression stroke, indicated by the mark on the crankshaft pulley coinciding with the pointer on the timing cover.
4. Check that numbers one and two valves are fully closed by ascertaining with a feeler gauge that clearance exists between the valve tips and rocker pads.
5. Using two feeler gauges of the same thickness check that the rocker clearances of numbers eleven and twelve are the same. Oscillate the crankshaft to achieve this condition. Ensure however that when the rocker clearances are the same the conditions in instructions 3 and 4 are maintained.

**NOTE:** The actual rocker clearance is not important providing the clearances are the same.

6. Should the valve timing prove to be incorrect retiming will be necessary – 12.65.12 instructions 1 to 7 and 12.41.05 instructions 79 to 85.
7. Reset the rocker clearances of numbers eleven and twelve valves. See Data operation 12.29.48.
8. Refit the rocker cover 12.29.42.



NT0 743



NT2 194

## ENGINE

### TIMING CHAIN AND SPROCKETS

#### – Remove and refit

12.65.12

Special tool S341

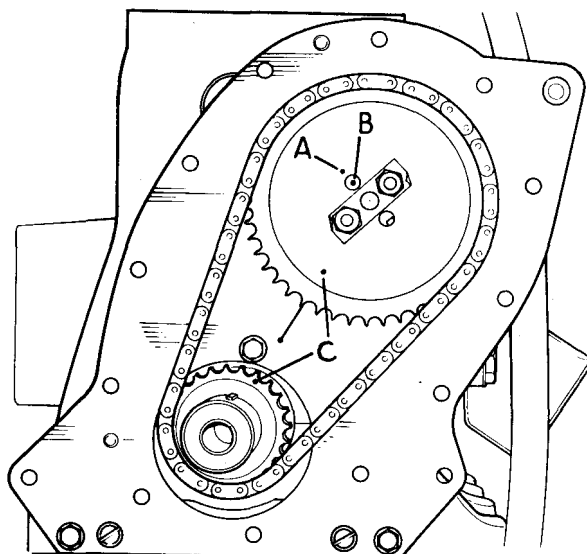
#### Timing chain – remove and refit

12.65.14

##### Removing

1. Isolate the battery.
2. Remove the timing chain cover 12.65.14.
3. Remove the oil seal sleeve.
4. Remove the oil thrower.
5. Turn the engine over until numbers one and six pistons are at T.D.C. number one firing, check that the timing marks A and B are in evidence and marks C on the camshaft and crankshaft sprockets line-up.
6. Straighten the lock tabs on the camshaft sprocket and remove the bolts.
7. Remove the timing chain complete with the camshaft and crankshaft sprockets.

**NOTE:** Ensure that the crankshaft and camshaft are not turned whilst the chain and sprockets are removed.

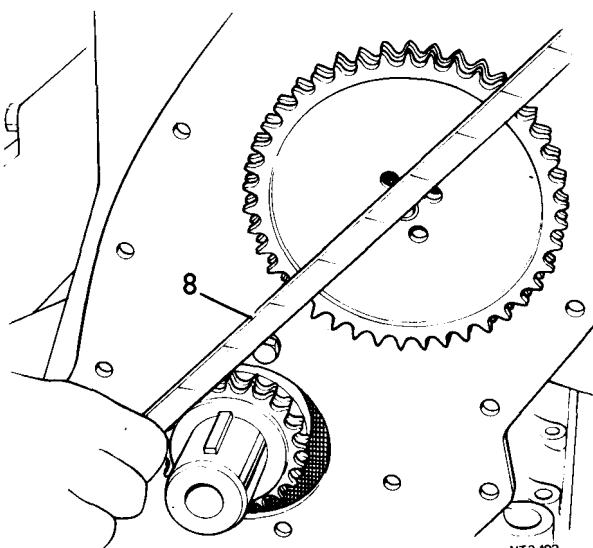


NT0 420

##### Refitting

8. Fit the two sprockets in their normal positions on the camshaft and crankshaft. Check the alignment of the sprockets by placing a straight edge across the sprocket.

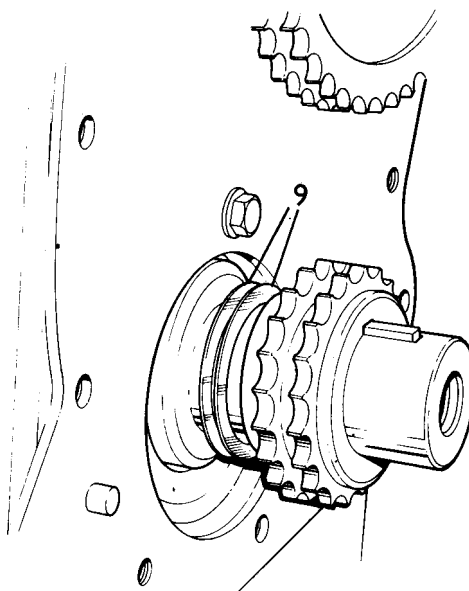
*Continued*



NT2 193

9. If the sprockets are out of alignment, adjust by removing the drive key and fitting shims behind the crankshaft sprocket. Refit the key.

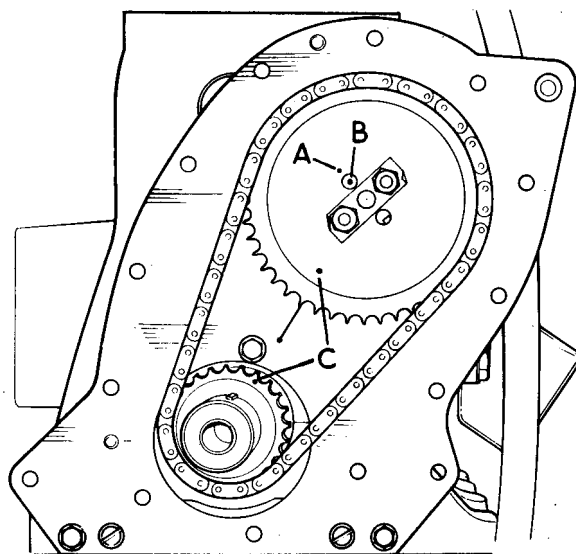
**NOTE:** Two shim thicknesses are available 0.004 in (0.10 mm) and 0.006 (0.52 mm).



NT2 422

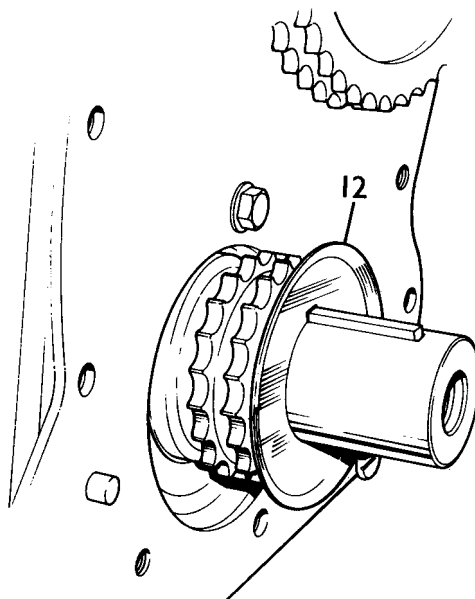
10. Remove the sprockets and encircle them with the timing chain and refit to their respective positions keeping the chain taut on the drive side. If the original sprockets are being refitted, make sure that punch marks A on the sprocket and B on the end of the camshaft correspond, and Punch marks C on the crankshaft and camshaft sprockets line-up.
11. If new sprockets are being fitted, check their alignment as in instructions 8 and 9, and fit them in position and secure and make the appropriate punch marks A, B, and C.

*continued*



NT0 420

12. Reverse instructions 1 to 4, ensuring that the oil thrower is fitted with the dished face towards the timing cover.



NT2 423

## TIMING CHAIN TENSIONER

— Remove and refit

12.65.28

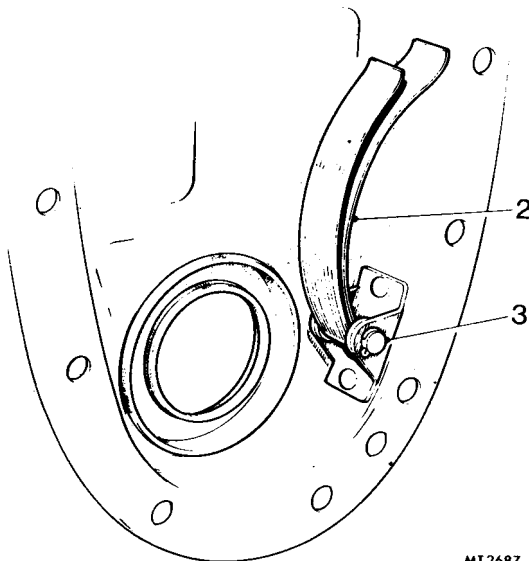
Special tool S341.

### Removing

1. Remove the timing chain cover 12.65.01.
2. Prise open the tensioner blades.
3. Slide the tensioner blades off the anchor pin.

### Refitting

4. Open the tensioner blades and slide it over the anchor or pin ensuring that the convex surface of the tensioner is towards the timing chain.
5. Refit the timing chain cover 12.65.01.



MT2687



## EMISSION CONTROL OPERATIONS

|  |          |
|--|----------|
| Adsorption canister air filter – remove and refit . . . . .              | 17.15.07 |
| Adsorption canister – remove and refit . . . . .                         | 17.15.13 |
| Carburettor emission pack – red – remove and refit . . . . .             | 17.20.07 |
| C. O. Levels at idle – check . . . . .                                   | 17.35.01 |
| Control pipe – canister to tank – remove and refit . . . . .             | 17.15.24 |
| E.G.R. Control valve – remove and refit . . . . .                        | 17.45.01 |
| E.G.R. System check . . . . .  | 17.45.20 |
| E.G.R. System vacuum control tubing – remove and refit . . . . .         | 17.45.15 |
| E.G.R. Valve – remove and refit . . . . .                                | 17.45.05 |
| E.G.R. Valve to manifold pipe – remove and refit . . . . .               | 17.45.10 |
| Evaporative loss control system – leak testing . . . . .                 | 17.15.01 |
| Expansion tank – remove and refit . . . . .                              | 17.15.19 |
| Purge pipe – canister to crankcase breather – remove and refit . . . . . | 17.15.36 |
| Running on control valve – remove and refit . . . . .                    | 17.40.01 |
| Thermostatic switch – remove and refit . . . . .                         | 17.20.31 |

| SYMPTOM         |                               |                                   |                       |                   |                             |              |                 |               |              |          | CAUSE                                  | ACTION   |
|-----------------|-------------------------------|-----------------------------------|-----------------------|-------------------|-----------------------------|--------------|-----------------|---------------|--------------|----------|--|--|
| POOR/ROUGH IDLE | LOSS OF POWER/POOR DRIVE AWAY | MISFIRING (under load conditions) | HIGH FUEL CONSUMPTION | HIGH IDLING SPEED | OVERHEATING (at idle speed) | LEAN RUNNING | ARCING AT PLUGS | SMELL OF FUEL | RICH MIXTURE | STALLING |  |  |
| X               | X                             | X                                 |                       |                   |                             |              |                 |               |              |          | DISTRIBUTOR C. B. POINTS               | CHECK DWELL ANGLE/CHECK GAP & RESET/RENEW POINTS           |
| X               | X                             | X                                 |                       |                   |                             |              |                 |               |              |          | SPARKING PLUGS                         | CHECK GAP AND RESET/RENEW DEFECTIVE PLUG                   |
| X               | X                             | X                                 |                       |                   |                             |              | X               |               |              |          | IGNITION WIRING                        | INSPECT FOR FRAYING CHAFFING & DETERIORATION/RENEW         |
| X               | X                             |                                   | X                     |                   |                             |              |                 |               |              |          | CHOKE MECHANISM                        | CHECK FAST IDLE ADJUSTMENT/CAM AND CABLE/ADJUST            |
| X               | X                             |                                   | X                     |                   |                             |              |                 |               |              |          | CHOKE MECHANISM                        | REMOVE STARTER BOX AND CLEAN INTERFACE                     |
| X               | X                             |                                   |                       | X                 |                             |              |                 |               |              | X        | VACUUM FITTINGS, HOSES AND CONNECTIONS | CHECK PIPING CONDITION AND SECURITY/RENEW AS NECESSARY     |
| X               | X                             |                                   |                       |                   |                             | X            |                 |               |              |          | OIL FILLER CAP                         | CHECK FOR SECURITY/TIGHTEN CAP                             |
| X               | X                             |                                   |                       |                   |                             | X            |                 |               |              |          | VENTILATION HOSES                      | CHECK HOSES FOR SECURITY, BLOCKAGE & DETERIORATION         |
| X               |                               |                                   | X                     |                   |                             |              |                 |               |              |          | CARBURETTER                            | SEE CARBURETTER FAULT FINDING CHART                        |
|                 | X                             |                                   |                       |                   |                             |              |                 |               |              |          | DISTRIBUTOR                            | LUBRICATE/CHECK OPERATION BY REMOVING PIPE & NOTING R.P.M. |
|                 | X                             |                                   | X                     |                   |                             |              |                 |               |              |          | CARBURETTER AIR CLEANER                | CLEAN OR RENEW ELEMENT                                     |
|                 | X                             |                                   |                       | X                 | X                           |              |                 |               |              |          | IGNITION TIMING AND ADVANCE SYSTEMS    | CHECK AND RESET DYNAMIC TIMING                             |
|                 |                               | (X)                               |                       |                   |                             |              |                 |               |              |          | CONDENSOR AND COIL                     | CHECK FOR BREAKDOWN ON OSCILLOSCOPE TUNE                   |
|                 |                               |                                   | X                     |                   |                             |              |                 | X             |              |          | HOSE CONNECTIONS                       | CHECK FOR HOSE DAMAGE AND DETERIORATION                    |
|                 |                               |                                   |                       |                   |                             |              |                 |               | X            |          | CARBON STORAGE CANISTER                | RENEW CANISTER   |
|                 |                               |                                   |                       |                   | (X)                         |              |                 |               |              |          | THERMOSTATIC SWITCH                    | CHECK SWITCH OPERATION AND RENEW IF NECESSARY              |
|                 |                               |                                   |                       |                   |                             |              |                 |               |              | X        | RUNNING ON CONTROL VALVE               | CHECK VALVE OPERATION AND RENEW IF NECESSARY               |
| X               |                               |                                   |                       |                   |                             |              |                 |               |              |          | E.G.R. VALVE                           | CHECK VALVE OPERATION AND RENEW IF NECESSARY               |



## EVAPORATIVE LOSS CONTROL SYSTEM

## – Leak testing

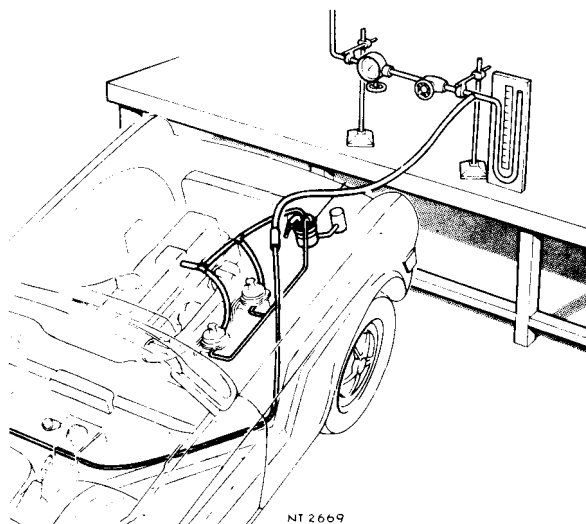
17.15.01

Test apparatus: Water manometer, pressure regulating valve, pressure sealing valve and pressurised air supply. An alternative to the manometer is an accurate pressure gauge reading 0 to 30 in of water with which a pressure relief valve or weak rubber connection will be necessary to protect against over-pressurising the system.

**WARNING:** During the test, pressure will be applied to the fuel tank breather system. The pressure, albeit very low, may displace pipe connections or cause an emission of fuel vapour. It is, therefore, important to avoid naked lights or actions likely to cause sparks during this test. It is also dangerous to exceed the pressure quoted.

## Test Procedure

1. At the carbon canister detach the tube from the separator tank and insert the pressurising tube of the test apparatus.
2. Apply 20 in of water pressure to the system and close the sealing valve. DO NOT EXCEED 25 in OF WATER PRESSURE.
3. After two minutes, check the pressure in the system. If the pressure has fallen more than 2 in of water, investigation and rectification is necessary.



## EMISSION CONTROL

### ADSORPTION CANISTER AIR FILTER

– Pre 1973 Cars only

– Remove and refit 17.15.07

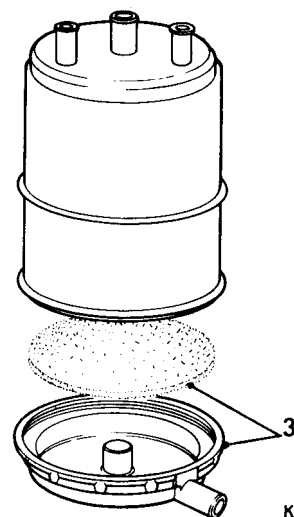
#### Removing

1. Remove the nut and screw on the canister securing strap.
2. Lift the canister clear of the bracket.
3. Unscrew the base of the canister and lift out the filter.
4. Clean any carbon particles from the base of the canister.

#### Refitting

5. Fit the new filter into body of canister.
6. Reverse 1 to 3 ensuring that the canister pipes are still in position and that they present leak free joints.

**WARNING:** Because of the possible presence of fuel fumes, avoid naked lights or actions likely to cause sparks.



K249

### ADSORPTION CANISTER

– Remove and refit 17.15.13

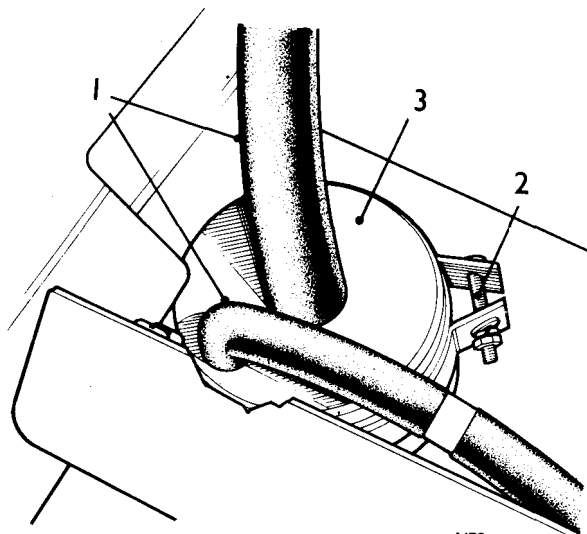
#### Removing

1. Disconnect the two pipes into the top of the canister.
  - 1a. 1973 vehicles – disconnect the three pipes into the top and one pipe from the bottom.
2. Remove the nut and screw on the canister securing strap.
3. Remove the canister.

#### Refitting

4. Reverse instructions 1 to 3 ensuring that all connections are leak free.

**WARNING:** Because of the possible presence of fuel fumes, avoid naked lights or action likely to cause sparks.



NT2108

## EXPANSION TANK

– Remove and refit

17.15.19

## Removing

1. Drain the fuel.
2. Remove the spare wheel and cover.
3. Remove the luggage compartment rear trim cover (8 screws plus two connectors for lamp).
4. Slacken the hose clip – filler pipe to tank.
5. Disconnect the two connectors at the fuel gauge transmitter.
6. Remove the six bolts securing the fuel tank to the body and lower the fuel tank to spare wheel well.
7. Disconnect the two pipes at the tank.
8. Slacken the clips securing the tank to the fuel tank.
9. Remove the tank.

## Refitting

10. Reverse instructions 1 to 9, ensure that all pipe connections are leak free.

**WARNING:** Because of the presence of fuel fumes avoid naked lights or actions likely to cause sparks.

**NOTE:** On earlier models a larger tank is bolted to a bracket at the rear of the luggage compartment right trim pad and is connected by separate pipes to each corner of the main fuel tank.

## CONTROL PIPE – CANISTER TO TANK

– Remove and refit

17.15.24

## Purge pipe – canister to crankcase breather

17.15.36

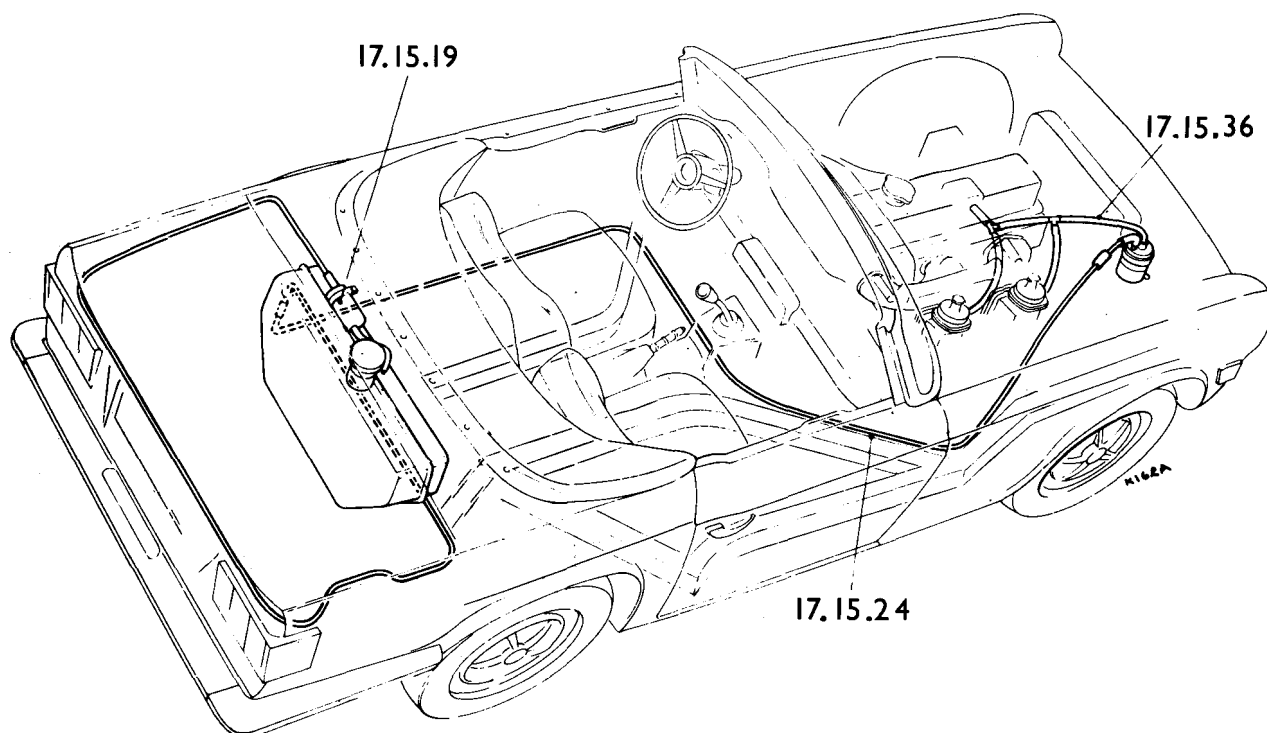
1. All piping in the evaporative control and engine breather systems is push fitted. Access to the tank end, of the control pipe is via the luggage compartment trim pad. When refitting pipes ensure that all restrictors are replaced in the line and that all connections are leak free.

## CARBURETTOR EMISSION PACK – RED

– Remove and refit

17.20.07

1. Fit the gaskets and sealing washers of this pack in accordance with the overhaul procedure detailed in 19.15.17.



## EMISSION CONTROL

### THERMOSTATIC SWITCH (FITTED TO LATER CARS ONLY)

#### – Remove and refit

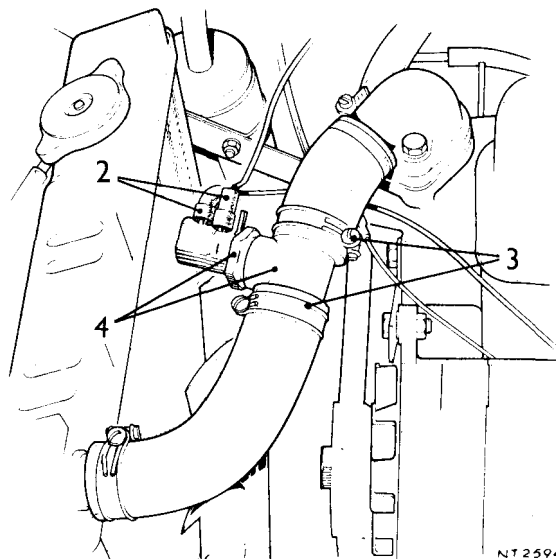
17.20.31

#### Removing

1. Drain part of the coolant.
- 2.\*\* Disconnect the vacuum pipes at the switch.\*\*
3. Slacken the two hose clips.
4. Remove the switch complete with mounting tube.
5. Secure the tube in a vice and unscrew the switch.

#### Refitting

6. Reverse instructions 1 to 5, apply sealing compound to the thread of the switch.



### C. O. LEVELS AT IDLE

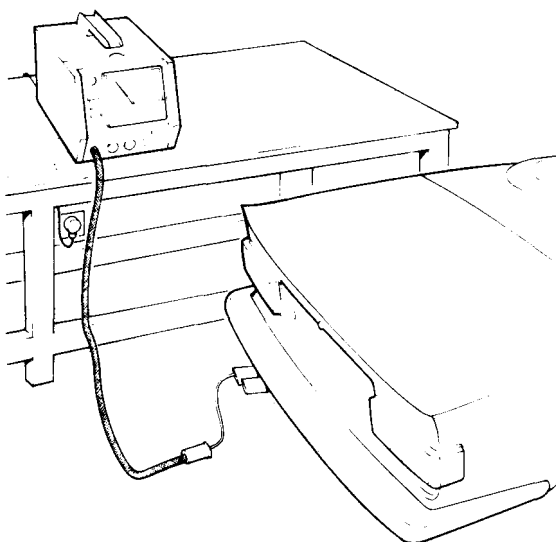
#### – Check

17.35.01

Special tools: Approved infra-red gas analyser

1. Attain normal engine running temperature.
2. Set the idle speed to that quoted on the emission control label 19.15.01.
3. Check ignition timing, reset if necessary 86.35.16.
4. Re-check idle speed – adjust if necessary.
5. Insert the gas analyser probe as far as possible into the exhaust pipe.
6. Check the C. O. reading (compare with emission control label).
- 7a. Adjust mixture if necessary 19.15.01.
- b. Check idle speed – adjust if necessary.
8. Withdraw the analyser probe.
9. Switch off the ignition.

**NOTE:** Do not allow the engine to idle for longer than 3 minutes without a 'clear out' burst of 1 minute at 2000 rev/min.



### RUNNING ON CONTROL VALVE

(Not fitted to pre 1973 cars)

#### – Remove and refit

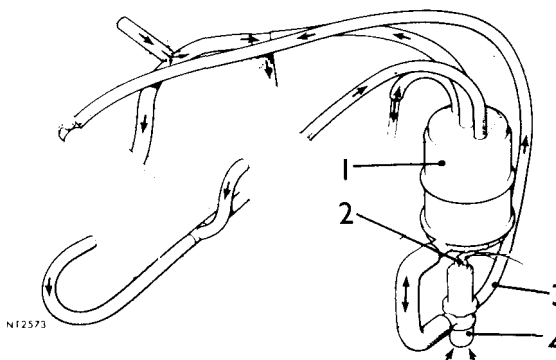
17.40.01

#### Removing

1. Remove the carbon canister 17.15.07.
2. Disconnect the two electrical leads to the solenoid at the top of the valve.
3. Disconnect the vacuum signal pipe.
4. Remove the securing bolts and lift off the valve complete with mounting bracket.

#### Refitting

5. Reverse instructions 1 to 4.



17.20.31

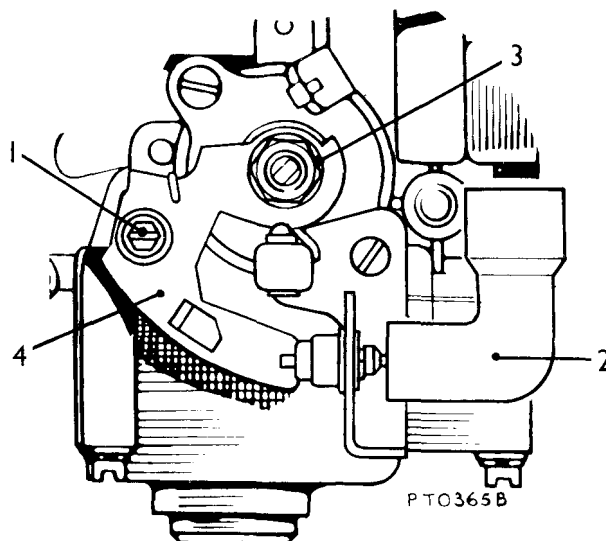
17.40.01

**E.G.R. CONTROL VALVE***(Not fitted to pre 1974 cars)***Remove and refit****17.45.01****Removing**

1. Disconnect the throttle control cable.
2. Disconnect the vacuum control tube.
3. Unscrew the cam retaining nut.
4. Lift off the cam complete with valve.

**Refitting**

5. Reverse instructions 1 to 4 ensuring the security of the vacuum tube connections and the setting of the throttle cable i.e. no tightness, no play.

**EXHAUST GAS RECIRCULATION (E.G.R.) VALVE***(Not fitted to pre 1974 cars)***Remove and refit****17.45.05****E.G.R. Valve to manifold pipe****17.45.10****Removing**

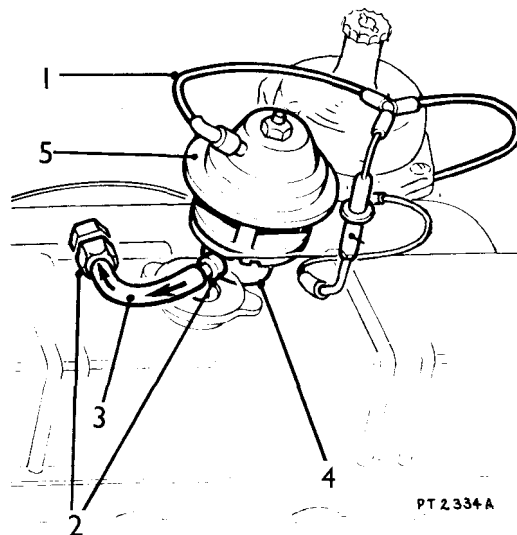
1. Disconnect the vacuum control valve pipe from the top of the valve.
2. Slacken the unions securing the steel pipe to the inlet manifold and the valve.

**NOTE:** As the steel pipe is longer on one side of the bend than the other it should be marked to ensure correct refitting.

3. Remove the steel pipe.
4. Slacken the locknut at the base of the valve.
5. Unscrew the valve and remove from the head.

**Cleaning**

6. Clean the assembly area of the valve with a wire brush. Use a standard spark plug machine to clean the valve and seat. Insert the valve opening into the machine and lift the diaphragm evenly by using two fingers, one each side of the support strut. Blast the valve for approx. 30 seconds, remove and inspect, if necessary repeat until all carbon deposits are removed. Use compressed air to remove all traces of carbon grit from the valve. Use a flexiwire brush to clean the steel pipe – blow clear of carbon grit.

**Refitting**

7. Refit by reversing the instructions 1 to 6 – check the position of the steel pipe before attempting to tighten it.

## EMISSION CONTROL

---

### E.G.R. SYSTEM VACUUM CONTROL TUBING

*(Not fitted to pre 1974 cars)*

#### Remove and refit

17.45.15

All tubing in the system is push fit. Check the condition of tubing and connectors before refitting and test the operation of the valve to ensure leak free fitting.

### E.G.R. SYSTEM

*(Not fitted to pre 1974 cars)*

#### Check

17.45.20

A system check of the valve carried out with the unit in situ is by "blipping" the throttle and observing the valve unit, which must be actuated by the sudden shift of engine speed. The valve will settle back and it is not possible to perform a total check to find small leaks by this method. For a complete check on the operation of the valve connect the vacuum pipe of a distributor vacuum test unit to the valve and ensure that the valve is actuated, held, and that there is no leak in vacuum.

To check the sealing of the control valve, apply vacuum to the tubing from the three way connector to the valve, it will be readily apparent if the valve is not sealing.



