This Workshop Manual reproduces pages from the Ford Sierra RS Cosworth and Ford Escort RS Cosworth service microfiche and details technical service information required for components not already covered in previously issued Dealer literature. Note that, unlike the previous issue, CG473, covering the Sierra RS Cosworth only, this manual does not include system test sections. For vehicle system tests, reference should be made to the appropriate Vehicle System Test Manual.

The manual is designed primarily for use by Ford dealerships and gives repair and adjustment procedures together with component illustrations, technical data and details of special tools or equipment which may be required. The repair and adjustment procedures are intended as a guide for both the fully qualified and the less experienced technician.

The repair operations numbering sequence used in all Sections corresponds to that used in the Ford Car Labour Time Schedule.

FOR ALL REPAIR OPERATIONS AND PROCEDURES WHICH ARE NOT DESCRIBED IN THIS MANUAL, REFERENCE SHOULD BE MADE TO THE FORD SIERRA '87 ONWARDS SERVICE MICROFICHE (CG1464), FORD SIERRA RS COSWORTH SERVICE MICROFICHE (CG534) OR THE FORD ESCORT/ORION '91 SERVICE MICROFICHE (CG1524) AS NECESSARY.

OWNERS AND OPERATORS ARE ADVISED TO ALLOW ONLY AUTHORISED FORD DEALERSHIPS TO CARRY OUT THE MORE COMPLEX REPAIRS SUCH AS THE OVERHAUL OF A TRANSMISSION OR DIFFERENTIAL ASSEMBLY, PARTICULARLY THOSE REQUIRING SPECIALISED TOOLING AND KNOWLEDGE.

REPLACEMENT PARTS

Behind all FORD and MOTORCRAFT products are the vast resources of the worldwide Parts Supply Operations which can supply replacement parts made to the same exacting standard as the original factory fitted components.

FOR THIS REASON, INSIST THAT ONLY GENUINE FORD OR MOTORCRAFT PARTS ARE USED AS SERVICE REPLACEMENTS.

SPECIAL TOOLS

The Special Service Tool recognition chart given at the start of each section shows all European sourced tools desirable or necessary to carry out a satisfactory repair. When possible, illustrations are given to assist in identifying the tool needed.

Special Service Tools may be ordered from:

- V.L. Churchill Ltd.
  P.O. Box No.3
  London Road
  Daventry
  Northants NN11 4NF
  ENGLAND

- V. Löwener
  W 401B Langenfeld
  Postfach 2252
  Industriestrasse 67
  GERMANY

- O.P.T.O.M. S.A.
  Polígono Industrial Del Henares
  (Ampilacion)
  Parcela No. 58
  19080 Guadalajara
  SPAIN
FORD

SIERRA RS COSWORTH
and
ESCORT RS COSWORTH

Workshop Manual

Ford

Volume I
VOLUME I

00 INTRODUCTION
01 FORMAT AND USAGE
02 VEHICLE IDENTIFICATION
04 FUEL CONSUMPTION
05 HEALTH AND SAFETY PRECAUTIONS
06 STANDARD PRACTICES
07 APPLICATION AND USE OF SPECIFICATIONS
08 SOLVENTS AND SEALERS
09 ROAD OR ROLLER TESTING

11 WHEELS AND TYRES

12 BRAKING SYSTEM - ESCORT
12C BRAKING SYSTEM - SIERRA

13A POWER ASSISTED STEERING - ESCORT
13B POWER ASSISTED STEERING - SIERRA

14A FRONT AXLE AND SUSPENSION - SIERRA
14B FRONT AXLE, SUSPENSION AND DRIVESHAFTS - MT75/4x4
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15 REAR AXLE, SUSPENSION AND DRIVESHAFT

16A MANUAL TRANSMISSION AND CLUTCH - BORG WARNER
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VOLUME II

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21B Engine - Sierra 4x4
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22 Ignition System

23 Fuel System

24A Cooling System
24B Cooling System - 4x4

25A Exhaust System
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26 Starting System

29L Engine Management and Emission System - Sierra
29T Engine Management and Emission System - Sierra 4x4
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32 Exterior Lights, Direction Indicators, Horn and Windscreen Wipers - Sierra
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43 Interior and Exterior Trim

54 Pre-Delivery and Maintenance Procedures

For operations and sections not included in this manual, refer to either the Sierra '87 Microfiche or the Escort/Orion '91 Microfiche, as appropriate.
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<tr>
<td>Format</td>
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<tr>
<td>Usage</td>
<td>2</td>
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</tbody>
</table>
FORMAT

Groups

The manual is divided into six main groups:

0 - General Information  
1 - Chassis

2 - Engine  
3 - Electrical

4 - Body  
5 - Maintenance

Sections

Each group is then sub-divided into sections, eg:

Group 2 - Engine comprises:

21 - Engine  
22 - Ignition System

23 - Fuel System 
24 - Cooling System

25 - Exhaust System  
26 - Starting System

29 - Engine Management

USAGE

Section Contents

Where applicable, each section comprises the following:

Index - This will be frame one of the section and is an itemised list and page location of the content of the section. It also includes a list and page location of each operation covered in the section.

Technical Data - A listing of essential information required during service and repair operations, eg. tightening torques, ignition timings, critical dimensions etc.

Special Service Tool Recognition - This is an illustrated list of special tools and suitable equipment required to carry out the repair procedures described.

Service and Repair Operations - A series of procedures selected to give coverage of the normal repairs undertaken in the workshop.

The removal and installation of some components is not covered in detail because the procedure is essentially simple and straightforward. Where a repair procedure is not covered, it may be for one of the following reasons:

1. The component may have been introduced after the repair operations were issued.

2. The component may be classed as not repairable due to the requirement for specialist equipment to ensure its correct function and adjustment after repair. (Non-service Item).

3. The component may be classed as not economical to repair, with renewal being less costly than dismantling and overhaul.

4. The repair may be of specialist nature, possibly covered in another FORD publication. For instance: Tyre repairs, fuel injection equipment testing, overhaul and calibration.
<table>
<thead>
<tr>
<th>Index</th>
<th>Code Definition</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
CODE DEFINITION (cont'd)

(Box 13) VERSION Provision for locally required codes by certain territories.

(Box 14) BODY COLOUR
A - Black '69 (XSC 632)
B - Diamond White '73 (XSC 601)
C -
D - Galaxy Blue '87 (XSC 2101A)
E - Burgundy '87 (XSC 2079A)
F - Maritime Blue '91 (XSC 2009A)
G -
H -
J - Pacifica Blue (XSC 2360CM)
K - Tasman '86 (XSC 1903C)
L - Aqua Jade '91 (XSC 2240C)
M -
N - Verona Green '91 (XSC 2398C) Polaris Grey (XCS 2455C)
P - Radiant Red '89 (XSC 2251A)
Q - Mercury Grey '87 (XSC 2076C)
R -
S -
T - Flint Grey '89 (XSC 2228C)
U - Crystal Blue '87 (XSC 2028C)
V - Strato Silver '91 (XSC 1056C)
W -
X -
Y - Special Vehicles
Z -
0 - Aztec Gold '91 (XSC 2387C)
1 - Magenta '89 (XSC 2159CM)
2 -
3 - Bisque Blue
4 - Mallard Green (XSC 2683 CM)
5 - Moonstone Blue '89 (XSC 1903C)
6 - Moondust Silver '91 (XSC 2431C)
7 -
8 - Olympic Gold '91 (XSC 2231C)
9 -

For vehicles built in Britain the second digit of the paint code denotes the current model year. For vehicles built on the continent the second digit of the paint code denotes the model year the colour was introduced.

