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Supercharger (18.50.15) - VIN Range: N52048->N99999

Supercharger Outlet Pipe (18.50.16)

303-12C: Intake Air Distribution and Filtering - 2.7L V6 - TdV6

Specification

Description and Operation

Intake Air Distribution and Filtering

Diagnosis and Testing

Intake Air Distribution and Filtering

Removal and Installation

Air Cleaner (19.10.05)

Air Cleaner Element (19.10.08)

Charge Air Cooler

303-13: Evaporative Emissions

Specification

Description and Operation

Evaporative Emissions - VIN Range: M45255->N52047

Evaporative Emissions - VIN Range: N52048->N99999

Diagnosis and Testing

Evaporative Emissions - VIN Range: M45255->N52047

Evaporative Emissions - VIN Range: N52048->N99999

Removal and Installation

Evaporative Emission Canister (17.15.13) - VIN Range: M45255->N52047

Evaporative Emission Canister (17.15.13) - VIN Range: N52048->N99999

Evaporative Emission Canister Purge Valve (17.15.30) - VIN Range: M45255->N52047

Evaporative Emission Canister Vent Solenoid (17.15.45)

Fuel Tank Pressure Sensor (19.55.31) - Vehicles Built Up To: 01/2004

303-14A: Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Specification

Description and Operation

Electronic Engine Controls

Diagnosis and Testing

Electronic Engine Controls - VIN Range: M45255->N52047

Electronic Engine Controls - VIN Range: N52048->N80180

Electronic Engine Controls - VIN Range: N80181->R99999

General Procedures

Powertrain Control Module (PCM) Long Drive Cycle Self-Test

Powertrain Control Module (PCM) Short Drive Cycle Self-Test

Removal and Installation

Brake Pedal Position (BPP) Switch

Camshaft Position (CMP) Sensor LH (18.31.12)

Camshaft Position (CMP) Sensor RH (18.31.11)

Catalyst Monitor Sensor (18.30.66)

Crankshaft Position (CKP) Sensor (18.30.12)

Engine Control Module (ECM) (18.30.01)

Engine Coolant Temperature (ECT) Sensor (18.30.10) - VIN Range: M45255->N52047

Engine Coolant Temperature (ECT) Sensor (18.30.10) - VIN Range: N52048->N99999

Fuel Temperature Sensor (18.30.99)

Heated Oxygen Sensor (HO2S)
Intake Manifold Tuning (IMT) Valve LH (19.70.30)
Knock Sensor (KS) LH (18.30.92)
Knock Sensor (KS) RH (18.30.93)
Manifold Absolute Pressure (MAP) Sensor (18.30.86)
Mass Air Flow (MAF) Sensor (18.30.15)
Oil Temperature Sensor (18.31.01)
Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90)

303-14B: Electronic Engine Controls - V8 4.2L Petrol/V8 S/C 4.2L Petrol Specification

Description and Operation

Electronic Engine Controls

Diagnosis and Testing

Electronic Engine Controls - VIN Range: M45255->N52047

Electronic Engine Controls - VIN Range: N52048->N80180

Electronic Engine Controls - VIN Range: N80181->R99999

General Procedures

Powertrain Control Module (PCM) Long Drive Cycle Self-Test

Powertrain Control Module (PCM) Short Drive Cycle Self-Test

Removal and Installation

Brake Pedal Position (BPP) Switch

Camshaft Position (CMP) Sensor LH (18.31.12)

Camshaft Position (CMP) Sensor RH (18.31.11)

Catalyst Monitor Sensor (18.30.66)

Crankshaft Position (CKP) Sensor (18.30.12)

Engine Control Module (ECM) (18.30.01)

Engine Coolant Temperature (ECT) Sensor (18.30.10)

Fuel Temperature Sensor (18.30.99)

Heated Oxygen Sensor (HO2S)

Intake Air Temperature (IAT) Sensor (18.30.52)

Knock Sensor (KS) LH (18.30.92)

Manifold Absolute Pressure (MAP) Sensor (18.30.86)

Mass Air Flow (MAF) Sensor (18.30.15)

Oil Temperature Sensor (18.31.01)

Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90)

303-14C: Electronic Engine Controls - 2.7L V6 - TdV6

Specification

Description and Operation

Electronic Engine Controls

Diagnosis and Testing

Electronic Engine Controls

Removal and Installation

Brake Pedal Position (BPP) Switch

Camshaft Position (CMP) Sensor (18.30.63)

Crankshaft Position (CKP) Sensor (18.30.12)

Crankshaft Position (CKP) Sensor Ring

Engine Control Module (ECM) (18.30.01)

Engine Coolant Temperature (ECT) Sensor (18.30.10)

Engine Oil Pressure (EOP) Sensor

Fuel Rail Pressure (FRP) Sensor (18.30.98)

Fuel Temperature Sensor (18.30.99)

Knock Sensor (KS) LH (18.30.92)

Knock Sensor (KS) RH (18.30.93)

Manifold Absolute Pressure (MAP) Sensor (18.30.86)

Mass Air Flow (MAF) Sensor (18.30.15)

307: Automatic Transmission/Transaxle

307-01: Automatic Transmission/Transaxle

Specification

Description and Operation

Transmission Description

Diagnosis and Testing

Diagnostic Strategy - VIN Range: M45255->N52047

Diagnostic Strategy - VIN Range: N52048->N99999

General Procedures

Transmission Fluid Drain and Refill (44.24.02)

Transmission Fluid Level Check

In-Vehicle Repair

Extension Housing Seal (44.20.18)

Transmission Fluid Pan, Gasket and Filter (44.24.07)

Transmission Control Module (TCM) and Main Control Valve Body

Removal

Transmission (44.20.01) - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Transmission (44.20.01) - 2.7L V6 - TdV6

Transmission (44.20.01) - V8 4.2L Petrol/V8 S/C 4.2L Petrol

Disassembly and Assembly of Subassemblies

Input Shaft Seal (44.32.07)

Installation

Transmission (44.20.01) - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Transmission (44.20.01) - 2.7L V6 - TdV6

Transmission (44.20.01) - V8 4.2L Petrol/V8 S/C 4.2L Petrol

307-02: Transmission/Transaxle Cooling

Specification

Description and Operation

Transmission Cooling

Diagnosis and Testing

Transmission Cooling

Removal and Installation

Transmission Fluid Cooler (44.24.10)

Transmission Fluid Cooler Tubes (44.24.19)

307-05: Automatic Transmission/Transaxle External Controls

Specification

Description and Operation

External Controls

Diagnosis and Testing

External Controls

General Procedures

Selector Lever Cable Adjustment (44.15.07)

Removal and Installation

Selector Lever Cable and Bracket (44.15.08)

Selector Lever Assembly (44.15.04)

308: Manual Transmission/Transaxle, Clutch and Transfer Case

308-00: Manual Transmission/Transaxle and Clutch - General Information

Specification

Description and Operation

Manual Transmission and Clutch

Diagnosis and Testing

Manual Transmission and Clutch

General Procedures

Clutch System Bleeding (33.15.01)

Release Hub and Bearing Check

308-01: Clutch

Specification

Description and Operation

Clutch

Diagnosis and Testing

Clutch

Removal and Installation

Clutch Disc and Pressure Plate (12.53.13) (33.10.01)

308-02: Clutch Controls

Specification

Description and Operation

Clutch Controls

Diagnosis and Testing

Clutch Controls

Removal and Installation

Clutch Master Cylinder (33.20.01)

Clutch Slave Cylinder (33.35.01)

308-03A: Manual Transmission/Transaxle - Vehicles With: 5-Speed Manual Transmission –

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Specification

Description and Operation

Manual Transmission

Diagnosis and Testing

Manual Transmission

General Procedures

Drain Procedure

Fill Procedure

In-Vehicle Repair

Gearshift Control Shaft Seal (37.23.08)

- Input Shaft Seal (37.23.09)
- Output Shaft Seal (37.23.01)
- Support Insulator (37.16.42)

Removal

- Transmission (37.20.01)

Installation

- Transmission (37.20.01)

308-03B: Manual Transmission/Transaxle - Vehicles With: S6-53 6-Speed Manual

- Transmission

- Specification

- Description and Operation

- Manual Transmission

- Diagnosis and Testing

- Manual Transmission

- General Procedures

- Drain Procedure

- Fill Procedure

- In-Vehicle Repair

- Countershaft Seal

- Gearshift Control Shaft Seal (37.23.08)

- Input Shaft Seal (37.23.09)

- Output Shaft Seal (37.23.01)

- Support Insulator (37.16.42)

- Removal

- Transmission (37.20.01)

- Installation

- Transmission (37.20.01)

308-06: Manual Transmission/Transaxle External Controls

- Specification

- Description and Operation

- External Controls

- Diagnosis and Testing

- External Controls

- Removal and Installation

- Gearshift Lever Bushing

Gearshift Linkage (37.16.03) - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Gearshift Linkage (37.16.03) - 2.7L V6 - TdV6

309: Exhaust System

309-00: Exhaust System

Specification - VIN Range: M45255->N52047

Specification - VIN Range: N52048->N99999

Description and Operation

Exhaust System - VIN Range: M45255->N52047

Exhaust System - VIN Range: N52048->N99999

Diagnosis and Testing

Exhaust System - VIN Range: M45255->N13088

Exhaust System - VIN Range: N13089->N99999

Removal and Installation

Catalytic Converter (17.50.05) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Catalytic Converter (17.50.05) - 2.7L V6 - TdV6

Diesel Particulate Filter (DPF)

Diesel Particulate Filter (DPF) Differential Pressure Sensor

Exhaust System - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Front Muffler (30.10.18)