## PETROL INJECTION

## FUEL SYSTEM OPERATIONS

|  |                         |
|--|-------------------------|
| Air cleaner — remove and refit . . . . .                                   | 19.10.01 P.I.           |
| Air cleaner — renew element . . . . .                                      | 19.10.08 P.I.           |
| Air intake manifold — remove and refit . . . . .                           | 19.70.01 P.I.           |
| Cold start cable — remove and refit . . . . .                              | 19.20.26 P.I.           |
| <b>** Cold start linkage — remove and refit . . . . .</b>                  | <b>19.20.27 P.I. **</b> |
| Excess fuel lever — check and adjust . . . . .                             | 19.35.02 P.I.           |
| Fault diagnosis . . . . .  | 19.00.01 P.I.           |
| Fuel filter element — remove and refit . . . . .                           | 19.25.07 P.I.           |
| — filler cap — remove and refit . . . . .                                  | 19.55.08 P.I.           |
| — injectors — remove and refit . . . . .                                   | 19.60.01 P.I.           |
| — injectors — spray check . . . . .  | 19.60.02 P.I.           |
| — main filter — remove and refit . . . . .                                 | 19.25.02 P.I.           |
| — metering distributor timing — check and adjust . . . . .                 | 19.35.01 P.I.           |
| — metering distributor — remove and refit . . . . .                        | 19.35.07 P.I.           |
| — metering distributor union seals — remove and refit . . . . .            | 19.35.14 P.I.           |
| — metering distributor inlet union and filter — remove and refit . . . . . | 19.40.00 P.I.           |
| — pipes . . . . .  | 19.40.00 P.I.           |
| <b>Fuel Pump</b>   |                         |
| — data and description . . . . .   | 19.45.00 P.I.           |
| — inertia cut out switch — data and description . . . . .                  | refer to 86.65.00       |
| — inertia cut out switch — remove and refit . . . . .                      | refer to 86.65.58       |
| — inertia cut out switch — reset . . . . .                                 | refer to 86.65.59       |
| — overhaul . . . . .   | 19.45.15 P.I.           |
| — remove and refit . . . . .   | 19.45.08 P.I.           |
| — test on vehicle . . . . .  | 19.45.01 P.I.           |
| — tank — drain . . . . .   | 19.55.02 P.I.           |
| — tank — remove and refit . . . . .  | 19.55.01 P.I.           |
| General description of P. I. system . . . . .                              | 19.35.00 P.I.           |
| Hose — filler to tank — remove and refit . . . . .                         | 19.40.19 P.I.           |
| Injector pipe No. 1 — remove and refit . . . . .                           | 19.60.15 P.I.           |
| Injector pipe No. 2 — remove and refit . . . . .                           | 19.60.16 P.I.           |
| Injector pipe No. 3 — remove and refit . . . . .                           | 19.60.17 P.I.           |
| Injector pipe No. 4 — remove and refit . . . . .                           | 19.60.18 P.I.           |
| Injector pipe No. 5 — remove and refit . . . . .                           | 19.60.19 P.I.           |
| Injector pipe No. 6 — remove and refit . . . . .                           | 19.60.20 P.I.           |

*Continued*

**FUEL SYSTEM — P.I. OPERATIONS — *Continued***

|   |               |
|---|---------------|
| Injector pipes — overhaul . . . . .                                 | 19.60.24 P.I. |
| Petrol pipe main line rear end — remove and refit . . . . .         | 19.40.02 P.I. |
| Petrol pipe main line — centre section — remove and refit . . . . . | 19.40.03 P.I. |
| Petrol pipe main line — engine end — remove and refit . . . . .     | 19.40.04 P.I. |
| Petrol pipe meter to tank return — remove and refit . . . . .       | 19.40.08 P.I. |
| Pipe — tank to filter inlet — remove and refit . . . . .            | 19.40.09 P.I. |
| Pipe — filter outlet to pump — remove and refit . . . . .           | 19.40.10 P.I. |
| Pipe — pump outlet to P.R.V. — remove and refit . . . . .           | 19.16.11 P.I. |
| Pipe — P.R.V. to main line — remove and refit . . . . .             | 19.40.12 P.I. |
| Pipe — P.R.V. return to tank — remove and refit . . . . .           | 19.40.13 P.I. |
| Pipe — pump leak — drain — remove and refit . . . . .               | 19.40.14 P.I. |
| Pressure relief valve — remove and refit . . . . .                  | 19.65.07 P.I. |
| Pressure relief valve — pressure test and adjust . . . . .          | 19.65.01 P.I. |
| Pressure relief valve — overhaul . . . . .                          | 19.65.13 P.I. |
| Throttle pedal — remove and refit . . . . .                         | 19.20.01 P.I. |
| Throttle butterflies — check and adjust . . . . .                   | 19.20.05 P.I. |
| Throttle cable — remove and refit . . . . .                         | 19.20.06 P.I. |
| Throttle linkage — remove and refit . . . . .                       | 19.20.07 P.I. |

# PETROL INJECTION FAULT DIAGNOSIS

## Primary Checks

Experience has shown that very often faults attributed to the Petrol Injection System are in fact caused by the engine being in poor state of tune. It is therefore essential that before attempting any fault diagnosis of the P.I. System the Primary Checks, detailed below, must be carried out first.

1. Check fuel supply is clean and adequate.
2. Ensure the battery is charged and in good condition.
3. Clean, check and set spark plug gaps.
4. Check and adjust valve clearances. 12.25.48.
5. Check compression pressures. 12.25.61.
6. Check ignition timing. 86.35.15.
7. Renew faulty rubber balance pipe connectors linking the three manifolds, and check the tightness of the vacuum adaptors.
8. Check and adjust throttle butterflies. 19.20.05.
9. Check manifold depression. 12.49.03.

## Special Equipment.

1. Pressure gauge 0 to 120 lb f/in<sup>2</sup> (0 to 8.4 kg/cm<sup>2</sup>)
2. Ammeter 0 to 10 amps
3. Voltmeter 0 to 20 volts.
4. Pressure test adaptor.
5. 15ft. (4.6 m) of twin cable 28/012 in. Two nipples soldered on one end of cable. Cable Connector for connection in series to pump.
6. Air-flow meter.
7. Vacuum gauge.
8. Metering unit outlet union seal removal and renewal tools. — see 19.35.14.

| SYMPTOM                | CAUSE                                   | ACTION   |
|------------------------|---|--|
| Engine will not start. | a. Inertia cut-out switch has operated. | Push switch down to complete pump circuit — 86.65.59   |
|                        | b. Blocked fuel filter.                 | Check fuel filter and renew element — 19.25.07   |
|                        | c. Pump inoperative                     | Check pump end-float. Check brushes. Check for gear seizure — 19.45.15.                        |
|                        | d. No spray from injectors.             | Remove each injector in turn and test — 19.60.02   |
|                        | e. Incorrect or no line pressure.       | Check line pressure and adjust pressure relief valve — 19.65.01                                |
|                        | f. Incorrect injection order.           | Check that the pipes are fitted to the injectors in correct order.                             |
| Engine cutting out.    | a. Slipping drive belt.                 | Check drive belt tension.  |
|                        | b. Incorrect line pressure.             | Check line pressure statically and during road test with pressure gauge and ammeter. 19.45.01. |
|                        | c. Fuel tank breather pipe blocked.     | Clear or renew pipe.   |
|                        | d. Blocked fuel filter.                 | Renew filter. 19.25.07   |

Continued



# FUEL SYSTEM — PI

| SYMPTOM                             | CAUSE   | ACTION  |
|-------------------------------------|---|---|
| Erratic Idling or lack of response. | <p><i>a.</i> Incorrect injection order.</p> <p><i>b.</i> Incorrect idling speed.</p> <p><i>c.</i> Excess fuel lever incorrectly adjusted.</p> <p><i>d.</i> Incorrect line pressure.</p> <p><i>e.</i> Metering Unit incorrectly timed to the engine.</p> <p><i>f.</i> Continuous injection.</p> <p><i>g.</i> Fuel leaks.</p>   | <p>Check that the injector pipes are fitted to the injectors in correct order.</p> <p>Check and adjust idling. 19.20.05</p> <p>Check and if necessary adjust clearance. 19.35.02</p> <p>Check and if necessary adjust line pressure at the pressure relief valve. 19.65.01</p> <p>Check and if necessary adjust timing. 19.35.01</p> <p>Check each injector in turn 19.35.14. Check outlet union seals and renew if necessary.</p> <p>Check for leaks from metering unit.</p> |
| Engine Mis-firing.                  | <p><i>a.</i> Lack of fuel in tank or blockage.</p> <p><i>b.</i> Excess fuel lever incorrectly set.</p> <p><i>c.</i> Faulty injection.</p> <p><i>d.</i> Faulty non-return valve in one of the metering unit unions.</p> <p><i>e.</i> Incorrect line pressure.</p> <p><i>f.</i> Faulty pressure relief valve.</p> <p><i>g.</i> Constantly fouled spark plugs on Nos. 2 and 5 cylinders.</p> | <p>Replenish with fuel of the correct octane rating and check tank outlet to line.</p> <p>Check lever is returning to the off position. Check clearance — 19.35.02</p> <p>Remove each injector in turn and test — 19.60.02</p> <p>Renew the union concerned 19.35.14</p> <p>Check line pressure and adjust pressure relief valve. 19.65.01</p> <p>Check by substitution.</p> <p>Check banjo seals on Nos. 2 and 5 injector pipes at metering unit connection.</p>             |
| Excessive fuel consumption.         | <p><i>a.</i> Fuel leakage.</p> <p><i>b.</i> Excess fuel lever out of adjustment.</p> <p><i>c.</i> Loose Calibration Cover Securing Screws letting in air.</p> <p><i>d.</i> Incorrect line pressure.</p>   | <p>Check for fuel leakage from all connections and pedestal seals.</p> <p>Check excess fuel lever is returning to the off position. Check clearance — 19.35.02</p> <p>Check tightness and sealing of cover.</p> <p>Check line pressure statically and during road test. Adjust if necessary — 19.65.00</p>  |

## AIR CLEANER — P.I.

### — Remove and refit

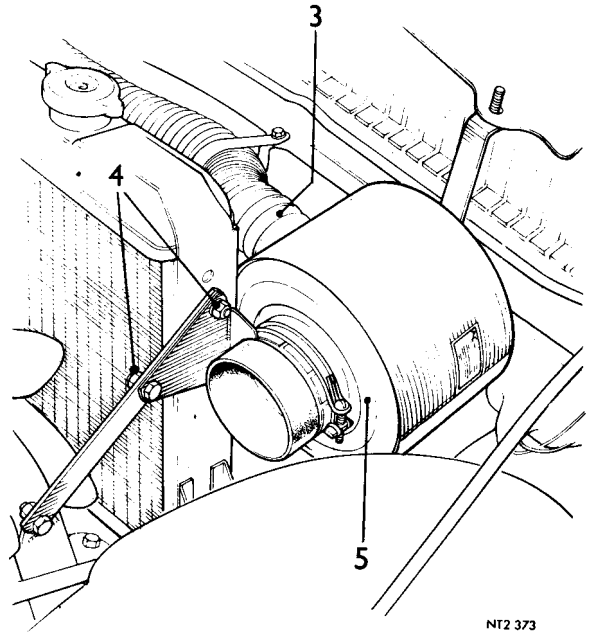
19.10.01

#### Removing

1. Remove the radiator cowling 76.79.04
2. Remove the hose connecting the air cleaner outlet to the air intake manifold.
3. Disconnect the inlet hoses to the air cleaner, running forward of the radiator.
4. Remove the nut and bolt and single nut securing the air cleaner bracket to the radiator stay.
5. Remove the air cleaner and bracket from the car.

#### Refitting

6. Reverse instructions 1 to 5.



NT2 373

## AIR CLEANER — P.I.

### — Renew element

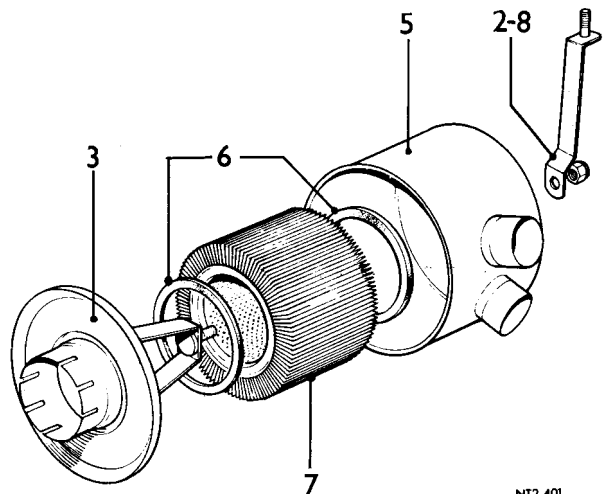
19.10.08

#### Dismantling

1. Remove air cleaner from the car 19.10.01.
2. Remove the cover plate retaining nut and steady bracket.
3. Withdraw the cover plate and discard the element.
4. Remove and if necessary discard the sealing rings.
5. Clean the container and cover plate.

#### Reassembling

6. Place the sealing rings in position at both ends of the element.
7. Insert the new paper element into the container.
8. Refit the cover and steady bracket and secure with the nut.
9. Refit the air cleaner assembly to the car 19.10.01.



NT2 401

### THROTTLE PEDAL

– Remove and refit

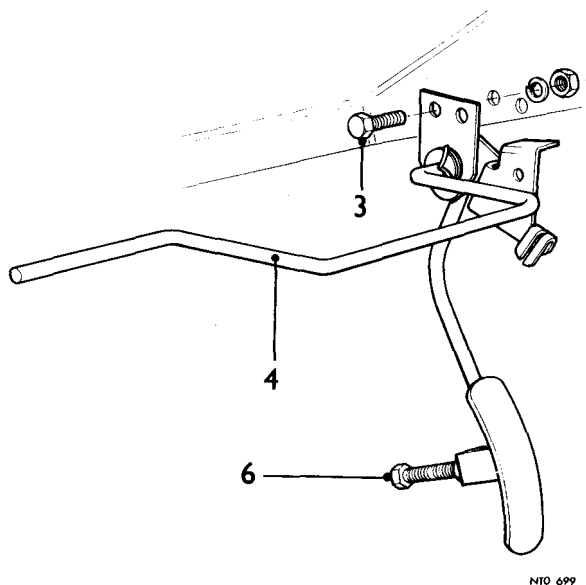
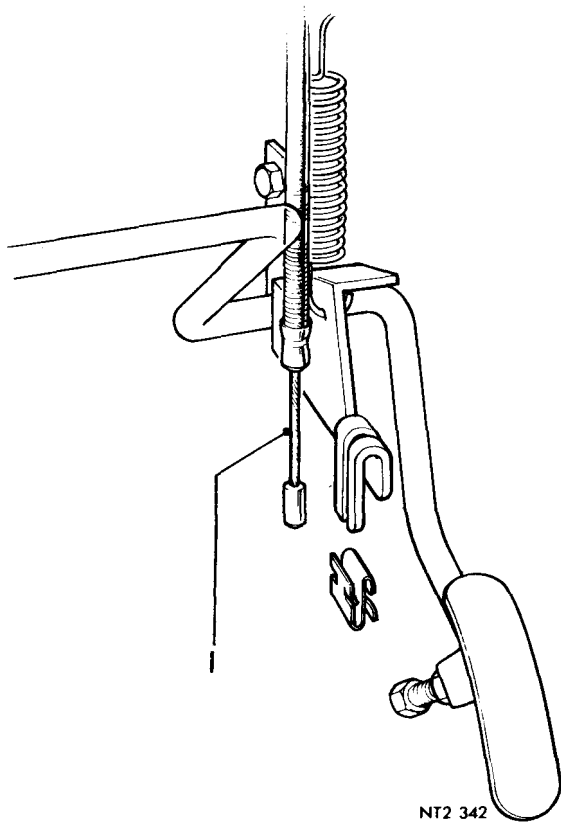
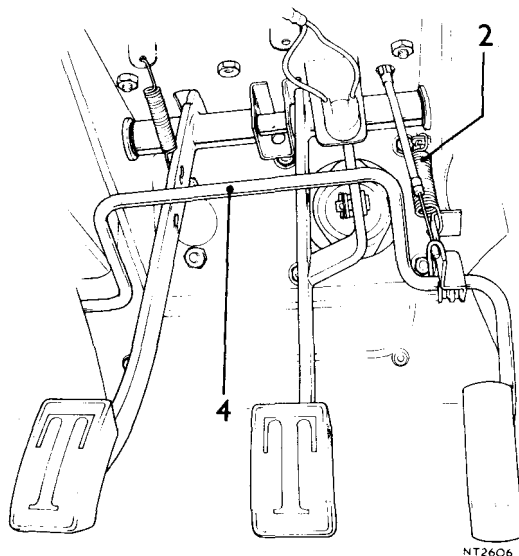
19.20.01

#### Removing

1. Disconnect the throttle cable from the pedal bracket.
2. Disconnect the pedal return spring.
3. Remove the two bolts and nuts securing the pedal assembly and pivot bracket to the body.
4. Withdraw the pedal and shaft assembly from the bulkhead bush and remove from the car.

#### Refitting

5. Reverse instructions 1 to 4.
6. Adjust pedal stop bolt so that the head touches the floor with the throttle butterflies in the fully open position.



# THROTTLE BUTTERFLIES

**\*\* (Up to Engine No. CP 77609E) \*\***

— Check and adjust

19.20.05

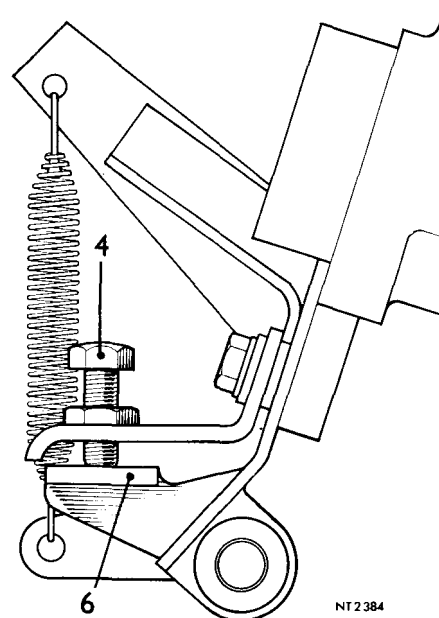
## Check

1. Start the engine and warm to normal operating temperature.
2. Remove the air intake manifold 19.70.01.
3. Ensure that the cold start lever on the metering unit is back against its stop and that there is clearance between the cam and adjusting screw on the manifold linkage.
4. Hold a Crypton synchro check meter against number six intake and open the butterflies by turning the throttle adjusting screw clockwise sufficiently for a reading to register on the meter scale (eg 3). \*\*



5. With the engine revolutions maintained compare the readings from number three and one intakes with that of number six.
6. If the readings are all the same no adjustment is required and the throttle adjusting screw should be reset and locked so that it just touches the countershaft operating lever.

*Continued*

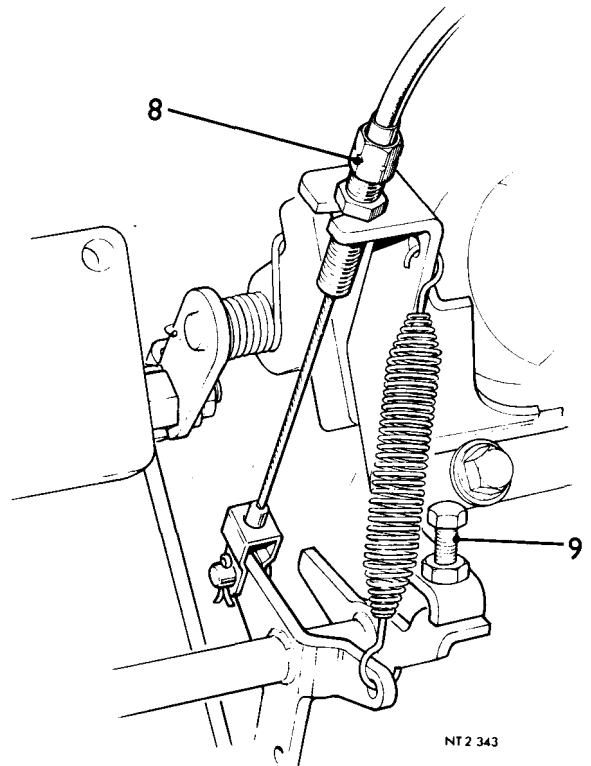


## FUEL SYSTEM PI

### Adjustment

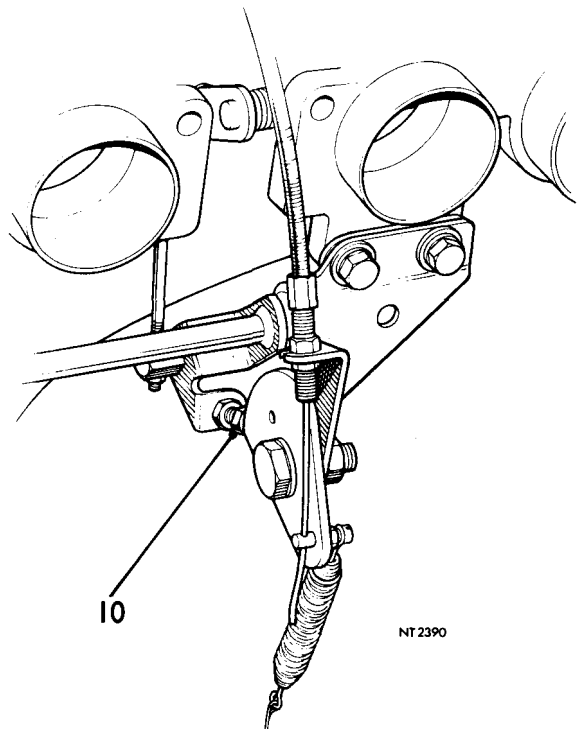
7. Should adjustment of the butterflies be necessary, maintain the engine at normal operating temperature, check as in instruction 3 and with the air intake manifold removed proceed as follows:-

8. Slacken the throttle cable adjuster so that there is no tension in the cable.



9. Turn the throttle adjusting screw anti-clockwise so that it is well clear of the countershaft operating lever.

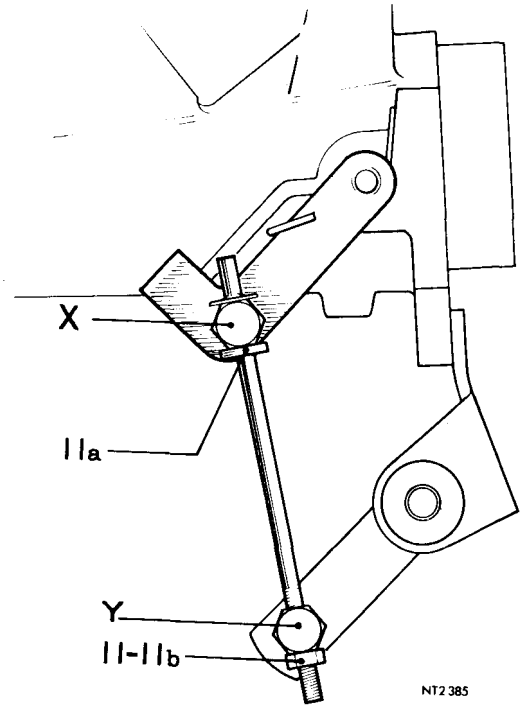
10. Slacken the cold start adjusting screw clockwise so that the screw head is well clear of the cam.



*Continued*

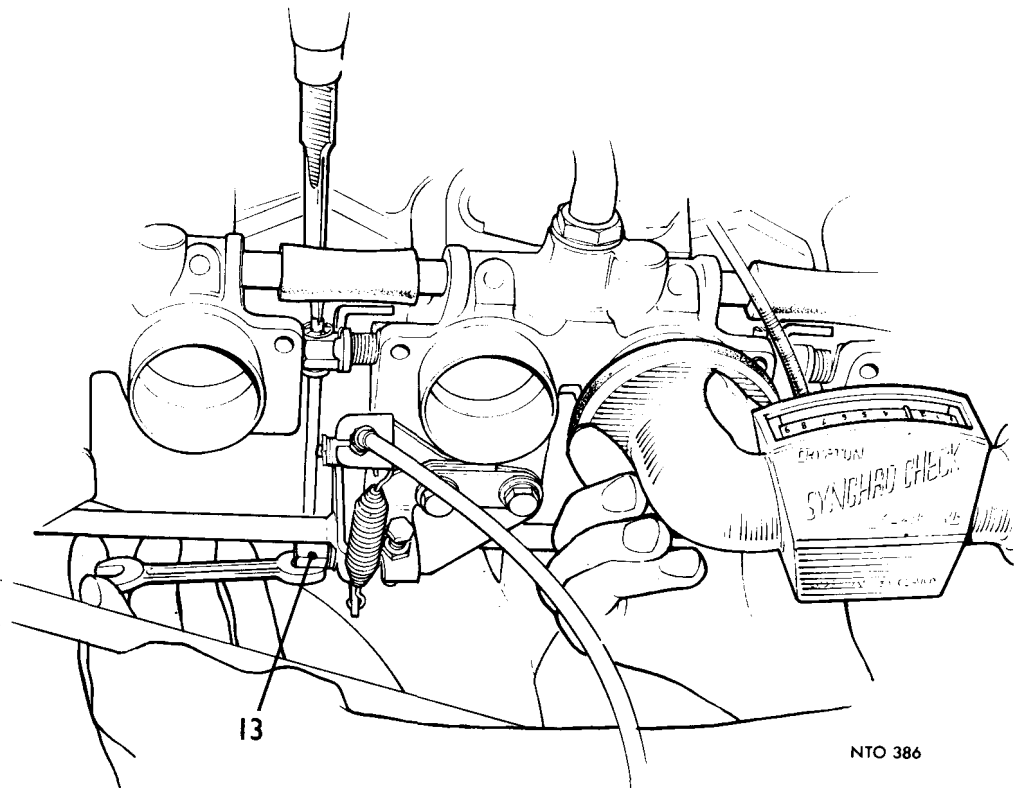


11. Release the lock nut of the rear vertical link and
  - a. adjust the link so that the brazed-on washer just touches the butterfly shaft trunnion.
  - b. Lock the nut against the lower trunnion.



NT2 385

12. Start the engine and again hold the crypton synchro check meter against number six intake and by means of the throttle adjusting screw (turning clockwise) open the intake butterflies thereby increasing the engine revolutions until a convenient reading (say 3), registers on the meter scale.
13. Slacken the centre vertical link lock-nut and hold the meter against number three intake and by means of the centre vertical link adjust the butterflies of numbers three and four intakes so that the same reading as in instruction 12 is recorded. Lock the nut against the lower trunnion.



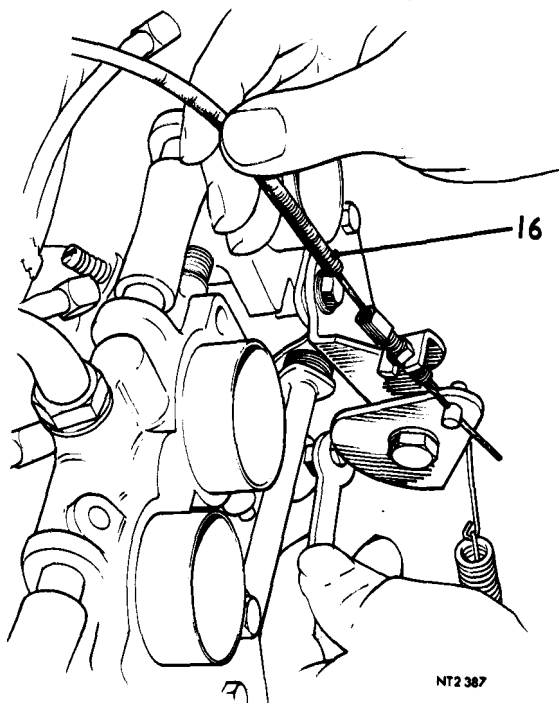
NT0 386

14. Release the locknut on the front vertical link and hold the meter against number one intake and adjust the link until the meter reading registers the same as in instructions 12 and 13. Lock the nut against the lower trunnion.

*Continued*

15. Re-check the metering readings on numbers three and six intakes and re-adjust if necessary.
16. Adjust the fast idle speed by pulling the cold start cable out of the adjuster with the cam turned to its maximum lift position. Turn the adjusting screw against the cam until the engine revolutions maintain a steady 1500 to 1800 r.p.m.

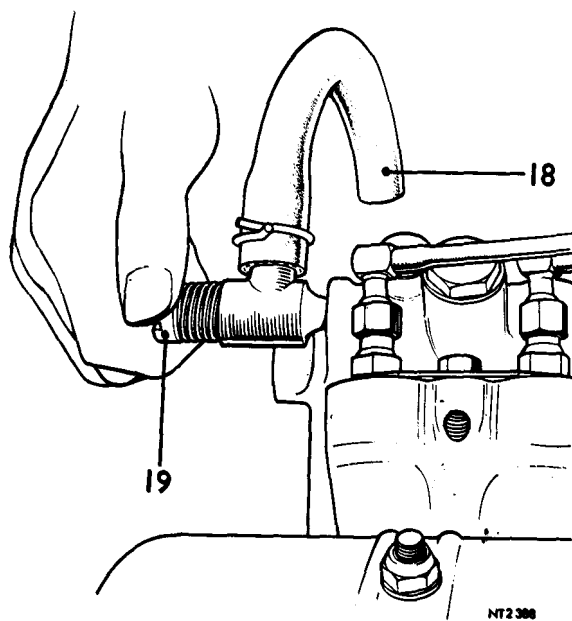
**NOTE:** Do not pull the cold start cable with the control knob on the control panel since it will also operate the excess fuel lever on the metering unit thereby increasing the quantity of fuel delivered to the injectors.



17. Turn the throttle adjusting screw so that it just touches the countershaft operating lever and secure with the lock nut. See instruction 6.

18. As a check to ensure that all the butterflies are fully closed hold a finger over the end of the air valve pipe so that the engine stalls.
19. Start the engine and by means of the air valve adjusting screw regulate the air bleed to give an idling speed of 750 to 800 r.p.m.

20. Adjust the throttle and cold start cables to remove excessive slack and secure with the locknuts.
21. Stop the engine and refit the air intake manifold. 19.70.01.



## Data

|                   |                     |
|-------------------|---------------------|
| Idling speed      | 750 to 800 r.p.m.   |
| Fast idling speed | 1500 to 1800 r.p.m. |

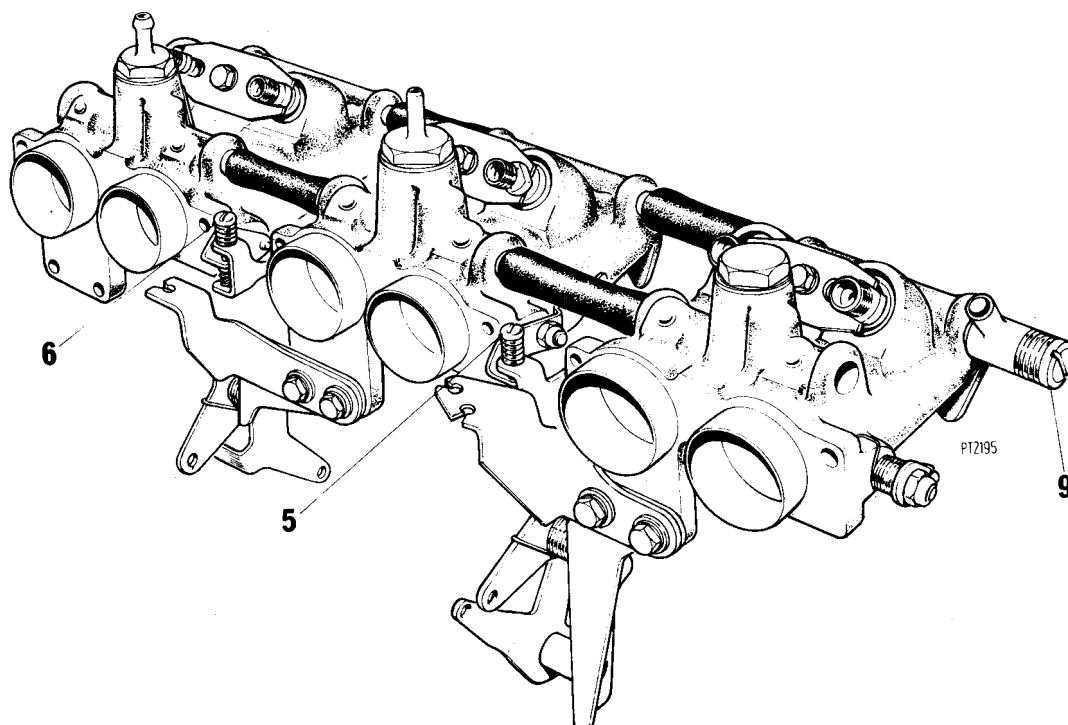
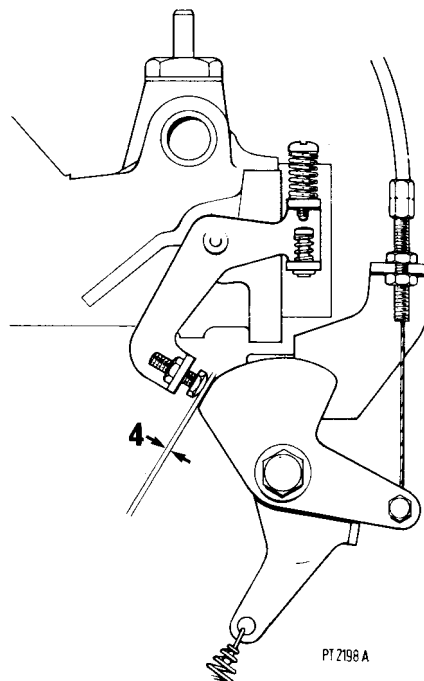
**THROTTLE BUTTERFLIES**

(From Engine No. CR 1E)

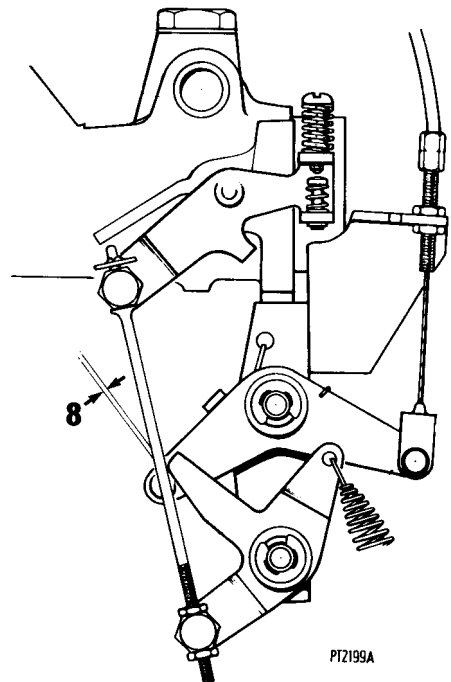
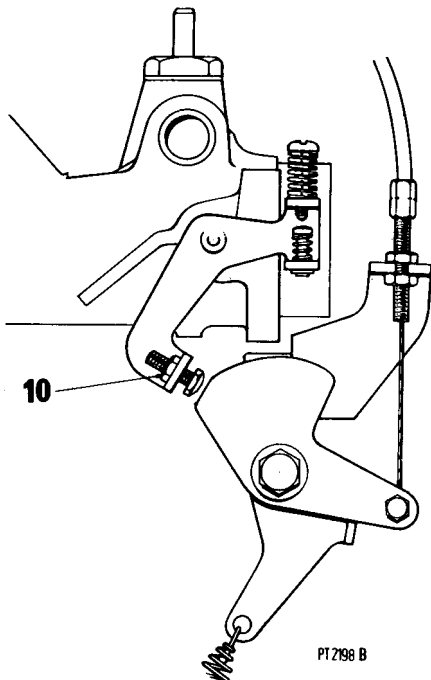
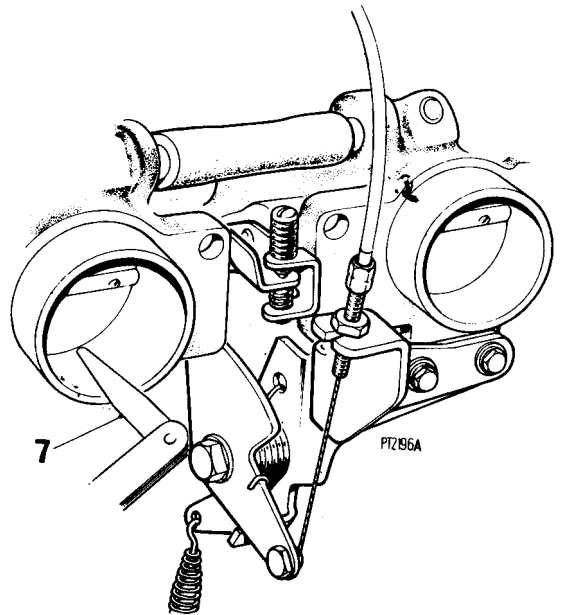
## — Check and adjust

19.20.05

1. Start the engine and warm to the normal operating temperature.
2. Remove the air intake manifold 19.70.01.
3. Check that the throttle cable is correctly adjusted.
4. Ensure that the cold start lever on the metering unit is back against its stop and that there is clearance between the cam and adjusting screw on the manifold linkage.
5. Screw in the front adjuster until the centre pair of butterflies are just opening and the front pair are just closing. Back off the adjuster until the centre butterflies just close.
6. Screw in the rear adjuster until the rear pair of butterflies are just opening and the centre pair are just closing. Back off the adjuster until the rear butterflies just close.