Box 15 EXHAUST EMISSIONS

<table>
<thead>
<tr>
<th>Code</th>
<th>7</th>
<th>83 US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust Emission Level</td>
<td>15:04</td>
<td></td>
</tr>
</tbody>
</table>

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### CODE DEFINITION

**Box 7) STEERING**

<table>
<thead>
<tr>
<th>Code</th>
<th>1 or A</th>
<th>2 or B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>Left-hand drive</td>
<td>Right-hand drive</td>
</tr>
</tbody>
</table>

**Box 8) ENGINE**

<table>
<thead>
<tr>
<th>Code</th>
<th>N 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>DOHC/1-4 FFI Turbo</td>
</tr>
<tr>
<td>Capacity</td>
<td>2.0</td>
</tr>
<tr>
<td>Power</td>
<td>kw (DIN) 4 x 2 150.0 4 x 4 161.0</td>
</tr>
</tbody>
</table>

**Box 9) TRANSMISSION**

<table>
<thead>
<tr>
<th>Code</th>
<th>J</th>
<th>L</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Man (5-speed) Borg Warner T5</td>
<td>Man (5-speed) Borg Warner</td>
<td>Man (5-speed) MT-75</td>
</tr>
</tbody>
</table>

**Box 10) AXLE**

<table>
<thead>
<tr>
<th>Code</th>
<th>J</th>
<th>U</th>
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</thead>
<tbody>
<tr>
<td>Axle ratio</td>
<td>3.64</td>
<td>3.62</td>
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</tbody>
</table>

**Box 11) INTERIOR TRIM**

<table>
<thead>
<tr>
<th>Code</th>
<th>J</th>
<th>L</th>
<th>M</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Bluestone</td>
<td>Shadow</td>
<td>Mace</td>
<td>Raven</td>
</tr>
</tbody>
</table>

**Box 12) TYPE**

<table>
<thead>
<tr>
<th>1st letter</th>
<th>2nd letter</th>
<th>3rd letter</th>
<th>4th &amp; 5th letter</th>
<th>6th &amp; 7th letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Body Type</td>
<td>Year of Homologation</td>
<td>20 = 2.0 litre</td>
<td>-</td>
</tr>
<tr>
<td>A = Escort</td>
<td>B = 3 Door</td>
<td>G = 1986</td>
<td>Belgium &amp; Luxemburg only</td>
<td>Identification not required</td>
</tr>
<tr>
<td>B = Sierra</td>
<td>F = 4 Door</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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FORD SIERRA/ESCORT RS COSWORTH: SECTION 02-04
CODE DEFINITION

[Box 1] NATIONAL TYPE APPROVAL NUMBER
A unique code required by certain territories.

[Box 2] VEHICLE IDENTIFICATION NUMBER (VIN)

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| * | W | F | O | F | X | X | C | B | B | F | K | C | 1 | 2 | 3 | 4 | 5 | * |

eg Sierra 4-door saloon, manufactured in Genk, West Germany during September 1989.

(Digit 1): Constant asterisk - (*)

A) (Digit 2 - 4): World Manufacturer Indicator
Ford Werke A.G. - West Germany - WFO (European vehicles) - WF1 (Federal vehicles)

B & G) (Digit 5 & 11): Model Variant:
- BB - Saloon 3 door saloon
- BF - Sierra 4 door saloon
- AM - Escort Cosworth

C) (Digit 6 & 7): Constant X

D) (Digit 8): Product Source Company:
- G - Ford of Germany - Own assembly

E) (Digit 9): Assembly Plant:
- B - Genk

F) (Digit 10): Model Range:
- A - Escort
- B - Sierra

H) (Digit 12): Date of Manufacture - Year:
- G - 1986
- H - 1987
- J - 1988
- K - 1989
- L - 1990
- M - 1991
- N - 1992
- P - 1993

I) (Digit 13): Date of Manufacture - Month

<table>
<thead>
<tr>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>B</td>
<td>R</td>
<td>A</td>
<td>G</td>
<td>C</td>
<td>K</td>
<td>D</td>
<td>E</td>
<td>L</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>1989</td>
<td>J</td>
<td>U</td>
<td>N</td>
<td>P</td>
<td>B</td>
<td>R</td>
<td>A</td>
<td>G</td>
<td>C</td>
<td>K</td>
<td>D</td>
</tr>
<tr>
<td>1990</td>
<td>L</td>
<td>Y</td>
<td>S</td>
<td>T</td>
<td>J</td>
<td>U</td>
<td>M</td>
<td>P</td>
<td>B</td>
<td>R</td>
<td>A</td>
</tr>
<tr>
<td>1991</td>
<td>C</td>
<td>K</td>
<td>D</td>
<td>E</td>
<td>L</td>
<td>Y</td>
<td>S</td>
<td>T</td>
<td>J</td>
<td>U</td>
<td>M</td>
</tr>
<tr>
<td>1992</td>
<td>B</td>
<td>R</td>
<td>A</td>
<td>G</td>
<td>C</td>
<td>K</td>
<td>D</td>
<td>E</td>
<td>L</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>1993</td>
<td>J</td>
<td>U</td>
<td>M</td>
<td>P</td>
<td>B</td>
<td>R</td>
<td>A</td>
<td>G</td>
<td>C</td>
<td>K</td>
<td>D</td>
</tr>
</tbody>
</table>

J) (Digit 14 - 18): Vehicle Sequence Number:
Five digits.

(Digit 19): Constant asterisk - (*)

[Box 3] GROSS VEHICLE MASS
Indicates maximum legal laden mass, in territories where this is required.

[Box 4] GROSS TRAIN MASS
Indicates the maximum combined mass of vehicle and trailer or caravan.

[Box 5] PERMITTED FRONT AXLE LOADING
Maximum permissible load on the front wheels of the vehicle.

[Box 6] PERMITTED REAR AXLE LOADING
Maximum permissible load on the rear wheels of the vehicle.

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FORD SIERRA/ESCORT RS COSWORTH: SECTION 02-03
Vehicle Identification (VIN) Plate Location

The vehicle identification plate which is riveted to the front upper cross-member of each vehicle has embossed alpha-numerical codes which are explained on the following page. These codes indicate details of vehicle specifications in respect of type, permissible loading weights, engine, gear ratio, body paint colour, trim within the vehicle etc. They are therefore useful when procuring replacement parts. During production the two-language plate was replaced by a four-language plate. Both versions are shown in Fig.1.

Fig.1 VIN Plate Location (Both two and four-language versions shown - Sierra illustrated).

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<table>
<thead>
<tr>
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<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Consumption</td>
<td>2</td>
</tr>
<tr>
<td>Simulated Urban Driving</td>
<td>2</td>
</tr>
<tr>
<td>Consumption Data</td>
<td>3</td>
</tr>
</tbody>
</table>
FUEL CONSUMPTION

Legal requirements in certain territories require that, for new passenger cars, official fuel consumption figures are included in service literature intended for presentation to the first purchaser of the vehicle.

A copy of the official fuel consumption figures for Sierra RS Cosworth models is published on page 04-03.

The fuel consumption of each class of car is determined in accordance with specified test procedures and three sets of data are given.

a) Simulated Urban Driving (ECE 15 cycle, see below for details)

b) Constant Speed Driving at 90 km/h (56 mph)

c) Constant Speed Driving at 120 km/h (75 mph)

A passenger car prepared for testing shall have been run-in and driven for at least 3000 km (1875 miles). It shall be clean, have its windows and air intakes closed, have any manually controlled device on the carburettor inlet in the "Summer" position, have in use only the equipment necessary for normal operation, have its heating system or air conditioner system switched off and have any temperature controlled radiator fan or any supercharger in the normal operating condition. The tyres shall be of type normally fitted and inflated to the manufacturer's recommended pressures.

In addition to the above, the driving weight of the car, the type of fuel used, the lubricants used and the ambient air conditions during the test are controlled by the Regulations.