Muffler and Tailpipe (30.10.52)

310: Fuel System

310-00: Fuel System - General Information

Specification

Description and Operation

Fuel System - VIN Range: M45255->N52047

Fuel System - VIN Range: N52048->N99999

Diagnosis and Testing

Fuel System

General Procedures

Fuel System Pressure Check

Fuel System Pressure Release (19.50.02)

Fuel Tank Draining - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: M45255->N52047

Fuel Tank Draining - 2.7L V6 - TdV6, VIN Range: M45255->N52047

Fuel Tank Draining - VIN Range: N52048->N99999

High-Pressure Fuel System Bleeding

Low-Pressure Fuel System Bleeding

Quick Release Coupling - Push Connect

Quick Release Coupling

Spring Lock Couplings

310-01: Fuel Tank and Lines

Specification

Description and Operation

Fuel Tank and Lines - VIN Range: M45255->N52047

Fuel Tank and Lines - VIN Range: N52048->N99999

Diagnosis and Testing

Fuel Tank and Lines - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: M45255->N52047

Fuel Tank and Lines - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: N52048->N80180

Fuel Tank and Lines - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: N80181->R99999

Fuel Tank and Lines - 2.7L V6 - TdV6

Removal and Installation

Fuel Filter (19.25.02) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Fuel Filter (19.25.02) - 2.7L V6 - TdV6

Fuel Level Sender LH - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: M45255->N52047

Fuel Level Sender LH - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: N52048->N99999

Fuel Level Sender RH - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: M45255->N52047

Fuel Level Sender RH - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: N52048->N99999

Fuel Pump Module (19.45.08) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: M45255->N52047

Fuel Pump Module (19.45.08) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: N52048->N99999

Fuel Pump Module (19.45.08) - 2.7L V6 - TdV6

Fuel Tank (19.55.01) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Fuel Tank (19.55.01) - 2.7L V6 - TdV6

Fuel Tank Filler Pipe (19.55.33)

Fuel Transfer Pump (19.45.21) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: M45255->N52047

Fuel Transfer Unit - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: N52048->N99999

Fuel Transfer Unit - 2.7L V6 - TdV6

Inertia Fuel Shutoff (IFS) Switch (18.30.35)

310-02: Acceleration Control

Specification

Description and Operation

Acceleration Control

Diagnosis and Testing

Acceleration Control

Removal and Installation

Accelerator Pedal (19.20.01)

Accelerator Pedal (19.20.01) - Vehicles With: Adjustable Pedals

310-03: Speed Control

Specification

Description and Operation

Speed Control - VIN Range: M45255->N52047

Speed Control - VIN Range: N52048->N99999

Diagnosis and Testing

Speed Control - VIN Range: M45255->N13088

Speed Control - VIN Range: N13089->N52047

Speed Control - VIN Range: N52048->N99999

General Procedures

Speed Control Module Alignment

Removal and Installation

Speed Control Deactivator Switch (19.75.20)

Speed Control Module (19.75.26)

Speed Control Sensor

Speed Control Switch (19.75.25)

4: Electrical

412: Climate Control System

412-00: Climate Control System - General Information

Specification

Description and Operation

Climate Control System

Diagnosis and Testing

Climate Control System

General Procedures

Air Conditioning (A/C) System Flushing

Air Conditioning (A/C) System Recovery, Evacuation and Charging (82.30.30)

Contaminated Refrigerant Handling

Electronic Leak Detection

Fluorescent Dye Leak Detection

Inspection and Assembly Requirements

Manifold Gauge Set Connection

Refrigerant Oil Adding

Refrigerant System Tests

412-01: Air Distribution and Filtering

Specification

Description and Operation

Air Distribution and Filtering

Diagnosis and Testing

Air Distribution and Filtering

Removal and Installation

Cabin Air Filter (76.10.09)

Center Registers (82.20.38)

Driver Side Register (82.20.39)

Driver Side Register Duct (82.20.49)

Floor Console Register Duct (82.20.37)

Front Footwell Duct LH (82.20.91)

Front Footwell Duct RH (82.20.92)

Passenger Side Register (82.20.40)

Passenger Side Register Duct (82.20.51)

Rear Footwell Duct (82.20.96)

412-02A: Heating and Ventilation

Specification

Description and Operation

Heating and Ventilation

Diagnosis and Testing

Heating and Ventilation

Removal and Installation

Auxiliary Coolant Flow Pump (82.25.59) - 2.7L V6 - TdV6

Auxiliary Coolant Flow Pump (82.25.59) - V8 4.2L Petrol/V8 S/C 4.2L Petrol

Blower Motor (82.25.66)

Dual Coolant Flow Valve (82.20.33) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 –
AJV6/3.0L NA V6 - AJ27

Dual Coolant Flow Valve (82.20.33) - 2.7L V6 - TdV6

Heater Core and Evaporator Core Housing (82.25.21)

Heater Hose (80.25.01) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L
NA V6 - AJ27

Disassembly and Assembly

Heater Core and Evaporator Core Housing

412-02B: Auxiliary Heating

Specification

Description and Operation

Auxiliary Heater

Diagnosis and Testing

Auxiliary Heater

Fuel Fired Booster Heater

Removal and Installation

Auxiliary Heater

412-03: Air Conditioning

Specification

Description and Operation

Air Conditioning

Diagnosis and Testing

Air Conditioning

Removal and Installation

Air Conditioning (A/C) Compressor (82.10.20) - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Air Conditioning (A/C) Compressor (82.10.20) - V8 4.2L Petrol/V8 S/C 4.2L Petrol

Air Conditioning (A/C) Compressor (82.10.20) - 2.7L V6 - TdV6

Clutch and Clutch Field Coil (82.10.25)

Condenser Core (82.15.07)

Desiccant Bag (82.17.03)

Pressure Cutoff Switch (82.10.32) - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Pressure Cutoff Switch (82.10.32) - 2.7L V6 - TdV6

412-04: Control Components

Specification

Description and Operation

Control Components

Diagnosis and Testing

Control Components

Removal and Installation

Air Discharge Temperature Sensor (82.20.64)

Ambient Air Temperature Sensor (82.20.02)

Climate Control Assembly (82.20.07)

Cold Air Bypass Blend Door Actuator (82.20.86)

Defrost Vent/Register Blend Door Actuator (82.20.84)

Footwell Vent/Duct Blend Door Actuator (80.20.20 or 82.20.85)

Instrument Panel Blend Door Actuator (82.20.83)

In-Vehicle Temperature Sensor (82.20.03)

Recirculation Blend Door Actuator (82.20.67)

Sunload Sensor (82.20.70)

413: Instrumentation and Warning Systems

413-00: Instrument Cluster and Panel Illumination

Diagnosis and Testing

Instrument Cluster and Panel Illumination

413-01: Instrument Cluster

Specification - Vehicles Built Up To: 01/2004

Description and Operation

Instrument Cluster

Diagnosis and Testing

Instrument Cluster

Removal and Installation

Indicator Bulb (86.45.61) - Vehicles Built Up To: 01/2004

Instrument Cluster (88.20.01)

Instrument Cluster Lens (88.20.28)

413-06: Horn

Specification

Description and Operation

Horn

Diagnosis and Testing

Horn

Removal and Installation

Horn (86.30.02) (86.30.10)

Horn Switch (86.30.01)

413-08: Information and Message Center

Description and Operation

Information and Message Center

Diagnosis and Testing

Information and Message Center

Removal and Installation

Message Center Switch (86.66.11)

413-09: Warning Devices

Description and Operation

Warning Devices

Diagnosis and Testing

Warning Devices

General Procedures

Oil Change Indicator Reset

413-13: Parking Aid

Description and Operation

Parking Aid

Diagnosis and Testing

Parking Aid

Removal and Installation

Front Parking Aid Sensor (86.62.33) - Vehicles Built From: 02/2004

Parking Aid Module (86.80.39)

Parking Aid Speaker (86.62.02)

Rear Parking Aid Sensor (86.54.14) (86.62.01) - Vehicles Built From: 02/2004

Rear Parking Aid Sensor (86.54.14) (86.62.01) - Vehicles Built Up To: 01/2004

414: Battery and Charging System

414-00: Battery and Charging System - General Information

Description and Operation

Charging System

Battery Care

Quiescent Drain

Diagnosis and Testing

Charging System - V8 4.2L Petrol/V8 S/C 4.2L Petrol/2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Charging System - 2.7L V6 - TdV6

General Procedures

Battery Charging

414-01: Battery, Mounting and Cables

Specification

Description and Operation

Battery and Cables

Diagnosis and Testing

Battery

General Procedures

Battery Connect (86.15.15)

Battery Disconnect and Connect

Removal and Installation

Battery (86.15.01)

Battery Ground Cable (86.15.19)

Battery Tray (86.15.11)

414-02: Generator and Regulator

Specification

Description and Operation

Generator

Diagnosis and Testing

Generator

Removal and Installation

Generator (86.10.02) - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Generator (86.10.02) - 2.7L V6 - TdV6

Generator (86.10.02) - V8 4.2L Petrol/V8 S/C 4.2L Petrol

415: Information and Entertainment Systems

415-00: Information and Entertainment System - General Information

Diagnosis and Testing

Audio System

General Procedures

Cassette Player Cleaning

415-01: Audio Unit

Specification

Description and Operation

Audio System

Diagnosis and Testing

Audio System

Removal and Installation

Amplifier (86.50.10)

Audio Unit (86.50.03)

Compact Disc (CD) Changer (86.50.06)

Steering Wheel Audio Controls (86.50.42)

415-02: Antenna

Description and Operation

Antenna

Diagnosis and Testing

Antenna

Removal and Installation

Antenna Isolator Module (86.51.08)