7. Check the closure of all the butterflies with a 0.002 in. (0.05 mm) feeler gauge. The feeler gauge should not pass between the butterfly plate and the bore.
8. Adjust the link rod to obtain a clearance of 0.020 – 0.030 in. (0.5 – 0.75 mm) between the nylon roller on the primary lever and the link rod lever.
9. Start the engine and adjust the air bleed valve to achieve an idling speed of 750 – 800 r.p.m. Screwing in the valve increase the speed.
10. Open the fast idle cam and check the engine speed. If necessary slacken the locknut and adjust the contact screw to achieve a fast idle speed of 1500 – 1800 r.p.m.
11. Refit the air intake manifold 19.70.01



## THROTTLE CABLE

## – Remove and refit

19.20.06

## Removing

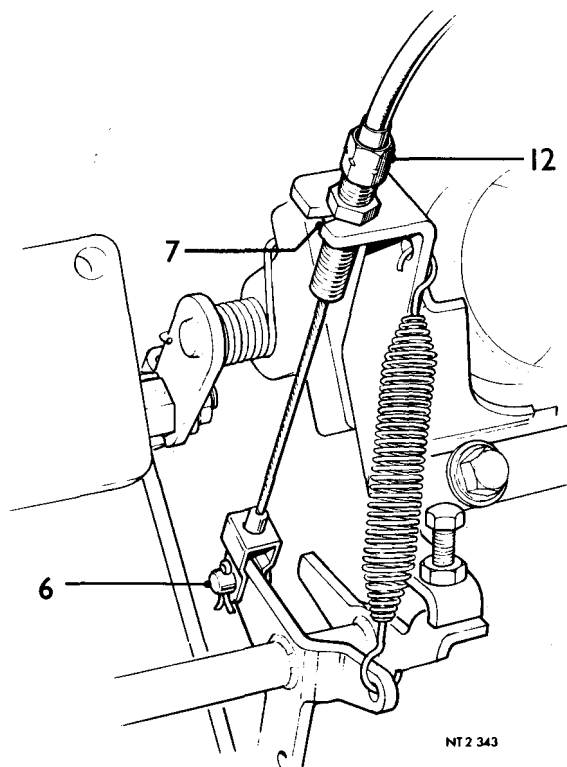
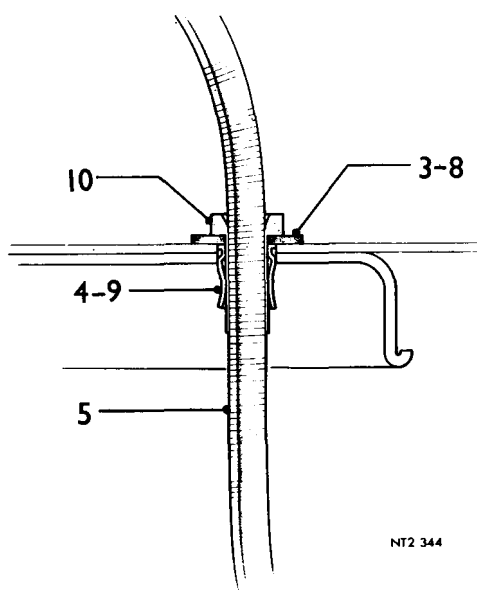
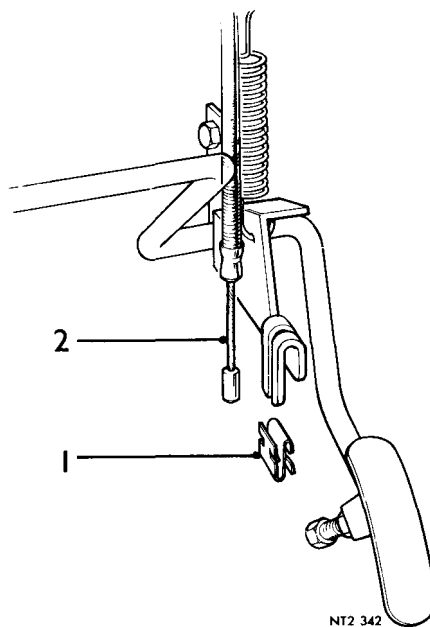
1. Remove the spring clip retaining the inner cable to the throttle pedal.
2. Disconnect the inner cable from the pedal.
3. Remove the rubber sealing washer from the brass ferrule on the bulkhead.
4. Pull the outer cable complete through the bulkhead hole sufficiently to enable the cable gripper to be removed.

**NOTE:** The spring steel cable gripper in the bulkhead cable clearance hole must be removed before the complete cable is withdrawn from the bulkhead, otherwise the ferrule at the end of the outer cable will be pulled off.

5. Remove the cable from the bulkhead.
6. Remove the split pin from the clevis pin securing the inner cable fork to the countershaft lever.
7. Remove the lower locknut from the cable adjuster and remove the cable complete from the bracket.

## Refitting

8. Thread the rubber sealing washer on to the pedal end of the cable.
9. Thread the cable gripper over the cable and insert the cable into the bulkhead.
10. Position the cable gripper into the bulkhead hole and push the brass ferrule into the hole so that it is held firm by the gripper and the shoulder is flush with the bulkhead.
11. Reverse instructions 1 to 3 and 6 and 7.
12. Adjust the cable tension by means of the cable adjuster.



## FUEL SYSTEM PI

### THROTTLE LINKAGE – P.I.

**\*\* (Up to Engine No. CP 77609E) \*\***

– Remove and refit

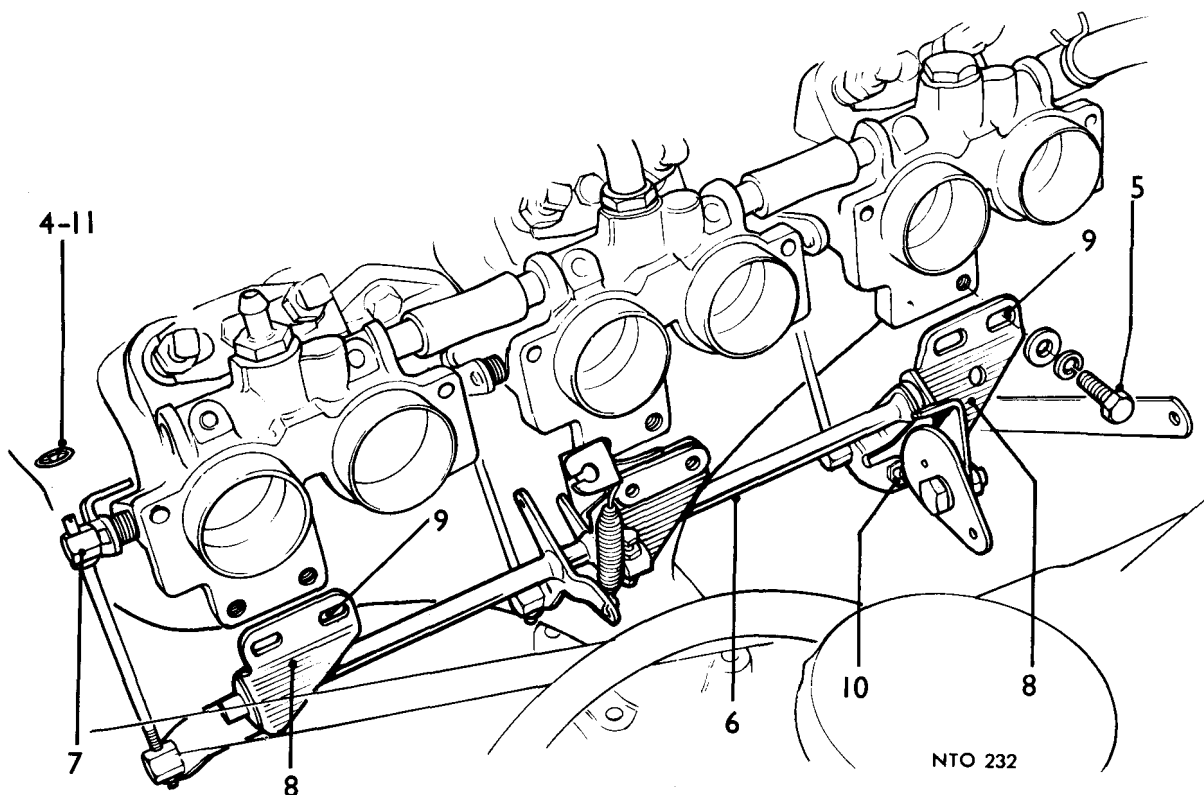
19.20.07

#### Removing

1. Remove the air intake manifold 19.70.01
2. Disconnect the throttle cable and the return spring from the linkage 19.20.06.
3. Disconnect the cold start control cable and return spring 19.20.26.
4. Remove the spring clips from three vertical links.
5. Remove the six bolts complete with washers securing the linkage to the induction manifold.
6. Remove the linkage complete from the engine.

#### Refitting

7. Offer-up the linkage to the manifold passing each of the three vertical links through the throttle spindle trunnions. Secure the linkage by the centre throttle bracket only using two bolts, plain and spring washers.
8. Loosely secure the two endbrackets to the manifold so that the brackets may be moved laterally within the limits of the elongated holes.
9. Adjust the countershaft by means of the elongated holes in the two end brackets so that no end-float exists in the shaft. Ensure, however that the vertical links are at right angles to the countershaft. Tighten the four securing bolts.
10. Check and if necessary adjust the position of the cold start cam in relation to its adjusting screw, ensuring that the cam is central on the screw head.
11. Fit the spring clips to the trunnion end of the vertical links.
12. Reconnect the throttle cable and spring.
13. Reconnect the cold start cable and spring.
14. Adjust the linkage 19.20.05.
15. Refit the air intake manifold 19.70.01.



## THROTTLE LINKAGE (From Engine No. CR1E)

– Remove and refit

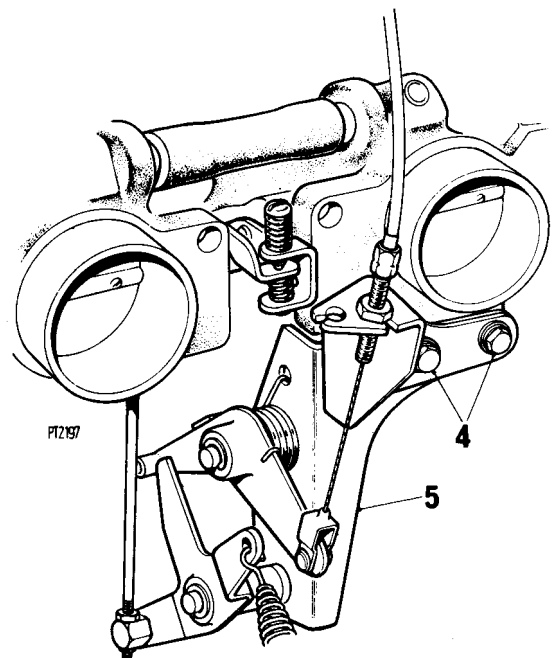
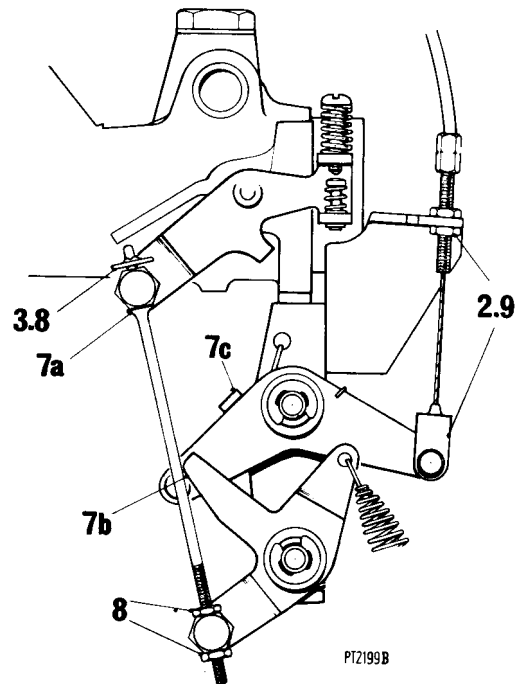
19.20.07

### Removing

1. Remove the air intake manifold 19.70.01.
2. Disconnect the throttle cable from the linkage.
3. Remove the retaining clip from the vertical link rod.
4. Remove two bolts, plain and spring washers securing the linkage to the induction manifold.
5. Withdraw the linkage.

### Refitting

6. Reverse instructions 4 and 5.
- 7a. Adjust the vertical link rod so that the brazed-on washer just touches the butterfly spindle trunnion.
- 7b. The cam lever is in contact with the roller on the throttle lever.
- 7c. The throttle lever is against its stop.
8. Tighten the vertical link locknuts and refit the retaining clip.
9. Refit and adjust the throttle cable.
10. Refit the air intake manifold.



## COLD START CABLE

– Remove and refit

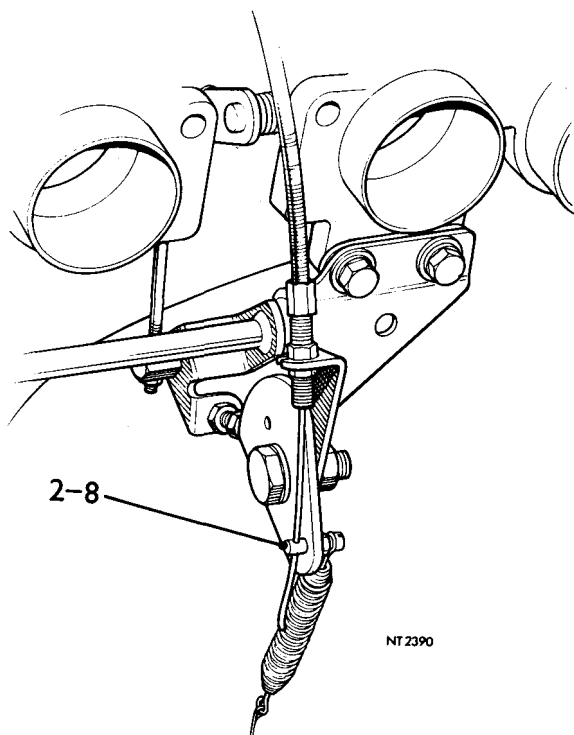
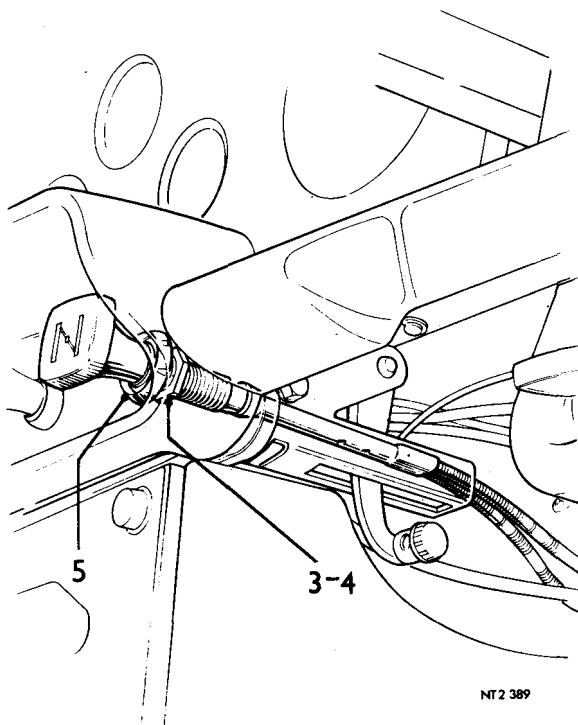
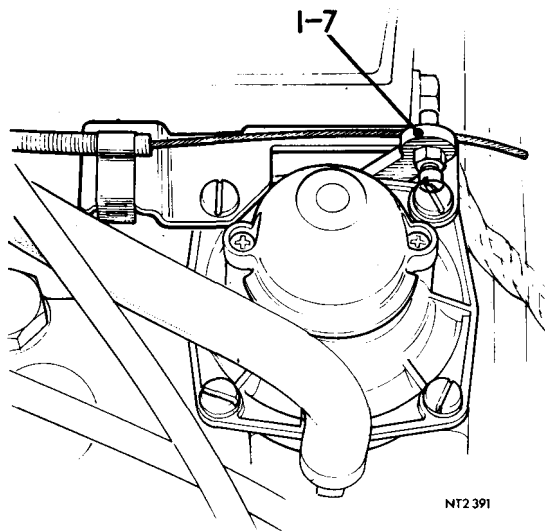
19.20.26

### Removing

1. Disconnect the inner cable from the metering distributor excess fuel lever.
2. Disconnect the inner cable from the cold start cam on the throttle linkage and release the spring.
3. Unscrew the locknut behind the control panel and withdraw the cable complete through the control panel, locknut and bulkhead.

### Refitting

4. Feed the cable complete through the control panel hole and pass the locknut over the cables.
5. Secure the outer cable to the control panel with the locknut so that the end of the threaded part of the outer cable is flush with the plated ferrule on the control panel.
6. Feed the engine end of the cable through the bulkhead.
7. Connect the inner cable to the metering distributor excess fuel lever and ensure that there is sufficient slack in the cable to allow the lever to rest against its stop when the control knob is pushed fully home.
8. Connect the inner cable to the cam on the throttle linkage and adjust the cable by means of the adjuster. Ensure that there is clearance between the cam and adjusting screw.





# COLD START CABLE

– Remove and refit

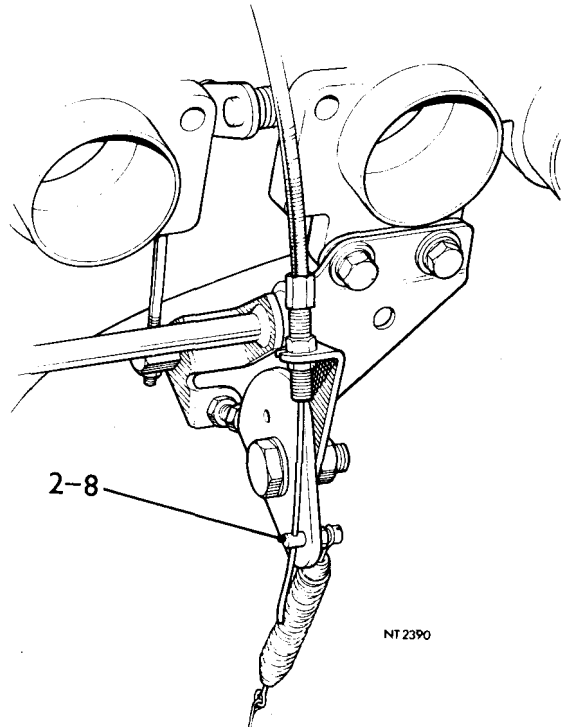
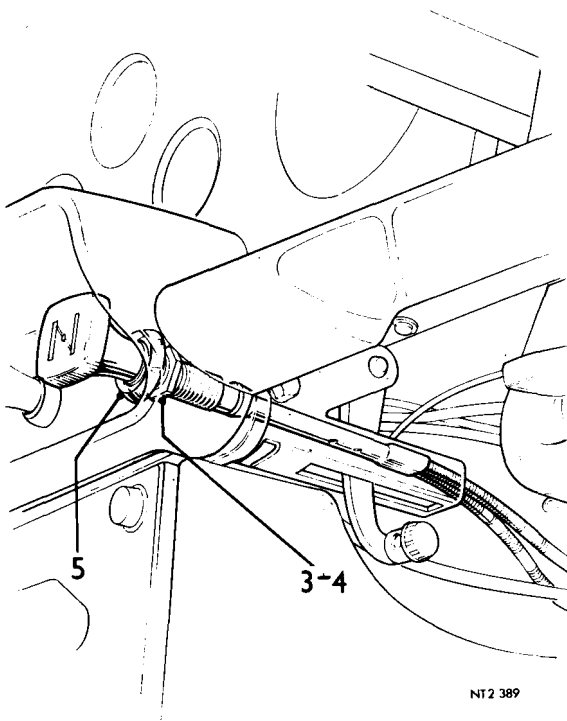
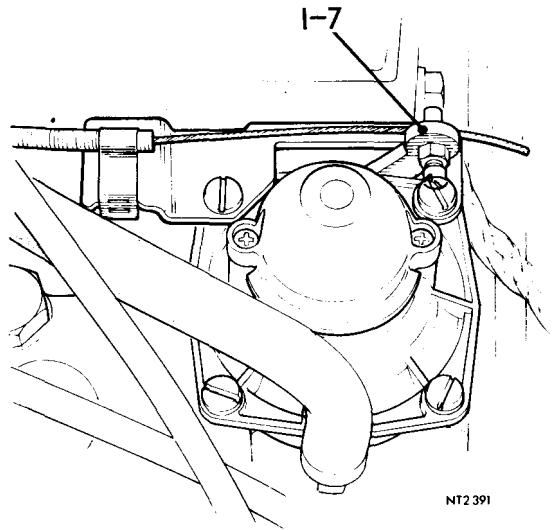
19.20.26

## Removing

1. Disconnect the inner cable from the metering distributor excess fuel lever.
2. Disconnect the inner cable from the cold start cam on the throttle linkage and release the spring.
3. Unscrew the locknut behind the control panel and withdraw the cable complete through the control panel, locknut and bulkhead.

## Refitting

4. Feed the cable complete through the control panel hole and pass the locknut over the cables.
5. Secure the outer cable to the control panel with the locknut so that the end of the threaded part of the outer cable is flush with the plated ferrule on the control panel.
6. Feed the engine end of the cable through the bulkhead.
7. Connect the inner cable to the metering distributor excess fuel lever and ensure that there is sufficient slack in the cable to allow the lever to rest against its stop when the control knob is pushed fully home.
8. Connect the inner cable to the cam on the throttle linkage and adjust the cable by means of the adjuster. Ensure that there is clearance between the cam and adjusting screw.



## FUEL SYSTEM PI

### FUEL MAIN FILTER

– Remove and refit

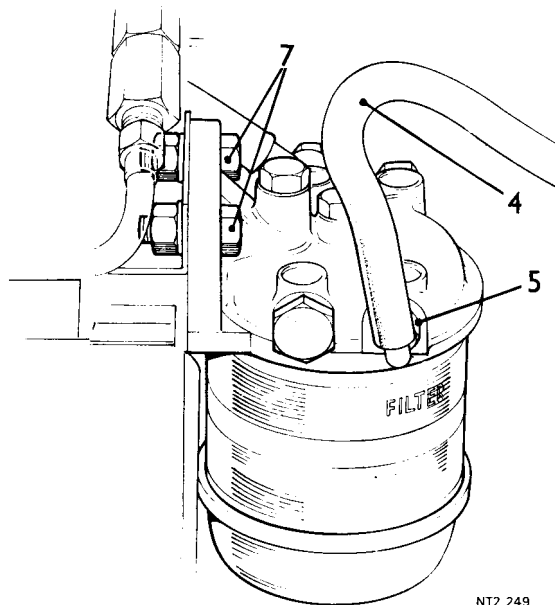
19.25.02

#### Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Remove the luggage compartment forward trim panel 76.13.17.
4. Clamp the gravity feed hose from the fuel tank to the filter inlet union.
5. Disconnect the gravity feed supply to the filter at the inlet union.
6. Disconnect the outlet feed from the filter at the pump inlet union.

**NOTE:** As an alternative, the outlet feed hose may be detached from the extension pipe at the filter outlet, providing damage is not caused by using undue force to remove a tightly gripped hose.

7. Remove the two nuts and bolts securing the filter assembly to the car body and remove the filter from the car.



NT 2 249

#### Refitting

8. Reverse instructions 1 to 7.

### FUEL MAIN FILTER ELEMENT

– Remove and refit

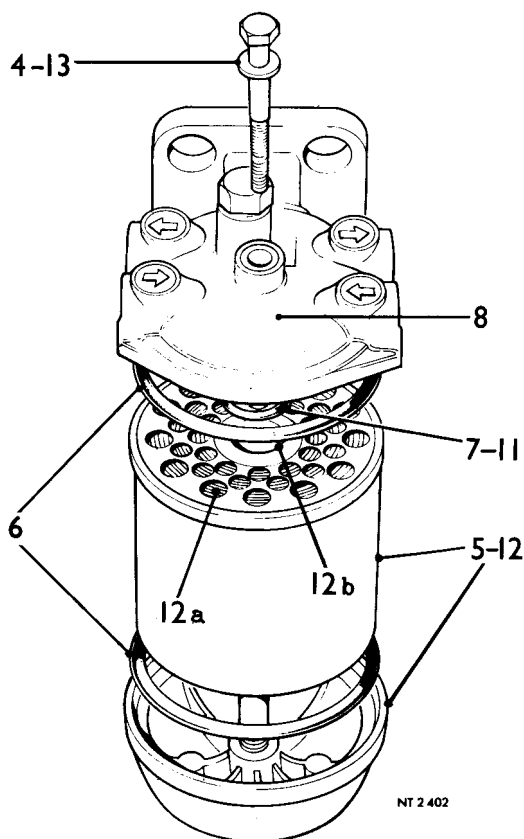
19.25.07

#### Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Clamp the gravity supply hose to the filter.
4. Remove the centre retaining bolt and sealing washer.
5. Remove the filter element and lower casing.
6. Remove the upper and lower sealing rings.
7. Remove the 'O' ring on the element location spigot.

#### Refitting

8. Clean the filter head and lower body.
9. Fit a new sealing ring to the filter head, ensuring that it seats properly in its groove.
10. Locate a new sealing ring to the filter lower body.
11. Fit a new 'O' ring to the filter element spigot, ensuring that it locates in its groove.
12. Fit a new filter element to the filter body ensuring:—
  - a. The element is fitted so that the circular holes in the end of the element are uppermost.
  - b. The large hole in the centre of the element locates correctly over the spigot and 'O' ring.
13. Secure the assembly with the central retaining bolt and sealing washer.
14. Remove the hose clamp, reconnect the battery and run the engine whilst checking for fuel leaks from the filter.
15. Refit the spare wheel.



NT 2 402

19.25.02 P.I.

19.25.07 P.I.

**COLD START LINKAGE**

(From Engine No. CR1E)

**– Remove and refit**

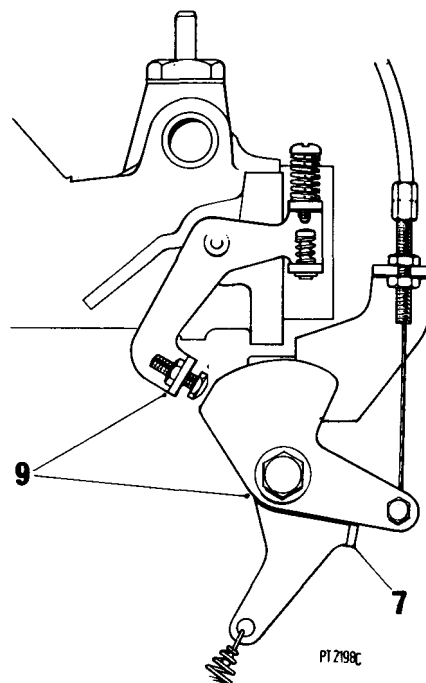
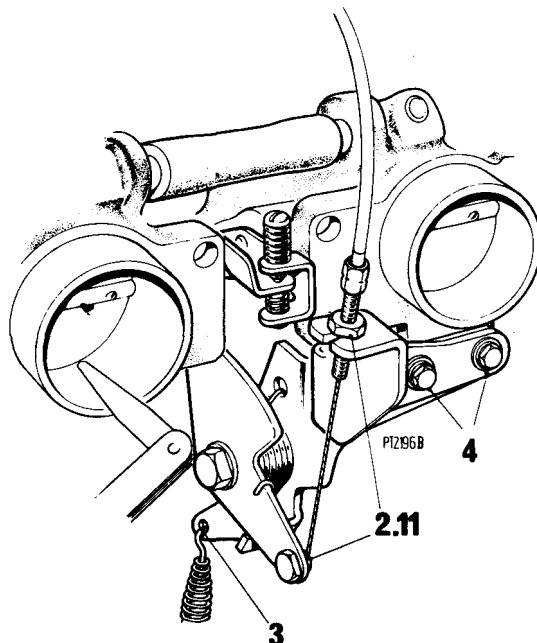
19.20.07

**Remove**

1. Remove the air intake manifold. 19.70.01
2. Disconnect the cold start cable from the manifold linkage.
3. Disconnect the cold start cam return spring.
4. Remove the two bolts, plain and spring washers securing the linkage to the manifold.
5. Lift off the linkage.

**Refitting**

6. Reverse instructions 3 to 5.
7. Ensure that the cold start cam is against its stop.
8. Start the engine and warm to the normal operating temperature.
9. Slacken the locknut and turn the cam to the fully open position.
10. Adjust the screw until a fast idle speed of 1500 – 1800 r.p.m. is attained.
11. Reconnect and adjust the cold start cable.
12. Refit the air intake manifold.



## FUEL SYSTEM PI

### FUEL MAIN FILTER

#### — Remove and refit

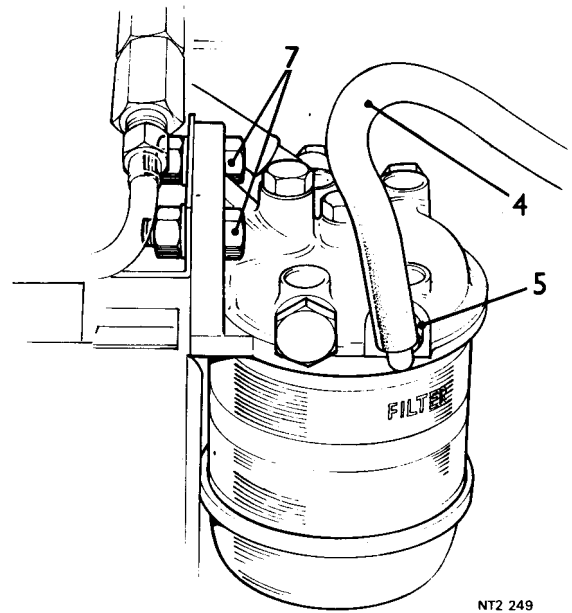
19.25.02

##### Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Remove the luggage compartment forward trim panel 76.13.17.
4. Clamp the gravity feed hose from the fuel tank to the filter inlet union.
5. Disconnect the gravity feed supply to the filter at the inlet union.
6. Disconnect the outlet feed from the filter at the pump inlet union.

**NOTE:** As an alternative, the outlet feed hose may be detached from the extension pipe at the filter outlet, providing damage is not caused by using undue force to remove a tightly gripped hose.

7. Remove the two nuts and bolts securing the filter assembly to the car body and remove the filter from the car.



NT 249

##### Refitting

8. Reverse instructions 1 to 7.

### FUEL MAIN FILTER ELEMENT

#### — Remove and refit

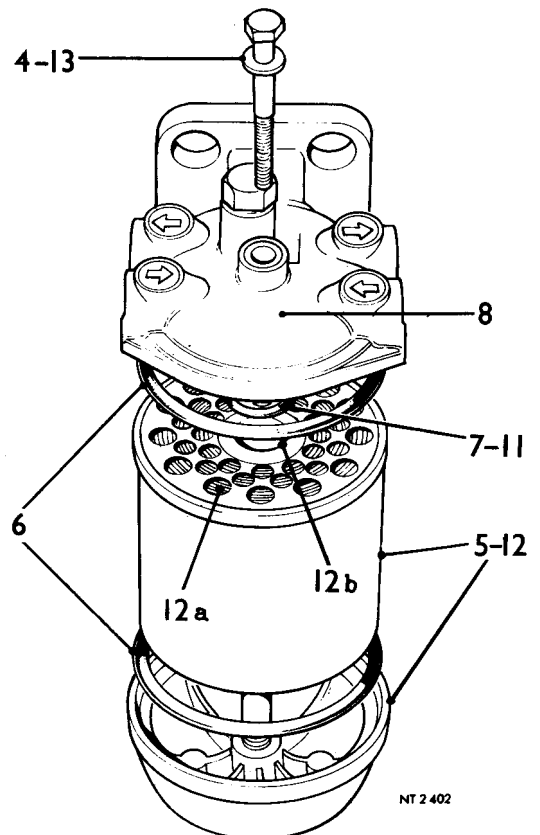
19.25.07

##### Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Clamp the gravity supply hose to the filter.
4. Remove the centre retaining bolt and sealing washer.
5. Remove the filter element and lower casing.
6. Remove the upper and lower sealing rings.
7. Remove the 'O' ring on the element location spigot.