SIMULATED URBAN DRIVING

![Graph of Simulated Urban Driving (ECE 15 Cycle)](image)

**Fig.1. Simulated Urban Driving (ECE 15 Cycle).**

The test cycle shown in Fig.1. can be described as follows:

Idle for 11 seconds, accelerate in 1st gear to 15 km/h (9.4 miles/h) in 4 seconds, maintain this for 8 seconds, decelerate to rest in 5 seconds. Idle for 21 seconds, accelerate to 32 km/h (20 miles/h) in 12 seconds (changing from 1st to 2nd gear at 15 km/h) hold this speed for 24 seconds, decelerate to rest in 11 seconds. Idle for 21 seconds, accelerate to 50 km/h (31.2 miles/h) in 26 seconds (changing from 1st to 2nd gear at 15 km/h and 2nd to 3rd gear at 35 km/h), hold this speed for 12 seconds, decelerate to 35 km/h (21.9 miles/h) in 8 seconds and hold this speed for a further 13 seconds, change to 2nd gear and decelerate to rest in 12 seconds. Idle for a final 7 seconds. This cycle should be carried out five times to ensure that the vehicle is at normal operating temperature. The complete fuel consumption test check comprises six consecutive test cycles, after the engine is at normal operating temperature, carried out without interruption. The total test cycle time is 19.5 minutes, the average speed is 13 km/h (11.9 miles/h) and the distance covered is 6,075 km (3,777 miles).
OWNER LITERATURE

To comply with the requirements of certain territories, Owner Handbooks contain official fuel consumption figures.

FUEL CONSUMPTION FIGURES

For reference purposes, the official fuel consumption figures for Sierra RS Cosworth vehicles are provided below. These figures were correct at the time of going to press. The consumption figures are the same for all trim levels of a particular engine variant, except where otherwise stated.

NOTE: All references to 'gallons' are imperial gallons (1.2 U.S. Gallons).

The results do not express or imply any guarantee of the fuel consumption of any particular car. Individual vehicles are not tested and there are inevitably differences between different cars of the same model. In addition, any car may incorporate particular modifications. Furthermore the driver's style and road and traffic conditions, as well as the extent to which the car has been driven and the standard of maintenance, will all affect its fuel consumption.

<table>
<thead>
<tr>
<th>MODEL/ENGINE</th>
<th>BODY STYLE</th>
<th>TRANS-MISSION</th>
<th>FINAL DRIVE</th>
<th>TYRE SIZE</th>
<th>EMISS. LEVEL</th>
<th>MILES PER GALLON A</th>
<th>B</th>
<th>C</th>
<th>LITRES PER 100 KM A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 Sierra DOHC Turbo</td>
<td>Saloon Hatch.</td>
<td>Man 5-sp</td>
<td>3,64</td>
<td>205/50VRx15</td>
<td>15:04</td>
<td>22,8</td>
<td>38,2</td>
<td>30,1</td>
<td>12,4</td>
<td>7,4</td>
<td>9,4</td>
</tr>
<tr>
<td>2.0 Sierra DOHC Turbo</td>
<td>Saloon Notch.</td>
<td>Man 5-sp</td>
<td>3,64</td>
<td>205/50VRx15</td>
<td>15:04</td>
<td>22,1</td>
<td>35,3</td>
<td>27,7</td>
<td>12,8</td>
<td>8,0</td>
<td>10,2</td>
</tr>
<tr>
<td>2.0 Sierra DOHC Turbo 4x4</td>
<td>Saloon Notch.</td>
<td>Man 5-sp</td>
<td>3,64</td>
<td>205/50VRx15</td>
<td>15:04</td>
<td>22,1</td>
<td>37,2</td>
<td>30,4</td>
<td>12,8</td>
<td>7,6</td>
<td>9,3</td>
</tr>
<tr>
<td>2.0 Sierra DOHC Turbo 4x4</td>
<td>Saloon Notch.</td>
<td>Man 5-sp</td>
<td>3,64</td>
<td>205/50VRx15</td>
<td>83 US</td>
<td>20,8</td>
<td>34,5</td>
<td>28,3</td>
<td>13,6</td>
<td>8,2</td>
<td>10,0</td>
</tr>
<tr>
<td>Escort 2.0 DOHC Turbo Hatch.</td>
<td>Man 5-sp</td>
<td>3,64</td>
<td>205/50VRx15</td>
<td>83 US</td>
<td>22,8</td>
<td>33,6</td>
<td>30,1</td>
<td>12,4</td>
<td>8,4</td>
<td>9,4</td>
<td></td>
</tr>
</tbody>
</table>

A - Simulated Urban Driving (ECE 15 cycle)
B - Constant Speed Driving at 56 mph (90 km/h)
C - Constant Speed Driving at 75 mph (120 km/h)
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<td>Adhesives and Sealers</td>
<td>2</td>
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<tr>
<td>Antifreeze</td>
<td>2</td>
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<td>Brake and Clutch Fluids</td>
<td>3</td>
</tr>
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<td>Chemical Materials - General</td>
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</tr>
<tr>
<td>Chlorofluorocarbon (CFC)</td>
<td>4</td>
</tr>
<tr>
<td>Corrosion Protection Materials</td>
<td>4</td>
</tr>
<tr>
<td>Dusts</td>
<td>4</td>
</tr>
<tr>
<td>Electric Shock</td>
<td>4</td>
</tr>
<tr>
<td>Engine Oils</td>
<td>4</td>
</tr>
<tr>
<td>Exhaust Fumes</td>
<td>5</td>
</tr>
<tr>
<td>Fibre Insulation</td>
<td>5</td>
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<tr>
<td>Fire</td>
<td>5</td>
</tr>
<tr>
<td>First Aid</td>
<td>5</td>
</tr>
<tr>
<td>Fluorolastomer</td>
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</tr>
<tr>
<td>Foams - Polyurethane</td>
<td>5</td>
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<td>Fuels</td>
<td>6</td>
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<tr>
<td>Gas Cylinders</td>
<td>6</td>
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<td>General Workshop Tools and Equipment</td>
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<td>Legal Aspects</td>
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<td>Lubricants and Greases</td>
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<td>Noise</td>
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<td>Paints</td>
<td>8</td>
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<td>Solder</td>
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<td>Solvents</td>
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<td>Suspended Loads</td>
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<td>Welding</td>
<td>10</td>
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<tr>
<td>Warning Symbols</td>
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HEALTH AND SAFETY PRECAUTIONS

Many of the procedures associated with vehicle maintenance and repair involve physical hazards or other risks to health. This section lists, alphabetically, some of these hazardous operations and the materials and equipment associated with them. The precautions necessary to avoid these hazards are identified.

The list is not exhaustive and all operations and procedures, and the handling of materials, should be carried out with health and safety in mind.

ACIDS AND ALKALIS - See also Battery acids.
eg. caustic soda, sulphuric acid.

Used in batteries and cleaning materials.

Irritant and corrosive to the skin, eyes, nose and throat. Causes burns.

Avoid splashes to the skin, eyes and clothing.

Wear suitable protective gloves and goggles. Can destroy ordinary protective clothing. Do not breathe mists.

Ensure access to water and soap is readily available for use after splashing accidents.

ADHESIVES AND SEALERS - See Fire, Chemical materials - General

Highly Flammable, Flammable, Combustible.

Generally should be stored in "No Smoking" areas; cleanliness and tidiness in use should be observed eg. disposable paper covering benches; should be dispensed from applicators where possible; containers, including secondary containers, should be labelled appropriately.

Solvent based adhesives/sealers - See Solvents

Follow manufacturers instructions.

Water based adhesives/sealers

Those based on polymer emulsions and rubber latices may contain small amounts of volatile toxic and harmful chemicals. Skin and eye contact should be avoided and adequate ventilation provided during use.

Follow manufacturers instructions.

Hot Melt Adhesives

In the solid state, they are safe. In the molten state they may cause burns, and health hazards may arise from the inhalation of toxic fumes.

Use thermostatically controlled heaters with thermal cut-out, adequate extraction and appropriate protective clothing.

Resin-based adhesives/sealers eg. epoxide and formaldehyde resin based.

Mixing should only be carried out in well ventilated areas as harmful or toxic volatile chemicals may be released.

Skin contact with uncured resins and hardeners can result in irritation; dermatitis; and absorption of toxic or harmful chemicals through the skin. Splashes can damage the eyes.