415-03: Speakers

Description and Operation

Speakers

Diagnosis and Testing

Speakers

Removal and Installation

Front Door Speaker (86.50.13)

Rear Door Speaker (86.50.14)

Subwoofer Speaker (86.51.05)

417: Lighting

417-01: Exterior Lighting

Specification

Description and Operation

Exterior Lighting

Diagnosis and Testing

Headlamps

General Procedures

Headlamp Adjustment (86.40.18)

Removal and Installation

Ballast (86.41.52) - Vehicles With: High Intensity Discharge Headlamps

Front Fog Lamp (86.40.96) - Vehicles Built From: 02/2004

Front Fog Lamp (86.40.96) - Vehicles Built Up To: 01/2004

Headlamp Assembly (86.41.33)

Headlamp Bulb (86.42.14) - Vehicles With: High Intensity Discharge Headlamps

Headlamp Leveling Module

Headlamp Leveling Motor (86.42.04) - Vehicles With: High Intensity Discharge \ Headlamps

Headlamp Leveling Motor (86.42.04) - Vehicles Without: High Intensity Discharge Headlamps

Headlamp Leveling Sensor (86.42.15)

Headlamp Leveling Switch (86.65.87)

Rear Lamp Assembly (86.40.70) - Vehicles Built From: 02/2004

Rear Lamp Assembly (86.40.70) - Vehicles Built Up To: 01/2004

Stoplamp Switch

417-02: Interior Lighting

Description and Operation

Interior Lighting

Diagnosis and Testing

Interior Lighting

417-04: Daytime Running Lamps (DRL)

Description and Operation

Daytime Running Lamps (DRL)

Diagnosis and Testing

Daytime Running Lamps (DRL)

418: Electrical Distribution

418-00: Module Communications Network

Description and Operation

Communications Network

Diagnosis and Testing

Communications Network - VIN Range: M45255->N52047

Communications Network - VIN Range: N52048->N99999

418-01: Module Configuration

Diagnosis and Testing

Module Configuration

418-02: Wiring Harnesses

Description and Operation

Wiring Harness

General Procedures

Wiring Harness Repair

419: Electronic Feature Group

419-01A: Anti-Theft - Active

Description and Operation

Anti-Theft - Active

Diagnosis and Testing

Anti-Theft - Active

Removal and Installation

Anti-Theft Alarm Horn (86.52.03)

419-01B: Anti-Theft - Passive

Description and Operation

Anti-Theft - Passive

Diagnosis and Testing

Anti-Theft - Passive

General Procedures

Anti-Theft Security Access

Key Programming Using Diagnostic Equipment

Key Programming Using Two Programmed Keys

Removal and Installation

Passive Anti-Theft System (PATS) Transceiver (86.52.30)

419-05: Telematics

Description and Operation

Telematics

Diagnosis and Testing

Telematics

Removal and Installation

Global Positioning System (GPS) Antenna (86.56.61)

Module (86.56.59)

419-07: Navigation System

Description and Operation

Navigation System

Diagnosis and Testing

Navigation System

Removal and Installation

Navigation System Antenna (86.62.06)

Navigation System Display Module (86.62.07)

Navigation System Module (86.62.05)

419-08: Cellular Phone

Description and Operation

Cellular Phone - VIN Range: M45255->N52047

Cellular Phone - VIN Range: N52048->N99999

Diagnosis and Testing

- Cellular Phone

- Cellular Phone - Vehicles With: Bluetooth

Removal and Installation

- Bluetooth Module

- Cellular Phone Antenna (86.51.17)

419-10: Multifunction Electronic Modules

Specification

Description and Operation

- Module Controlled Functions

Diagnosis and Testing

- Multifunction Electronic Module

Removal and Installation

- Driver Door Module (DDM) (86.80.29)

- Driver Seat Module (DSM) (86.75.28)

- Front Electronic Module (FEM) (86.80.41)

- Multifunction Voice Activated Module (86.53.13) (86.80.40)

- Rear Electronic Module (REM) (86.80.37)

5: Body and Paint

501: Body and Paint

501-02: Front End Body Panels

Description and Operation

- Front End Body Panels

Removal and Installation

- Air Deflector (76.11.41)

- Cowl Panel Grille (76.10.01) (76.43.39)

- Fender Splash Shield (76.10.90)

- Radiator Grille Opening Panel (76.10.06)

- Radiator Splash Shield (76.22.90)

501-03: Body Closures

Specification

Description and Operation

- Body Closures

General Procedures

Hood Alignment (76.16.02)

Luggage Compartment Lid Alignment (76.19.03)

Rear Door Alignment (76.28.08)

Removal and Installation

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General Information - About This Manual

Description and Operation

Notes, Cautions and Warnings

Throughout this manual, important information is highlighted by the use of notes, cautions and warnings. NOTES give additional information on a topic or procedure, CAUTIONS are given to prevent damage to the vehicle, and WARNINGS are given to prevent personal injury.

General Information - Application and Use of Specifications

Description and Operation

Torque Specifications

Torque specifications are shown in the torque specifications chart located at the front of the relevant section.

General Information - General Service Information

Description and Operation

Repairs and Replacements

When service parts are required, it is essential that only genuine Jaguar/Daimler replacements are used.

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

- Safety features embodied in the vehicle may be impaired if other than genuine parts are fitted. In certain territories, legislation prohibits the fitting of parts which are not produced to the vehicle manufacturer's specification.
- Torque wrench setting figures given in this 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 make sure that the accessory and its fitted location on the vehicle conform to mandatory requirements existing in their country of origin.
- The vehicle warranty may be invalidated by the fitting of other than genuine Jaguar/Daimler parts. All Jaguar/Daimler replacements have the full backing of the factory warranty.
- Jaguar/Daimler dealers are obliged to supply only genuine service parts.

Vehicle Specifications

Purchasers are advised that the specification details set out in this manual apply to a range of vehicles and not to any specific one. For the specification of a particular vehicle, purchasers should consult their dealer.

The Manufacturer reserves the right to vary the specifications, with or without notice, and at such times and in such manner as the Manufacturer thinks fit. Major as well as minor changes may be involved, in accordance with the Manufacturer's policy of continuous improvement.

Whilst every effort is made to make sure the accuracy of the particulars contained in this manual, neither the Manufacturer nor the Dealer, by whom the manual is supplied, shall in any circumstances be held liable for any inaccuracy or the consequences thereof.

Service Repair Operation Numbering

A master index of numbered operations has been compiled for universal application to all vehicles manufactured by Jaguar Cars Ltd.

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

Each maintenance procedure in this manual is described in the sequence necessary to complete the operation in the minimum time, as specified in the Repair Operation Times schedule.

References to Bank-1 and Bank-2


References to Bank-1 and Bank-2 are made with regard to the engine. When viewed from the flywheel the right-hand bank will be Bank-1 and the left-hand bank will be Bank-2.

Special Tools

Any special tools and equipment required to perform a maintenance procedure, are shown at the beginning of each procedure. When possible, illustrations are given to assist in identifying the tool needed.

Disconnecting/Connecting the Battery

Always stop the engine before disconnecting the battery negative lead and make sure the battery positive lead is isolated i.e. wrapped in a suitable cloth.

 **WARNING:** Radio code saving devices must not be used when conducting work on Air Bag or Fuel systems. It must be noted that, when using these devices, the vehicle electrical system is still live albeit with a reduced current flow.

• **NOTE:** Before disconnecting the battery make sure that the radio receiver/cassette player/mini disc player and compact disc player keycodes are known and, that no data is required from the engine control module (ECM) as battery disconnection will erase any fault codes and idle/drive values held in the Keep Alive Memory (KAM). It is not necessary to disconnect or remove electronic control modules.

Always disconnect the battery before commencing repair operations which require:

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

Alternatively a Radio Code Saver may be used. With the battery disconnected, a Radio Code Saver will allow sufficient current to pass to maintain the radio receiver/cassette player/mini disc player and compact disc player memory, operate the clock and supply the door operated interior lights while isolating the battery in the event of a short circuit.

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 a damp cloth.

Always make sure 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 that 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 receiver/cassette player/mini disc player and compact disc player model codes and preset frequencies, if known.

Following reconnection of the battery, the engine should be allowed to idle until it has reached normal operating temperature as the stored idle and drive values contained within the ECM have been lost. Allow the vehicle to idle for a further three minutes. Drive the vehicle at constant speeds of approximately 48 km/h (30 mph), 64 km/h (40 mph), 80 km/h (50 mph), 96 km/h (60 mph) and 112 km/h (70 mph) for three minutes each. This may cause a driveability concern if the procedure is not carried out. This will allow the ECM to relearn idle values.

Connecting a Slave Battery Using Jump Leads

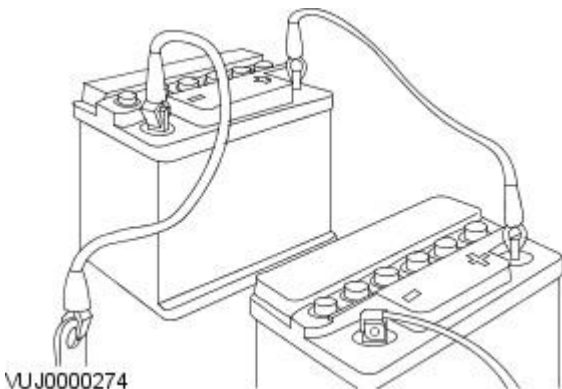
WARNING: If the slave battery has recently been charged and is gassing, cover the vent plugs or covers with a damp cloth to reduce the risk of explosion should arcing occur when connecting the jump leads.