##### Refitting

8. Clean the filter head and lower body.
9. Fit a new sealing ring to the filter head, ensuring that it seats properly in its groove.
10. Locate a new sealing ring to the filter lower body.
11. Fit a new 'O' ring to the filter element spigot, ensuring that it locates in its groove.
12. Fit a new filter element to the filter body ensuring:—
  - a. The element is fitted so that the circular holes in the end of the element are uppermost.
  - b. The large hole in the centre of the element locates correctly over the spigot and 'O' ring.
13. Secure the assembly with the central retaining bolt and sealing washer.
14. Remove the hose clamp, reconnect the battery and run the engine whilst checking for fuel leaks from the filter.
15. Refit the spare wheel.



NT 2 402

# PETROL INJECTION SYSTEM

## General Description

19.35.00

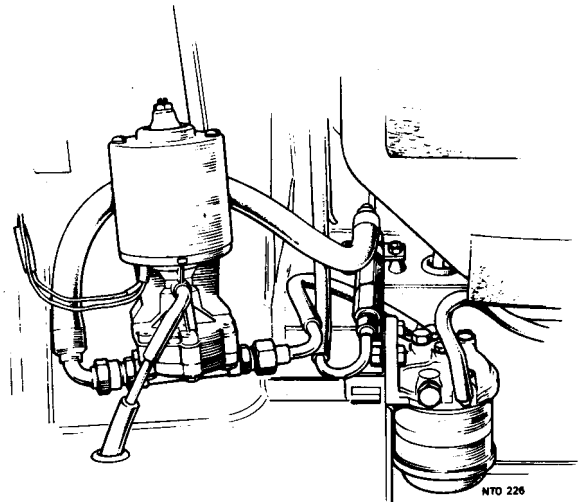
The Lucas Mk. II petrol injection equipment used on the Triumph TR6 engine replaces carburettors as a means of inducing a combustible petrol-air mixture into the cylinders.

Essentially, the system consists of a pump, a pressure relief valve and a metering distributor, the latter delivering precisely timed and measured quantities of fuel to six injectors housed in an induction manifold. A normal petrol-air mixture is then induced, and compressed and ignited by a conventional ignition system.

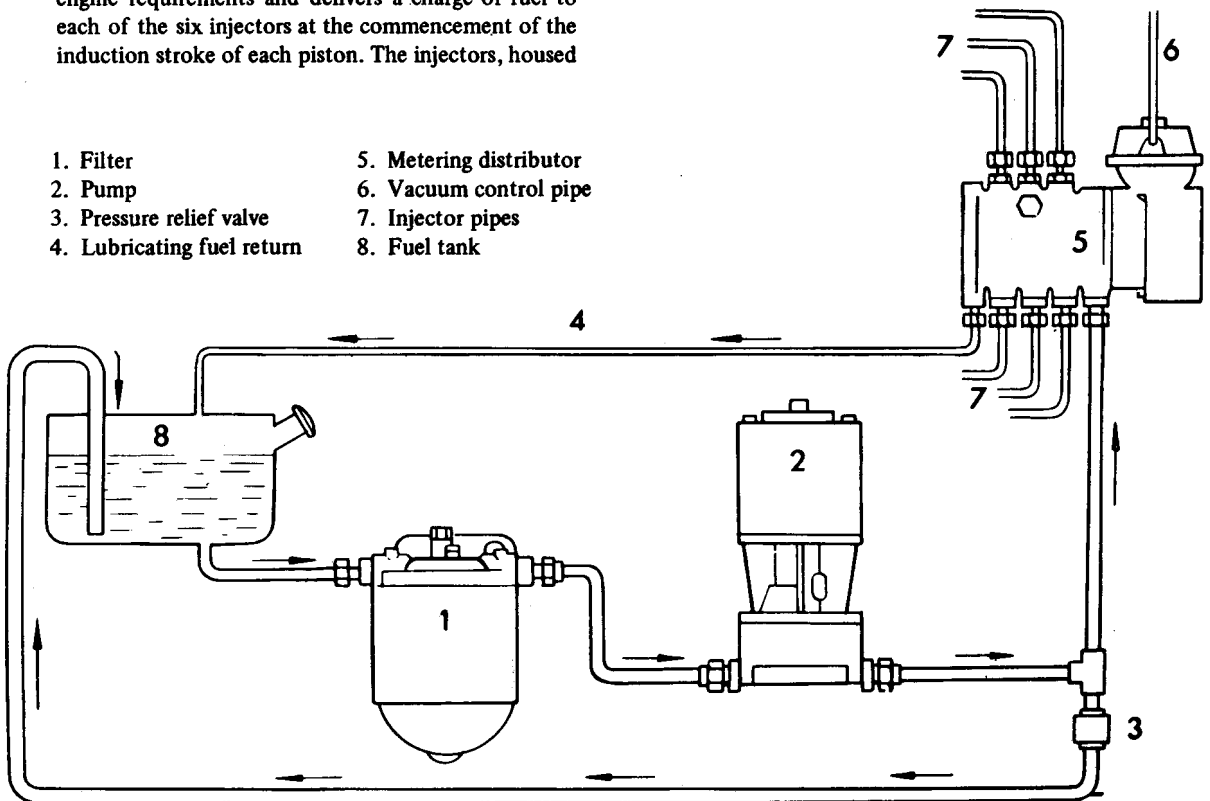
## Description of the Petrol Injection Circuit and Components Petrol Injection Circuit.

Fuel, gravity fed from the tank to a paper element filter is drawn into an electrically driven pump which delivers pressurised fuel to a metering distributor via a pressure relief valve. The valve, which is adjustable, maintains a constant pressure of fuel to the metering distributor and releases excess fuel pressure back to the tank via a return pipe. The metering distributor, controlled by vacuum from a pipe to the induction manifold measures, subject to engine requirements and delivers a charge of fuel to each of the six injectors at the commencement of the induction stroke of each piston. The injectors, housed

in the induction manifold, contain a poppet valve which is set to open at 50 p.s.i. (3.52 kgf cm<sup>2</sup>) and allows a charge of fuel in the form of a hollow cone spray into the induction manifold. Fuel which also lubricates the metering distributor is returned to the tank via the lubricating fuel return pipe.



- |                            |                         |
|----------------------------|-------------------------|
| 1. Filter                  | 5. Metering distributor |
| 2. Pump                    | 6. Vacuum control pipe  |
| 3. Pressure relief valve   | 7. Injector pipes       |
| 4. Lubricating fuel return | 8. Fuel tank            |

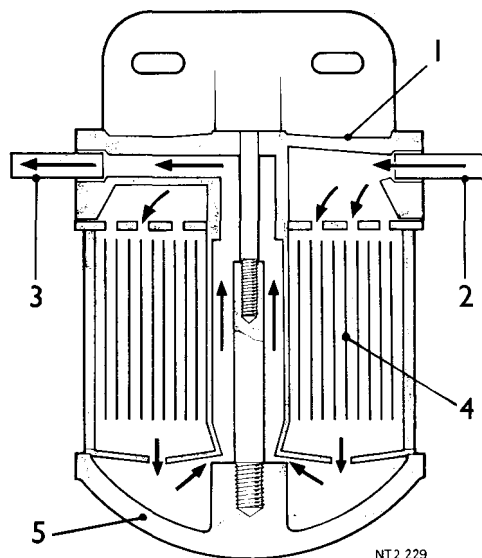


NTO 325



## Fuel Filter

The fuel filter, which is gravity fed, is situated in the luggage compartment below the level of the fuel tank. The filter comprises a top assembly which is fixed to the luggage compartment floor and has inlet and outlet connections. A paper element housed in a metal canister is secured in position between the top assembly and a bottom sediment bowl by a single bolt.



NT2 229

1. Top assembly
2. Inlet
3. Outlet
4. Paper element
5. Bottom bowl

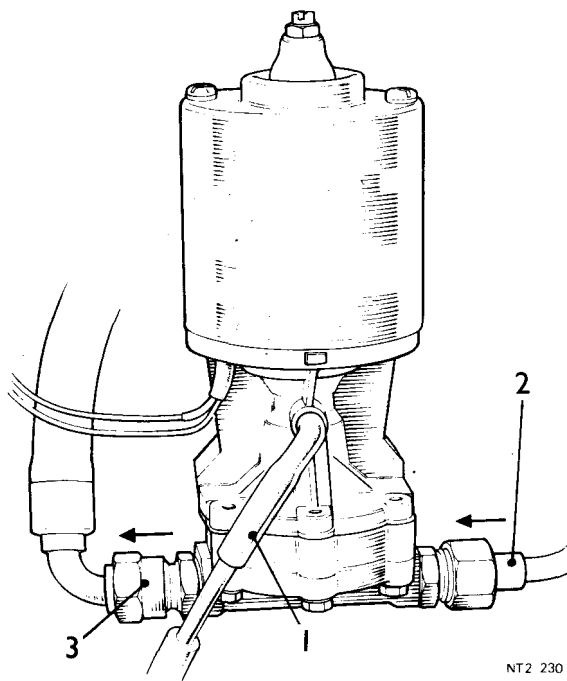
## Fuel Pump Unit

The fuel pump unit mounted in the luggage compartment consists of two main parts, an electric motor and a twin-gear pump.

The electric motor which drives the fuel pump by means of a nylon coupling, is a 12 volt high performance permanent magnet unit.

The motor is protected against the entry of fuel from the pump by a shaft seal. A 'Tell-tale' pipe in the motor base casting indicates whether the fuel has passed this seal.

Filtered fuel enters the pump through the inlet union and is expelled through the pump outlet by the rotating action of the spur-type gears. The pump pressure is dependent upon the setting of the pressure relief valve.



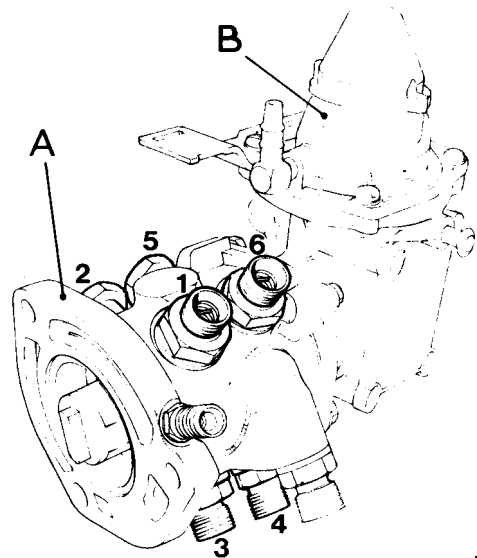
NT2 230

- 1 "Tell-tale" pipe
- 2 Pump inlet
- 3 Pump outlet

## Metering Distributor Assembly

The metering distributor assembly is mounted on the engine and is driven by a pinion shaft gear off the ignition distributor driving gear. The assembly comprises two main units namely the metering unit and the control unit.

- A Metering Unit  
B Control Unit



NT2 237

## Metering Unit

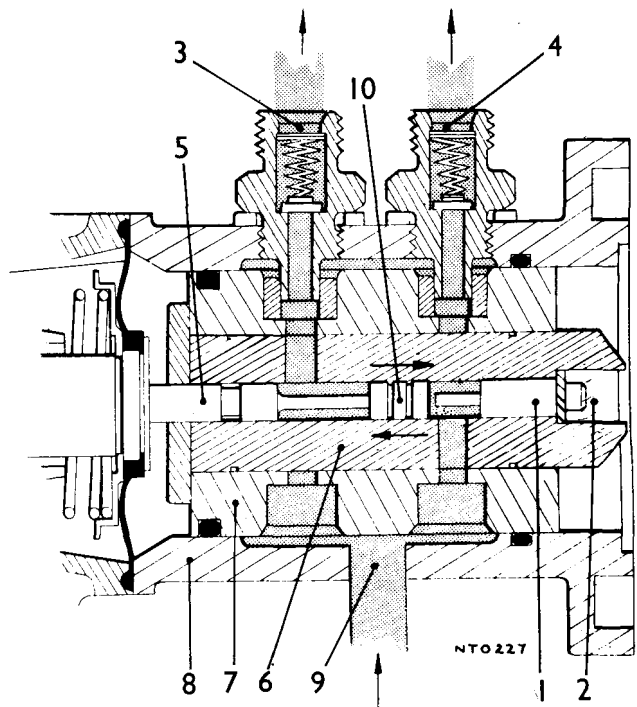
The metering unit consists of an outer casing with one inlet and six outlet ports. Located and seated inside the casing so that it cannot revolve or move axially is a sleeve with six inlet and six outlet ports arranged in spaced pairs  $60^\circ$  apart, inlet and outlet alternating. A space between the body and the sleeve forms a reservoir for pressurised fuel. The six outlet ports are coincident with the outlet ports in the outer casing and sealed unions containing non-return valves connect the sleeve and body ports to injector delivering pipes. A rotor which has two radial ports to a central bore and is driven by the pinion shaft gear, revolves within the sleeve. The central bore of the rotor contains a shuttle with a fixed stop at one end and a variable stop at the other.

When the engine is started and the rotor turns within the sleeve, the rotor port at the variable stop end becomes coincident with the port in the sleeve leading to the fuel reservoir in the outer casing. Fuel at high pressure enters the rotor bore and drives the shuttle to the fixed stop end of the rotor. This movement of the shuttle displaces fuel in the rotor bore through the ports in the rotor and sleeve and out through the non-return valve in the union serving number one cylinder.

A further  $120^\circ$  rotation of the rotor causes the rotor ports at the fixed stop end to align with the sleeve port leading to the pressurised fuel reservoir. Fuel now enters at the fixed stop end of the rotor and drives the shuttle back towards the variable stop end. The displaced fuel from the rotor bore ports passes to number five cylinder via the sleeve port and non-return valve union.

The shuttle continually moves between the two stops displacing an accurate amount of fuel to each cylinder in turn. The quantity of fuel delivered at each injection is dependent upon the distance the shuttle travels which is determined by the control unit.

1. Fixed stop
2. Rotor drive
3. Outlet to No. 1 injector
4. Outlet to No. 2 injector
5. Variable control stop
6. Rotor
7. Sleeve
8. Body
9. Fuel inlet from pump
10. Shuttle



NT0227

## Control Unit

The control unit is attached to the metering unit by four bolts. A cam follower with a diaphragm seal set in an annular groove around its periphery projects through the leading face of the unit. The rear end of the cam follower bears against the outer two of three rollers carried on the control links, whilst the third roller of smaller diameter runs against the fuel cam or datum track.

The control links are pivoted at the top where they are attached to the centre of a spring controlled rubber diaphragm — the lower part of the control links are free.

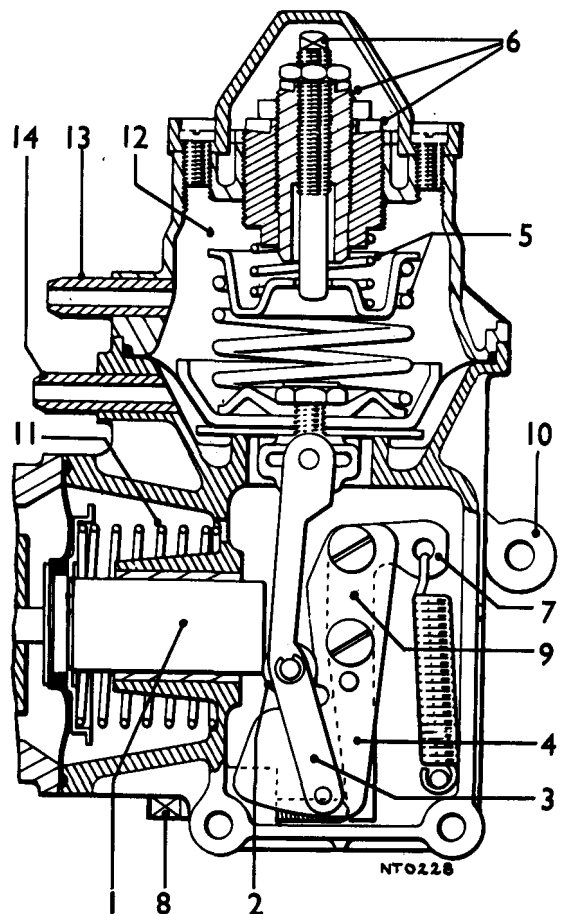
Two springs are positioned between the diaphragm and three concentric calibration screws. The top of the diaphragm and the calibration screws are in a chamber connected by a pipe to the manifold.

The fuel cam or datum track is secured by two screws to a carrier which is in contact with an external control screw. The carrier is pivoted at point X and the pivot extends through the rear face of the unit. The excess fuel lever is pivoted at the rear face of the unit and has a cam face at the lower end which contacts the cam carrier pivot.

Engine fuel demands, according to throttle openings and load, are reflected in changes in inlet manifold depression. The change is sensed by the spring loaded diaphragm which takes up a position balancing the loading of the springs against the depression in the chamber. The central links are thus raised or lowered along the cam track allowing the follower in or out of the forward face of the unit and so regulate the metering unit variable stop. To prevent the full hydraulic force of the variable stop from impinging on the control linkage a balancing spring is fitted on the cam follower which results in only light pressure between the follower and the rollers. Movement of the excess fuel lever for cold starting is effected by pulling the choke control knob on the control panel. This alters the position of the excess fuel lever and the carrier for the cam is drawn away from the cam follower thus causing the shuttle to travel further. When the control knob is pushed back the carrier is returned to the normal operating position by the action of a tension spring.

**CAUTION:** It is important that under no circumstances must the following adjustments be altered:-

- a) Calibration screws
- b) Full load setting screw
- d) Datum track screws



1. Cam follower
2. Rollers
3. Control links
4. Fuel cam (datum tank)
5. Calibration springs
6. Calibration screws
7. Fuel cam carrier
8. Full load setting screw
9. Point X
10. Excess fuel lever
11. Balance spring
12. Depression chamber
13. To manifold
14. To atmosphere

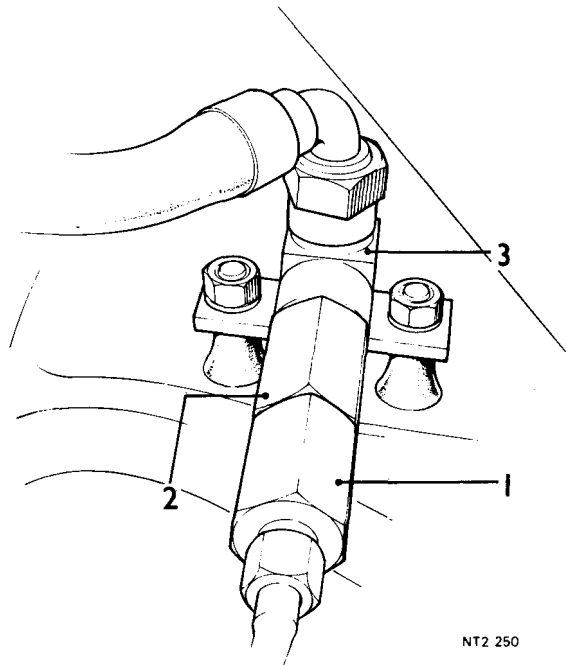




### Pressure relief valve assembly

The pressure relief valve is mounted in the luggage compartment between the pump and the filter. The unit consists of three parts, namely an adjustable valve, a strainer housing and a brass 'T' piece.

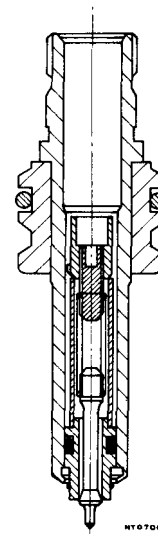
Fuel from the pump enters and leaves the assembly through the 'T' piece. The valve is set to provide a constant pressure of 106 – 110 p.s.i. (7.45 – 7.70 kgf/cm<sup>2</sup>) to the metering distributor and fuel in excess of this pressure is fed back to the tank through the strainer housing and valve.



1. Adjustable Valve
2. Strainer housing
3. T piece

### Injectors

The injectors are fitted into the inlet manifold and secured in pairs by a clamping plate. Fuel pipes from the metering unit are secured to the injectors by union nuts. The unions are numbered one to six for identification purposes. A poppet valve in the injector is set to open at 50 p.s.i. (3.52 kgf m<sup>2</sup>) to provide a 60° hollow cone spray of atomised fuel.



# FUEL SYSTEM PI

## FUEL METERING DISTRIBUTOR TIMING

**\*\* (Up to Engine No. CP 77609E)\*\***

– Check and adjust

19.35.01

### Check

1. Isolate the battery.
2. Turn the engine until the T.D.C. mark on the crankshaft pulley is in line with the pointer and number one piston is on its firing stroke.
3. Disconnect number six injector pipe from the metering distributor.
4. Remove number six outlet union from the metering distributor body and observe the relationship of the sleeve port to the rotor port.
5. Illustration A shows the **ACCEPTABLE** range of rotor port positions in relation to the rotor sleeve port. The direction of rotation of the rotor is clockwise looking at the drive end of the rotor.

**NOTE:** Black shading represents the rotor.

The arrow indicates direction of rotor rotation.

AA shows the sleeve port almost covered by the rotor.

AB shows the sleeve port half covered by the rotor.

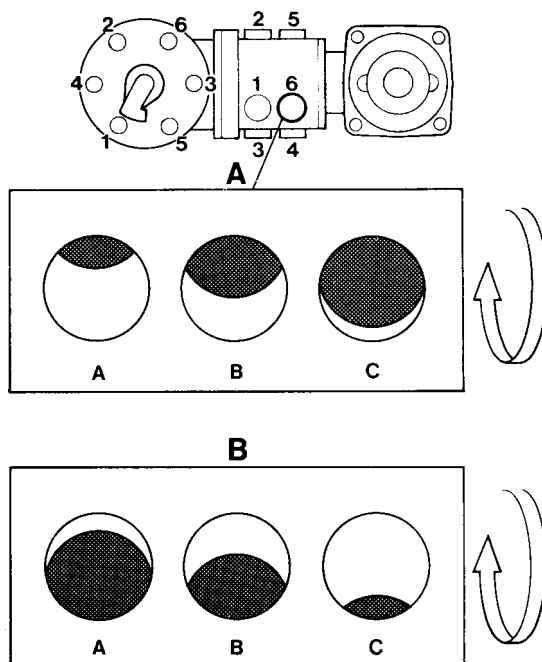
AC shows the sleeve port and the rotor port almost in line moving towards a full hole.

6. Illustration B represents an **UNACCEPTABLE** range of rotor and sleeve port positions.

BA shows the rotor and sleeve port almost in line.

BB shows the rotor covering half of the sleeve port.

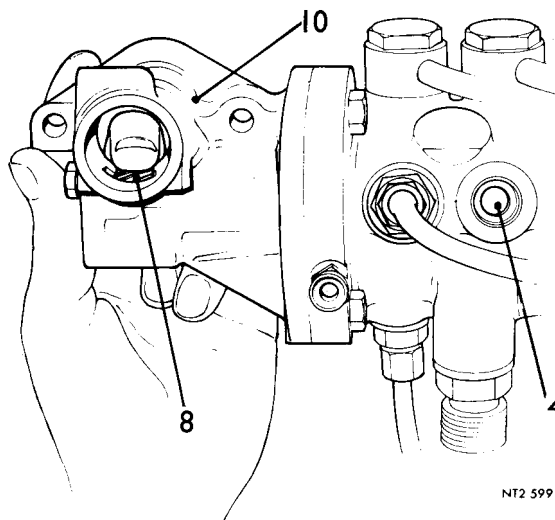
BC shows the rotor almost covering the sleeve port and moving towards total closure of the sleeve port.



NT2 231

### Adjust

7. In the event of the timing being incorrect, remove the metering distributor and pedestal complete instructions 1 to 8 12.10.22.
  8. Insert a finger in the distributor shaft bore and turn the pinion gear anti-clockwise (towards the engine) until a full rotor hole is visible through number six outlet.
  9. Continue to turn the gear anti-clockwise until the rotor hole just disappears from view, and then rotate the gear one extra tooth.
  10. Lower the pedestal and metering distributor into position and recheck the position of the rotor hole.
- NOTE:** If the position of the hole is still not correct the gear may not have been turned sufficiently, therefore repeat instructions 8 to 10.
11. Secure the pedestal to the cylinder block, refit the ignition distributor and distributor cap and H.T. leads.
  12. Reverse instructions 1 to 4, 12.10.22.



NT2 599

## FUEL METERING DISTRIBUTOR TIMING

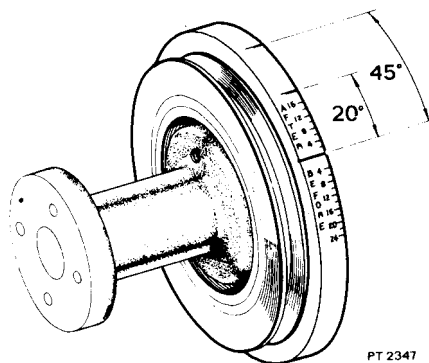
(From Engine No. CR1E)

— Check and adjust

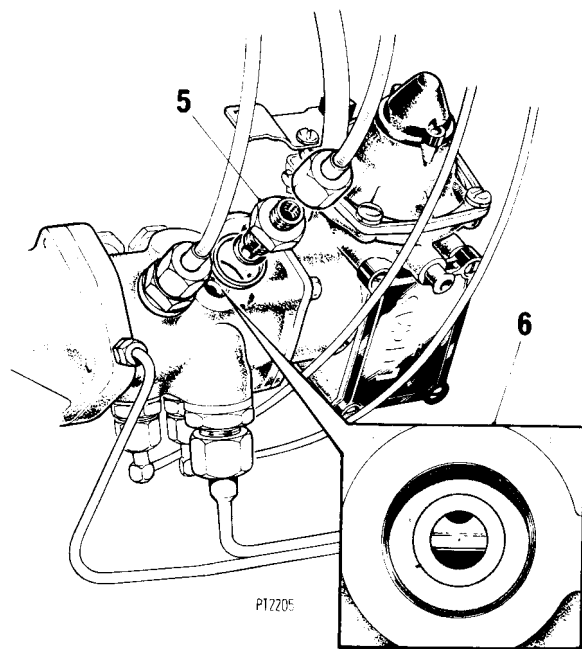
19.35.01

## Check

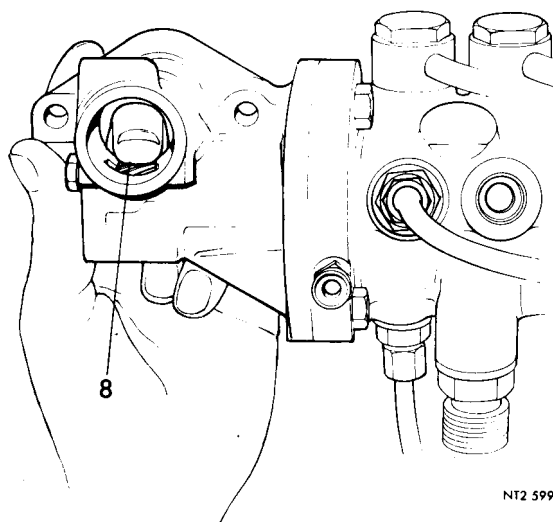
1. Isolate the battery.
  2. Remove the spark plugs and rocker cover.
  3. Turn the engine in a running direction until No. 6 piston is at T.D.C. induction stroke, i.e. No. 6 inlet and exhaust valves on the rock.
  4. Using a thin steel rule, mark off lines from the T.D.C. line on the crankshaft pulley 1 1/8 in. and 2 5/8 in. (29 mm and 67 mm) on the A.T.D.C. side of the pulley. The mark off lines should be sufficiently clear to be observed as timing marks and represent 20° and 45° A.T.D.C. respectively.
  5. Remove number six outlet union from the metering distributor body. (No portion of the rotor hole should be visible in the outlet port).
  6. Turn the crankshaft in a running direction until the leading edge of the hole in the rotor just appears on the upper side of the outlet port hole (the 'cracking' point); note the crankshaft angle at which this occurs. If this 'cracking' point occurs between the lines marked in 4, i.e. 20° – 45° A.T.D.C. the injection timing is satisfactory; if not, proceed as follows:
  7. Remove the metering distributor and pedestal complete, 12.10.22 (instructions 1 to 8).
  8. Insert a finger in the distributor shaft bore and turn the pinion gear anti-clockwise (towards the engine) until a full rotor hole is visible through number six outlet.
  9. Continue to turn the gear anti-clockwise until the rotor hole just disappears from view, and then rotate the gear one extra tooth.
  10. Lower the pedestal and metering distributor into position and recheck the position of the rotor hole.
- NOTE:** If the position of the hole is still not correct the gear may not have been turned sufficiently, therefore repeat instructions 8 to 10.
11. Secure the pedestal to the cylinder block, refit the ignition distributor cap and H.T. leads.
  12. Reverse instructions 1 to 4, 12.10.22.



PT 2347



PT2205



NT2 599

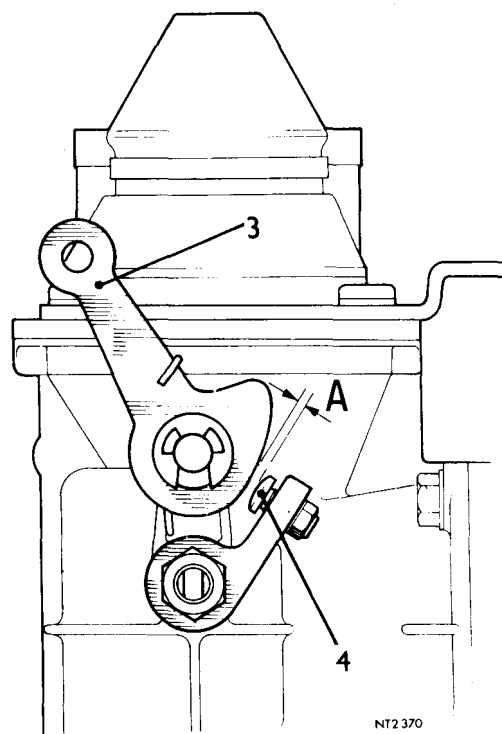
## EXCESS FUEL LEVER

### — Check and adjust

19.35.02

1. Isolate the battery.
2. Remove the metering distributor 19.35.07.
3. Hold the excess fuel lever back against its stop and with a feeler gauge check the clearance A which should be 0.006 – 0.008 in (0.15 – 0.2 mm).
4. If adjustment is required slacken the locknut and turn the screw clockwise to increase and anti-clockwise to decrease the clearance. Tighten the locknut.
5. Reverse instructions 1 and 2.

**NOTE:** Clearance adjustment of the excess fuel lever should not be necessary during normal service. Should the adjustment be suspect, establish first, whether free play exists at the cable end of the lever. Providing that there is approximately ¼ in (6 mm) free play it is unlikely that the excess fuel lever is causing any malfunction and therefore the removal of the metering distributor would be unnecessary.



NT2 370

## FUEL METERING DISTRIBUTOR

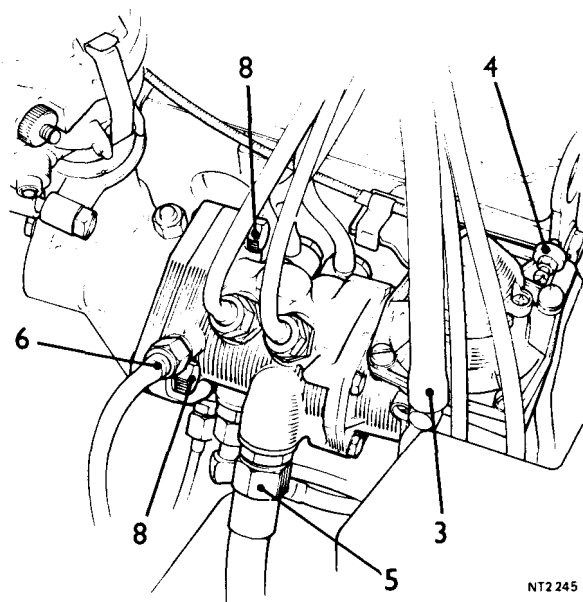
### — Remove and refit

19.35.07

#### Removing

1. Isolate the battery.
2. Disconnect the injector pipes at the injector.
3. Disconnect the vacuum pipe at the metering distributor.
4. Disconnect the cold start cable at the metering distributor.
5. Disconnect and blank off the main fuel feed pipe to the metering distributor.
6. Disconnect the metering distributor bleed off pipe.
7. Turn the engine over until numbers one and six pistons are at T.D.C. with number one cylinder firing. Do not turn the engine over again until completion of the operation.

*Continued*

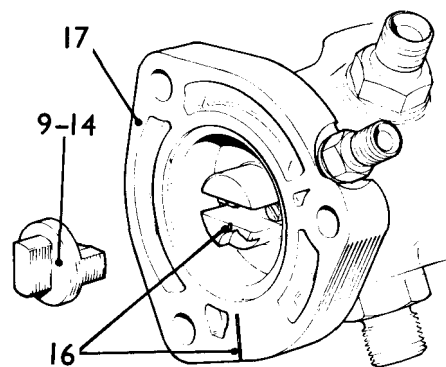


NT2 245

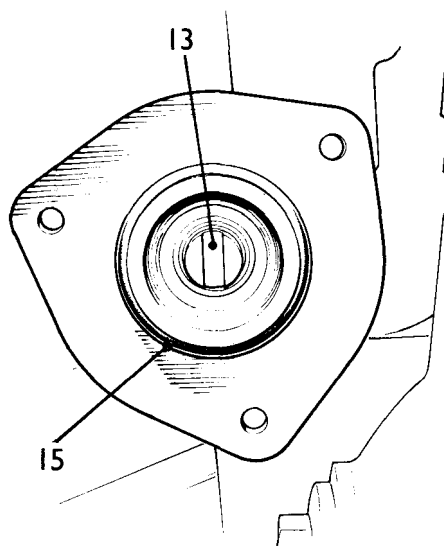
8. Remove the three bolts and washers securing the metering distributor to the pedestal flange and remove the unit from the engine.
9. Remove the plastic drive dog and the 'O' ring from the pedestal flange.
10. If necessary, remove the injector pipes.