Provide adequate ventilation and avoid skin and eye contact. Follow manufacturers instructions.

Anaerobic, cyanoacrylate and other acrylic adhesives.

Many are irritant, sensitizing or harmful to the skin. Some are eye irritants.

Skin and eye contact should be avoided and the manufacturers instructions followed.

Cyanoacrylate adhesives (super-glues) must not contact the skin or eyes. If skin or eye tissue is bonded, cover with a clean moist pad and get medical attention. Do not attempt to pull tissue apart. Use in well ventilated areas as vapours can cause irritation of the nose and eyes.

For two-pack systems see Resin based and Isocyanate adhesives/sealers.

Isocyanate (polyurethane) adhesives/sealers

See Resin based adhesives.

Individuals suffering from asthma or respiratory allergies should not work with or near these materials as sensitivity reactions can occur.

Any spraying should preferably be carried out in exhaust ventilated booths removing vapours and spray droplets from the breathing zone.

Individuals working with spray applications should wear air-fed respirators.

ANTIFREEZE - See Fire, Solvents e.g. isopropanol, ethylene glycol, methanol.

Highly Flammable, Flammable, Combustible.

Used in vehicle coolant systems, brake air pressure systems, screenwash solutions.

Vapours may be given off from coolant antifreeze (glycol) when heated. Avoid breathing these vapours.

Antifreeze may be absorbed through the skin in toxic or harmful quantities. Antifreeze, if swallowed, can be fatal and medical attention should be sought immediately.

These products must not be used in any cooling or industrial water system which is connected or linked to general, food preparation or drinking water supplies.
ARC-WELDING - See Welding.

ASBESTOS - See also Warning Symbols.

Breathing asbestos dust may cause lung damage or, in some cases, cancer.

Used in Brake and Clutch linings, Transmission brake bands and gaskets. Ford original production and replacement items for this model are asbestos free.

The use of drum cleaning units, vacuum cleaning or damp wiping is preferred.

Asbestos dust waste should be dampened, placed in a sealed container and marked to ensure safe disposal. If any cutting or drilling is attempted on materials containing asbestos the items should be dampened and only hand tools or low-speed power tools used.

BATTERY ACIDS - See also Acids and Alkalis.

Gases released during charging are explosive. Never use naked flames or allow sparks near charging or recently charged batteries.

Ensure adequate ventilation.

CHEMICAL MATERIALS - GENERAL - See Legal Aspects

Chemical materials such as solvents, sealers, adhesives, paints, resin foams, battery acids, antifreeze, brake fluids, fuels, oils and grease should always be used with caution and stored and handled with care. They may be toxic, harmful, corrosive, irritant or highly inflammable and give rise to hazardous fumes and dusts.

The effects of excessive exposure to chemicals may be immediate or delayed; briefly experienced or permanent; cumulative; superficial; life threatening; or may reduce life-expectancy.

DO'S

Do remove chemical materials from the skin and clothing as soon as practicable after soiling. Change heavily soiled clothing and have it cleaned.

Do carefully read and observe hazard and precaution warnings given on material containers (labels) and in any accompanying leaflets, posters or other instructions. Material health and safety data sheets can be obtained from Manufacturers.

Do organise work practices and protective clothing to avoid soiling of the skin and eyes; breathing vapours/aerosols/dusts/fumes; inadequate container labelling; fire and explosion hazards.

Do wash before job breaks, before eating, smoking, defecating or using toilet facilities when handling chemical materials.

Do keep work areas clean, uncluttered and free of spills.

Do store materials and parts according to national and local regulations.

Do keep chemical materials out of the reach of children.
HEALTH AND SAFETY PRECAUTIONS

DO NOTS

Do not mix chemical materials except in accordance with the manufacturers' instructions; some chemicals can form other toxic or harmful chemicals; give off toxic or harmful fumes; become explosive, when mixed together.

Do not spray chemical materials, particularly those based on solvents, in confined spaces e.g. when people are inside a vehicle.

Do not apply heat or flame to chemical materials except in accordance with the manufacturers' instructions. Some are highly inflammable and some may release toxic or harmful fumes.

Do not leave containers open. Fumes given off can build up to toxic, harmful or explosive concentrations. Some fumes are heavier than air and will accumulate in confined areas, pits etc.

Do not transfer chemical materials to unlabelled containers.

Do not clean hands or clothing with chemicals. Chemicals, particularly solvents and fuels, will dry the skin and may cause irritation and dermatitis. Some can be absorbed through the skin in toxic or harmful quantities.

Do not use emptied containers for other materials except when they have been cleaned under supervised conditions.

Do not sniff or smell chemical materials. Brief exposure to high concentrations of fumes can be toxic or harmful.

CORROSION PROTECTION MATERIALS - See Solvents, Fire.

Highly flammable, flammable

These materials are varied and the manufacturers' instructions should be followed. They may contain solvents, resins, petroleum products etc. Skin and eye contact should be avoided. They should only be sprayed in conditions of adequate ventilation and not in confined spaces.

CUTTING - See Welding

DEWAXING - See Solvents and Fuels (Kerosene)

DUSTS

Powder, dusts or clouds may be irritant, harmful or toxic. Avoid breathing dusts from powdery chemical materials or those arising from dry abrasion operations. Wear respiratory protection if ventilation is inadequate.

Fine dusts of combustible material can present an explosion hazard in high concentrations and in the presence of sources of ignition.

ELECTRIC SHOCK

Electric shocks can result from the use of faulty electrical equipment or from the misuse of equipment even in good condition.

Ensure that electrical equipment is maintained in good condition and frequently tested.

Ensure that flexes, cables, plugs and sockets are not frayed, kinked, cut, cracked or otherwise damaged.

Ensure that electric equipment is protected by a fuse of the correct rating.

Never misuse electrical equipment and never use equipment which is in any way faulty. The results could be fatal.

Ensure that the cables of mobile electrical equipment cannot get trapped and damaged, such as in a vehicle hoist.

Use air operated mobile equipment where possible in preference to electrical equipment.

In cases of electrocution:
- switch off electricity before approaching victim
- if this is not possible, push or drag victim from source of electricity using dry non-conductive material
- commence resuscitation if trained to do so
- SUMMON MEDICAL ASSISTANCE

ENGINE OILS - See Lubricants and Greases

CHLOROFLUOROCARBONS (CFC)

There is concern in the scientific community that CFC's and Halons are depleting the upper ozone layer which filters out harmful ultraviolet radiation. Decreased filtration of ultraviolet radiation may result in increases in skin cancer, cataracts and immune system suppression in humans, as well as decreased productivity of crops and aquatic systems.

CFC's are used primarily as a refrigerant in vehicle air conditioning systems and as an aerosol propellant. Halons are used as fire extinguishants.

Ford supports worldwide elimination of CFC usage and it is recommended that Company subsidiaries and affiliates should phase out CFC usage as soon as acceptable substitutes are commercially available.

CLUTCH FLUIDS - See Brake and clutch fluids.

CLUTCH LININGS AND PADS - See Asbestos.

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FORD SIERRA/ESCORT RS COSWORTH: SECTION 05-04
EXHAUSTS

Acids - See Acids and Alkalis

Catalytic systems may be subject to the build up of a small amount of sulphuric acid inside the converter. Care should be taken when removing converters so that no spillage occurs.

Fumes

These contain asphyxiating, harmful and toxic chemicals and particles such as carbon oxides, nitrogen oxides, aldehydes, lead and aromatic hydrocarbons. Engines should only be run under conditions of adequate extraction or general ventilation and not in confined spaces.

Systems

Catalytic systems operate at extremely high temperatures. Care should be taken when handling these systems by the use of heat resistant gloves.

Gasoline (petrol) engine

There may not be adequate warning properties of odour or irritation before immediate and delayed toxic or harmful effects arise.

Diesel engine

Soot, discomfort and irritation usually give adequate warning of hazardous fume concentrations.

FIBRE INSULATION - See Dusts

Used in noise and sound insulation

The fibrous nature of surfaces and cut edges can cause skin irritation. This is usually a physical and not a chemical effect.