• CAUTIONS:

! A 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 arcing when the jump leads are connected.

! Whilst it is not recommended that the vehicle is jump started, it is recognized that this may occasionally be the only practical way to mobilize a vehicle. In such an instance the discharged battery must be recharged immediately after jump starting to avoid permanent damage.

- Always make sure that the jump leads are adequate for the task. Heavy duty cables must be used.
- Always make sure that the slave battery is of the same voltage as the vehicle battery. The batteries must be connected in parallel.
- Always make sure that switchable electric circuits are switched off before connecting jump leads. This reduces the risk of sparks occurring when the final connection is made.



WARNING: Make sure that the ends of the jump leads do not touch each other or ground against the vehicle body 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 arcing and very rapid heating of the jump leads and terminals, and can even cause the battery to explode.

Always connect the jump leads in the following sequence.

- Slave battery positive first then vehicle battery positive.
- Slave battery negative next and then vehicle ground at least, 300 mm (12 in) from the battery terminal e.g. engine lifting bracket.

Always reduce the engine speed to idle before disconnecting the jump leads.

Before removing the jump leads from the vehicle that had the discharged battery, switch on the heater blower (high) or the heated rear screen, to reduce the voltage peak when the leads are removed.

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.

Do not rely on the alternator to restore a discharged battery. For an alternator to recharge a battery, it would take in excess of 8 hours continuous driving with no additional loads placed on the battery.

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 inspection prior to reassembly.

Cleaning Methods:

- Dry Cleaning
- Removal of loose dirt with soft or wire brushes.
- Scraping dirt off with a piece of metal or wood.
- Wiping off with a rag.

CAUTION: Compressed air is sometimes wet so use with caution, especially on hydraulic systems.

- Blowing dirt off with compressed air. (Eye protection should be worn when using this method).
- Removal of dry dust using vacuum equipment. This method should always be used to remove friction lining material dust (asbestos particles).
- Steam Cleaning

Calibration of Essential Measuring Equipment

WARNING: Failure to comply may result in personal injury or damage to components.

It is of fundamental importance to certain equipment e.g. torque wrenches, multimeters, exhaust gas analysers, rolling roads etc., are regularly calibrated in accordance with the manufacturers instructions.

Use of Control Modules

Control modules may only be used on the vehicle to which they were originally fitted. Do not attempt to use or test a control module on any other vehicle.

Functional Test

On completion of a maintenance procedure, a thorough test should be carried out, to make sure that the relevant vehicle systems are working correctly.

Preparation

Before disassembly, clean the surrounding area as thoroughly as possible. When components have been removed, blank off any exposed openings using grease-proof paper and masking tape. Immediately seal fuel, oil and hydraulic lines when separated, using plastic caps or plugs, to prevent loss of fluid and the entry of dirt. Close the open ends of oilways, exposed by component removal, with tapered hardwood plugs or readily visible plastic plugs. Immediately a component is removed, place it in a suitable container; use a separate container for each component and its associated parts. Before dismantling a component, clean it thoroughly with a recommended cleaning agent; check that the agent will not damage any of the materials within the component. Clean the bench and obtain marking materials, labels, containers and locking wire before dismantling a component.

Dismantling

Observe scrupulous cleanliness when dismantling components, particularly when parts of the brake, fuel or hydraulic systems are being worked on. A particle of dirt or a fragment of cloth could cause a dangerous malfunction if trapped in these systems. Clean all tapped holes, crevices, oilways and fluid passages with compressed air. Do not permit compressed air to enter an open wound. Always use eye protection when using compressed air.

Make sure that any O-rings used for sealing are correctly refitted or renewed if disturbed. Mark mating parts to make sure that they are replaced as dismantled. Whenever possible use marking materials which avoid the possibilities of causing distortion or the initiation of cracks, which could occur if a center punch or scriber were used. Wire together mating parts where necessary to prevent accidental interchange (e.g. roller bearing components). Tie labels on to all parts to be renewed and to parts requiring further inspection before being passed for reassembly. Place labelled parts and other parts for rebuild in separate containers. Do not discard a part which is due for renewal until it has been compared with the new part, to make sure that the correct part has been obtained.

Inspection

Before inspecting a component for wear or performing a dimensional check, make sure that it is absolutely clean; a slight smear of grease can conceal an incipient failure. When a component is to be checked dimensionally against figures quoted for it, use the correct equipment (surface plates, micrometers, dial gauges etc.) in serviceable condition. The use of makeshift equipment can be dangerous. Reject a component if its dimensions are outside the limits quoted, or if damage is apparent. A part may be refitted if its critical dimension is exactly to the limit size and it is otherwise satisfactory. Use Plastigauge 12 Type PG-1 for checking bearing surface clearance, e.g. big end bearing shell to crank journal. Instructions for the use of Plastigauge and a scale giving bearing clearances in steps of 0,0025 mm (0.0001 in) are supplied with the package.

On-Board Diagnostics (OBD)

This vehicle uses programmed electronic control systems to provide engine management and emission regulation, automatic transmission operation and anti-lock braking control. These control systems are integral with the On-Board Diagnostics (OBD) facility which is used in conjunction with either the Jaguar approved diagnostic system or the more restricted scan tools.

The OBD information in this manual provides diagnostic and rectification procedures for emission related electrical and mechanical systems. The information is intended to facilitate fault diagnosis and the subsequent rectification of the vehicle without recourse to the Jaguar approved diagnostic system.

The manual covers the following OBD topics:

- General Information
- Engine Management System
- Automatic Transmission
- Anti-lock Braking System

Each section comprises one or more of the following sub-sections as required.

The Description and Operation sub-section includes:

- A general illustration and parts list to help the identification of the particular system or component.
- A brief description of the system operating characteristics and monitoring procedure accompanied by a component illustration.
- Additional information, where appropriate, is provided in the form of component calibrations, characteristics and cross sectional views.
- A localized circuit diagram is included to provide circuit identification, connectors, splices, fuses, wire gauge and colors. See Circuit Diagrams.

The Diagnosis and Testing sub-section is dedicated to fault analysis and rectification, and includes:

- Recommended special tools.
- Symptom chart; a chart containing all relevant Diagnostic Trouble Codes (DTC), their possible causes and an indication of the appropriate test.
- Specific pinpoint test(s), designed so that fault diagnosis can be carried out in a logical and efficient manner.

The Removal and Installation sub-section covers:

- Removal procedure(s), formatted in the recommended sequence.
- Illustrated guide to the use of special tools.
- Illustrations to support the relevant text.
- Installation procedure as above and including special recommendations for processes, lubricants and tightening torques.

Circuit Diagrams

To understand the relationship between the vehicle electrical system and the system circuit diagrams, Refer to the Electrical Guide.

In the interest of clarity, single lines may represent multiple wires. Refer to the color code (1st alpha) followed by the wire reference (numeric/alpha/numeric) to trace origin and destination.

e.g. BW 647B002. BW (black with white trace) 647 (wire reference) B002 (stage from origin).

Glossary of Terms

This glossary of terms is intended to cover mainly emissions-related (to SAE J 1930) terminology, and other abbreviations that may be used in this manual.

The required term may be looked-up in the left-hand column, and subsequent columns give the standard acronym, unit or abbreviation, and definition.

Term(s)	Acronym / Unit / Abbreviation	Definition
Accelerator Pedal	AP	
Accelerator Pedal Position Sensor	APP	Is a multitrack sensor which inputs the drivers demand into the engine control module (ECM)
After Bottom Dead Center	ABDC	Event occurring after BDC
After Top Dead Center	ATDC	Event occurring after TDC
Airbag / Supplementary Restraint System	Airbag, SRS	Airbag restraint system for driver and front seat passenger
Air Cleaner	ACL	
Air Conditioning	A/C	
Air Conditioning Control Module	A/CCM	Module controlling air conditioning, heating and ventilation
Air Conditioning Signal	ACS	Air conditioning compressor clutch operation is signalled to the ECM which induces idle speed corrections to compensate for engine load changes
Alternating current	ac	
Air Fuel Ratio	AFR	Nominally 14.7 parts air to one part fuel
Ampere	A	SI unit of current
Ampere hour	Ah	
ABS Control Module	ABS CM	System which prevents wheel lock-up under braking by sensing lack of rotation of a wheel(s) and diverting fluid pressure away from it (them)
ABS / Traction Control Control Module	ABS/TCCM	System which prevents wheel lock-up under braking by sensing lack of rotation of a wheel(s) and diverting fluid pressure away from it (them)
Atmosphere	atm	Unit of pressure (1.01325 bar)
Barometric Absolute Pressure Sensor	BARO Sensor	Sensor measuring the pressure of surrounding air at any given temperature and altitude
Battery positive voltage	B+	The positive voltage from a battery or any circuit connected directly to it
Before Bottom Dead Center	BBDC	Event occurring before BDC
Before Top Dead Center	BTDC	Event (usually ignition) occurring before TDC
Blower	BLR	Device which supplies a current of air at moderate pressure, e.g. heater or A/C blower
Body Processor Module	BPM	Control module for body electrical systems, e.g. interior lamps, windshield wash / wipe control
Bottom Dead Center	BDC	Lowest point of piston travel in a reciprocating engine
Brake horsepower	BHP	Effective horsepower developed by an engine or motor, as measured by a brake applied to its output shaft
Brake Mean Effective Pressure	BMEP	The part of the effective pressure developed in a cylinder that would result in a cylinder output equal to the bhp of the engine
Brake On/Off	BOO	Indicates the position of the brake pedal
British Standard	BS	Standard specification issued by the British Standards Institution
British Standard Automotive	BSau	
Bus	Topology of a communication network	
Bypass Air	BPA	Mechanical control of throttle bypass air
Camshaft Position Sensor	CMP Sensor	Indicates camshaft position
Canadian Motor Vehicle Safety Standard	CMVSS	
Canister Purge	CANP	Controls purging of the EVAP canister
Carbon dioxide	CO ₂	Colorless gas with a density of approximately 1.5 times that of air
Carbon monoxide	CO	Poisonous gas produced as the result of incomplete combustion
Case Ground	CSE GND	Control module casing ground
Catalytic converter		In-line exhaust system device used to reduce the level of engine exhaust emissions
Celsius	C	SI term for the Centigrade scale, with freezing point at zero and boiling point at 100 degrees
Central Processor Unit	CPU	The section of a computer that contains the arithmetic, logic and control circuits. It performs arithmetic operations, controls instruction processing, and provides timing signals and other housekeeping operations
Cylinder Head Temperature Sensor	CHT Sensor	A sensor for measuring the temperature of the cylinder head
Closed Loop	CL	
Closed Loop System	CL System	Control system with one or more feedback loops
Column/Mirror Control Module	C/MCM	A self-contained group of electrical /electronic components, designed as a single replaceable unit, and controlling one or more processes
Controller Area Network	CAN	A communication system which allows control modules to be linked together.
Crankshaft Position Sensor	CKP Sensor	Generates crankshaft position information in conjunction with the CKPTR (also generates speed information in certain applications)
Crankcase Ventilation System	CV	System which scavenges camshaft cover and crankcase emissions and feeds them into the inlet manifold
Cubic centimeter	cm ³	
Curb weight		Weight of vehicle with fuel, lubricants and coolant, but excluding driver, passengers or payload
Data Link Connector	DLC	Connector providing access and/or control of the vehicle information, operating conditions, and diagnostic information