## Refitting

11. Fit the injector pipes (if removed) to the metering distributor.
12. Check and if necessary adjust the cold start lever clearance 19.20.26.
13. Ensure that the engine has not been turned over and the drive gear pinion slot is in a vertical position with numbers one and six pistons at T.D.C. — number one firing and the ignition distributor rotor arm electrode pointing to number one cylinder electrode in the distributor cap.
14. Fit the plastic drive dog into the pinion gear drive slot using, if necessary a little grease to retain it in position. Ensure that it is fitted the correct way round i.e. the small driving member locating in the pinion drive slot.
15. Fit a new 'O' ring to the pedestal flange and ensure that the face is clean.
16. Turn the drive member of the metering distributor so that the scribed lines on the drive member and flange face coincide.
17. Clean the flange face and fit the metering distributor to the pedestal flange ensuring that the driving dog member locates properly in the drive member of the metering distributor.
18. Secure the metering distributor with the three bolts and washers and tighten evenly.
19. Reverse instructions 1 to 7.



NT2 247

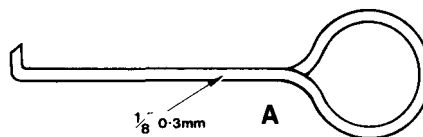


NT2 246

# FUEL METERING DISTRIBUTOR OUTLET UNION AND ADAPTOR SEALS

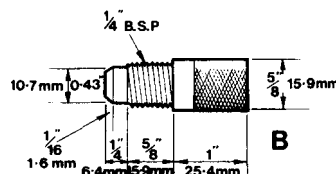
— Remove and refit

19.35.14



Special tools to make in the workshop.

- A — Hook for removing sleeve sealing rings.
- B — Sleeve alignment tool.
- C — Tool for fitting sealing rings to the sleeve.

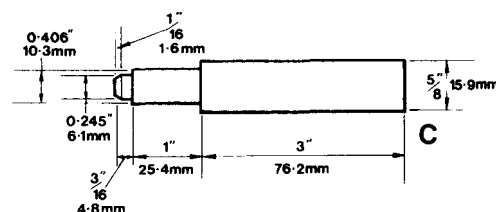


## Removing

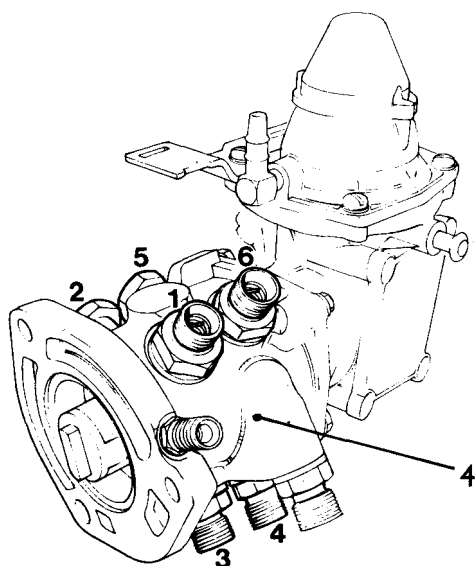
1. Isolate the battery.
2. Remove the metering distributor 19.35.07.
3. Remove the injector pipes from the metering distributor.
4. Hold the metering distributor in a vice and remove numbers one, six, three and four outlet unions complete with 'O' rings and sealing washers.

**NOTE:** The seals for numbers two and five outlets are removed when their respective injector pipes are removed.

5. Using special tool A, remove the six adaptor seals from the outlet ports.

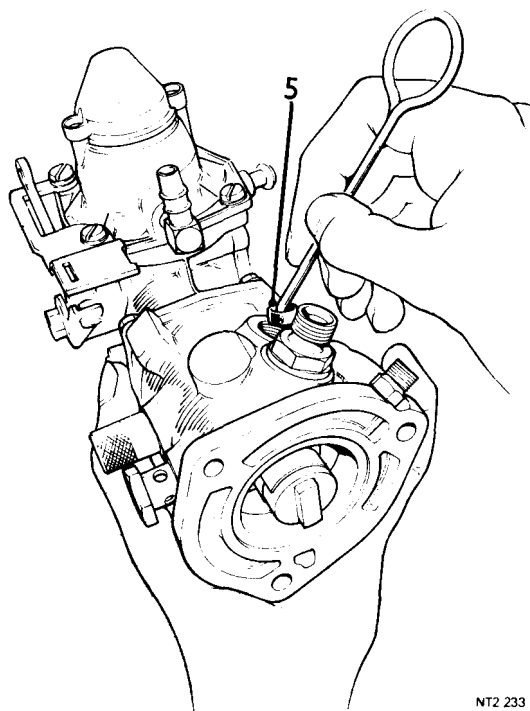


NT2 248



NT2 237

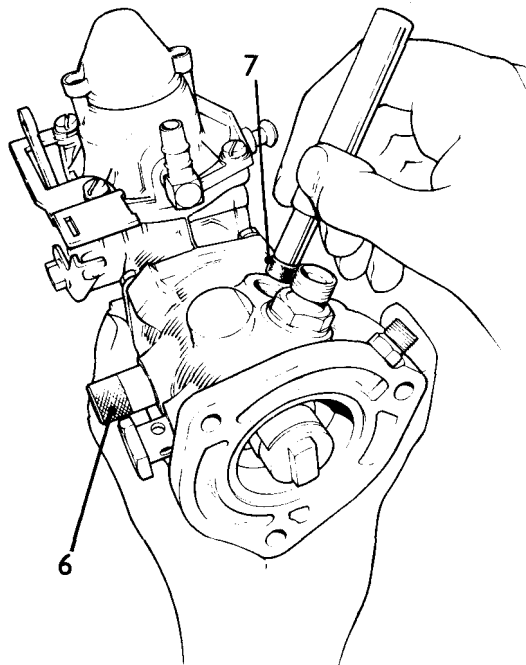
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NT2 233

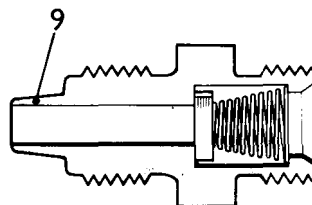
## Refitting

6. Fit the alignment tool B to one of the outlet ports in the metering unit body so that it locates in the sleeve port.
7. Fit a new adaptor seal to each outlet port using the special seal location tool C, ensuring that the seals are pushed firmly into the sleeve locations.
8. Remove the alignment tool B and fit a seal in its place.



NT2 235

9. Check the non-return valves in the outlet unions — and banjo bolts as follows. Place the tapered end of the union in Kerosene and blow through the opposite end to see if the valve is leaking. **Caution:** Do not use an air line since the valve seat may be damaged due to the high pressure. If the valve proves to be leaking, even very slightly, renew the union complete.

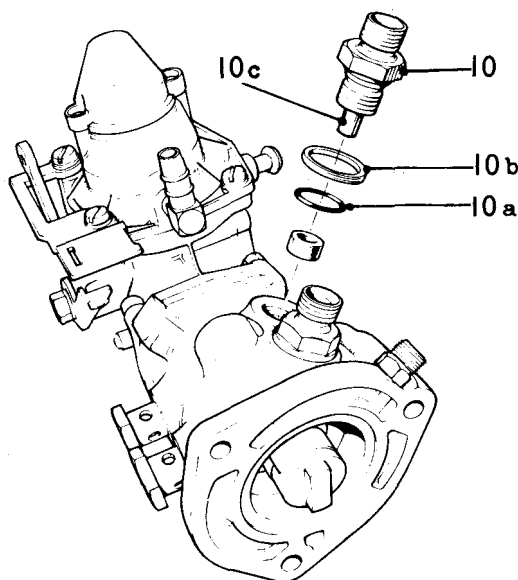


NT2 874

10. Fit the outlet unions to the metering distributor body ensuring:-

- a) New 'O' rings are fitted if originals are faulty.
- b) The 'O' rings are located properly in the grooves formed by the sealing washers.
- c) The 'O' ring groove and the unthreaded end of the union are smeared with Petroleum Jelly.

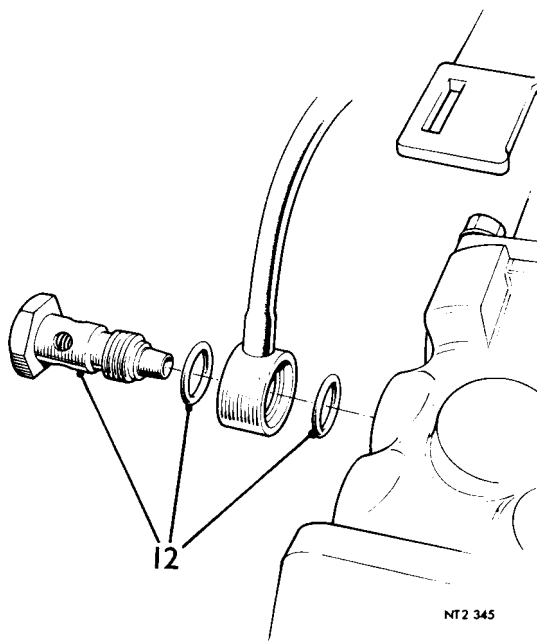
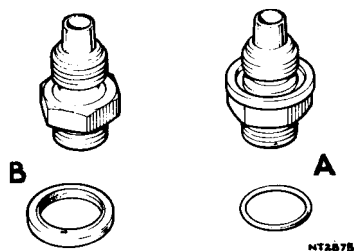
*Continued*



NT2 236

11. Refit the injector pipes to the distributor.
12. Refit the banjo connectors ensuring new seals are fitted. Tighten the banjo bolts to 150 – 200 lb ins.
13. Check the excess fuel lever clearance 19.35.02.
14. Refit the metering distributor 19.35.07.
15. Reconnect the battery, start the engine and check for fuel leaks from the system.

**NOTE:** Later distributor units A employ 'O' rings to seal the outlet unions and these may be refitted providing they are in good condition. Earlier units B however, used 'Dowty' type seals and these *must* be renewed each time a union is removed.



## FUEL METERING DISTRIBUTOR INLET UNION AND FILTER

– Remove and refit

19.35.15

### Removing

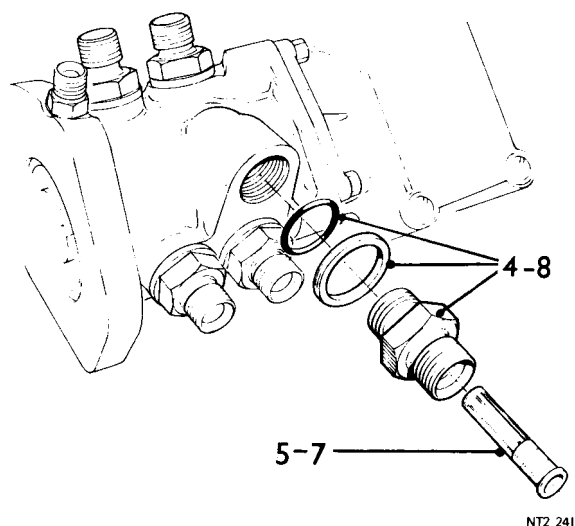
1. Isolate the battery.
2. Hold the union steady with an open ended spanner and disconnect the inlet pipe union nut.
3. Plug the inlet pipe to prevent fuel loss.
4. Remove the union complete with the 'O' ring, sealing washer and filter.
5. Remove the filter from the union.

### Refitting

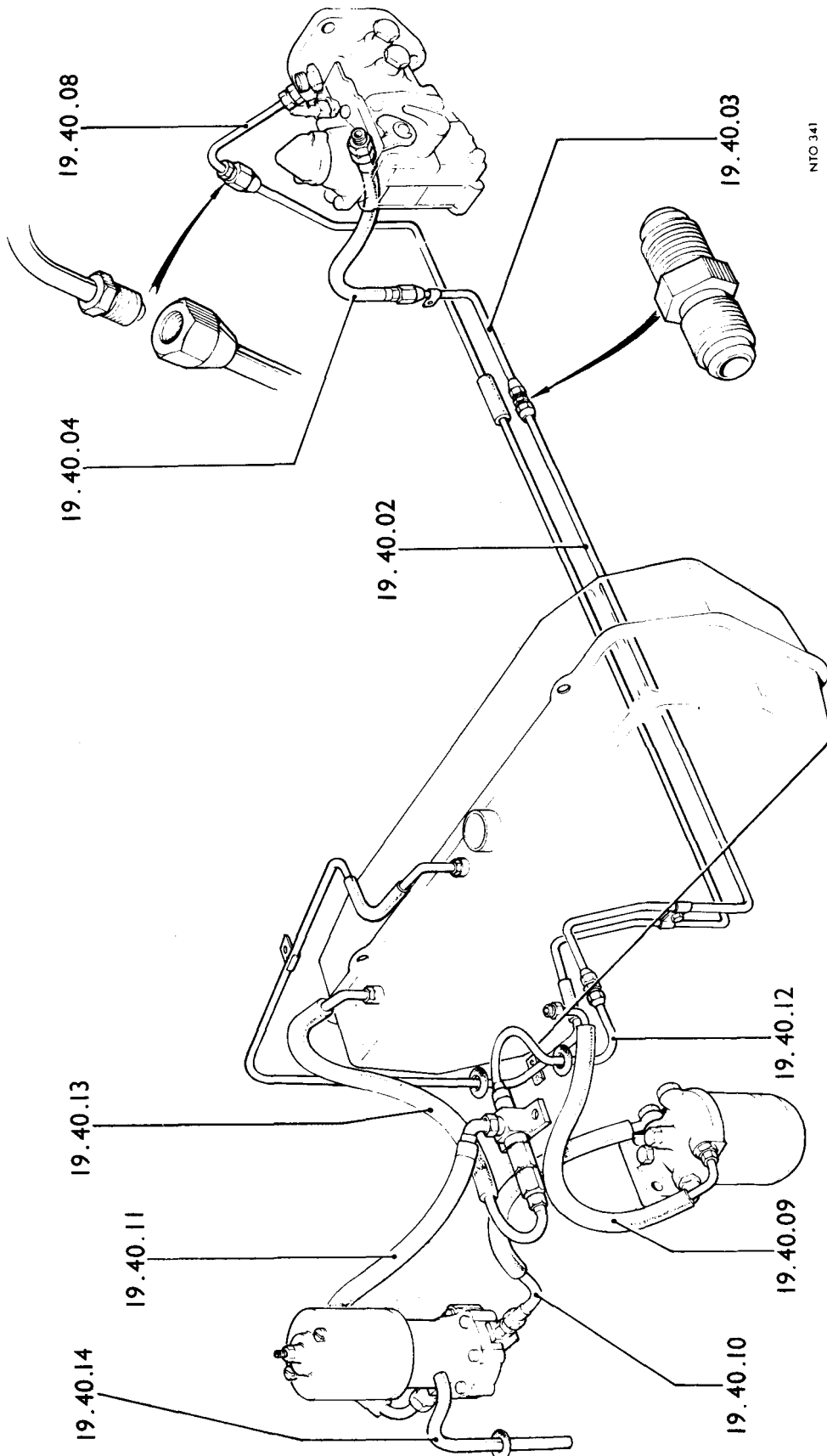
6. Wash the filter in petrol or renew if damaged.
7. Insert the filter into the union.
8. Refit the union ensuring that a new 'O' ring is fitted and that it locates properly in the groove formed by the sealing washer.

**NOTE:** To ensure that the 'O' ring is retained in the groove whilst fitting smear a little petroleum jelly into the groove.

9. Reconnect the inlet supply pipe, reconnect the battery. Start the engine and check for fuel leaks.







NTC 341

FUEL PIPES

19.40.00

**NOTE:** The pipes and hoses of the Petrol injection fuel system are illustrated with annotations giving operation numbers for removing and refitting. Detailed instructions for these operations are omitted since they are self explanatory. Access to the pipes within the luggage compartment is gained by removing the spare wheel cover, spare wheel and removing the forward trim panel 76.13.17.

PETROL PIPE MAIN LINE

19.40.02

PETROL PIPE MAIN LINE — CENTRE SECTION 19.40.03

PETROL PIPE MAIN LINE — ENGINE SECTION 19.40.04

PETROL PIPE METER TO TANK RETURN 19.40.08

PIPE — TANK TO FILTER INLET 19.40.09

PIPE — FILTER OUTLET TO PUMP 19.40.10

PIPE — PUMP OUTLET TO P.R.V. 19.40.11

PIPE — P.R.V. TO MAIN LINE 19.40.12

PIPE — P.R.V. RETURN TO TANK 19.40.13

PIPE — PUMP LEAK — DRAIN 19.40.14

HOSE — FILLER TO TANK — P.I.

— Remove and refit

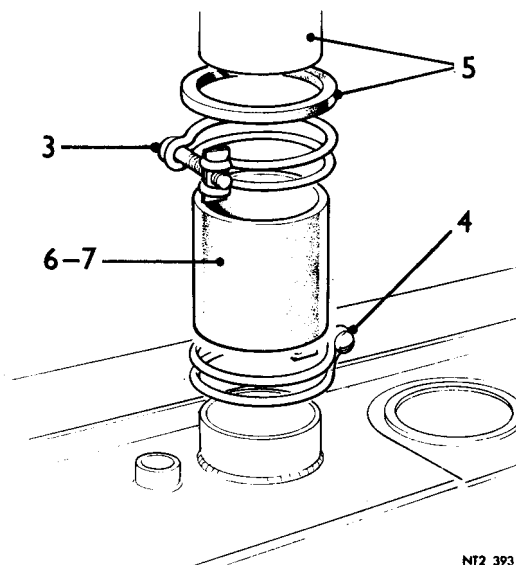
19.40.19

Removing

1. Remove the luggage compartment forward trim panel. 76.13.17
2. Remove the rear compartment trim panel 76.13.20.
3. Working from the rear compartment, slacken the top hose clip securing the filler cap assembly to the filler hose.
4. From the luggage compartment slacken the hose clip securing the hose to the fuel tank.
5. Withdraw the filler cap assembly and the rubber sealing grommet.
6. Remove the filler hose complete with clips.

Refitting

- \* 7. Fit the hose to the fuel tank (using a sealant a- necessary) and secure with a hose clip. \*\*
8. Fit the filler cap securing clip to the hose, assemble the sealing grommet to the filler cap and fit the assembly to the tank filler hose. Secure with the hose clip.
9. Reverse instructions 1 and 2.



NT2 393

FUEL SYSTEM — PI

FUEL PUMP

Data and description

19.45.00

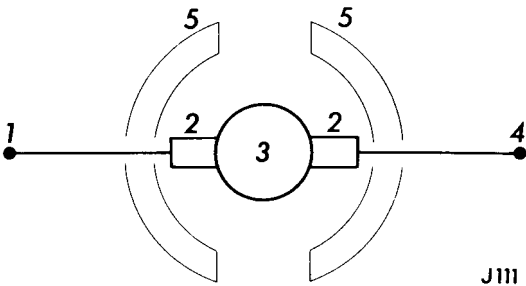
**CAUTION:** The fuel pump is controlled directly by the ignition/starter switch. The motor will therefore run continually while the ignition is on. If, during servicing, the ignition has to remain on for a long period with the engine not running isolate the unit as follows:

- Early vehicles not fitted with fuel pump inertia cut out switch only—  
Open the luggage boot lid. Remove the floor carpet. Remove the spare wheel cover panel. Remove two screws and washers and turn back the trim panel. Disconnect the white wire snap connector to isolate the unit.
- Later vehicles fitted with fuel pump inertia cut out switch only —  
Open the bonnet. Locate the switch mounted in a clip attached to the bulkhead. Pull up the button to trip the switch and isolate the fuel pump.

Data

|   |           |  |
|---|-----------|--|
| Manufacturer                            | . . . . . | Lucas  |
| Lucas part No.                          | . . . . . | 54073012   |
| Stanpart No.                            | . . . . . | 214347   |
| Running current                         | . . . . . | 4 amp approximately  |
| Light running — speed                   | . . . . . | 2200 rev/min   |
| current                                 | . . . . . | 1.4 amp  |
| volts                                   | . . . . . | 13.5 volt  |
| Armature winding resistance —           |           |  |
| adjacent commutator bars                | . . . . . | 0.16 to 0.24 ohm at 15 degrees C                               |
| Armature end float                      | . . . . . | 0.004 to 0.010 in (0.10 to 0.25 mm)                            |
| Brush length — new                      | . . . . . | 0.375 in (9.53 mm)   |
| renew if less than                      | . . . . . | 0.188 in (4.76 mm)   |
| Brush spring pressure — when compressed |           |  |
| to 0.158 in (4 mm)                      | . . . . . | 5 to 7 oz (140 to 200 g)                                       |
| Maximum delivery                        | . . . . . | 16 gal (73 litres) per hour                                    |
| Delivery pressure — controlled by       |           |  |
| pressure relief valve unit              | . . . . . | 100 to 110 lbf/in <sup>2</sup> (690 to 760 kN/m <sup>2</sup> ) |

The fuel pump consists of a permanent magnet electric motor driving a precision built twin gear pump. The drive is transmitted by a drive coupling which features a spiral formed on its upper surface to throw fuel up to lubricate the shaft seal. Failure of the shaft seal would be indicated by fuel leakage from the 'tell tail' pipe projecting from the base casting which is fitted with a drain pipe.



- 1. Supply connection
- 2. Brushes
- 3. Commutator
- 4. Earth connection
- 5. Permanent magnets

Component wiring diagram



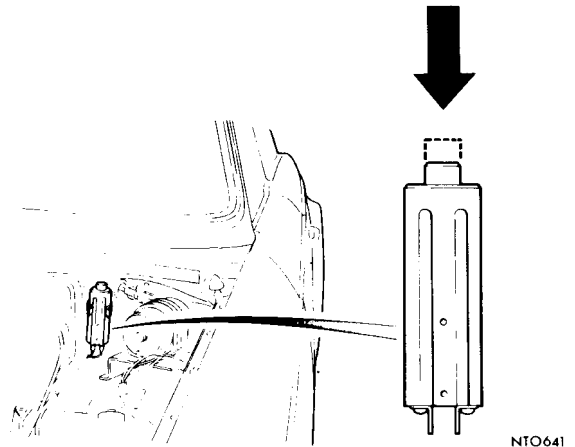
# FUEL PUMP

## – Test on vehicle

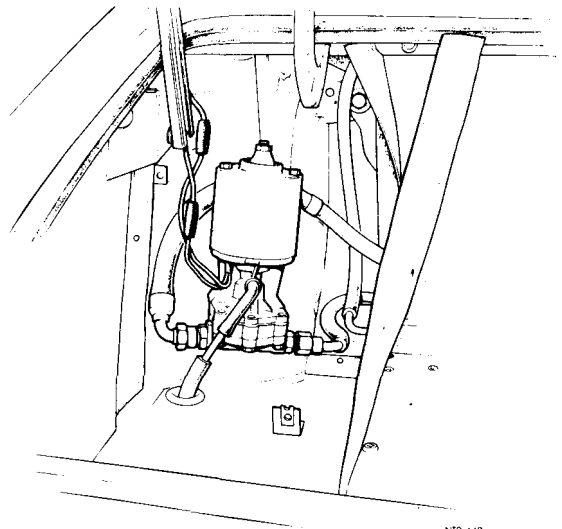
19.45.01

Service tools: S351, CBW 1B

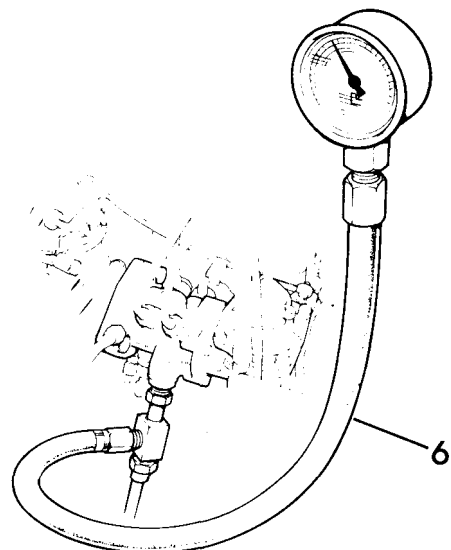
1. Later vehicles fitted with fuel pump inertia cut out switch only –  
Open the bonnet. Locate the switch mounted in a clip attached to the bulkhead. Ensure that the button is depressed so that the switch is in its normal operating condition, with the contacts closed.
2. Obtain access to the fuel pump as follows:  
Open the luggage boot lid. Remove the floor carpet. Remove the spare wheel cover panel. Remove two screws and washers and turn back the trim panel as shown.
3. Check that the fuel pump runs as follows:  
Switch on the ignition. Check that the pump is running audibly or by touch.
4. Check electrical supply and earth as follows:  
Disconnect two snap connectors. Switch on the ignition. Use a voltmeter to check that a supply of 12 volts exists between the white wire and a good electrical earth. Use a suitable test circuit to check that the black wire is providing a good electrical earth. Connect two snap connectors observing polarity to ensure that the pump motor runs in the correct direction.
5. Check the running current as follows:  
Disconnect the white wire snap connector. Restore the circuit with an ammeter included in the white supply wire. Switch on the ignition. Check that the pump is running with the ammeter reading 3.5 to 5.0 amp. If the ammeter reading is not within this range the indication is that the pump requires overhaul or replacement.
6. Check the pressure output as follows:  
Open the bonnet. Prepare for fuel spillage. Insert a PI pressure test adaptor Churchill tool No. S351 in the fuel line as shown. Connect a pressure gauge Churchill tool No. CBW 1B to the adaptor. Switch on the ignition. The pressure gauge reading should now be 100 to 110 lb/in<sup>2</sup> (690 to 760 kN/m<sup>2</sup>). If the pressure gauge reading is low the indication is that the pump requires overhaul or replacement or a fault exists in the fuel line – refer to 19.00.01. If the pressure gauge reading is high the indication is that the pump is serviceable but a fault exists in the fuel line – refer to 19.00.01.



NTO 641



NTO 640



NTO 645

## FUEL SYSTEM — PI

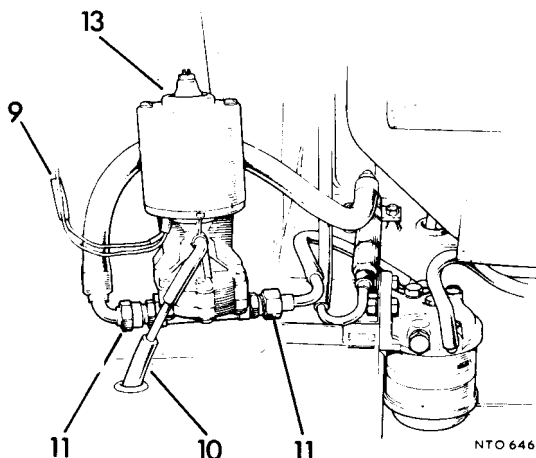
### FUEL PUMP

— Remove and refit

19.45.08

#### Removing

1. Open the luggage boot lid.
2. Remove the floor carpet.
3. Remove the spare wheel cover panel.
4. Remove two screws securing the luggage boot lamp.
5. Withdraw the lamp assembly from the petrol tank trim panel.
6. Disconnect two Lucar connectors.
7. Remove eight screws and washers and withdraw the petrol tank trim panel.
8. Isolate the battery.
9. Disconnect two snap connectors.
10. Pull the drain pipe upwards from the body aperture grommet and then pull from fuel pump pipe.
11. Prepare for fuel spillage. Disconnect the inlet pipe coupling and the outlet pipe coupling.
12. Under wheel arch, remove three nuts and spring washers. Three plain washers may remain stuck to the body underseal.
13. Withdraw the fuel pump from its mounting.
14. Unscrew three special rubber mounting studs.



#### Refitting

15. Reverse instructions 10 to 14.
16. Connect two snap connectors observing polarity to ensure that the pump motor runs in the correct direction.
17. Connect the battery.
18. Turn on ignition to energise the fuel pump. Check the disturbed fuel pipe couplings to ensure no fuel leakage.
19. Reverse instructions 1 to 7.

## FUEL PUMP

### — Overhaul

19.45.15

#### Dismantling

1. Remove the inlet connection and the outlet connection. Withdraw the strainer from the inlet connection.
2. Slacken six bolts equally and remove the gear pump assembly.
3. Remove the drive coupling.
4. Remove two through bolts.
5. Carefully withdraw the cover and armature about 0.5 in (12 mm). The brushes will drop clear of the commutator. Push each brush back to clear the circlip and thrust washer. Complete the withdrawal of the cover and armature.
6. Remove the thrust washer.
7. Pull the armature from the cover against the action of the permanent magnet.
8. If necessary remove the circlip.
9. Remove the brush assembly. Release the wires by carefully manoeuvring the rubber grommet upwards through the hole.
10. If necessary force the shaft seal from the base casting. Do not perform this operation unless a new shaft seal is available.

#### Bearings

11. The two self aligning motor bearings are not replaceable.

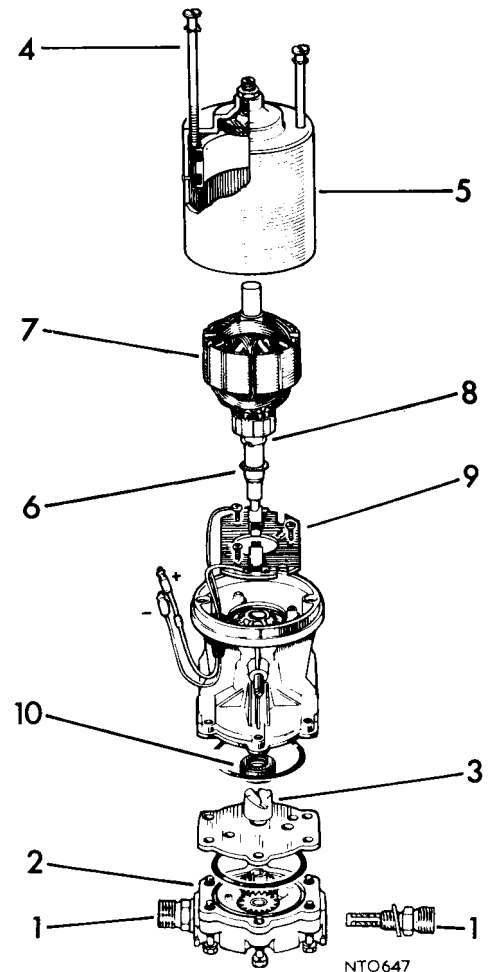
#### Brushes

12. Clean the brushes with a petrol moistened cloth. Ensure that the brushes move freely in the brushplate.
13. Check the brush length. Renew the brushplate assembly if less than 0.188 in (4.76 mm).
14. Using a suitable push type spring scale check the brush spring pressure. The pressure should be 5 to 7 oz (140 to 200 g) when compressed to 0.158 in (4 mm). If the pressure is low renew the brushplate assembly.

#### Commutator

15. Clean the commutator with a petrol moistened cloth. If the unit is in good condition it will be smooth and free from pits or burned spots. If necessary polish with fine glass paper. If excessively worn replace the armature.

*Continued*



## FUEL SYSTEM — PI

### Gear pump

16. If necessary an indication of the gear pump condition may be obtained by performing a flow test. With a motor terminal voltage of 13.5 volt approximately 1 gallon (4.5 litres) should be delivered in 3 minutes 45 seconds at 100 lbf/in<sup>2</sup> (700 kN/m<sup>2</sup>).
17. Examine the interior of the gear pump. If there are indications of wear or damage replace the gear pump assembly.
18. Do not replace the gears or the housing individually. The components are mated and replacement must be by a complete gear pump assembly only.

### Shaft seal

19. Failure of the shaft seal would be indicated by fuel leakage from the drain pipe.
20. If necessary an indication of the seal condition may be obtained by performing a bubble test. Connect a short pipe to the inlet connection and a short pipe to the outlet connection. Position the petrol pump above an open tank of paraffin. Immerse the free end of each pipe in the paraffin. Run the petrol pump. A continuous flow of bubbles from the outlet pipe indicates a defective seal.
21. If seal failure is suspected petrol may have contaminated the motor. The unit should therefore be dismantled as detailed above and all components inspected before a new shaft seal is fitted.

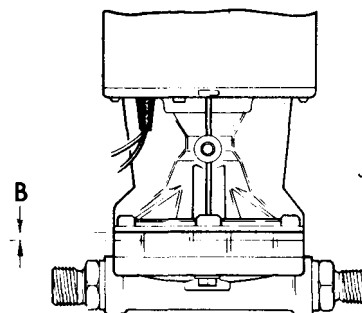
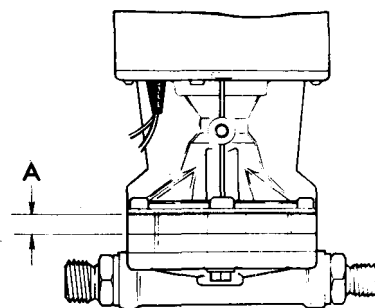
### Spares

22. The motor and gear pump may be considered as two units. On the majority of vehicles replacement of either may be undertaken.
23. A few early vehicles were fitted with a gear pump with a narrow top plate as shown. On these units the top plates were matched to the motor base castings during production to prevent the possibility of top plate distortion causing gear binding. A 'narrow top plate' gear pump should not be fitted with a replacement motor. If a new motor is required it should be obtained by replacement of the complete fuel pump.