Precautions should be taken to avoid excessive skin contact through careful organisation of work practices and the use of gloves.

FIRE - See Welding, Foams, Legal Aspects

Many of the materials found on or associated with the repair of vehicles are highly flammable. Some give off toxic or harmful fumes if burnt.

Observe strict fire safety when storing and handling flammable materials or solvents, particularly near electrical equipment or welding processes.

Ensure before using electrical or welding equipment, that there is no fire hazard present.

Have a suitable fire extinguisher available when using welding or heating equipment.

FIRST AID

Apart from meeting any legal requirements, it is desirable for someone in the workshop to be trained in first aid procedures.

Splashes in the eye should be flushed carefully with clean water for at least ten minutes.

Soiled skin should be washed with soap and water.

Individuals affected by inhalation of gases, fumes etc. should be removed to fresh air immediately. If effects persist, consult a doctor.

If liquids are swallowed inadvertently, consult a doctor giving him the information on the container or label. Do not induce vomiting unless this action is indicated on the label.

FLUORELASTOMER - See 'Viton'.

FOAMS - POLYURETHANE - See Fire

Used in sound and noise insulation. Cured foams used in seat and trim cushioning. Closed cell rigid foam used in lower 'A' pillars.

Follow manufacturers instructions

Unreacted components are irritating and may be harmful to the skin and eyes. Wear gloves and goggles.

Individuals with chronic respiratory diseases, asthma, bronchial medical problems, or histories of allergic diseases, should not work with or near uncured materials.

The components, vapours, spray mists can cause direct irritation, sensitivity reactions and may be toxic or harmful.

Vapours and spray mists must not be breathed. These materials must be applied with adequate ventilation and respiratory protection. Do not remove respirator immediately after spraying, wait until vapour/mists have cleared.

Burning of the uncured components and the cured foams can generate toxic and harmful fumes. Smoking, open flames or the use of electrical equipment during foaming operations and until vapours/mists have cleared should not be allowed.

Any heat cutting of cured foams or partially cured foams should be conducted with extraction ventilation (see Body Section 44 Legal and Safety aspects).

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FORD SIERRA/ESCORT RS COSWORTH: SECTION 05-05
FUELS - See Fire, Legal Aspects, Chemicals - General, Solvents

Avoid skin contact with fuel where possible. Should contact occur, wash the affected skin with soap and water.

Gasoline (petrol)

Highly flammable. Observe "NO SMOKING" signs.

Swallowing can result in mouth and throat irritation and absorption from the stomach can result in drowsiness and unconsciousness. Small amounts can be fatal to children. Aspiration of liquid into the lungs e.g. through vomiting, is a very serious hazard.

Gasoline dries the skin and can cause irritation and dermatitis on prolonged or repeated contact. Liquid in the eye causes severe smarting.

Motor gasoline may contain appreciable quantities of benzene, which is toxic upon inhalation, and the concentration of gasoline vapours must be kept very low. High concentrations will cause eye, nose and throat irritation, nausea, headache, depression and symptoms of drunkenness. Very high concentrations will result in rapid loss of consciousness.

Ensure there is adequate ventilation when handling and using gasoline. Great care must be taken to avoid the serious consequences of inhalation in the event of vapour build up arising from spillages in confined spaces.

Special precautions apply to cleaning and maintenance operations on gasoline storage tanks.

Gasoline should not be used as a cleaning agent. It must not be siphoned by mouth. See First Aid.

Kerosene (paraffin)

Used also as heating fuel, solvent and cleaning agent.

Flammable. Observe "NO SMOKING" signs.

Irritation of the mouth and throat may result from swallowing. The main hazard from swallowing arises if liquid aspiration into the lungs occurs. Liquid contact dries the skin and can cause irritation or dermatitis. Splashes in the eye may be slightly irritating.

In normal circumstances, the low volatility does not give rise to harmful vapours. Exposure to mists and vapours from kerosene at elevated temperatures should be avoided (mists may arise in dewaxing). Avoid skin and eye contact and ensure there is adequate ventilation.

Gas-oil (Diesel fuel) - See Fuels (Kerosene)

Combustible

Gross or prolonged skin contact with high boiling gas-oils may also cause serious skin disorders including skin cancer.

GAS CYLINDERS - See Fire

Gases such as oxygen, acetylene, argon and propane are normally stored in cylinders at pressures of up to 2000 lb/in², (13,790 kPa/m²) and great care should be taken in handling these cylinders to avoid mechanical damage to them or to the valve gear attached. The contents of each cylinder should be clearly identified by appropriate markings.

Cylinders should be stored in well ventilated enclosures, and protected from ice and snow, or direct sunlight. Fuel gases (e.g. acetylene and propane) should not be stored in close proximity to oxygen cylinders.

Care should be exercised to prevent leaks from gas cylinders and lines, and to avoid sources of ignition.

Only trained personnel should undertake work involving gas cylinders.

GASES - See Gas Cylinders

GASKETS (Fluorosilastic) - See 'Viton'

GAS SHIELDED WELDING - See Welding

GAS WELDING - See Welding
GENERAL WORKSHOP TOOLS AND EQUIPMENT

It is essential that all tools and equipment are maintained in good condition, and the correct safety equipment used where required.

Never use tools or equipment for any purpose other than that for which they were designed. Never overload equipment such as hoists, jacks, axle and chassis stands or lifting slings. Damage caused by overloading is not always immediately apparent and may result in a fatal failure the next time that the equipment is used.

Do not use damaged or defective tools or equipment, particularly high speed equipment such as grinding wheels. A damaged grinding wheel can disintegrate without warning and cause serious injury.

Wear suitable eye protection when using grinding, chiselling or sand blasting equipment.

Wear a suitable breathing mask when using abrasive blasting equipment, working with asbestos based materials or using spraying equipment.

Ensure adequate ventilation to control dusts, mists and fumes.

GLUES - See Adhesives and Sealers.

HALON - See CFC's

HIGH PRESSURE AIR, LUBRICATION AND OIL TEST EQUIPMENT. See Lubricants and Greases.

Always keep high pressure equipment in good condition, and regularly maintained, particularly at joints and unions.

Never direct a high pressure nozzle, eg diesel injector, at the skin as the fluid may penetrate to the underlying tissue etc. and cause serious injury.

LEGAL ASPECTS

Many laws and regulations make requirements relating to health and safety in the use of materials and equipment in workshops. Some of these laws which apply in the U.K. are listed. Similar laws exist for other territories:

- The Factories Act (1961)
- The Asbestos Regulations (1969)
- Highly Flammable Liquids and Liquified Petroleum Gases Regulations (1972)
- Control of Pollution Act (1974)
- Health and Safety at Work Act (1974)

- Control of Lead at Work Regulations (1980)
- Control of Substances Hazardous to Health (COSHH) Regulations (1989)
- Abrasive Wheels Regulations (1970)

Workshops should be familiar, in detail, with these and associated laws and regulations. Consult local factory inspectorate if in any doubt.

LUBRICANTS AND GREASES

Avoid all prolonged and repeated contact with mineral oils. All lubricants and greases may be irritating to the eyes and skin.

Used Engine Oils

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Do not employ used engine oils as lubricants or for any application where appreciable skin contact is likely to occur.

There are publications describing the problems and advising on precautionary measures. For the U.K. a typical Health and Safety Executive publication is:

SHW 397 : Cautionary Notice: Effects of mineral oil on the skin.

Health protection precautions

- Avoid prolonged, excessive or repeated skin contact with used engine oils - where necessary wear protective clothing.
- Wear protective clothing, including impervious gloves where practicable.
- Do not pull oily rags in pockets.
- Avoid contaminating clothes, particularly underpants, with oil.
- Heavily soiled clothing and oil-impregnated footwear should not be worn. Overalls must be cleaned regularly.
- First Aid treatment should be obtained immediately for open cuts and wounds.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.
LUBRICANTS AND GREASES (Cont’d)

- Do not use gasoline (petrol), kerosene (paraffin), diesel fuel (gas oil), thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practicable, degrease components prior to handling.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.