Term(s)	Acronym / Unit / Abbreviation	Definition
Data Output Line	DOL	Circuit that sends certain information from the ECM to the instrument cluster
Degree	deg, °	Angle or temperature
Department of Transportation (US)	DOT	Which is a fibre optic ring network, can be diagnosed through the SCP network, and with the optical bus tester.
Deutsche Institut fur Normung	DIN	German standards regulation body
Diagnostic Module	DM	Supplemental Restraint System (non -controlling) module for diagnostics overview
Diagnostic Test Mode	DTM	A level of capability in an OBD system. May include different functional states to observe signals, a base level to read DTCs, a monitor level which includes information on signal levels, bi-directional control with on/off board aids, and the ability to interface with remote diagnosis
Diagnostic Trouble Code	DTC	An alpha/numeric identifier for a fault condition identified by the On-Board Diagnostic (OBD) system
Differential pressure		Pressure difference between two regions e.g. between intake manifold and atmospheric pressures
Differential Pressure Feedback EGR	DPFE	An EGR system that monitors differential EGR pressure across a remote orifice to control EGR flow
Direct current	dc	Current which flows in one direction only, though it may have appreciable pulsations in its magnitude
Domestic Data Bus	D2B	
Exhaust Gas Recirculation Temperature Sensor	EGRT	Sensing EGR function based on temperature change
Engine Management System	EMS	The engine management system conditions and reads inputs, supplies processing capability, and provides output drivers to control actuators as directed by software and calibration
Engine Oil Pressure	EOP	
EGR Vacuum Regulator	EVR	Controls EGR flow by changing vacuum to the EGR valve
EGR Valve Position	EVP	An EGR system that directly monitors EGR valve position to control EGR flow
Electrically Erasable Programmable Read-Only Memory	EEPROM	
Electrically Programmable Read-Only memory	EPROM	
Electronic Secondary Air Injection	EAIR	A pump-driven system for providing secondary air using an electric air pump
Engine Control Module	ECM	
Engine Coolant Level	ECL	
Engine Coolant Temperature	ECT	
ECT Sensor	ECTS	Thermistor which provides engine coolant temperature signal to the ECM to trigger enrichment circuits which increase injector 'on' time for cold start and warm-up
Engine speed	RPM	
Environmental Protection Agency	EPA	
Evaporative Emission	EVAP	System designed to prevent fuel vapor from escaping into the atmosphere. Typically includes a charcoal filled canister to absorb fuel vapor
Evaporative Emission Control Valve	EVAPP	
Exhaust Gas Recirculation	EGR	System which reduces NOx emissions by adding exhaust gases to the incoming fuel/air charge
Exhaust Gas Recirculation Solenoid Vacuum Valve	EGRS	
Exhaust Gas Recirculation Temperature Sensor	EGRT Sensor	
Exhaust Gas Recirculation Valve	EGR Valve	
Fan Control	FC	Engine cooling fan control
Federal Motor Vehicle Safety Standard (US)	FMVSS	
Figure	Fig.	Illustration reference
Flash Electrically Erasable Programmable Read-Only Memory	FEEPROM	
Flash Erasable Programmable Read-Only Memory	FEPRM	
Flywheel Sensor	CKFS	Sensor mounted so as to be triggered by each flywheel ring gear tooth to give an engine speed signal
Fuel Injection	FI	Solenoid operated devices that spray a metered quantity of fuel into the inlet ports
Fuel Pressure Regulator Control	FPRC	Controls fuel pressure regulator; used primarily to give extra fuel at cold start-up
Fuel Pump	FP	Pumps fuel from the fuel tank to the fuel injection system
Fuel Pump Monitor	FP Module	Monitors operation of fuel pump
Fuel Pump Relay	FP Relay	Relay which controls electrical current to fuel pump
Fuel rich/lean		Qualitative evaluation of air/fuel ratio based on a ratio known as stoichiometry, or 14.7:1 (Lambda)
Generic Electronic Module	GEM	
Generator	GEN	Rotating machine which converts mechanical energy into electrical energy
Gramme centimeter	gcm	
Gramme (force)	gf	
Gramme (mass)	g	
Ground	GND	Electrical conductor used as a common return for an electrical circuit or circuits, and with a relative zero potential
Hard fault		A fault currently present in the system
Headlamp	HL	

Term(s)	Acronym / Unit / Abbreviation	Definition
Heated Oxygen Sensor	HO2S	Electrically heated oxygen sensor which induces fueling corrections
Hertz (frequency)	Hz	Frequency, one cycle per second
High Mounted Stoplamp	HMSL	
High tension	HT	
Hour	hour	
Hydrocarbon	HC	
Idle Air Control	IAC	Stepper motor driven device which varies the volume of air by-passing the throttle to maintain the programmed idle speed
Ignition amplifier	IA	Device which amplifies the ignition system output
Ignition ground	IGN GND	
Injection Pressure Sensor	IPS	
Inertia Fuel Shut-off	IFS	An inertia system that shuts off the fuel supply when activated by pre-determined force limits brought about by (e.g.) collision
Inertia Fuel Shut-off Switch	IFS Switch	Shuts down fuel and ignition systems in the event of a vehicle impact
Intake air		Air drawn through a cleaner and distributed to each cylinder for use in combustion
Intake Air Temperature	IAT	Temperature of intake air
Intake Air Temperature Sensor	IAT Sensor	Device used to measure IAT
Intake Air Temperature Sensor Ignition	IAT Sensor Ignition	Thermistor which signals the ECM to retard the ignition timing in response to high inlet air temperatures
Intake Air Temperature Sensor Injection	IAT Sensor Injection	Thermistor which inputs air density information to the ECM
Internal diameter	i.dia	
International Standards Organisation	ISO	
Kilogramme (mass)	kg	
Kilogramme (force)	kgf	
Kilogramme force per square centimeter	kgf/cm ²	
Kilometer	km	
Kilometer per hour	km/h	
Kilopascal	kPa	
Kilovolt	kV	
Knock Sensor	KS	Sensor which detects the onset of detonation, and signals the ECM to retard the ignition
Left-hand	LH	
Left-hand drive vehicle	LHD	
Left-hand thread	LHthd	
Liquid Crystal Display	LCD	Optical digital display system, applied voltage to which varies the way the crystals reflect light, thereby modifying the display
Litre	L	
Low Tension	LT	Primary circuit of the ignition system, linking the battery to the primary winding in the ignition coil
Malfunction Indicator Lamp	MIL	A required on-board indicator to alert the driver of an emission related malfunction
Manifold Absolute Pressure	MAP	Absolute pressure of the intake manifold air
Manifold Absolute Pressure Sensor	MAP Sensor	Sensor located in the ECM and ported to the intake manifold
Manifold Surface Temperature	MST	
Mass Air Flow	MAF	System which provides information on the mass flow rate of the intake air to the engine
Mass Air Flow Sensor	MAF Sensor	Hot-wire sensor which monitors air flow into the intake manifold for fueling and ignition control
Maximum	max.	
Meter (measurement)	m	
Metric (screw thread, e.g. M8)	M	
Microfarad	MFD	Unit of electrical capacitance, one millionth of a farad
Millimeter	mm	
Millimeter of mercury	mmHg	
Millisecond	ms	
Minimum	min.	
Minute	minute	
Model year	MY	
Motorized In-Car Aspirator	MIA	Device which constantly samples cabin temperature by passing air over a sensor, and communicates with the A/CCM to modify A/C system performance to suit
Multi Protocol Adapter	MPA	An interpreter for the various data languages present on a vehicle
National Institute of Occupational Safety and Health (US)	NIOSH	
Newton	N	SI unit of force. 1 N = 0.2248 pounds force
Newton Meter	Nm	SI unit of torque. Must not be confused with nm (nanometer)
Nox		Compounds of nitrogen and oxygen formed at high temperatures. Major source of exhaust-gas air pollution
Non-Volatile Random Access Memory	NVRAM	RAM which retains memory even if power supply is interrupted
Normally aspirated	N/A	Fueling system using intake air at atmospheric pressure; not supercharged or turbocharged
Normally Closed	NC	
Normally Open	NO	
North American Specification	NAS	Vehicles for sale in the USA and Canadian markets
Number	No.	
Occupational Safety and Health Administration (US)	OSHA	