### Strainer

24. Remove the inlet connection. Withdraw the strainer from the connection. Inspect and wash in clean petrol.

*Continued*

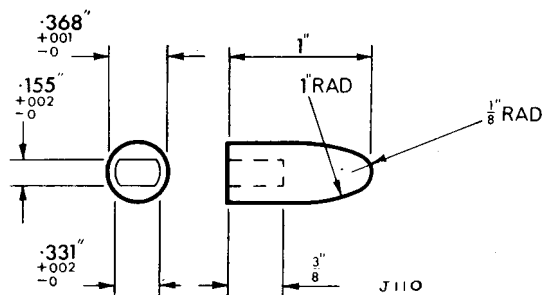
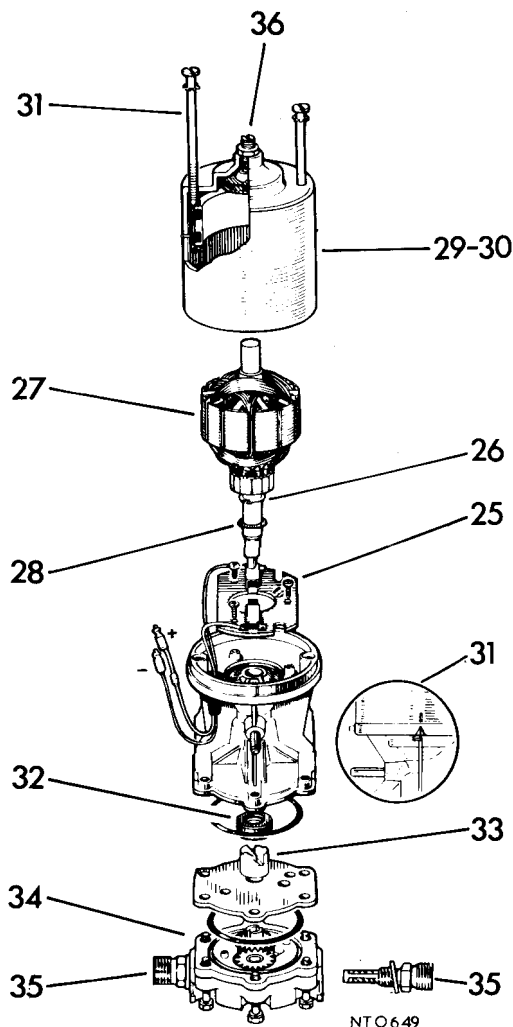


J109

- A Normal top plate  
B Narrow top plate

## Assemble

25. Fit the brush assembly.
26. If necessary fit the circlip.
27. Position the armature to the cover against the action of the permanent magnet.
28. Fit the thrust washer.
29. If the shaft seal is fitted only —  
Provide a protective bullet as shown. Position the protective bullet over the shaft key. Lightly grease the bullet. Carefully insert the armature shaft through the base casting. Align the bullet to the shaft seal. Push each brush back to clear the thrust washer, circlip and commutator.
30. If the shaft seal is not fitted only —  
Carefully insert the armature shaft through the base casting. Push each brush back to clear the thrust washer, circlip and commutator.
31. Seat the cover against the base casting flange. Turn the cover to align the marks shown. Fit the through bolts.
32. If the shaft seal is not fitted only —  
Provide a protective bullet as shown. Position the protective bullet over the shaft key. Lightly grease the bullet. Carefully insert the shaft seal into the base casting.
33. Position the drive coupling to the motor.
34. Renew all disturbed rubber 'O' rings. Note that effective seals cannot be assured if new rubber 'O' rings are not fitted to the disturbed joints. Fit the gear pump assembly. Tighten six bolts equally.
35. Insert the strainer through the inlet connection. Fit the inlet connection and the outlet connection.
36. Adjust the armature end float as follows:  
Hold the fuel pump vertical with the adjuster uppermost. Slacken the locknut. Screw the adjuster in until resistance is felt. Screw the adjuster out a quarter of a turn — maintain in this position and tighten the locknut.





## FUEL SYSTEM — P.I.

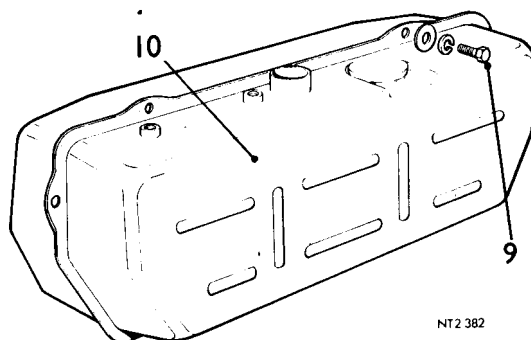
### FUEL TANK — P.I.

#### — Remove and refit

19.55.01

##### Removing

1. Isolate the battery.
2. Remove the luggage compartment forward trim panel 76.13.17.
3. Drain the fuel tank 19.55.02.
4. Disconnect the pipe-tank to filter inlet 19.40.09.
5. Disconnect the pipe-PRV return to the fuel tank 19.40.13.
6. Disconnect the metering distributor lubrication fuel return to the tank, pipe 19.40.08.
7. Remove the fuel filler to tank hose 19.40.19.
8. Disconnect the tank gauge unit leads.
9. Remove the six bolts complete with plain and spring washers securing the fuel tank to the body.
10. Remove the fuel tank.



##### Refitting

11. Reverse instructions 3 to 10 inclusive.
12. Reconnect the battery, start the engine and examine for fuel leaks.
13. Refit the luggage compartment forward trim panel 76.13.17.

### FUEL TANK — P.I.

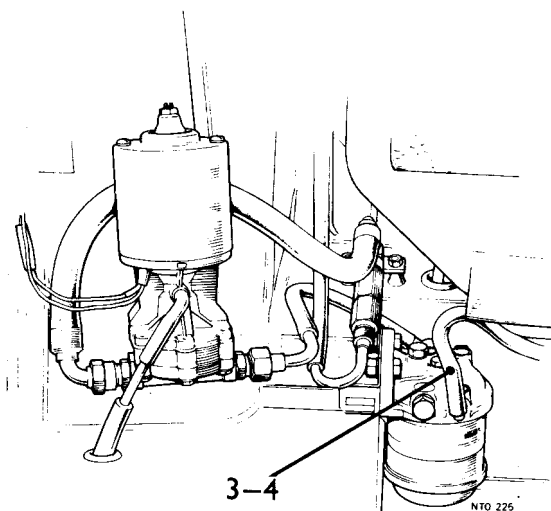
#### — Drain

19.55.02

**WARNING:** Extinguish all naked lights before commencing this operation.

1. Remove the spare wheel cover and spare wheel.
2. Place a suitable clean receptacle under the fuel tank gravity outlet point.
3. Disconnect the hose from the filter inlet and allow the fuel to drain.
4. Reconnect the hose to the filter inlet when the tank is empty.
5. Refit the spare wheel and cover.

**CAUTION:** If the fuel is to be returned to the tank ensure absolute cleanliness whilst draining and during storage, otherwise foreign matter and fluids may cause serious damage to the P.I. fuel system.



## FUEL FILLER CAP — P.I.

### — Remove and refit

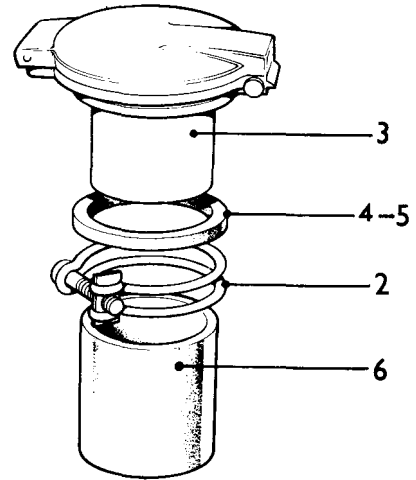
19.55.08

#### Removing

1. Remove the rear compartment trim panel 76.13.20.
2. Working from the rear compartment slacken the hose clip securing the filler hose to the filler cap extension.
3. Withdraw the filler cap complete assembly.
4. Remove the rubber sealing grommet.

#### Refitting

5. Assemble the rubber sealing grommet to the filler cap extension.
6. Fit the assembly to the body ensuring that the filler cap extension locates properly in the filler hose.
7. Secure the hose to the filler cap with the hose clip.
8. Refit the rear compartment trim panel 76.13.20.



NT2 706

## INJECTORS — SET

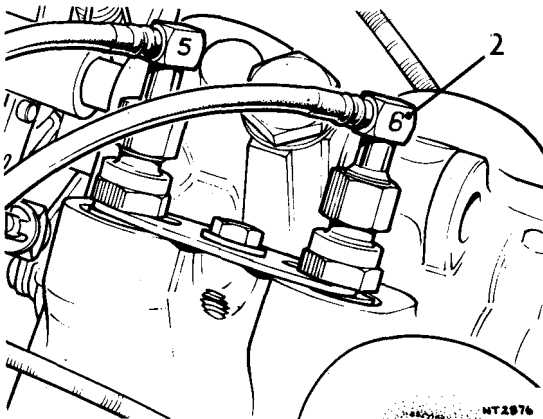
### — Remove and refit

19.60.01

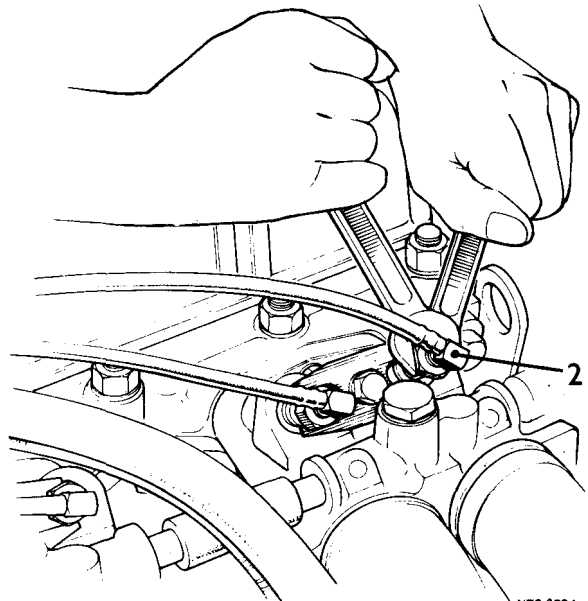
#### Removing

1. Isolate the battery.
2. Disconnect the fuel pipe at the injector and check identification of the pipe for reassembly.

**Note:** The pipes are numbered 1 to 6 starting at the front of the engine.



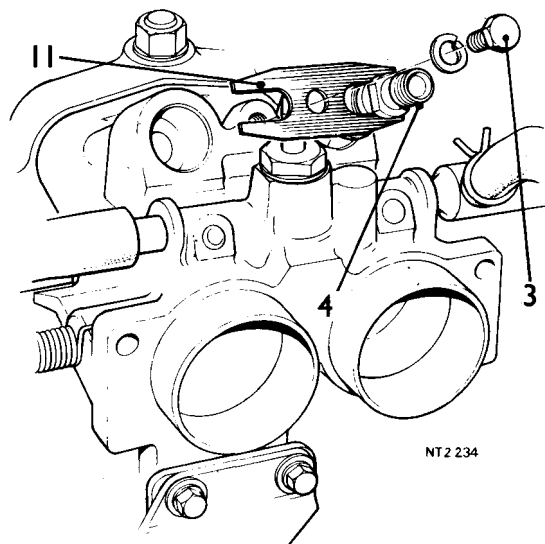
NT2 976



NT2 233A

*Continued*

3. Remove the bolt securing the injector clamp plate to the injector manifold and remove the plate.



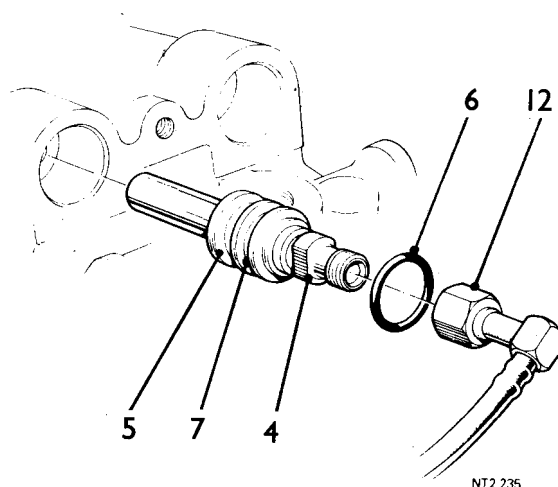
4. Grip the injector firmly and pull the injector from the manifold.

**NOTE:** Whilst the injector should come out of the manifold complete with the insulating block, it may in some instances leave the insulating block behind in the manifold.

5. If necessary – see above note – remove the insulating block from the manifold using a suitable tool taking care not to damage the manifold.
6. Remove the 'O' ring from the insulating block.

## Refitting

7. Fit a new 'O' ring to the insulating block, ensuring that it is located in the top groove of the block i.e. the chamfered end of the block.
8. Insert the injector into the insulating block ensuring that the chamfered end of the block is uppermost and firmly up against the shoulder of the injector.
9. Lubricate the 'O' ring with engine oil – to prevent the ring from being torn – and push the assembly into the manifold location.
10. Repeat instructions 3 to 9 on the adjacent injector.
11. Refit the clamp plate ensuring that the fork ends locate correctly in the groove below the milled flats of the injector.
12. Reconnect the fuel feed pipes.
13. Repeat the foregoing instructions on the remaining injectors.
14. Reconnect the battery.



## FUEL INJECTORS

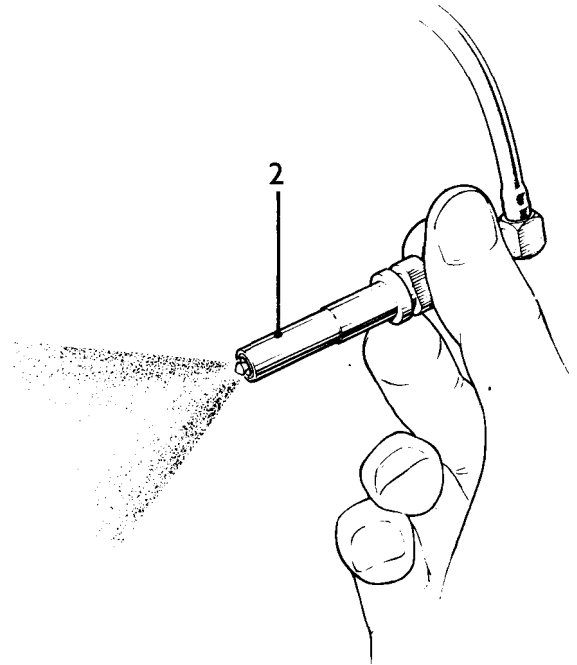
### — Spray check

19.60.02

#### Testing without a rig

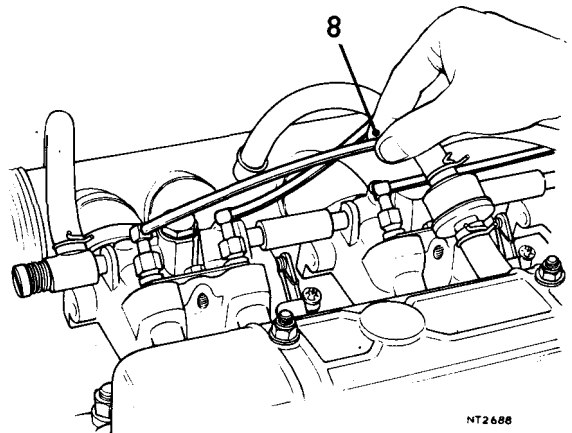
1. Remove the bolt securing the injector clamp plate to the manifold and remove the plate.
2. Start the engine and pull number one injector out of the manifold and observe the emission of fuel. The check should show a 60° hollow cone spray in regular pulsations. If there is any sign of dribbling or irregular cone formation the injector should be disconnected from its injection pipe — instruction 3, 19.60.01 and cleaned by passing dry filtered air through the injector in the direction of the fuel flow at a pressure of approximately 80 lb/in<sup>2</sup> (5.624 kg/cm<sup>2</sup>).
3. Reconnect the injector to its injection pipe — test again and if satisfactory refit to the manifold. If unsatisfactory, renew the injector.
4. Repeat instructions 2 and 3 on number two injector.
5. Refit the clamp plate and secure with the bolt.
6. Repeat instructions 1 to 5 on the remaining injectors and stop the engine.

**CAUTION:** When checking fuel emission, direct spray into a glass jar to prevent atomized fuel being sprayed over the engine.



**NOTE:** A possible faulty injector may be identified without the necessity of removing each injector in turn as described in instruction 1 to 6 by following instructions 7 to 9.

7. Remove the cleats holding injection pipes together, and separate them to prevent the transmission of pulsations from one pipe to another.
8. Start the engine and hold each injector pipe in turn between the thumb and forefinger. A regular pulsation should be felt but a weak or missing pulsation suggests a possible faulty injector. No pulsation on two consecutive pipes, in the firing order, indicates that the first injector of the two is blocked.
9. Stop the engine and remove the suspect injector and clean as described in instruction 2. Refit or renew the injector and refit the cleats.



*Continued*

**Testing** — with a test rig on which the line pressure can be varied from 0 to 100 lbf/in<sup>2</sup> (0 to 689.50 Kn/m<sup>2</sup>)

10. Remove each injector in turn 19.60.01.
11. Use Fawley white spirit '100' plus 50 parts per million Santolene 'C' or Shell calibrating fluid 'C' for testing purposes.
12. Flow test the injector at 50 to 60 g.p.h. (227.298 to 272.758 litres per hour) at 100 lb/in<sup>2</sup> (689.50 Kn/m<sup>2</sup>) pressure. During this test the cone or needle must freely vibrate off its seat and the injector must produce an evenly distributed cone of fuel at an angle of 55° to 60°.
13. Flow the injector with an applied pressure of 100 lbf/in<sup>2</sup> (689.50 Kn/m<sup>2</sup>) and gradually reduce the pressure to zero. Use compressed air to remove fuel from the nozzle tip. Increase applied pressure to 40 lbf/in<sup>2</sup> (275.80 Kn/m<sup>2</sup>) and check the time taken for a droplet of fuel to appear at the injector tip. This should not be less than 60 seconds.
14. Flow the injector with an applied pressure of 100 lbf/in<sup>2</sup> (689.50 Kn/m<sup>2</sup>) and gradually reduce the pressure to zero and remove fuel from the nozzle tip with compressed air. Increase the applied pressure gradually and observe the pressure at which the injector sprays an evenly distributed cone of fuel. This should be between 45 and 55 lbf/in<sup>2</sup> (310.26 to 379.21 Kn/m<sup>2</sup>).
15. Renew any injectors that fail the above test.

### INJECTOR PIPE NUMBER ONE

— Remove and refit

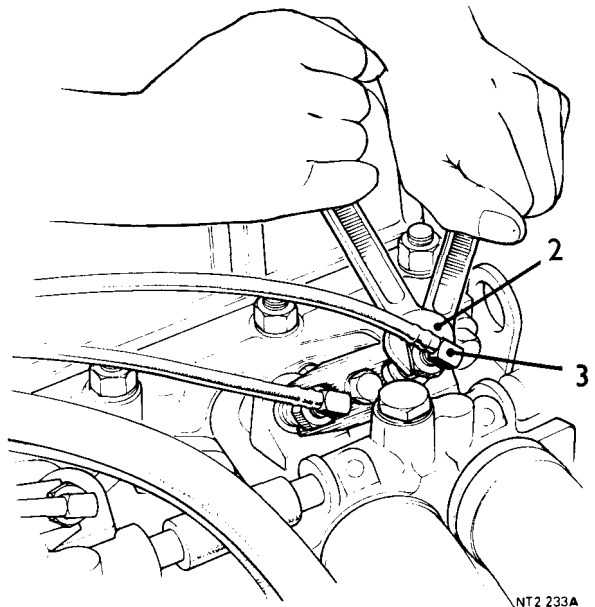
19.60.15

#### Removing

1. Isolate the battery.
2. Using a suitable open ended spanner across the milled flats, hold the injector steady and disconnect the pipe from the injector at the elbow union nut.
3. Check that the pipe is marked for re-assembly, if more than one pipe is to be removed.
4. Disconnect the pipe from the metering unit.

#### Refitting

5. Reverse instructions 1 to 4 ensuring:-
  - a) A kinked pipe is renewed 19.60.24.
  - b) Absolute cleanliness is observed.



## INJECTOR PIPE NUMBER TWO

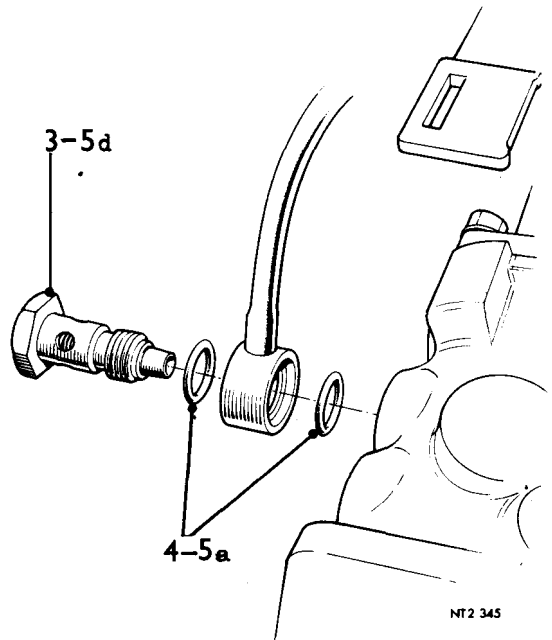
— Remove and refit 19.60.16

### Removing

1. Isolate the battery.
2. Remove the fuel metering distributor 19.35.07.
3. Remove the banjo bolt.
4. Remove the two 'O' rings from the banjo connector.

### Refitting

5. Reverse instructions 1 to 4 ensuring:-
  - a) New 'O' rings are fitted if originals are faulty.
  - b) Absolute cleanliness is observed.
  - c) A kinked pipe is renewed 19.60.24
  - d) The banjo bolts are tightened to 150 to 200 lb ins.



## INJECTOR PIPE NUMBER THREE

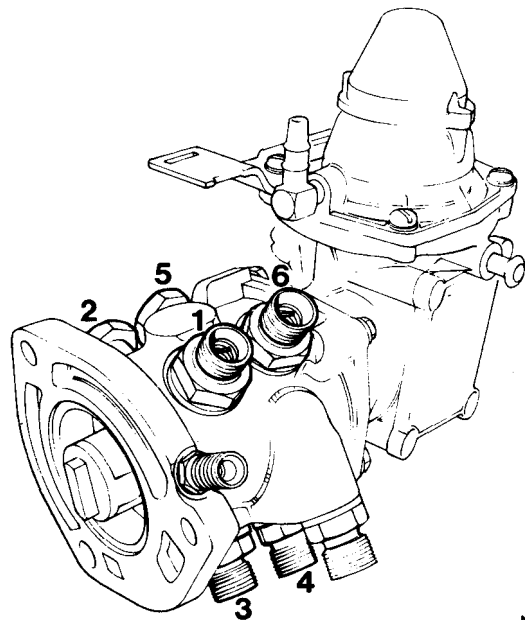
— Remove and refit 19.60.17

Same as 19.60.15.

## INJECTOR PIPE NUMBER FOUR

— Remove and refit 19.60.18

Same as 19.60.15 except that for access to the union on the metering distributor number three pipe union on the distributor must be disconnected.



## INJECTOR PIPE NUMBER FIVE

— Remove and refit 19.60.19

Same as 19.60.16

## INJECTOR PIPE NUMBER SIX

— Remove and refit 19.60.20

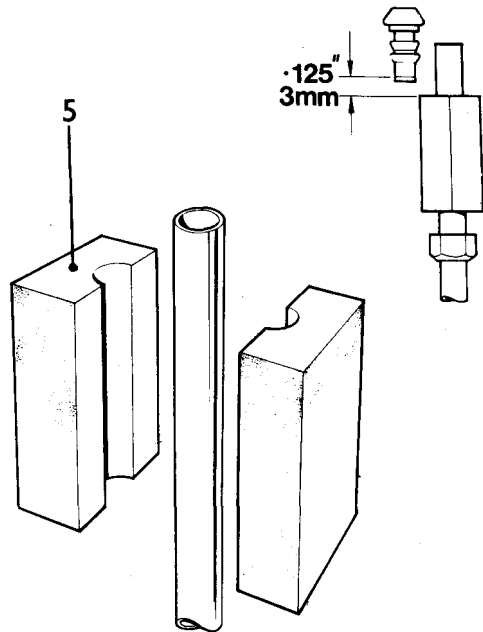
Same as 19.60.15

## INJECTOR PIPES

### — Overhaul

19.60.24

1. Isolate the battery.
2. Remove the metering distributor 19.35.07.
3. Remove the injector pipes from the metering distributor.
4. Cut the old pipes from the union connections.
5. Manufacture a clamp from a Tufnol block 2 in x 1 in x 1 in (50.8 mm x 25.4 mm x 25.4 mm). Drill a hole 0.250 in dia (6.35 mm) through the centre of the block and cut the block in half along the centre line of the hole.
6. Cut the new piping to the required length and clamp it in the block in a vice. Allow approximately 1/8 in (3 mm) protrusion of pipe above the clamp in addition to the length of pipe required to fit to the union connection. If a straight union connection is being fitted to the pipe, place the union nut over the pipe before it is clamped.
7. Locate the union connection into the pipe and gently tap it into position with a soft hammer.
8. Reverse instructions 1 to 3.



NT2 242

## PRESSURE RELIEF VALVE

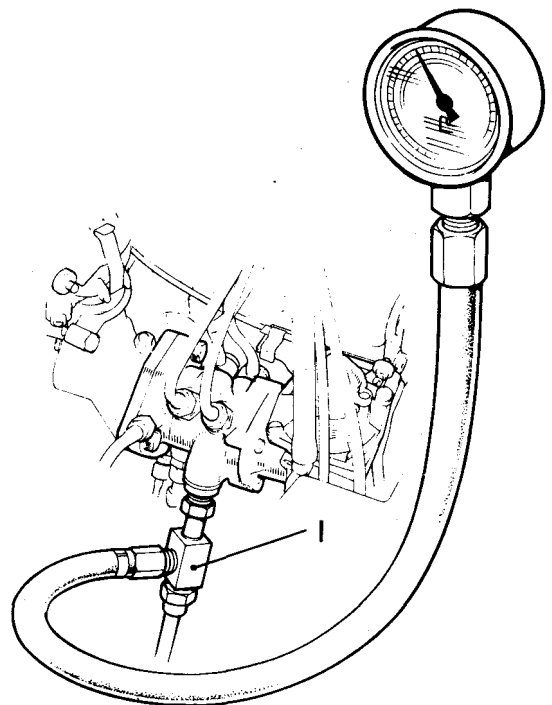
### — Pressure test and adjust

19.65.01

Special equipment — 0 to 120 p.s.i. (0 to 850 g/cm<sup>2</sup>) pressure gauges and hose from the CBW 1A kit, connected to a S351 adaptor.

### Test

1. Connect the pressure gauge and adaptor into the fuel line.
2. Switch on the ignition but do not start the engine. Check and note the gauge pressure which should be 106 to 110 p.s.i. (7453 to 7734 g/m<sup>2</sup>).
3. Switch off the ignition.

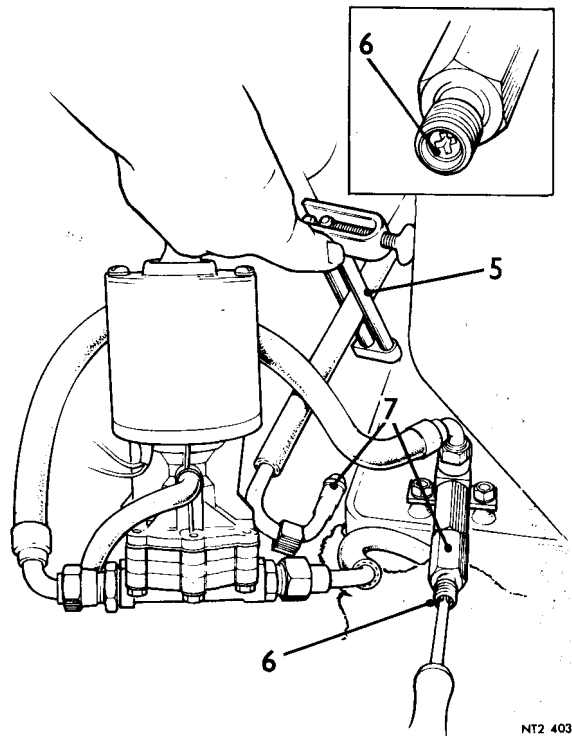


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NT0 645

### Adjust

4. Remove the luggage compartment forward trim panel and spare wheel.
5. Clamp the return hose from the pressure relief valve to the fuel tank and disconnect the hose from the pressure relief valve.
6. With a cross recessed screw driver adjust the relief valve by turning the nylon tensioner clockwise to increase the pressure and anti-clockwise to reduce the pressure.
7. Reconnect the hose to the pressure relief valve and release the clamp. Switch on the ignition and observe the pressure.
8. Repeat instructions 5 and 6 until a constant pressure within the limits in instruction 2 is achieved.
9. If a satisfactory pressure cannot be obtained and the pump is known to be working correctly, overhaul the valve 19.65.13 or renew it 19.65.07.
10. Disconnect the pressure gauge and reconnect the fuel line to the metering unit.
11. Refit the luggage compartment trim panel and spare wheel.



NT2 403

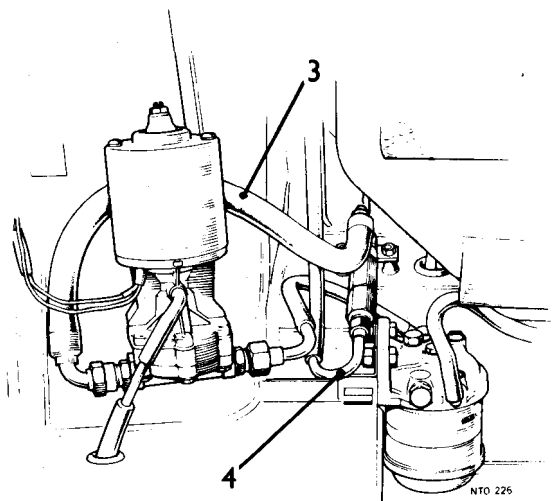
### PRESSURE RELIEF VALVE

— Remove and refit

19.65.07

### Removing

1. Isolate the battery.
2. Remove the luggage compartment forward trim panel 76.13.17.
3. Disconnect the hose from the pump to the pressure relief valve.
4. Disconnect the pressure relief valve to fuel tank hose.
5. Disconnect from the rear of the 'T' piece the main fuel feed from the pressure relief valve to the fuel metering distributor.

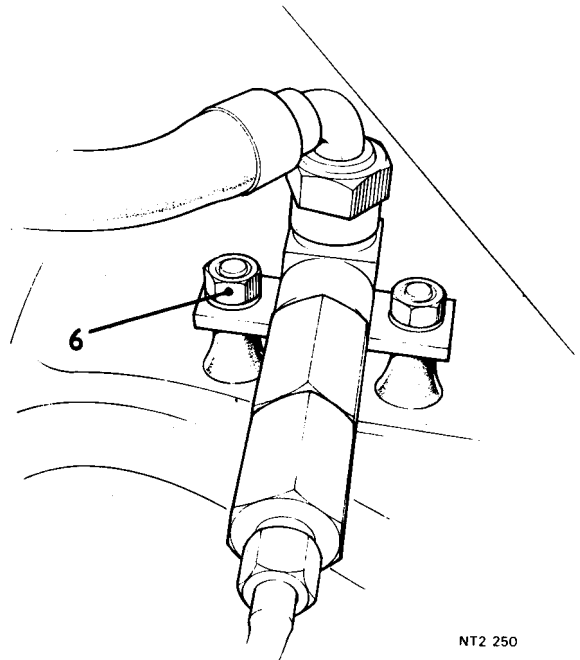


NT0 226

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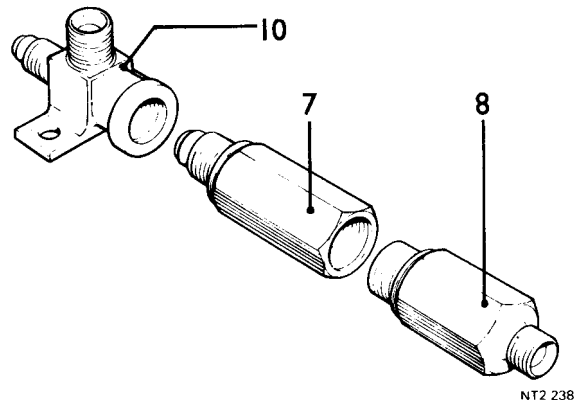
6. Remove two nuts complete with spring washers securing the 'T' piece and pressure relief valve assembly to the body and remove the assembly from the car.



7. Disconnect the strainer housing complete with the pressure relief from the 'T' piece.
8. Remove the pressure relief valve from the strainer housing.

### Refitting

9. Assemble the pressure relief valve to the strainer housing using a new washer and tightening to 30 – 40 lbf ft (4.1 to 5.5 kgf m).
10. Reconnect the strainer housing and pressure relief valve to the 'T' piece using a new washer and tighten to 30 to 40 lbf ft (4.1 to 5.5 kgf m).
11. Reverse instructions 1 to 6.



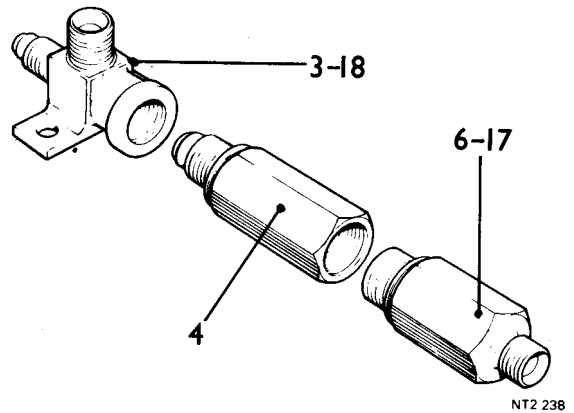
# PRESSURE RELIEF VALVE

## — Overhaul

19.65.13

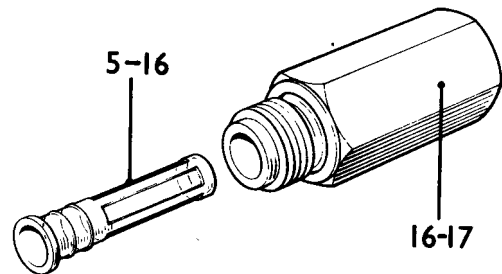
### Dismantling

1. Isolate the battery.
2. Remove the pressure relief valve assembly from the car 19.65.07.
3. Disconnect the 'T' piece from the strainer housing.
4. Remove the strainer housing from the pressure relief valve.
5. From the inside of the strainer housing carefully press out the strainer.
6. From the pressure relief valve body remove:-
  - a. The circlip
  - b. The distance sleeve
  - c. The valve and plunger
  - d. The spring
  - e. Plain washer
7. Using a cross recessed screw driver remove from the back of the valve body the nylon spring tensioner.