Environmental Precautions

Burned used engine oil in small space heaters or boilers can be recommended only for units of approved design. In the UK the heating system must meet the requirements of HM Inspectorate of Pollution for small burners of less than 0.4 MW. If in doubt check with the appropriate local authority and/or manufacturer of approved appliance.

Dispose of used oil and used oil filters through authorised waste disposal contractors to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact the relevant local authority for advice on disposal facilities.

It is illegal to pour used oil on to the ground, down sewers or drains, or into water courses.

NOISE

Some operations e.g. sawing, discing, proximity to engines under load, or at high speeds, may produce high noise levels which could, in time, damage hearing. In these cases, suitable ear protection must be worn.

NOISE INSULATION MATERIALS - See Foams, Fibre insulation.

‘O’ RINGS (Fluorocarbon) - See ‘Viton’


Highly flammable, Flammable. Observe "NO SMOKING" signs.

One Pack. Can contain harmful or toxic pigments, driers and other components as well as solvents. Spraying should only be carried out with adequate ventilation.

Two-Pack. Can also contain harmful and toxic unreacted resins and resin hardening agents. The manufacturers instructions should be followed and the section on page 05-02 covering Resin Based Adhesives, Isocyanate containing Adhesives and Foams, should be consulted.

Spraying should preferably be carried out in exhausted ventilated booths removing vapour and spray mists from the breathing zone. Individuals working in booths should wear respiratory protection. Those doing small scale repair work in the open workshop should wear air-fed respirators.

PAINT THINNERS - See Solvents

PETROL - See Fuels (gasoline)

PRESSURISED EQUIPMENT - See High Pressure Air, Lubrication and Oil test equipment.

RESISTANCE WELDING - See Welding

SEALS AND SEALERS - See Adhesives, Sealers and 'Viton'

SOLDER - See Welding

Soldiers are mixtures of metals such that the melting point of the mixture is below that of the constituent metals (normally lead and tin). Solder application does not normally give rise to toxic lead fumes, provided a gas/air flame is used. Oxy-acetylene flames should not be used, as they are much hotter and will cause lead fumes to be evolved.

Some fumes may be produced by the application of any flame to surfaces coated with grease etc. and inhalation of these should be avoided.

Removal of excess solder should be undertaken with care, to ensure that fine lead dust is not produced, which can give toxic effects if inhaled. Respiratory protection may be necessary.

Solder spillage and filings should be collected and removed promptly to prevent general air contamination by lead.

High standards of personal hygiene are necessary in order to avoid ingestion of lead or inhalation of solder dust from clothing.

SOLVENTS - See Chemical materials - General Fuels (kerosene), Fire.

e.g. acetone, white spirit, toluene, xylene, trichloroethylene.

Used in cleaning materials, dewaxing, paints, plastics, resins, thinners etc.

Some may be highly flammable or flammable.
SOLVENTS (cont'd)

Skin contact will degrease the skin and may result in irritation and dermatitis following repeated or prolonged contact. Some can be absorbed through the skin in toxic or harmful quantities.

Splashes in the eye may cause severe irritation and could lead to loss of vision.

Brief exposure to high concentrations of vapours or mists will cause eye and throat irritation, drowsiness, dizziness, headaches and in the worst circumstances unconsciousness.

Repeated or prolonged exposure to excessive but lower concentrations of vapours or mists, for which there might not be adequate warning indications, can cause more serious toxic or harmful effects.

Aspiration into the lungs (e.g. through vomiting) is the most serious consequence of swallowing.

Avoid splashes to the skin, eyes and clothing. Wear protective gloves, goggles and clothing if necessary.

Ensure good ventilation when in use, avoid breathing fumes, vapours and spray mists and keep containers tightly sealed. Do not use in confined spaces.

When spraying materials containing solvents, e.g. paints, adhesives, coatings, use extraction ventilation or personal respiratory protection in the absence of adequate general ventilation.

Do not apply heat or flame except under specific and detailed manufacturers' instructions.

Always ensure that lifting equipment such as jacks, holts, axle stands, slings, etc. are adequate and suitable for the job, in good condition and regularly maintained.

Never improvise lifting tackle.

UNDERSEAL - See Corrosion Protection.

VITON

In common with many other manufacturers vehicles, some components fitted to the FORD range have 'O' rings, seals or gaskets which contain a material known as 'Viton'.

Viton is a fluororubber, that is a synthetic rubber type which contains Fluorine. It is commonly used for 'O' rings, gaskets and seals of all types. Although Viton is the most well known fluororubber, there are others, including Fluorel and Tecnoflon.

When used under design conditions fluororubbers are perfectly safe. If, however, they are exposed to temperature in excess of 400°C, the material will not burn, but will decompose, and one of the products formed is hydrogen fluoride.

This acid is extremely corrosive and almost impossible to remove once it has contaminated the skin.

'0' rings, seals or gaskets which have been exposed to very high temperatures will appear charred or as a black sticky substance.

DO NOT, under any circumstances touch them or the attached components.

Enquiries should be made to determine whether Viton or any other fluororubber has been used in the affected 'O' ring, seal or gasket. If they are of natural rubber or nitrile then there is no hazard. If in doubt, assume the material may be Viton or another fluororubber.

The affected area should be decontaminated before commencing any work. Disposable heavy duty plastic gloves should be worn at all times, and the affected area washed down using wire wool and a limesludge (calcium hydroxide) solution to neutralize the acid before disposing of the residue.

After use, the plastic gloves should be discarded carefully and safely.

Welding processes include Resistance Welding (Spot Welding), Arc Welding and Gas Welding.

Resistance Welding
This process may cause particles of molten metal to be emitted at high velocity, and the eyes and skin must be protected.

Arc Welding
This process emits a high level of ultra-violet radiation which may cause arc-eye and skin burns to the welder and to other persons nearby. Gas-shielded welding processes are particularly hazardous in this respect. Personal protection must be worn, and screens used to shield other people.

Metal spatter will also occur, and appropriate eye and skin protection is necessary.

The heat of the welding arc will produce fumes and gases from the metals being welded, the rods and from any applied coatings or contamination on the surfaces being worked on. These gases and fumes may be toxic and inhalation of these should be avoided. The use of extraction ventilation to remove the fumes from the working area may be necessary particularly in cases where the general ventilation is poor, or where considerable welding work is anticipated. In extreme cases or confined spaces where adequate ventilation cannot be provided, air-fed respirators may be necessary.

Gas Welding (and cutting)
Oxy-acetylene torches may be used for welding and cutting, and special care must be taken to prevent leakage of these gases, with consequent risk of fire and explosion.

The process will produce metal spatter and eye and skin protection is necessary.

The flame is bright, and eye protection should be used, but the ultra-violet emission is much less than that from arc welding, and lighter filters may be used.

The process itself produces few toxic fumes, but such fumes and gases may be produced from coatings on the work, particularly during cutting away of damaged body parts, and inhalation of the fumes should be avoided.

In brazing, toxic fumes may be evolved from the metals in the brazing rod, and a severe hazard may arise if brazing rods containing cadmium are used. In this event, particular care must be taken to avoid inhalation of fumes and expert advice may be required.

SPECIAL PRECAUTIONS MUST BE TAKEN BEFORE ANY WELDING OR CUTTING TAKES PLACE ON VESSELS WHICH HAVE CONTAINED COMBUSTIBLE MATERIALS, E.G. BOILING OR STEAMING OUT OF FUEL TANKS.

WHITE SPIRIT - See Solvents.
WARNING SYMBOLS

Vehicle displaying the warning triangle and open book symbol, Fig.1., advise consultation of the relevant section of the owners handbook before touching or attempting adjustments of any kind.

Fig.1. Warning symbol - consult handbook.

Vehicles displaying the warning triangle with the 'electrified' arrow and open book symbol, Fig.2., give warning of components with inherent high voltages. Never touch these with the engine running or the ignition switch 'on'.