Term(s)	Acronym / Unit / Abbreviation	Definition
On-Board Diagnostic	OBD	A system that monitors some or all computer input and output control signals. Signal(s) outside the pre-determined limits imply a fault in the system or a related system
Original Equipment Manufacturer	OEM	
Outside Diameter	o. dia	
Oxides of nitrogen	Nox	
Oxygen Sensor	O2S	A sensor which detects oxygen content in the exhaust gases
Parameter Identification	PID	An index number referring to a parameter within a module without knowledge of its storage location
Park Neutral Position	PNP	
Park Neutral Position Switch	PNP Switch	Indicates the selected non-drive modes of the (automatic) transmission
Part number	part no.	
Pulse Width Modulated	PWM	
Programmable Electronic Control Units System	PECUS	Process whereby a common ECM is programmed on the production line to suit the market requirements of a particular vehicle
Programmable Read-only Memory	PROM	ROM with some provision for setting the stored data after manufacture
Random Access Memory	RAM	Fast access memory store which is accessible for entry or extraction of data
Read-Only Memory	ROM	Fast access memory in which data is fixed and may not be changed
Reservoir	RES	Container, usually for oils, coolants or hydraulic fluids
Rest Of The World	ROW	
Return	RTN	A dedicated sensor ground circuit
Revolutions Per Minute	RPM	Shaft speed of a device, usually an engine or motor
Right-hand	RH	
Right-hand drive	RHD	
Scan Tool	ST	Device that interfaces with and communicates information on a data link
Seat Control Module	SCM	Module controlling the seat motor systems (not electric raise/lower-only seats)
Secondary Air		Air provided to the exhaust system
Secondary Air	AIR	System used for a period of time each time the engine is started, unless certain temperature criteria are met. Pumps air directly into the exhaust system which generates extra heat and reduces the time taken for the catalytic converters to reach operating temperature
Secondary Air Injection Bypass	AIR Bypass	Vents secondary air to atmosphere
Secondary Air Injection Check Valve	AIR Check Valve	Valve which prevents back-flow of exhaust gas to the AIR system when the system is inoperative
Secondary Air Injection Diverter	AIR Diverter	Diverts secondary air to either the catalyst or exhaust manifold
Secondary Air Injection Magnetic Clutch	AIR Clutch	Clutch mounted on the AIRP drive shaft
Secondary Air Injection Pump	AIR Pump	Mechanically driven rotary vane pump, driven through the AIRPC
Secondary Air Injection Relay	AIR Relay	Controls the injection of air into the exhaust system
Secondary Air Injection Switching Valve	AIR Switching Valve	Vacuum operated valve backing-up the AIRC
Security & Locking Control Module	SLCM	Module controlling the vehicle's security and closure-locking functions
Sensor	S	Generic name for a device that senses either the absolute value or a change in a physical quantity such as temperature, pressure or flow rate, and converts that change into an electrical quantity signal
Service Repair Operation (number)	SRO	Number generated by Jaguar Methods & Techniques system which relates to the time allowed to complete a repair operation. Further information on the system can be found in the separate Jaguar Publications (for each model range) entitled 'Repair Operation Times'
Shift Solenoid	SS	Controls shifting in an automatic transmission
Signal return	SIG RTN	
Sliding Roof Control Module	SRCM	
Society of Automotive Engineers	SAE	
Speed Control Control Module	SCCM	Module controlling Speed Control System
Square centimeter	cm ²	
Standard	std	
Standard Corporate Protocol	SCP	A high-speed, serial communications system linking all body system control modules. Control messages and data are passed between modules at up to 786 messages per second
Supercharger	SC	An intake system which utilizes a supercharger (mechanically driven device that pressurizes intake air, thereby increasing density of charge air and the consequent power output from a given displacement)
Supercharger Bypass	SCB	
Tachometer	TACH	A circuit that provides input for an electronic tachometer display
Thermal Vacuum Valve	TVV	Controls vacuum levels or routing based on temperature
Throttle Body	TB	Device containing the throttle
Throttle Position	TP	
Throttle Position Sensor	TP Sensor	Interprets throttle position and movement to identify idle, acceleration and full-power demands
Throttle Manifold Absolute Pressure Sensor	TMAP	Combines the inlet air temperature and manifold pressure sensor in one component
Top Dead Center	TDC	
Torque Converter Clutch	TCC	
Transmission Control Module	TCM	Controls the shifting pattern of the (automatic) transmission
Transmission Control Switch	TCS	Modifies the operation of electronically controlled transmissions

Term(s)	Acronym / Unit / Abbreviation	Definition
Transmission Oil Temperature	TOT	Indicates temperature of transmission fluid
Transmission Range	TR	The range in which the transmission is operating
Turbine Shaft Speed	TSS	Indicates rotational speed of transmission output shaft or turbine shaft
Vacuum Solenoid Valve	VSV	Vacuum operated valve used in the speed control system
Vacuum Solenoid Valve (atm)	VSV(VA)	Vacuum atmospheric valve used in the speed control system
Vacuum Solenoid Valve (rel)	VSV(VR)	Vacuum release valve used in the speed control system
Vacuum Solenoid Valve (vac)	VSV(VV)	Vacuum valve used in the speed control system
Variable Valve Timing	VVT	A system by which the relationship of the crankshaft and camshaft may be altered during engine running
Vehicle Battery Adapter	VBA	Provides electrical power to the Jaguar approved diagnostic system and supplies a battery reference level
Vehicle Control Monitor	VCM	Instrument panel display which warns of faults
Vehicle Emission Control Information Label	VECI Label	
Vehicle Identification Number	VIN	Number assigned to the vehicle by the manufacturer, primarily for licensing and identification purposes
Vehicle Interface Adapter	VIA	Extends the Jaguar approved diagnostic system capability and provides a parallel interface to vehicle harnesses and ECMs
Vehicle Speed Sensor	VSS	Sensor which provides vehicle speed information
Viscosity Index	VI	
Voltage Regulator	VR	Device which regulates the variable output voltage of a generator
Watt	W	SI unit of power (1 hp = 745.7 watts)
Wide Open Throttle	WOT	Full throttle position

General Information - Health and Safety Precautions

Description and Operation

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

Observe these recommendations:

- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags in pockets. Avoid contaminating clothes, particularly underwear, with oil.
- Overalls must be cleaned regularly. Discard oil impregnated clothing and footwear which cannot be washed or cleaned.
- First Aid treatment should be obtained immediately for open cuts or wounds.
- Use barrier creams, applying before each work period, to enable easier removal of dirty oil and grease from the skin.
- Wash with soap and water to make sure that all oil is removed (skin cleaner and a nail brush will help). The use of preparations containing lanolin will help to replace the natural skin oils which have been removed.
- Do not use petrol, kerosene, gas oil, thinners or solvents for washing skin.
- If skin disorders develop, obtain medical advice immediately.
- Where practical, degrease components prior to handling.
- Where there is a risk of fluids coming into contact with the eyes, eye protection should be worn, for example, goggles or a face shield. An eye wash facility should be provided.

The Health and Safety Precautions subsection refers to some commonly used chemicals and materials, hazards associated with their use, and safety measures to be taken. Some of these chemicals may be included in the following list either in their own right or as an ingredient in a sealer or adhesive.

Acids and Alkalis

See also Battery Acids.

e.g. caustic soda, sulphuric acid.

Used in batteries and cleaning materials.

Irritant and corrosive to the skin, eyes, nose and throat. Cause burns. Can destroy ordinary protective clothing.

Avoid splashes to the skin, eyes and clothing. Wear suitable protective impervious apron, gloves and goggles. Do not breath mists.

Ensure access to eye wash bottles, shower and soap are readily available for splashing accidents.

Display Eye Hazard sign.

Air Bags

See also Fire, Chemical Materials - General

Highly flammable, explosive – observe No Smoking policy.

Used as a safety restraint system mounted in the steering wheel.

The inflator contains a high - energetic propellant which, when ignited, produces a VERY HOT GAS (2500° C).

The gas generant used in air bags is Sodium Azide. This material is hermetically sealed in the module and is completely consumed during deployment. No attempt should be made to open an air bag inflator as this will lead to the risk of exposure to Sodium Azide. If a gas generator is ruptured, full protective clothing should be worn when dealing with the spillage.

After normal deployment, gloves and safety goggles should be worn during the handling process.

Deployed air bags should be disposed of in a plastic bag in accordance with local regulations at an approved chemical waste site.

Following any direct contact with gas generant.

- Wash affected areas thoroughly with water.
- Seek medical assistance if necessary.

Air Bags - Do's

- Do store in an airbag safe when not fitted to the vehicle.
- Do store modules in an upright position.
- Do keep modules dry.
- Do carry modules with the cover side pointing away from the body.
- Do place modules with their cover side upwards.
- Do carefully inspect modules for damage.
- Do stand to one side when connecting modules.
- Do make sure all test equipment is properly calibrated and maintained.
- Do wash you hands after handling deployed air bags.

Air Bags - Do Nots

- Do not store highly flammable material together with modules or gas generators.
- Do not store gas generators at temperatures exceeding 80° C.
- Do not store modules upside down.
- Do not attempt to open a gas generator housing.
- Do not expose gas generators to open flame or sources of heat.
- Do not place anything on top of a module cover.
- Do not use damaged modules.
- Do not touch a fired module or gas generator for at least 10 minutes.
- Do not use any electrical probes on the wiring circuit.