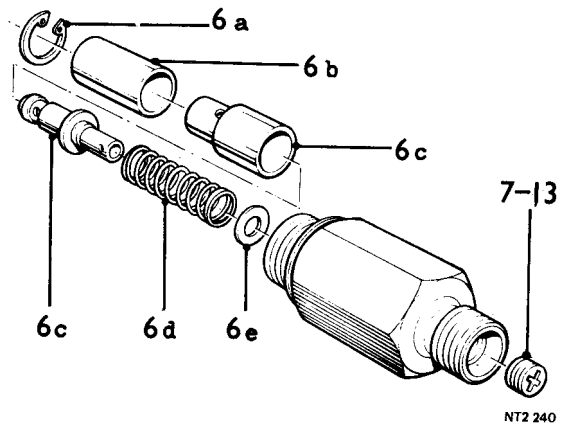
### Examination

8. Examine carefully each part of the valve and body and check for wear, pitting and corrosion.
9. Ensure that the plunger moves freely in its housing and the housing is free to move in the valve body.
10. Examine the spring and check for cracks.
11. Examine the strainer and housing and renew the strainer if damaged.



### Reassembling

12. Wash all the parts in petrol and dry with an air line. DO NOT USE CLOTH.
13. Screw the nylon spring tensioner into the back of the valve body.
14. Insert the valve plunger in its housing.
15. Assemble the remaining components in the reverse order in instruction 6.
16. Insert the strainer into the strainer housing.
17. Assemble the valve body to the strainer housing using a new washer and tighten to 30 to 40 lbf ft (4.1 to 5.5 kgf m).
18. Fit the 'T' piece using a new washer and tighten as in instruction 17.
19. Reverse instructions 1 and 2.
20. Pressure test and adjust the pressure relief valve — 19.65.01



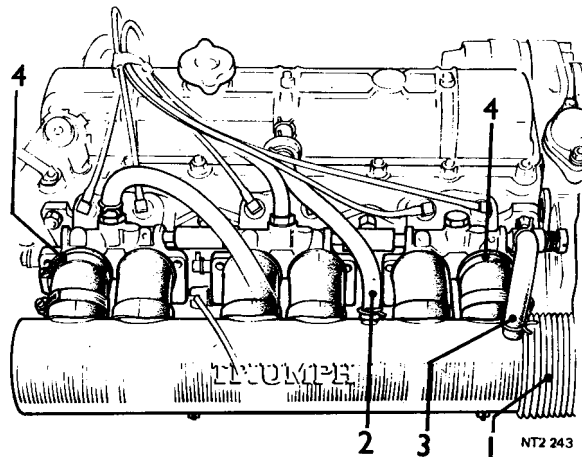
### AIR INTAKE MANIFOLD

— Remove and refit

19.70.01

#### Removing

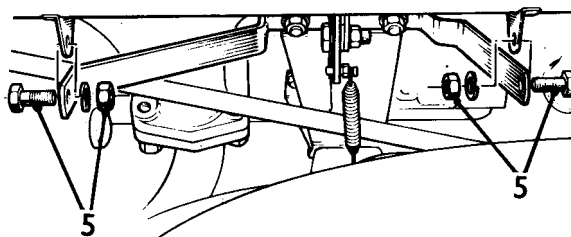
1. Remove the hose connecting the air intake manifold to the air cleaner.
2. Disconnect the engine breather hose.
3. Disconnect the air valve hose.
4. Slacken the hose clips on numbers one and six intakes.



5. Remove two nuts and bolts securing the air intake manifold to the engine brackets.
6. Remove the air intake from the induction manifold.

#### Refitting

7. Reverse instructions 1 to 6.



**FUEL SYSTEM OPERATIONS (TWIN CARBURETTER)**

|   |                |
|---|----------------|
| Air cleaner — remove and refit . . . . .                              | 19.10.01C      |
| — renew element . . . . .   | 19.10.08C      |
| Carburetters — car set — remove and refit . . . . .                   | 19.15.11C      |
| — tune and adjust . . . . .   | 19.15.02C      |
| — complete with inlet manifold — remove and refit . . . . .           | 19.15.15C      |
| Carburetter — each — overhaul and adjust . . . . .                    | 19.15.17C      |
| Diaphragm — remove and refit . . . . .                                | 19.15.35C      |
| Fault diagnosis . . . . .   | 19.00.01C      |
| Float chamber levels — check and adjust . . . . .                     | 19.15.32C      |
| needle valve — remove and refit . . . . .                             | 19.15.24C      |
| Fuel filler cap — remove and refit . . . . .                          | 19.55.08C      |
| main filter — remove and refit . . . . .                              | 19.20.08C      |
| pump — overhaul . . . . .   | * 19.45.15C ** |
| — remove and refit . . . . .  | 19.45.08C      |
| — test on vehicle . . . . .   | 19.45.01C      |
| filter — clean . . . . .  | 19.45.05C      |
| tank — drain . . . . .  | 19.55.02C      |
| — remove and refit . . . . .  | 19.55.01C      |
| Hose — filler to tank — remove and refit . . . . .                    | 19.40.19C      |
| Mixture control cable — inner — remove and refit . . . . .            | 19.20.14C      |
| — complete — remove and refit . . . . .                               | 19.20.13C      |
| Petrol pipe — main line — centre section — remove and refit . . . . . | 19.40.03C      |
| — engine end section — remove and refit . . . . .                     | 19.40.04C      |
| — rear section — remove and refit . . . . .                           | 19.40.02C      |
| Throttle Linkage — remove and refit . . . . .                         | 19.20.07C      |
| Pedal and Counter shaft — remove and refit . . . . .                  | 19.20.01C      |

## EMISSION CARBURETTER — FAULT DIAGNOSIS

**NOTE:** Before undertaking extensive carburetter servicing it is recommended that other engine factors and components such as cylinder compressions, valve clearance, distributor, sparking plugs, air intake temperature control system, etc., are checked for correctness of operation.

| SYMPTOM              | CAUSE  | ACTION   |
|----------------------|--|--|
| 1. Poor idle quality | a. Air leakage on induction manifold joints.   | Remake joints as necessary. Check idle carbon monoxide level with CO meter.  |
|                      | b. Throttles not synchronized.   | Re-balance carburetters and re-set linkage.  |
|                      | c. Air valve or valves sticking in piston guide-rods.  | Clean air valve rods and guides and reassemble. Check piston free movement by hand: unit should move freely and return to carburetter bridge with an audible click.                            |
|                      | d. Partially or fully obstructed float-chamber or diaphragm ventilation holes.                     | Check that gasket(s) are not causing obstruction or piping obstructed.   |
|                      | e. Incorrect fuel level caused by maladjusted float assemblies or worn or dirty needle valve.      | Reset float heights and clean or replace needle valves worn.   |
|                      | f. Metering needle incorrectly fitted or wrong type of needle fitted.                              | Ensure shoulder of needle is flush with face of air valve and that needle bias is correct.   |
|                      | g. Diaphragm incorrectly located or damaged.   | Check location with air valve cover removed, piston depression holes should be in line with and face towards the throttle spindle. Renew diaphragm with correct type if damage is in evidence. |
|                      | h. Leakage from ignition retard unit pipe connections.   | Re-make connections and re-check ignition settings.  |
|                      | i. Temperature compensator faulty.   | With engine and carburetter cold, check that compensator cone is seated, and free to move off seat, If any doubt exists, replace unit with new assembly.                                       |
|                      | j. After considerable service leakage may occur at throttle spindle or secondary throttle spindles | Replace spindle seals or spindles as required.   |

*continued*

| SYMPTOM   | CAUSE   | ACTION   |
|---|---|--|
| 2. Hesitation or 'flat spot'<br><i>a, b, c, d, e, f, g and h</i><br>plus: | Piston damper inoperative   | Check damper oil level and top up with specified oil. re-check damper operation by raising piston by hand whereupon resistance should be felt. |
|   | Air valve spring missing or wrong part fitted                                     | Check correct grade of spring and refit as required.   |
|   | Ignition timing incorrect   | Check and reset as required.   |
|   | Throttle linkage operation incorrect  | Check operation of linkage between carburettors and operation of secondary throttle links. reset or replace parts as required.                 |
| 3. Heavy fuel consumption<br>1 and 2 plus:                                | Leakage from the fuel connections, float-chamber joints or sealing plug 'O' rings | Replace gaskets and 'O' rings as required.   |
| 4. Lack of engine braking   | Faulty by-pass valve  | Replace by-pass valve with new unit.   |
|   | Sticking throttles  | Check throttle operation and reset as required.  |
|   | Ignition retard unit inoperative  | Check ignition setting at idle and ensure correct functioning of retard system.  |
| 5. Lack of engine power   | Damaged diaphragm   | Inspect, and replace if incorrectly fitted or damaged.   |
|   | Low fuel flow   | Check discharge from fuel pump. Inspect needle valve seating.  |

**NOTE:** To ensure compliance with exhaust emission legislative requirements the following items **MUST NOT** be changed or modified in any way:

The fuel jet assembly. the air valve. the depression cover. the position of the fuel metering needle.

The following items must not be adjusted in service but should be replaced completely by factory-set units.

The temperature compensator. the air valve return spring. the by-pass unit. the starter assembly.

### AIR CLEANER

#### — Remove and refit

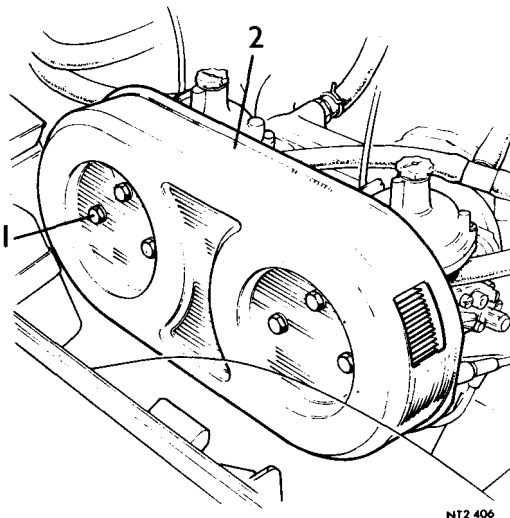
19.10.01

#### Remove

1. Remove the six bolts securing the air cleaner assembly to the carburettor intakes.
2. Lift off the air cleaner complete with gaskets.

#### Refitting

3. Reverse instructions 1 and 2 ensuring
  - a) A new gasket is fitted between the air cleaner and carburettor intakes.
  - b) The bolts are tightened evenly to 5 to 8 lbf ft (0.7 to 1.1 kgf m).



### AIR CLEANER

#### — Renew elements

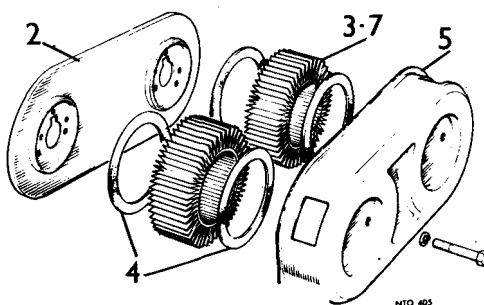
19.10.08

#### Dismantling

1. Remove the air cleaner from the carburettor intakes 19.10.01.
2. Remove the back plate from the cover.
3. Remove and discard the paper elements.
4. Examine and if unsatisfactory, discard the four sealing rings.
5. Clean the casing assembly.

#### Re-assembling

6. Place two sealing rings in position on the back plate location.
7. Position the new paper elements on the back plate ensuring that they locate properly.
8. Position remaining two sealing rings on the cover locations and place the cover over the back plate. Ensure that the elements locate correctly.
9. Refit the air cleaner 19.10.01.



# CARBURETTOR — CAR SET

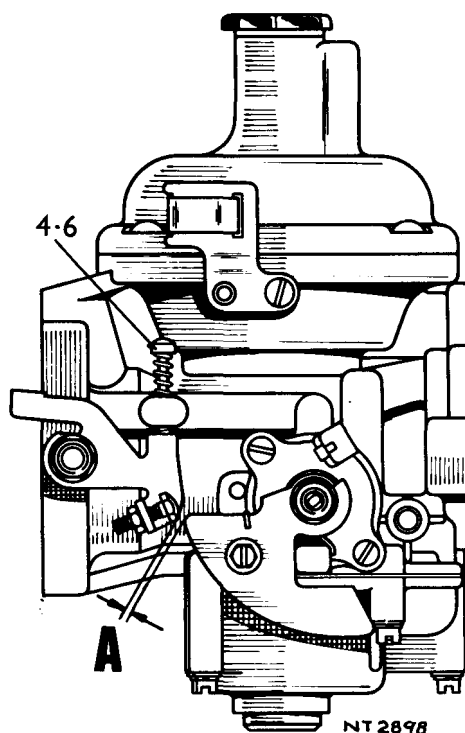
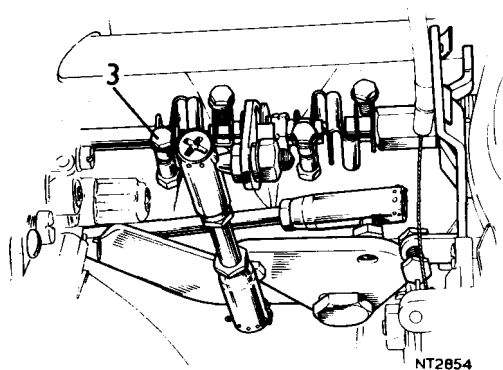
— Tune and adjust

19.15.02

Special tool: S353

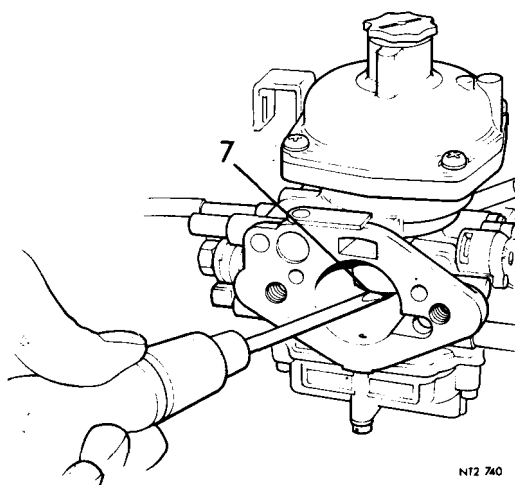
## Mixture checking

1. Start the engine and run until normal operating temperature is achieved.
2. Stop the engine and remove the air cleaner 19.10.01.
3. Slacken the throttle interconnection, spring coupling nuts and bolts.
4. Unscrew the slow running screw on both carburettors.
5. Ensure that the mixture control knob on the fascia is pushed fully home and that there is clearance 'A' between the fast idle screw and the cam on both carburettors.
6. Turn both throttle adjusting screws approximately 1½ turns to open the butterflies to give a datum setting.



7. Start the engine and lift both carburettor pistons in turn approximately ¼ in (6 mm) and note the engine response as follows.
  - a) Immediate increase in r.p.m — rich mixture
  - b) Decrease in r.p.m. or stall — weak mixture
  - c) Slight increase in r.p.m. then return to normal — correct mixture.
8. Carry out a C.O. level check.

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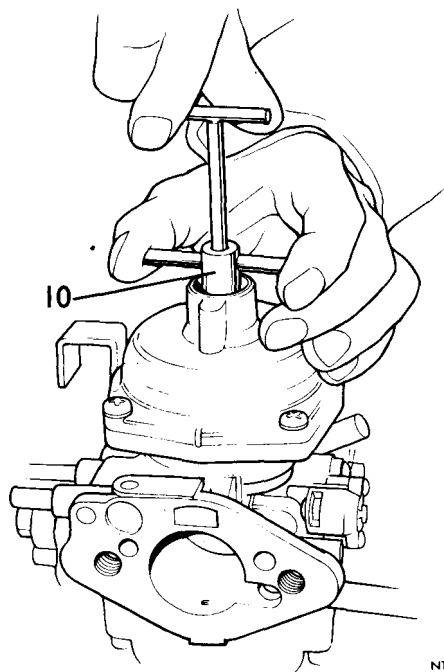




### Mixture adjusting

**NOTE:** If the mixture in both carburetters is correct ignore the following instructions 9 to 11.

9. Remove the piston dampers from both carburetters or the damper from the carburetter that requires adjustment.
10. Insert the special jet adjusting tool and turn it clockwise to enrich or anti-clockwise to weaken the mixture and top-up dash pot and refit the damper.
11. Repeat instructions 7 and 8 until the mixture is correct.
12. Top up the piston dash-pot and refit the damper.

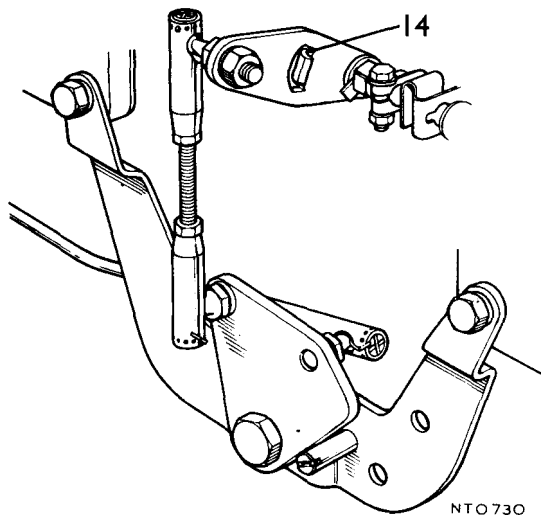


NT2 741

### Idle speed setting and balancing

13. Using a synchro check meter against both carburetter intakes in turn, adjust the fast idle screws to give an r.p.m. of 800 to 850 whilst maintaining an identical air flow reading from both carburetters.
14. Stop the engine, check that the relay lever is against its stop and insert a 3/32 in (2.4 mm) drill shank between the tongue and the slot of the interconnection lever — and whilst holding it in this position tighten the interconnection spring coupling nuts and bolts. Remove the drill.
15. Start the engine and increase the r.p.m. to 1500 and check the balance with the synchro check meter and if necessary adjust the idle screws to achieve an equal reading.
16. Recheck the balance at the correct idle speed.

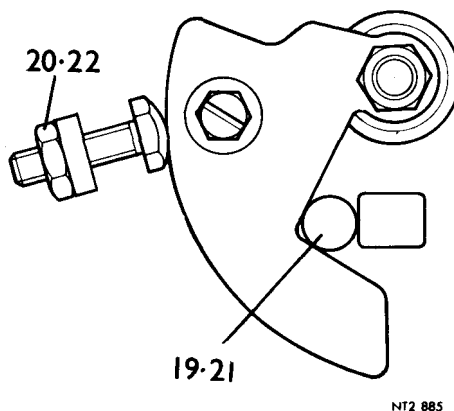
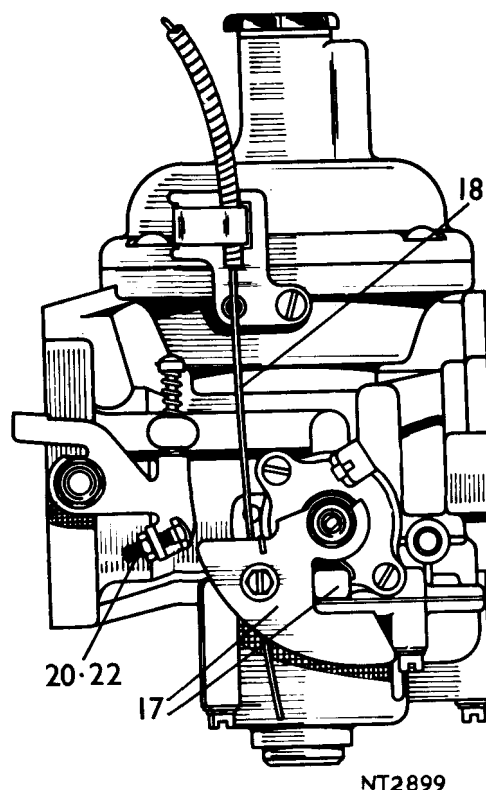
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NT0 730

### Fast idle speed setting

17. Check that the mixture control cam lever on both carburetters returns to its stop.
18. Ensure that the mixture control cables are so adjusted that they are not slack or too tight.
19. Pull the mixture control knob out on the fascia and insert a 5/16 in (7.937 mm) diameter bar between the cam and its stop on both carburetters in turn.
20. Slacken the fast idle screw lock nut on both carburetters and adjust the screws so that they just touch their respective cams.
21. Remove the bar, push the control knob home and pull the control knob out again to check that the setting gives a fast idle speed of 1100 – 1300 r.p.m. Make any necessary adjustments to the fast idle screw to achieve this setting whilst using the synchro check meter to maintain the carburetters in balance.
22. Tighten the lock nuts, stop the engine, push the control knob fully home and refit the air cleaner.



### DATA

|                           |                    |
|---------------------------|--------------------|
| Idle speed . . . . .      | 800 – 850 r.p.m.   |
| Fast idle speed . . . . . | 1100 – 1300 r.p.m. |



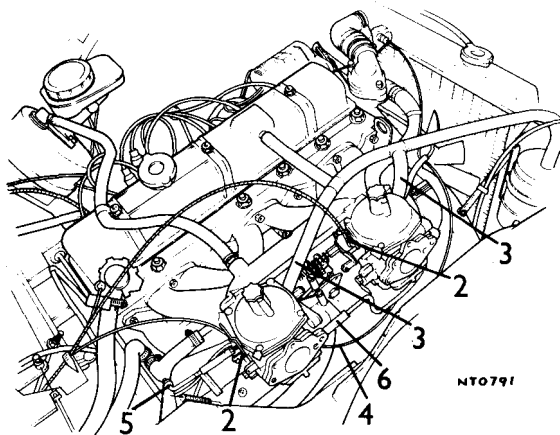
### CARBURETTERS — CAR SET

#### — Remove and refit

19.15.11

#### Removing

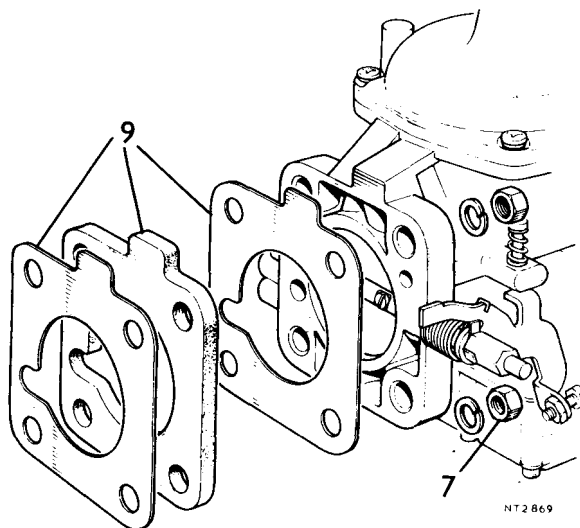
1. Remove the air cleaner assembly 19.10.01.
2. Disconnect the mixture control cables from both carburetters.
3. Disconnect the emission hoses from the carburetters.
4. Disconnect the vacuum pipe to the thermo static vacuum switch at the rear carburetter.
5. Disconnect the throttle linkage at the countershaft.
6. Disconnect the main fuel supply pipe to the carburetter.



7. Remove the eight nuts and spring washers (four per carburetter) securing the carburetters to the inlet manifold.
8. Withdraw the carburetters complete with the linkage.
9. Remove the gaskets from the carburetter intakes.

#### Refitting

10. Fit new gaskets to both the inlet manifold intakes.
11. Reverse instructions 1 to 8.



# CARBURETTERS COMPLETE WITH INLET MANIFOLD

## — Remove and refit

19.15.15

### Removing

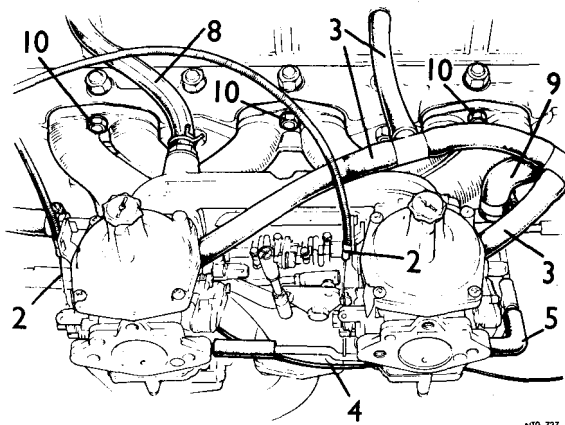
1. Remove the air cleaner 19.10.01.
2. Disconnect the mixture control cables from both carburetters.
3. Disconnect the emission pipes from the carburetters and rocker cover.
4. Disconnect the vacuum pipe at the rear carburetter to the thermo static vacuum switch.
5. Disconnect the main fuel supply pipe to the carburetters.
6. Disconnect the throttle linkage at the countershaft.
7. Partially drain the cooling system.
8. Disconnect brake servo vacuum hose at the inlet manifold.
9. Disconnect the manifold heater hoses at the front and rear of the manifold.
10. Remove the three nuts and spring washers securing the inlet manifold to the cylinder head and the six nuts and plain washers securing the inlet and exhaust manifold to the cylinder head.
11. Withdraw the carburetters complete with the inlet manifold.

### Refitting

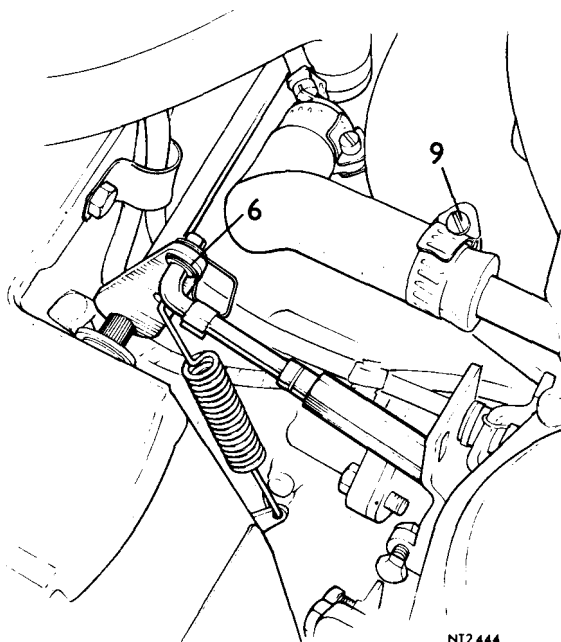
12. Clean the manifold mating faces and offer up and secure the manifold to the cylinder head with the three nuts and spring washers and the six nuts and plain washers.

**NOTE:** If the manifold gasket is in any way damaged it should be replaced 30.15.01.

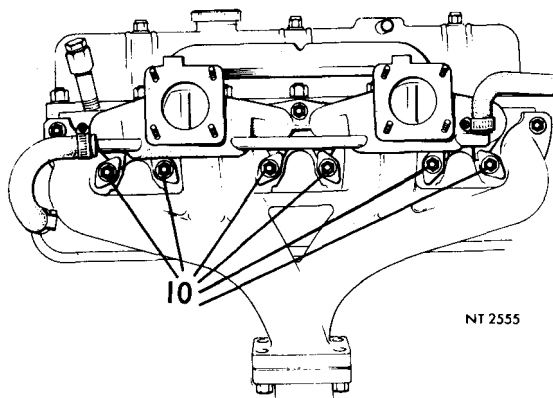
13. Reverse instructions 1 to 9.



NT0 727



NT2 444



NT 2555

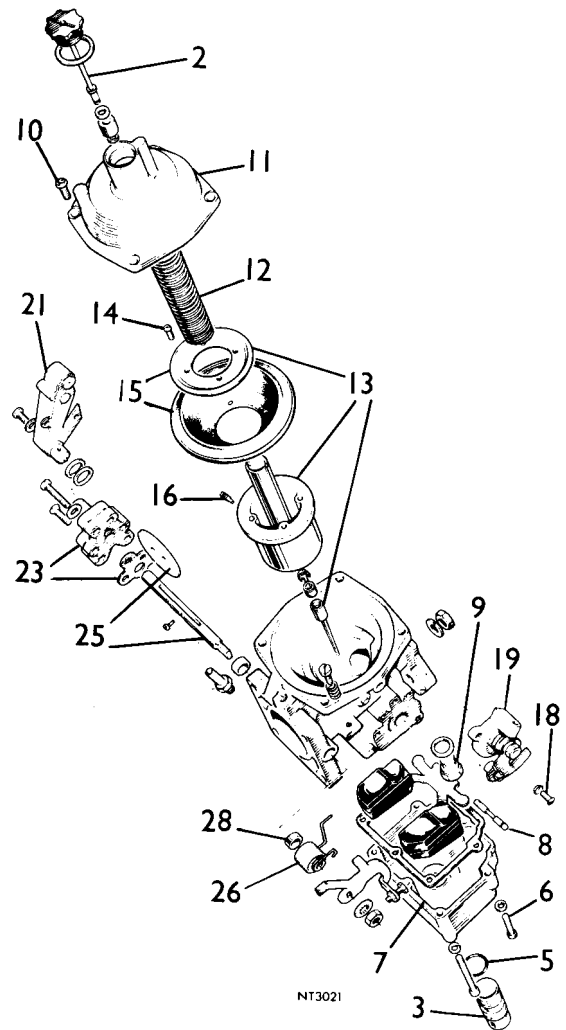
## CARBURETTOR — EACH

### — Overhaul and adjust

19.15.17

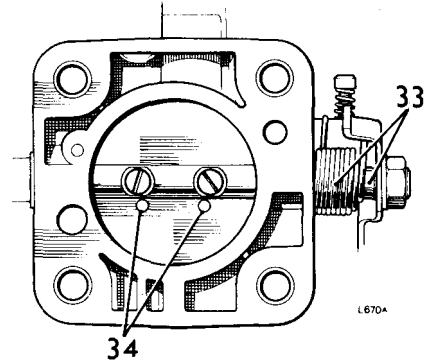
Service tool S353

1. Remove carburettors 19.15.11.
2. Remove damper.
3. Remove bottom plug. (lever-out).
4. Drain carburettor of oil and fuel.
5. Remove 'O' ring from plug.
6. Remove six screws securing float-chamber to body.
7. Remove float-chamber.
8. Remove float assembly by gently prising spindle from clip each end.
9. Remove needle valve.
10. Remove four screws securing top cover to body.
11. Remove top cover.
12. Remove spring.
13. Remove air valve assembly.
14. Remove four screws securing diaphragm and retaining ring to air valve assembly.
15. Remove diaphragm and retaining ring.
16. Slacken grub screw in side of air valve.
17. Insert tool S353 in stem of air valve, turn anticlockwise approximately two turns, withdraw needle and housing by pulling firmly and straight with the fingers.
18. Remove two screws securing starter box to body.
19. Remove starter box.
20. Remove two screws securing the temperature compensator to body.
21. Remove the temperature compensator and two rubber washers of different diameters.
22. Remove three (slotted) screws securing the by-pass valve to body.
23. Remove the by-pass valve and gasket.
24. Remove two screws securing butterfly to spindle.
25. Turn spindle, remove butterfly.
26. Release spindle return spring.
27. Withdraw spindle and spring.
28. Remove spindle seals from body by hooking out with small screwdriver.
29. Wash all components in clean fuel, allow to drain dry or use compressed air. Place all components on a clean surface. Discard all seals and gaskets.
30. Examine the condition of all components for wear, paying special attention to needle and seat, air valve and diaphragm which should be renewed unless in exceptionally good condition.
31. Use clean compressed air to blow through all ports, needle valve and starter box.

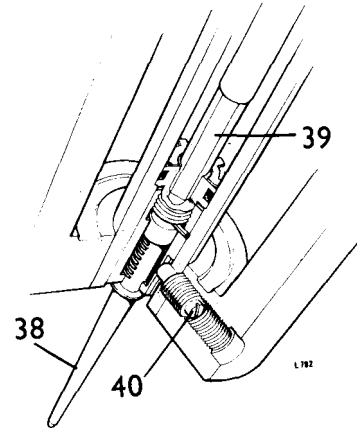


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32. Fit spindle seals to body, tapping gently into position, with metal casing of seals flush with body of carburettor.
33. Insert spindle, loading and locating spindle return spring whilst so doing.
34. Insert butterfly with two protruding spots, outboard and below spindle, tighten screws.

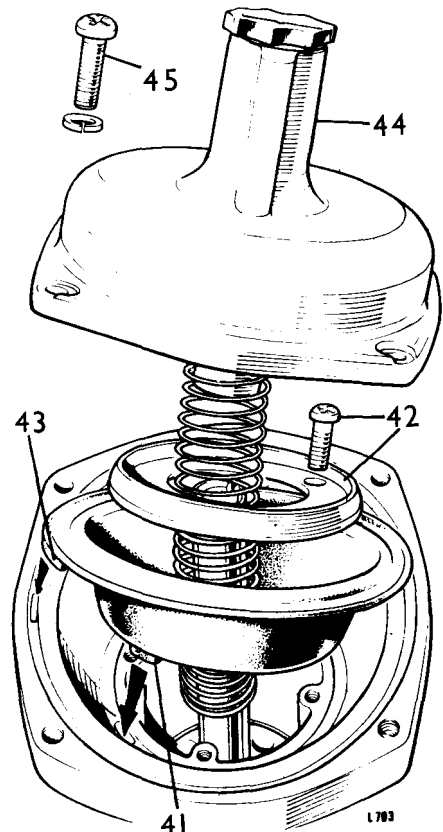


35. Fit starter box, tighten screws.
36. Fit by-pass valve and gasket, tighten screws.
37. Fit temperature compensator, tighten screws.
38. Insert needle housing assembly into the bottom of the air valve.
39. Fit tool S353, turning clockwise to engage threads of needle valve assembly with adjusting screw; continue turning until slot in needle housing is aligned with grub screw.
40. Tighten grub screw.