Fig.2. Warning symbol - high voltage - consult handbook.

Ford vehicles and replacement parts which contain asbestos are identified by a symbol, Fig.3. See Asbestos.

Fig.3. Warning symbol on parts containing asbestos - consult handbook.
## STANDARD PRACTICES

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VEHICLE IN WORKSHOP

When working on a vehicle in the workshop always ensure that:

- The hand brake is applied or the wheels are securely chocked to prevent the vehicle moving forwards or backwards.

- If the engine is to be run, there is adequate ventilation, or an extraction hose to remove exhaust gases.

- There is adequate room to jack up the vehicle and remove the wheels if necessary.

- The battery is disconnected if working on the engine, underneath the vehicle, or if the vehicle is jacked up.

- If using welding equipment on the vehicle, a suitable fire extinguisher is readily available.

CAUTION: When electric arc welding on a vehicle, always disconnect the alternator wiring and the battery to prevent the possibility of a surge of current causing damage to the internal components of the alternator. It is not necessary to disconnect electronic modules.

USING CHASSIS STANDS

Chassis stands must always be used to support a jacked up vehicle when working underneath it. See Figs. 1. and 2 for correct positioning of jacks, hoists and stands.

- Position the service jack centrally under the jacking point to be raised, ensuring that the jack saddle locates securely, and if it is a trolley jack, that the wheels are free to roll. Do not jack vehicle under suspension arms, links etc.

- Securely chock the wheels at the other end of the vehicle.

- Operate the jack to raise the vehicle, keeping watch on the jack saddle to ensure that it remains correctly positioned and does not slip.

- Place chassis stands in position ensuring that they locate correctly without fouling other components, especially brake tubing or electrical wiring.

- Lower the jack carefully and ensure that all the legs of the stands remain firmly in contact with the ground and their heads remain correctly located.

JACKING UP THE VEHICLE - GENERAL

If possible always position the vehicle on a hard level surface. If the vehicle must be jacked up on a soft surface, use load spreading blocks under the jack, and the axle or chassis stands. Always ensure that the jack is of sufficient capacity to lift the load.

Always securely chock the wheels remaining on the ground to prevent the vehicle rolling forwards or backwards. Do not rely on the hand brake as this may have to be released during the repair procedures.

Always install suitable axle or chassis stands before working under a jacked up vehicle.

When reversing onto some ramps, it may be necessary to raise the front of the vehicle to prevent damage to the front spoiler and/or the exhaust flange connection.

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JACKING AND SUPPORT LOCATIONS

Fig. 1. Jacking locations - Sierra

Fig. 2. Jacking locations - Escort.

March 1992
OWNER JACKING

Wherever possible, ensure that the vehicle is on firm ground and that you are working from the kerb-side. Before attempting to jack up the vehicle, make sure that the ground is sufficiently solid to take the jack and any additional supports used.

Apply the handbrake and engage 1st or reverse gear. If jacking the vehicle on a slope cannot be avoided, both wheels on the opposite side of the car must be securely chocked.

Two jacking points are provided on both sides of the car. Select the jacking point adjacent to the wheel which is to be changed.

Sierra

Slide the arm of the owner jack into the jacking point hole AS FAR AS POSSIBLE. Fig.1.

Pivot the top of the jack as close as possible to the side of the car and operate the jack crank handle, Fig.2.

NOTE: A stop is provided on the jack to prevent paintwork damage, when the jack is operated.

THE SIERRA RS COSWORTH JACK MUST NOT BE USED ON ANY OTHER MAKE OR MODEL OF VEHICLE.

Escort

The positions for locating the owner jack are easily recognised as they correspond with identical markings on the rocker panel.

The channel in the head of the jack locates on the flange under the rocker panel, Fig.5.

NOTE: Owner jacks must not be used on any other part of the vehicle. SUPPORTS MUST BE USED WHEN WORKING UNDER THE VEHICLE.

Fig.3. Slide the Sierra jack arm into the jacking point as far as possible.

Fig.4. Operating the Sierra owner jack.

Fig.5. Locating the Escort owner jack.
TOWING THE VEHICLE

When towing is necessary, the vehicle towing eyes should be used. The rope must be securely fastened to the towing eye and attached to the other vehicle such that the rope will not foul the bodywork.

CAUTION: When the vehicle is being towed, the ignition switch must be in position II (steering lock released and warning lights illuminated). Only then will the steering, direction indicators, horn and stop lights be operational.

Alternatively the vehicle can be transported on a Low Loader.

Fig. 4. Towing eyes (arrowed)
A - Escort
B - Sierra
DISCONNECTING THE BATTERY

Always stop the engine before disconnecting the battery.

Always disconnect the battery before commencing repair operation which require:

- The vehicle to be jacked up
- Work on the engine
- Work underneath the vehicle
- Arc-welding

Always disconnect the battery negative (-) lead first.

NOTE: Before disconnecting the battery ensure that the radio keycode is known and, on vehicles fitted with SEC IV ignition systems, make sure that no further data is required from the module as battery disconnection will erase the 'Keep Alive Memory' (KAM) contained in this system. It is not necessary to disconnect or remove electronic control modules.

RECONNECTING THE BATTERY

WARNING: If the battery has been on bench charge the cells may be giving off explosive hydrogen gas. Avoid creating sparks, and if in doubt cover the vent plugs or covers with damp cloth.

Always ensure that all electrical systems are switched OFF before reconnecting the battery, to avoid causing sparks or damage to sensitive electrical equipment.

Always reconnect the battery positive (+) lead first and the negative (-) last, ensuring there is a good electrical contact and the battery terminals are secure.

Restart the clock (where fitted) and set it to the correct time.

Re-enter the radio 'pre-set' frequencies, if known.

CONNECTING A SLAVE BATTERY USING JUMP LEADS.

- Always ensure that the jump leads are adequate for the task. Heavy cables must be used if the starter motor is to be used, but light leads may be adequate if only testing electrical circuits.
- Always ensure that the slave battery is of the same voltage as the vehicle battery and is only connected in parallel. (Positive to positive and negative to negative terminals).
- Always ensure that the electrical circuits are switched OFF before connecting jump leads. This reduces the risk of sparks occurring when the final connection is made.

CAUTION: The 'flat battery' condition may have been caused by an electrical 'short circuit'. If this condition exists there will be an apparently 'live' circuit on the vehicle even when all normal circuits are switched OFF. This can cause 'arching' to occur when the jump leads are connected.

WARNING: If the slave battery has recently been charged and is 'gassing', cover the vent plugs or covers with a damp cloth to reduce the risk of explosion should 'arching' occur when connecting the jump leads.

Always connect the jump leads in the following sequence:

- Booster battery positive first then vehicle battery positive.
CONNECTING A SLAVE BATTERY USING JUMP LEADS (Cont'd)

- Booster battery negative next and then vehicle earth (at least 12 inches (300 mm) from the battery terminal, e.g. engine lifting bracket.)

WARNING: Ensure that the ends of the jump leads do not touch each other, or earth (the vehicle body or chassis frame), at any time while the leads are attached to the battery. A fully charged battery, if 'shorted' through jump leads, can discharge at a rate well above 1000 amps causing violent 'arching', very rapid heating of the jump leads and terminals, and even cause the battery to explode.

- Always reduce the engine speed to idling before disconnecting the jump leads.

- Always disconnect the jump leads in the reverse order to the connecting sequence and take great care not to 'short' the ends of the leads.

CHARGING OF SEALED FOR LIFE BATTERIES (OFF THE VEHICLE)

If a Sealed For Life Battery has a low open circuit terminal voltage having been in stock for some time or failed to crank an engine satisfactorily, it can be fast charged off the vehicle.

The batteries selected for recharge must be charged in an area which is well ventilated and it is recommended that the British Standard Code of Practice for the safe operation of starter batteries is used as a guide.