Air Conditioning Refrigerant

See also Chlorofluorocarbon, Chemical Materials

Highly flammable, combustible – observe No Smoking policy.

Skin contact may result in frostbite.

Instructions given by the manufacturer must be followed. Avoid naked lights, wear suitable protective gloves and goggles.

If refrigerant comes into contact with the skin or eyes, rinse the affected areas with water immediately. Eyes should also be rinsed with an appropriate irrigation solution and should not be rubbed. SEEK MEDICAL ASSISTANCE IF NECESSARY.

Air Conditioning Refrigerant - Do Nots

- Do not expose refrigerant bottles to sunlight or heat.
- Do not stand refrigerant bottles upright; when filling, hold them with the valve downwards.
- Do not expose refrigerant bottles to frost.
- Do not drop refrigerant bottles.
- Do not vent refrigerant to atmosphere under any circumstance.
- Do not mix refrigerants i.e. R12 (Freon) and R134a.

Antifreeze

See also Fire, Solvents.

e.g. isopropanol, ethylene glycol, methanol.

Highly flammable, flammable, combustible.

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

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

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.

Asbestos

Used in brake and clutch linings, transmission brake bands and gaskets. Jaguar original production and replacement items are asbestos free.

See also Warning Symbols on Vehicles at the end of this subsection.

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

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 make sure safe disposal. If any cutting or drilling is attempted on materials containing asbestos the item 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.

Brake and Clutch Linings and Pads

See Asbestos.

Brakes Fluids (Polyalkylene Glycols)

See also Fire.

Splashes to the skin and eyes may cause irritation. Avoid skin and eye contact as far as possible. Inhalation vapor hazards do not arise at ambient temperatures because of the very low vapor pressure.

Brazing

See Welding.

Chemical Materials

See also 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 flammable 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.

Chemical Materials - Do's

- 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 remove chemical materials from the skin and clothing as soon as practical after soiling. Change heavily soiled clothing and have it cleaned.
- Do organise work practices and protective clothing to avoid soiling of the skin and eyes, breathing vapors, aerosols, dusts or fumes, inadequate container labelling fire and explosion hazards.

- Do wash before breaks, before eating, smoking, drinking or using toilet facilities when handling chemical materials.
- Do keep work areas clean, uncluttered and free of spills.
- Do store chemical materials according to national and local regulations.
- Do keep chemical materials out of the reach of children.

Chemical Materials - Do Nots

- Do not mix chemical materials except under the manufacturer's instructions; some chemicals can form other toxic or harmful chemicals, give off toxic or harmful fumes or 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 under the manufacturer's instructions. Some are highly flammable 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 unlabeled containers.
- Do not clean hands or clothing with chemicals. Chemicals, particularly solvents and fuels, will dry skin and may cause irritation leading to dermatitis or 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.

Chlorofluorocarbons (CFC)

There is concern in the scientific community that CFCs 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.

CFCs are used primarily as refrigerants in vehicle air conditioning systems and as aerosol propellants. Halons are used as fire extinguishants.

Jaguar 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 fluids.

Clutch Linings and Pads

See Asbestos.

Corrosion Protection Materials

See also Solvents, Fire.

Highly flammable, flammable – observe No Smoking policy.

These materials are varied and the manufacturer's 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. Avoid explosive limits and/or sources of ignition.

Electric Shock

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

Ensure that electrical equipment is maintained in good condition and frequently tested. Faulty equipment should be labelled and preferably removed from the work station.

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

Ensure that electrical equipment and flexes do not come into contact with water.

Ensure that electrical equipment is protected by the correct rated fuse.

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.

Ensure that the designated electrical workers are trained in basic First Aid.

In cases of electrocution:

- Switch off the power supply before approaching the victim.
- If this is not possible push or drag the victim from the source of electricity using dry non - conductive material.
- Commence resuscitation if trained to do so.
- SUMMON MEDICAL ASSISTANCE.

Engine Oils

See Lubricants and Grease.

Exhaust Fumes

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

Gasolene (petrol) engine

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

Fibre Insulation

See also 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 organization of work practices and the use of gloves.

Fire

See also 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.

Fluoroelastomer

See Viton.

Foams - Polyurethane

See also Fire.

Used in sound and noise insulation. Cured foams used in seat and trim cushioning.

Follow manufacturer's 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 in or near uncured materials.

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

Vapors and spray mists must not be inhaled. These materials must be applied with adequate ventilation and respiratory protection. Do not remove the respirator immediately after spraying, wait until the vapor/mists have cleared.

Burning of the uncured components and the cured foams can generate toxic and harmful fumes. Smoking, naked flames or the use of electrical equipment during foaming operations and until vapors/mists have cleared should not be allowed. Any heat cutting of cured foams or partially cured foams should be conducted with extraction ventilation.

Freon

See Air Conditioning Refrigerant.

Fuels

See also, Fire, Legal Aspects, Chemicals and 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 policy.

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 pain.

Motor gasoline may contain appreciable quantities of benzene, which is toxic upon inhalation, and the concentration of gasoline vapors 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 vapor 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.

Gas - oil (Diesel Fuel)

See warnings and cautions in relevant manual sections.

Combustible.

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

Kerosene (Paraffin)

Used also as heating fuel, solvent and cleaning agent.

Flammable - observe No Smoking policy.

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 vapors. Exposure to mists and vapors from kerosene at elevated temperature should be avoided (mists may arise in dewaxing). Avoid skin and eye contact and make sure there is adequate ventilation.

Gas Cylinders

See also Fire.

Gases such as oxygen, acetylene, argon and propane are normally stored in cylinders at pressures of up to 13.790 kPa, (2000 lb/in²) 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 (Fluoroelastomer)

See Viton.

General Workshop Tools and Equipment

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

Never use tools or equipment for any purpose other than that for which they were designed. Never over - load 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.

High Pressure Air, Lubrication and Oil Test Equipment

See also 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, e.g. diesel injector, at the skin as the fluid may penetrate to the under - lying tissue etc., and cause serious injury.

Halon

See CFCs.

Legal Aspects

Many laws and regulations make requirements relating to health and safety in the use and disposal 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 Liquefied Petroleum Gases Regulations (1972).
- Control of Pollution Act (1974).
- Health and Safety at Work Act (1974).
- The Classification, Packaging and Labelling of Dangerous Substances Regulations (1978, 1981, 1983, 1984).
- Control of Lead at Work Regulations (1980).
- Control of Substances Hazardous to Health (COSHH) Regulations (1989).
- Abrasive Wheels Regulations (1970).
- Reporting of injuries, diseases and dangerous occurrences regulations 1985 (RIDDOR).

Workshops should be familiar, in detail, with these and associated laws and regulations.

Consult the 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 Oil

Prolonged and repeated contact with mineral oil will result in the removal of natural oils 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 UK a typical Health and Safety Executive publication is: SHW 397: Cautionary Notice: Effects of mineral oil on the skin.

Health Protection Precautions

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags into pockets.
- Avoid contaminating clothing.
- 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 make sure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanoline replace the natural skin oils which have been removed.
- 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 practical, 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

Burning 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 appliances.

Dispose of used oil and used oil filters through authorized waste disposal contractors or licensed waste disposal sites, or to the waste oil reclamation trade, batteries should also be disposed off under similar arrangements. If in doubt, contact the relevant local authority for advice on disposal facilities.

It is illegal to pour used oil, antifreeze and automatic transmission fluid on to the ground, down sewers, drains, or into water courses.

Noise

Some operations 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 (Fluoroelastomer)

See Viton.

Paints

See also body and paint manual.

See also Solvents, Chemical Materials.

Highly flammable, flammable - observe No Smoking policy

Pressurized Equipment

See High Pressure Air, Lubrication and Oil Test Equipment.

Solder

Solders 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 produced.

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 make sure 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 also Chemical Materials, Fuels (Kerosene), Fire.

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

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

Some may be highly flammable or flammable.

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 of high concentrations of vapors 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 vapors 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, vapors and spray mists and keep containers tightly sealed. Do not use in confined spaces.

When spraying materials containing solvents, e.g. paints, adhesive, 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 manufacturer's instructions.

Sound Insulation

See Fibre Insulation, Foams.

Suspended Loads

 **CAUTION:** Never improvise lifting tackle.

There is always a danger when loads are lifted or suspended. Never work under an unsupported, suspended or raised load e.g. suspended engine, etc.

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

Transmission Brake Bands

See Asbestos.

Underseal

See Corrosion Protection.

Viton

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

Viton is a fluoroelastomer, 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 fluoroelastomer, there are others, including Fluorel and Tecmoflon.

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

This acid is extremely corrosive and may be absorbed directly, through contact, into the body.

'O' 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 fluoroelastomer has been used in the affected 'O' ring, seal or gasket. If they are of natural rubber or nitrile there is no hazard. If in doubt, be cautious and assume that the material may be Viton or any fluoroelastomer.

If Viton or any other fluoroelastomers have been used, the affected area should be decontaminated before the commencement of work.

Disposable heavy duty plastic gloves should be worn at all times, and the affected area washed down using wire wool and a limewater (calcium hydroxide) solution to neutralize the acid before disposing of the decomposed Viton residue and final cleaning of the area. After use, the plastic gloves should be discarded carefully and safely.

Welding

See also Fire, Electric Shock, Gas Cylinders.

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 a 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 operator 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.

CONTACT LENS WEARERS ARE ADVISED TO REVERT TO ORDINARY SPECTACLES WHEN ARC WELDING as the arc spectrum is believed to emit microwaves which dry out the fluid between the lens and the eye. This may result in blindness when the lens is removed from the eye.