**NOTE:** The grub screw does not tighten on the needle housing but locates into the slot. This ensures that, during adjustment, the needle will remain in its operating position, i.e. biased, by a spring in the needle housing, towards the air cleaner side of the carburettor.

41. Fit diaphragm, locating inner tag into recess in air valve.
42. Fit diaphragm retaining ring; secure with four screws.
43. Fit air valve assembly, locating outer tag and rim of diaphragm in complementary recesses in carburettor body.
44. Fit carburettor top cover with bulge on housing neck towards air intake.
45. Fit and evenly tighten top cover screws.

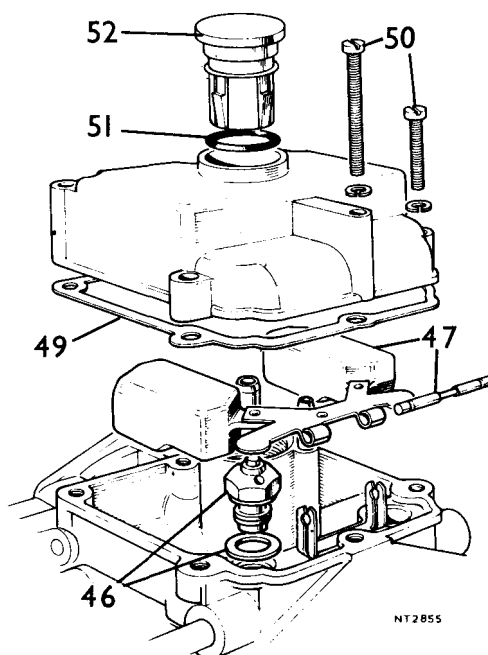


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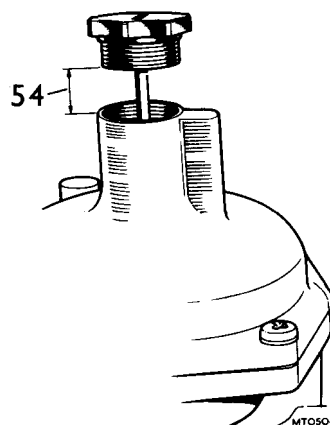
46. Fit needle valve and sealing washers; tighten.
47. Fit float assembly by levering pivot pin gently into position.
48. Check float height by measuring the distance between the carburettor gasket face and the highest point of the floats. See 19.15.32.

**NOTE:** The float heights must be equal and set to 0.625 to 0.672 in (16 to 17 mm). Adjust by bending tabs ensuring that tab sits on needle valve at right angles.

49. Fit float-chamber gasket.
50. Fit float-chamber, secure with six screws.
51. Fit 'O' ring to bottom plug.
52. Fit bottom plug. (Push fit).



53. Fit carburetters 19.15.11.
54. Fill carburettor damper dashpot with seasonal grade of engine oil until, using the damper as a dipstick, the threaded plug is 0.25 in (6 mm) above the dashpot when resistance is felt.
55. Fit damper.
56. Tune carburetters 19.15.02.



## FLOAT CHAMBER NEEDLE VALVE

— Remove and refit

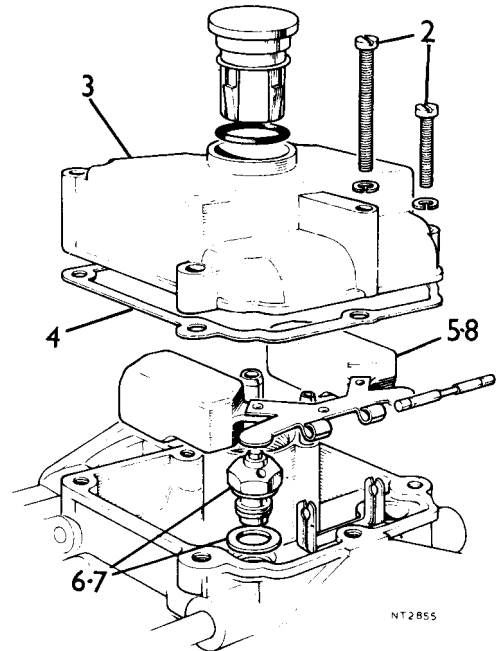
19.15.24

### Removing

1. Remove the carburetters 19.15.11.
2. Remove the six screws securing the float chamber to the body.
3. Remove the float chamber.
4. Remove the gasket.
5. Remove the float assembly by gently prising the spindle from the locating clips.
6. Remove the needle valve and washer.

### Refitting

7. Fit the needle valve and renew the washer.
8. Fit the float assembly.
9. Check and if necessary, adjust the height of both floats. Instruction 5, 19.15.32.
10. Renew the gasket and refit the float chamber.
11. Refit the carburetters.



## FLOAT CHAMBER LEVELS

— Check and adjust

19.15.32

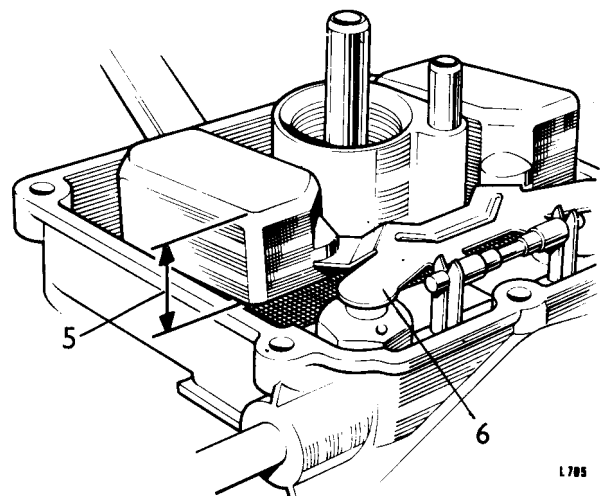
### Check

1. Remove the carburetters 19.15.11.
2. Remove the six screws securing the float chamber to the body.
3. Remove the float chamber.
4. Remove the gasket.
5. With the carburetter in the inverted position check the distance between the gasket face on the carburetter body to the highest point of each float.

**NOTE:** The height of both floats must be the same i.e. 0.625 to 0.627 in (16 to 17 mm).

### Adjust

6. Bend the tab that contacts the needle valve but ensure that it sits at right angles to the valve to prevent the possibility of sticking.
7. Fit a new gasket and reverse instructions 1 to 3.





### DIAPHRAGM

— Remove and refit

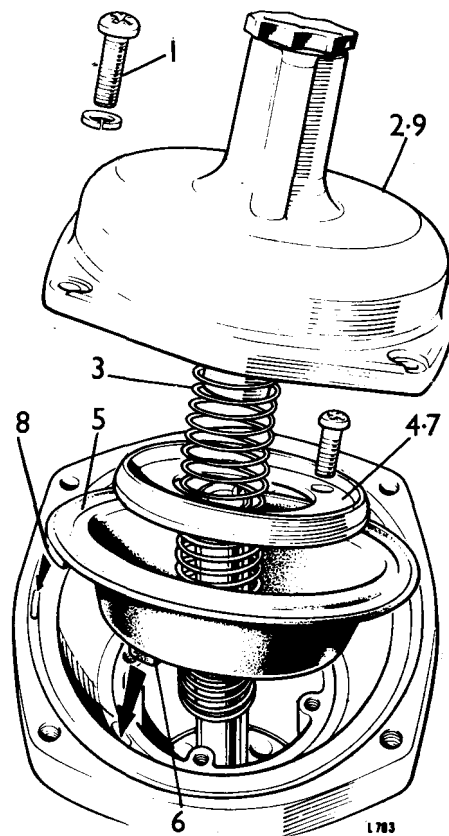
19.15.35

#### Removing

1. Remove the four screws securing the top cover to the carburettor body.
2. Lift off the top cover.
3. Remove the diaphragm spring.
4. Remove the diaphragm retaining plate.
5. Remove the diaphragm.

#### Refitting

6. Fit the diaphragm, locating the inner tag in the air valve recess.
7. Fit the retaining plate and ensure the correct diaphragm seating and tighten the screws.
8. Locate the diaphragm outer tag in the recess in the carburettor body.
9. Fit the top cover and evenly tighten the screws.



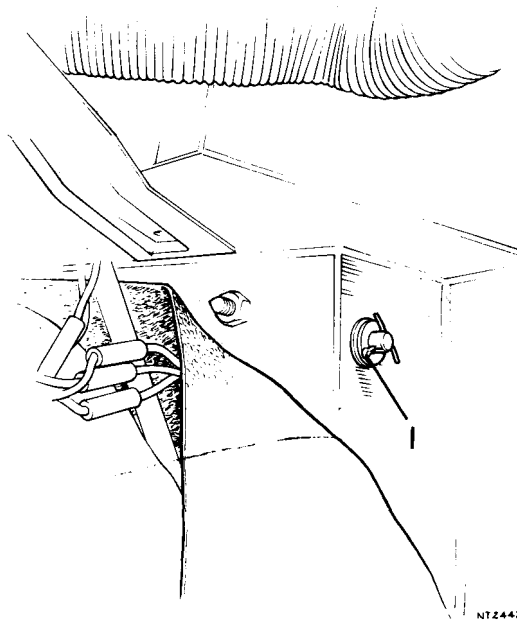
### THROTTLE PEDAL AND COUNTER SHAFT

— Remove and refit

19.20.01.

#### Removing

1. Working inside the car, pull back the carpet trim on the R.H. side of the bulkhead and remove the split pin and washer.

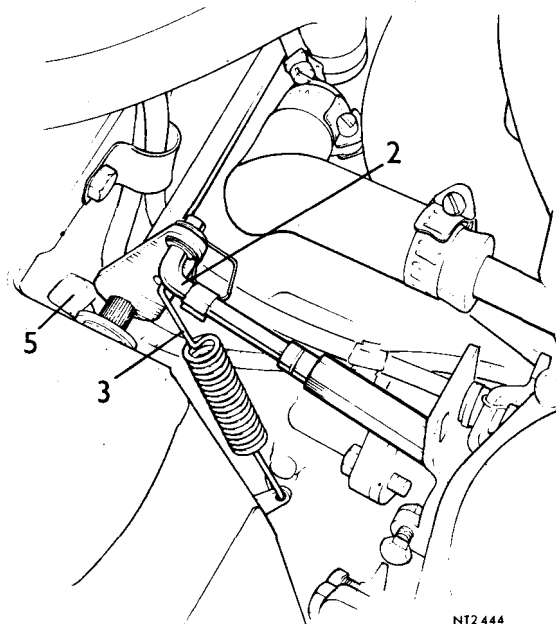


*Continued*

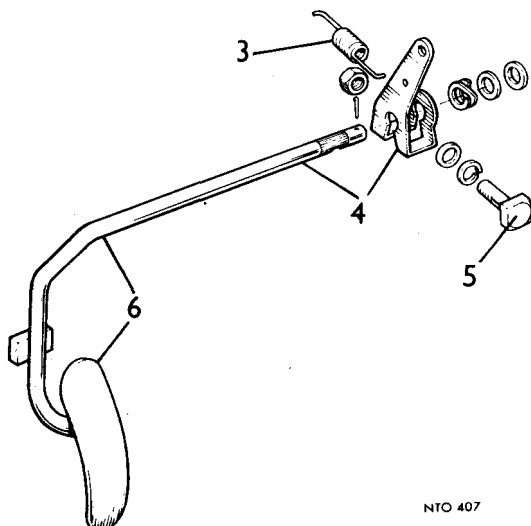
2. Within the engine compartment, disconnect the horizontal control rod from the countershaft lever.
3. Release the countershaft lever return spring.
4. Mark for reassembly the relationship of the countershaft to the lever.
5. Remove the countershaft lever clamp bolt and nut and remove the lever from the shaft together with the double spring and plain washer.
6. From inside the car, remove the throttle pedal and countershaft.
7. If necessary, remove the bushes in the bulkhead.

#### Refitting

8. Fit new bushes to the bulkhead if necessary.
9. Reverse instructions 1 to 6.



NT2 444



NT0 407

#### FUEL MAIN FILTER

##### — Remove and refit

19.20.02

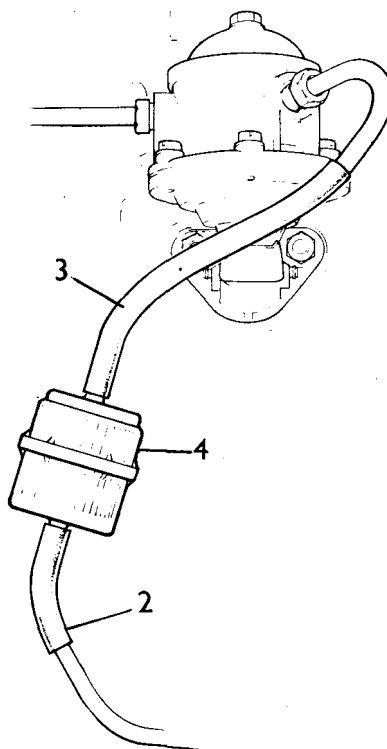
##### Removing

1. Clamp the inlet hose to the filter.
2. Disconnect the filter from the main line pipe.
3. Disconnect the filter from the inlet pipe to the pump and remove the filter.

**\*\*NOTE:** On later engines "Corbin" wire clips are fitted to secure the fuel pipe connections. New clips should be fitted when reassembling the fuel line.\*\*

##### Refitting

4. Fit a new filter ensuring that the side of the filter marked 'in' faces the direction of flow.
5. Remove the clamp from the inlet pipe.



NT2 733



## THROTTLE LINKAGE

### — Remove and refit

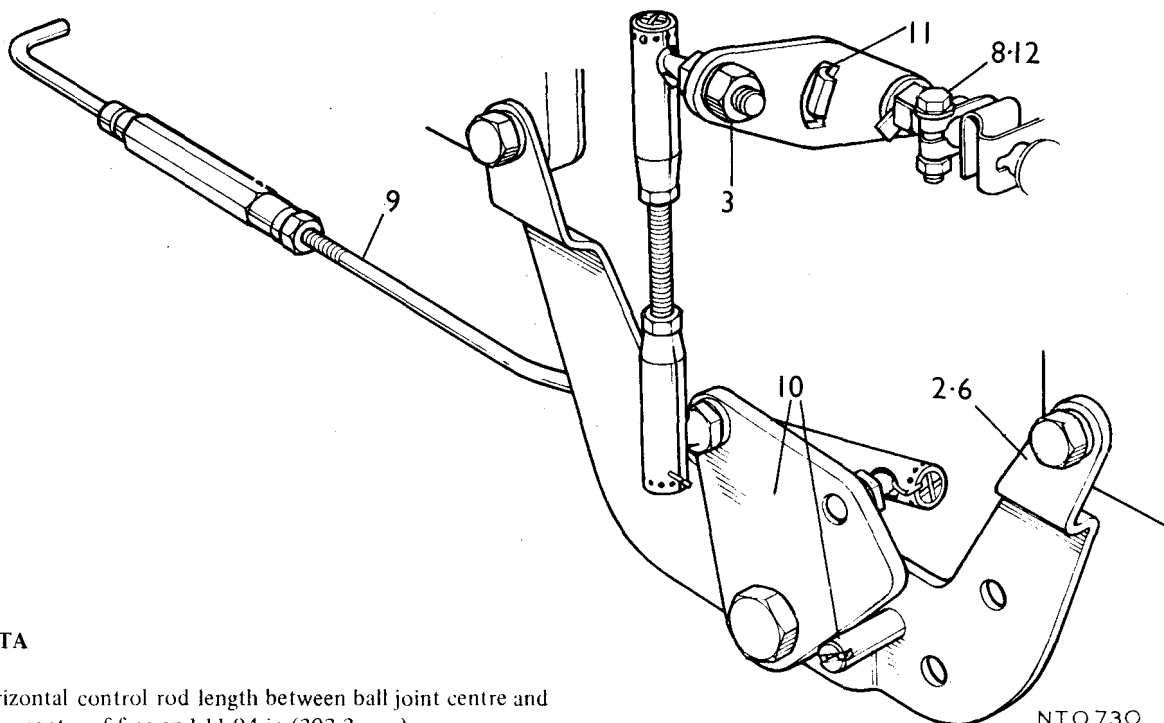
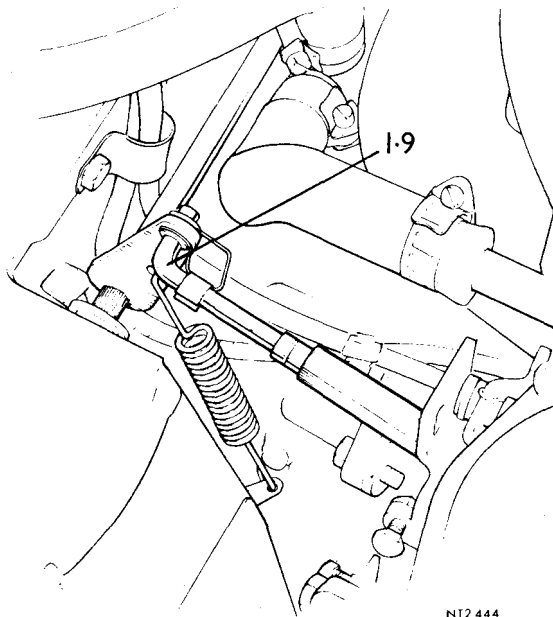
19.20.07

#### Removing

1. Disconnect the horizontal control rod from the throttle pedal countershaft lever.
2. Remove the relay lever support bracket from the carburetters.
3. Remove the nut and disconnect the short control rod from the interconnection lever.
4. Remove the throttle linkage complete.

#### Refitting

5. Check the length of the long horizontal and short vertical control rods — see DATA.
6. Refit the relay lever support bracket.
7. Fit the short vertical control rod assembly to the interconnection lever.
8. Slacken the spring coupling bolts.
9. Reconnect the long horizontal control rod to the throttle countershaft lever.
10. Check that the relay lever is against its stop.
11. Insert a 3/32 in (2.4 mm) drill shank between the tongue and slot of the throttle interconnection lever.
12. Tighten the spring coupling nuts and bolts.
13. Tune and adjust the carburetters 19.15.02.



#### DATA

Horizontal control rod length between ball joint centre and centre of free end 11.94 in (303.3 mm);

Vertical control rod length between ball joint centres 3.18 in (80.8 mm)

19.20.07C

## MIXTURE CONTROL CABLE

### — Remove and refit

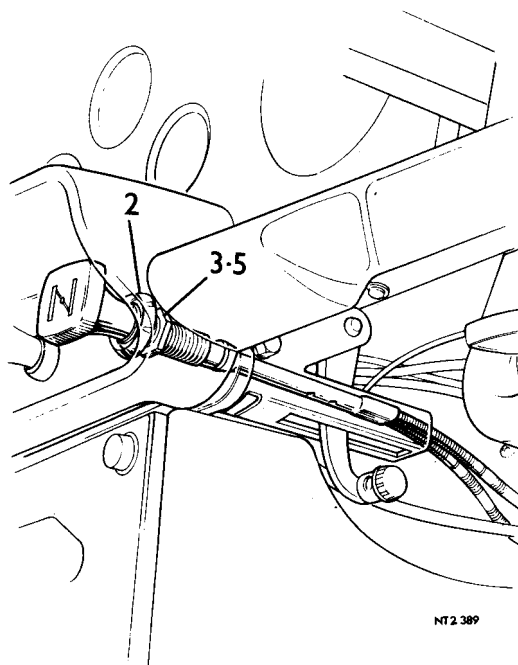
19.20.13

#### Removing

1. Disconnect the inner and outer cables from both carburetters.
2. Slacken the ferrule on the control panel (to facilitate the release of the locknut).
3. Unscrew the locknut behind the control panel and withdraw the cable complete through the locknut, the control panel and the bulkhead.

#### Refitting

4. Feed the cable complete through the control panel hole and pass the locknut over the cables.
5. Secure the outer cable assemblies to the control panel with the locknut and ferrule so that the end of the threaded part of the outer cable is flush with the ferrule on the control panel.
6. Feed the carburetter ends of the cable through the bulkhead and connect both inner and outer cables to the carburetters.



## MIXTURE CONTROL CABLE — INNER

### — Remove and refit

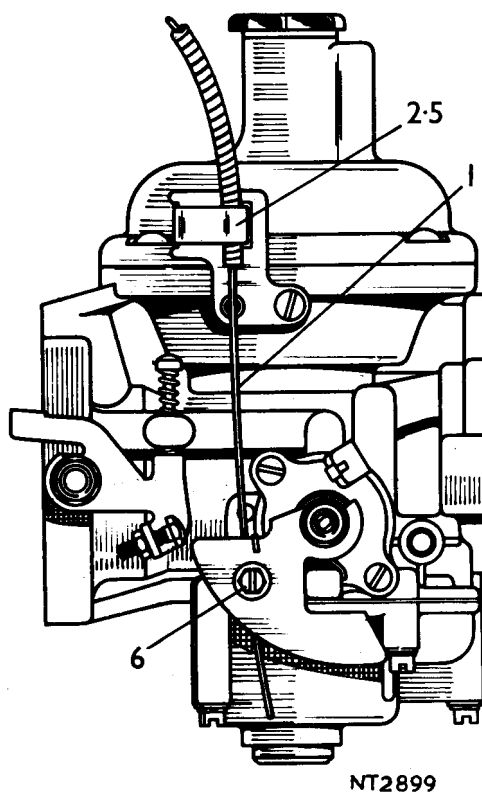
19.20.14

#### Removing

1. Disconnect the inner cables from both carburetters.
2. Release the outer cables from the clips on the carburetters.
3. From within the car pull the mixture control knob out and withdraw the twin inner cables complete with the knob. — see 19.20.13.

#### Refitting

4. Feed the twin inner cables through the outer cables until the control knob is fully home.
5. Secure the outer cables to the clips on both carburetters.
6. Connect the inner cables to the carburetter trunnions.



## FUEL SYSTEM — TC

### PETROL PIPE — MAIN LINE — REAR SECTION

— Remove and refit

19.40.02

#### Removing

1. Place the car on a ramp.
2. Isolate the battery.
3. Drain the fuel tank 19.55.02.
4. Disconnect the pipe from the centre section as illustrated.
5. Remove the pipe from the fuel tank.

#### Refitting

6. Reverse instructions 1 to 5.

### PETROL PIPE — MAIN LINE — ENGINE END SECTION

— Remove and refit

19.40.04

#### Removing

1. Place the car on a ramp.
2. Isolate the battery.
3. Clamp the connector joining the centre section to the engine end section.
4. Disconnect the pipe from the centre section.
5. Disconnect the pipe from the fuel line filter.

#### Refitting

6. Reverse instructions 1 to 5.

### PETROL PIPE — MAIN LINE — CENTRE SECTION

— Remove and refit

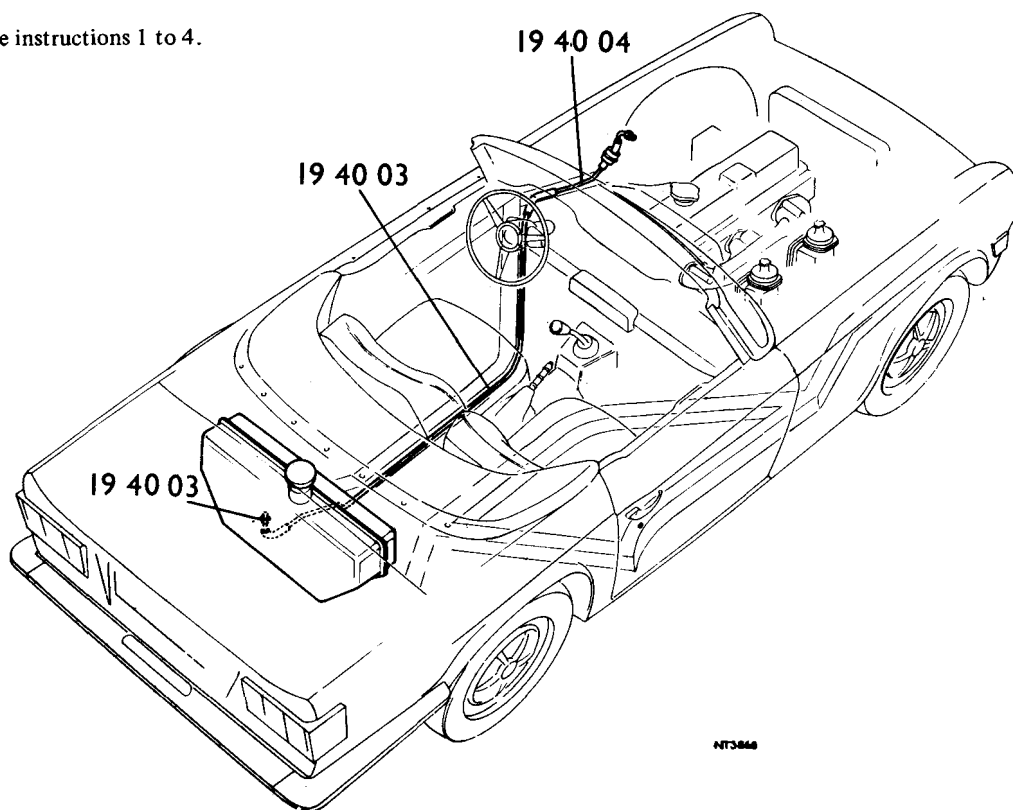
19.40.03

#### Removing

1. Place the car on a ramp.
2. Isolate the battery.
3. Drain the fuel tank 19.55.02.
4. Disconnect the centre pipe from the rear and engine end section as illustrated.

#### Refitting

5. Reverse instructions 1 to 4.



19.40.02C  
19.40.04C

## HOSE — FILLER TO TANK

### — Remove and refit

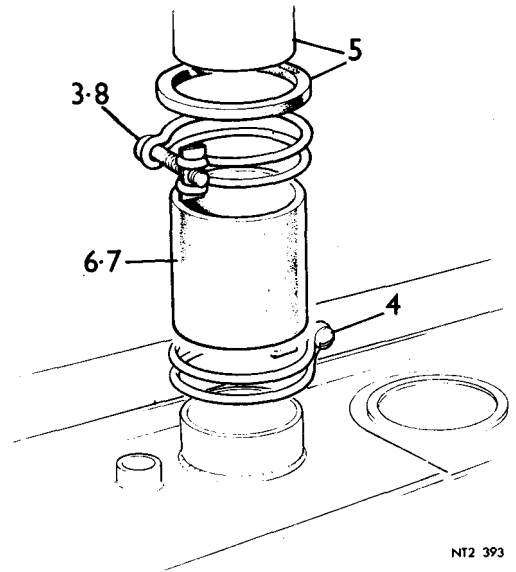
19.40.19

#### Removing

1. Remove the luggage compartment forward trim panel 76.13.17.
2. Remove the rear compartment trim panel 76.13.20.
3. Working from the rear compartment, slacken the top hose clip securing the filler cap assembly to the hose.
4. From the luggage compartment, slacken the hose clip securing the hose to the fuel tank.
5. Withdraw the filler cap assembly and the rubber sealing grommet.
6. Remove the filler hose complete with clips.

#### Refitting

7. Fit the filler hose to the fuel tank and secure with a hose clip.
8. Fit the filler cap securing clip to the hose, assemble the sealing grommet to the filler cap and fit the assembly to the tank filler hose. Secure with the hose clip.
9. Reverse instructions 1 and 2.



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## FUEL PUMP

### — Test on vehicle

19.45.01

1. Prime the fuel pump to fill the carburettor float chambers.
2. Connect a pressure gauge into the pump to carburettor fuel line.
3. Start the engine and allow it to run on the fuel remaining in the carburettors until the gauge reading on the scale ceases to rise.
4. Stop the engine and observe the gauge pressure which should remain at its highest reading for a short period. See Data for correct pressure.

**NOTE:** A rapid fall off indicates a leaking diaphragm or a sticking outlet valve. Failure to read within the tolerances in data suggests a defective pump or line blockage. Where the pressure is high it may be reduced by fitting extra paper washers between the pump and cylinder block. Where the pressure is low overhaul — 19.45.15 or renew the pump 19.45.15.

5. Remove the pressure gauge.

#### DATA

|                           |                       |
|---------------------------|-----------------------|
| Fuel pump static pressure | 1.5 p.s.i. minimum to |
|                           | 2.5 p.s.i. maximum    |

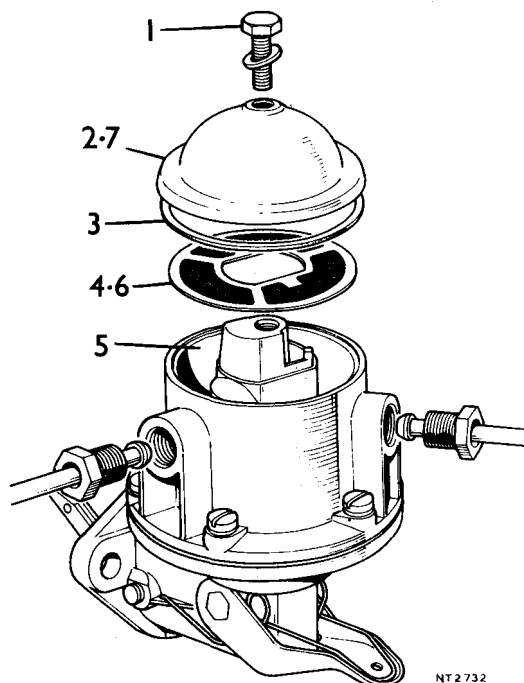


## FUEL PUMP

### — Clean filter

19.45.05

1. Remove the centre bolt and washer.
2. Remove the cover.
3. Remove the cover washer.
4. Remove the gauze filter and wash in petrol.
5. Loosen any sediment in the pump body and remove with compressed air. Avoid damage to the non-return valves.
6. Refit the gauze filter.
7. Refit the cover with a new cover washer and centre bolt washer. Do not overtighten the bolt.



## FUEL PUMP

### — Remove and refit

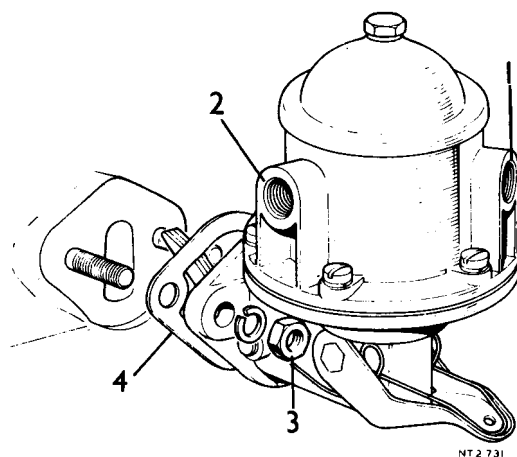
19.45.08

#### Removing

1. Disconnect the main fuel supply pipe from the pump inlet connection.
2. Disconnect the pipe from the pump outlet.
3. Remove the two nuts and spring washers securing the pump to the cylinder block.
4. Remove the gasket.

#### Refitting

5. Clean the cylinder block and pump mating faces and fit a new gasket.
6. Reverse instructions 1 to 3 ensuring that the pump rocker arm is located correctly against the camshaft before tightening the attachment nuts.



## FUEL PUMP

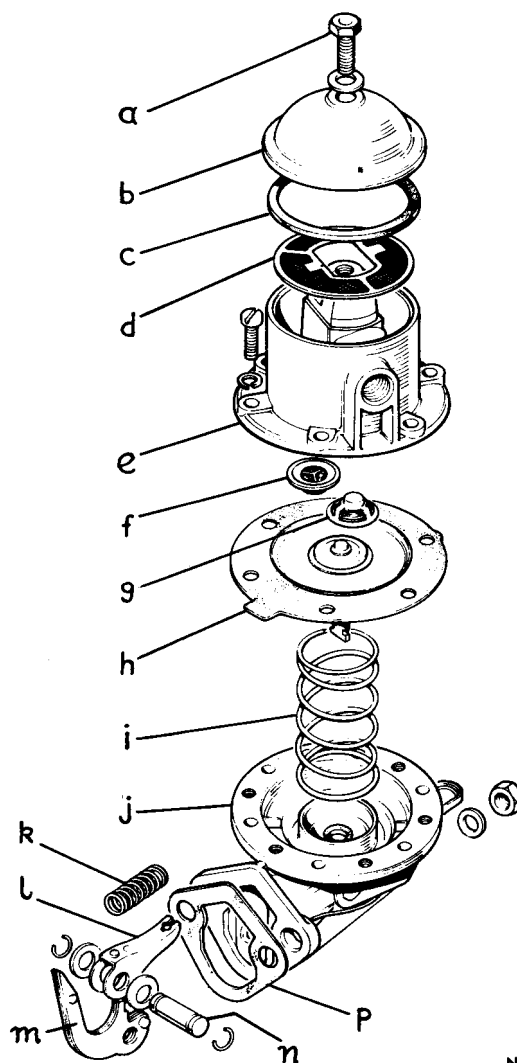
— Overhaul

19.45.15

### Dismantling

1. Remove the fuel pump from the engine 19.45.08.
2. Remove the cover retaining bolt and washer and lift off the cover and sealing washer.
3. Remove the filter gauze.
4. Mark the relationship of the upper and lower body for re-assembly and remove the six screws and separate the two assemblies.
5. Remove the diaphragm and spring turning it through 90° and lifting it out of engagement with the link lever.
6. Remove the circlip securing the rocker arm pin.
7. Drive out the pin and remove the rocker and link lever.

- a. Cover retaining bolt
- b. Cover
- c. Cover washer
- d. Filter gauze
- e. Upper body
- f. Inlet valve
- g. Outlet valve
- h. Diaphragm
- i. Diaphragm spring
- j. Lower body
- k. Rocker return spring
- l. Diaphragm actuating lever.
- m. Rocker
- n. Rocker fulcrum pin
- p. Gasket



NT0 409

*Continued*