Constant Voltage Charging

In order to avoid unnecessary supervision of the charge process, a nominally constant voltage charger should be used so that the charge current is automatically cut back as the battery's state of charge improves. The charging equipment should control the voltage maximum limit to 14.4 ± 0.5 volts and ensure that the maximum current is not greater than 25 amperes through any one battery at any time. The one charging equipment would therefore be suitable for all the range of common car batteries in use now and in the foreseeable future. Charge should be terminated when the current remains unchanged over 2 hours.

NOTE: Before disconnecting the charger, always switch the unit off, to avoid sparks.

This procedure will FULLY charge a battery in about 2-3 days. However, it will raise the state of charge from flat to a workable value within 3 hours if the battery is the normal car starter size.

Constant Current Charging

Constant Current Fast Charging is possible but requires constant supervision, otherwise electrolyte will be lost and will leak from the casing. It is not recommended to use this as a regular charging method.

The charge should be started at 25 to 30 Amperes and adjusted so that voltage is 14.0 to 14.4 volts. It should then be adjusted to maintain a voltage of 14.0 to 14.4 volts as the battery's state of charge increases and ensures that terminal voltage does not rise above 15.0 volts.

The battery is at a workable state of charge when the current is accepted at the normal bench charge rate or less and the terminal voltage is 14.4 volts.

NOTE: Before disconnecting the charger, always switch the unit off, to avoid sparks.

Batteries in storage, even on vehicles, must be charged at least once a month to prevent deterioration. When charging a battery, the charger unit manufacturer's instructions should be followed.

NEVER SMOKED OR IGNITE A NAKED FLAME near a battery which is being charged, as the charging process causes highly inflammable hydrogen gas to be given off. For this reason, the charging operation should be carried out off the vehicle, in a well ventilated area, to prevent a build-up of hydrogen.

It is safe to charge a battery on the vehicle provided the previous paragraph is observed during the charging period and for at least 15 minutes after. It has the advantage that after charging, no reconnection to vehicle systems is required (with current vehicles this inevitably causes a spark due to radio memory, clock etc.) and therefore eliminates the chance of an explosion due to the connection being made.

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COMPONENT CLEANING

To prevent ingress of dirt, accumulations of loose dirt and greasy deposits should be removed before disconnecting or dismantling components or assemblies.

Components should be thoroughly cleaned before being inspected prior to reassembly.

CLEANING METHODS

Dry Cleaning:
Remove loose dirt with soft or wire brush. Scraping dirt off with a piece of metal or wood. Wiping off with a rag or metal or wood. Blowing dirt off with compressed air. (Eye protection should be worn when using this method).

Vacuum Extraction:
Removal of dry dust using vacuum equipment. This method should always be used to remove friction lining material dust, (asbestos particles).

Steam Cleaning:
This method of cleaning can be used on most vehicle components except electrical assemblies. Exposed metal surface should be protected immediately after steam cleaning, to prevent corrosion.

Solvent Cleaning:
Various solvents are available which are suitable for component cleaning. Some components such as brake hydraulic parts and electrical assemblies should be cleaned only with recommended solvents - refer to Section 06 or to the section of the manual relevant to the component.

WARNING: Most solvents require careful handling and some are harmful. Refer to Section 05 and to the manufacturers literature for safety precautions.

COMPONENT INSPECTION

CAUTION: The information contained in this section is intended as a general guide to inspection of components. It does not supersede the detailed information given in SPECIFICATIONS or in the text of REPAIR PROCEDURES which must always take precedence.

Components may be inspected during repair or overhaul for the following reasons:

- To examine for damage
- To measure wear
- To assess whether the component is likely to function satisfactorily until its next probable overhaul.

DAMAGE

Damage should be assessed under the headings:

Broken:
The component or a vital part of it may be fractured in such a way as to make it unusable or irreparable.

Distorted:
The component may be bent, twisted, dented or misaligned.

Scored:
The function of the component must be taken into account when assessing the effects of scoring on working surfaces. For instance minor surface scratches or light scoring will cause a brake hydraulic cylinder to fail, but will have little effect in an engine cylinder bore. At the other extreme, robust, heavy duty components such as suspension spring bushes will still function satisfactorily even with very deep scores in their surface.

Cracked:
In some components, cracks may be difficult to find, such as in a cylinder head or block where the crack may widen when the engine is hot, and close up again when cool. It may be necessary to use special equipment such as penetrant dye or magnetic flux to detect the presence and extent of a suspected crack.

Corroded, Eroded or Pitted:
This is the deterioration of the surface of components usually as a result of chemical action. Chemical action can also cause non-metallic materials to swell up or soften, such as brake hydraulic seals damaged by contaminated brake fluid.

Torn or Cut:
Damage to non-metallic components such as oil seals, gaiters, weatherstrips, etc.

WEAR

Where the amount of wear allowable on a component is important, limits of wear will usually be given under SPECIFICATIONS in the relevant section of the manual. Where no wear limits are given, then the component should be inspected with regard to whether the amount of wear apparent on the working surfaces is such that it will seriously affect the function or operation of the component.
ASSESSMENT OF THE FUTURE USEFUL LIFE OF A COMPONENT

If a component has been removed from a high mileage vehicle and a further high mileage is anticipated, this factor should be taken into account when the component is inspected.

When the wear, damage or deterioration of a component is such that it is likely to have only a limited future life, even after overhaul, it may be more economical to renew it.

Where wear, damage or deterioration is apparent on a component which is critical to the safe operation of the vehicle, such as brakes or steering, to the extent that its future life is obviously limited, then that component or assembly must be renewed and not overhauled.

LICENSE PLATE MOUNTING

The necessary parts required for fixing licence plates to unregistered vehicles will be found in a plastic bag placed in the vehicle glove box or luggage compartment.

All models have two guide bosses in the front bumper and two pierced holes in the rear panel. Two waterproof plugs are fitted into the rear panel holes.

FITTING INSTRUCTIONS

U.K., GERMANY and territories not specified below

Drill or pierce front and rear licence plates, with two 6.5 mm holes, on the horizontal centre line symmetrically about the vertical and horizontal centre lines at 230 mm between hole centres. Letters and numerals should be arranged on the licence plate, where possible, to avoid these holes.

Front: - Fig. 7A.

Drill two 3.8 mm holes 15 mm into the guide bosses in the front bumper. Fasten the licence plate to the bumper with two AB 10 x 16 mm screws.

Rear: - Fig. 8.

Check to ensure that the waterproof plugs are firmly pressed into position in the body panel holes. Failure to ensure a correct fit could lead to water leaks. Offer the licence plate to the mounting plugs and pierce the sealing membrane by screwing two AB 10 x 16 mm screws carefully into the plugs until the plate is secure.

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Fig. 7.
Licence plate mounting (cont'd)

Italy only

Front: - Fig. 7B.

Drill two 3.8mm holes 15mm into the guide bosses in the front bumper. Fasten brackets supplied to the bumper with two AB 10 x 16 mm screws. Drill the licence plate with 4.5 mm holes to coincide with the holes in the mounting bracket. Fix the plate in place by passing plastic rivets through the plate into the bracket. Set the rivets by pushing the rivet stem firmly into the rivet body.

Rear: - As U.K., Germany and others.

France only

Front: - Fig. 7C.

Drill two 3.8mm holes 15mm into the guide bosses in the front bumper. Fasten brackets supplied to the bumper with two AB 10 x 16 mm screws. Drill four 4.85 mm holes in the licence plate to line up with the two holes in each mounting bracket.

Note: These holes must be offset vertically from the horizontal centre line by 6mm, see Fig. 8.

Fasten licence plate to brackets by passing four 4.8 mm blind rivets through plate and brackets and secure plate by setting rivets.

Rear: - Fig. 9.

Ensure plug is secure. Failure to do so could lead to water leaks. Offer the licence plate to the mounting area and drill two 4.85 mm holes through the plate and body panel/tailgate, symmetrically along the horizontal line of the plate, avoiding letters. Fix plate by passing two 4.8 mm blind rivets through the plate and a spacer washer into the body panel and setting in place.