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 produced 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.

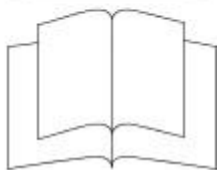
SPECIAL PRECAUTIONS MUST BE TAKEN BEFORE ANY WELDING OR CUTTING TAKES PLACE ON VESSELS WHICH HAVE CONTAINED COMBUSTIBLE MATERIALS, E.G. BOILING OR STEAMING OUT OF FUEL TANKS.

Warning Symbols on Vehicles

Decals showing warning symbols will be found on various vehicle components.

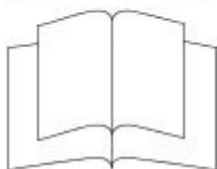
These decals must not be removed. The warnings are for the attention of owners/operators and persons carrying out service or repair operations on the vehicle.

The most commonly found decals are reproduced below together with an explanation of the warnings.



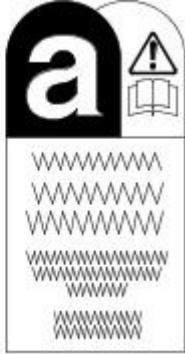
VJJ0000269

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



VJJ0000270

2. Components or assemblies displaying the warning triangle with the electrified arrow and open book symbol give warning of inherent high voltages. Never touch these with the engine running or the ignition switched on. See Electric Shock in this subsection.



VUJ0000271

3. **3.** Jaguar vehicles and replacement parts which contain asbestos are identified by this symbol. See Asbestos in this subsection.



VUJ0000272

4. **4.** Components or assemblies displaying this symbol give warning that the component contains a corrosive substance. See Acids and Alkalis in this subsection.



VUJ0000273

5. **5.** Vehicles displaying the caution circle with a deleted lighted match symbol, caution against the use of naked lights or flames within the immediate vicinity due to the presence of highly flammable or explosive liquids or vapors. See Fire in this subsection.



VUJ0002037


6. **6.** All vehicles fitted with the passenger air bag from the factory have a warning sticker attached to the instrument panel, prohibiting the use of rear facing child seats in the front seating position. Failure to follow this instructions may result in personal injury.

White Spirit

See Solvents.

Safety Precautions

• WARNINGS:

 Working on the fuel system results in fuel and fuel vapor being present in the atmosphere. Fuel vapor is extremely flammable, hence great care must be taken whilst working on the fuel system. Adhere strictly to the following precautions:

- Do not smoke in the work area.
- Display 'no smoking' signs around the area.
- Disconnect the battery before working on the fuel system.
- Do not connect/disconnect electrical circuits, use electrical equipment or other tools or engage in working practices which in any way may result in the production of sparks.
- Ensure that a CO2 fire extinguisher is close at hand.

- Ensure that dry sand is available to soak up any fuel spillage.
- Empty fuel using suitable fire proof equipment into an authorized explosion proof container.
- Do not empty fuel while working in a workshop or a pit.
- Ensure that working area is well ventilated.
- Ensure that any work on the fuel system is only carried out by experienced and well qualified maintenance personnel.
- Ensure that fume extraction equipment is used where appropriate.



Fume extraction equipment must be in operation when solvents are used e.g. Trichloroethane, white spirit, sbp3, methylene chloride, perchlorethylene. Do not smoke in the vicinity of volatile degreasing agents.

Whenever possible, use a ramp or pit whilst working beneath a vehicle, in preference to jacking. Position chocks at the wheels as well as applying the parking brake. Never rely on a jack alone to support a vehicle. Use axle stands, or blocks carefully placed at the jacking points, to provide a rigid location. Check that any lifting equipment used has adequate capacity and is fully serviceable. Ensure that a suitable form of fire extinguisher is conveniently located. When using electrical tools and equipment, inspect the power lead for damage and check that it is properly earthed. Disconnect the earth (grounded) terminal of the vehicle battery. Do not disconnect any pipes of the air conditioning refrigeration system unless you are trained and instructed to do so. A refrigerant is used which can cause blindness if allowed to come into contact with the eyes. Ensure that adequate ventilation is provided when volatile degreasing agents are being used.

Adhere strictly to handling and safety instructions given on containers and labels. Keep oils and solvents away from naked flames and other sources of ignition. Do not apply heat in an attempt to free seized nuts or fittings; as well as causing damage to protective coatings, there is a risk of damage from stray heat to electronic equipment and brake lines. Do not leave tools, equipment, spilt oil etc. around the work area. Wear protective overalls and use barrier cream when necessary.

Environmental Protection

In some countries it is illegal to pour used oil onto the ground, down sewers or drains, or into water courses. The burning of used engine oil in small space heaters or boilers is not recommended unless emission control equipment is fitted. Dispose of used oil through authorized waste disposal contractors, to licensed waste disposal sites or to the waste oil reclamation trade. If in doubt, contact the Local Authority for advice on disposal facilities.

General Information - How To Use This Manual

Description and Operation

Copyright Statement

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Workshop Manual Organization

This manual covers descriptive, diagnostic (including OBD), and repair aspects to service the vehicle effectively.

The manual is arranged in sections, each section dealing with a specific part of a vehicle system. For example, Section 412-03 covers air conditioning, which is part of the climate control system.

The first digit of the section number indicates the group. There are five groups:

- General Information.
- Chassis.
- Powertrain.
- Electrical.
- Body and Paint.

The second and third digits of the section number indicate the vehicle system.

The last two digits of the section number indicate the part of the system covered by the section.

General Information - Important Safety Instructions

Description and Operation

Safety Notice

Appropriate service methods and correct repair procedures are essential for the safe, reliable operation of all motor vehicles, as well as the safety of the person doing the work. This manual provides general directions for accomplishing service and repair work with tested effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the person doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in the manual must first establish that neither personal safety or vehicle integrity is compromised from choices of methods, tools or parts.

General Information - Road/Roller Testing

Description and Operation

Road or roller testing may be carried out for various reasons and a procedure detailing pre - test checks, through engine starting and stopping, pre - driving checks, on - test checks to final checks on completion of the test is given overleaf.

Unless complete vehicle performance is being checked, the full road test procedure need not be carried out. Instead, those items particularly relevant to the system/s being checked can be extracted.

Pre - Test Checks

 **WARNING:** If the brake system hydraulic fluid level is low, pedal travel is excessive or a hydraulic leak is found, do not attempt to road test the vehicle until the reason for the low fluid level, excessive pedal travel or hydraulic leak is found and rectified.

It is suggested that pre - test checks, and functional tests of those systems/circuits which affect the safe and legal operations of the vehicle, such as brakes, lights and steering, should always be carried out before the road or roller test.

- Engine oil level
- Engine coolant level
- Tires, for correct pressure, compatible types and tread patterns, and wear within limits.
- There is sufficient fuel in the tank to complete the test.
- All around the engine, transmission and under the vehicle for oil, coolant, hydraulic and fuel leaks. Make a note of any apparent leaks and wipe off the surrounding areas to make it easier to identify the extent of the leak on completion of the test.

Starting the Engine

• **NOTE:** On initial drive away from cold and within the first 1.5 km (1 mile), do not depress accelerator pedal beyond half travel until the vehicle has attained a minimum speed of 25 km/h (15 miles/h). Never operate at high engine speed or with the accelerator pedal at full travel whilst the engine is cold.


With the ignition switched off, check:

- The handbrake is applied.
- The gear lever is in neutral.
- All instrument gauges (except fuel gauge) read zero.

With the ignition switched on, check:


- Ignition controlled warning lights come on.
- Engine temperature gauge registers a reading compatible with the engine temperature.
- Fuel gauge registers a reading appropriate to the fuel level in the tank.
- The operation of the handbrake warning light and fluid level warning indicator light.

On Road or Roller Test Check:

 **CAUTION:** If road testing, check the brake operation while still travelling at low speed before continuing with the test. If the brakes pull to one side, or appear to be otherwise faulty, do not continue with the road test until the fault has been found and rectified.

- Clutch pedal operation is not stiff or heavy.
- Initial gear engagement is smooth and there is no evidence of clutch drag.
- Handbrake control operates smoothly and the handbrake releases quickly and completely.
- Clutch takes up the drive smoothly, without slip or judder.
- The engine power output is satisfactory, full power is achieved, acceleration is smooth and pedal operation not stiff or heavy, and engine speed returns to idle correctly.
- There is no excessive or abnormally colored smoke from the engine under normal driving, heavy load or overrun conditions.
- Steering operation, including power steering where fitted, is smooth, accurate, not excessively heavy or with excessive free play or vibration. Does not pull to one side and self centres smoothly after cornering.
- Speedometer, oil pressure warning lamp, coolant temperature gauge and tachometer (where fitted) register the correct readings or operate correctly.
- Switches and controls operate smoothly and positively, warning or indicator lights operate correctly and the direction indicator control self cancels when the steering is returned to the straight ahead position.
- Heating and ventilation systems work correctly and effectively.
- Brake operation and efficiency.

Brake Testing

 **WARNING:** When brake testing, avoid breathing the smoke or fumes from hot brakes, this may contain asbestos dust which is hazardous to health, see Health and Safety Precautions.

Avoid brake testing on busy roads where it can cause inconvenience or danger to other road users.

 **CAUTION:** Brake testing which includes heavy brake applications should not be carried out with new brake pads/discs or linings/drums until the components have bedded - in. New brake friction components will not reach full efficiency until the bedding - in process is complete.

Test the brakes at several speeds within the normal operating range using both light and heavy pedal pressure. Note any tendency to snatch, pull or drag, and any undue delay in application or release.

Allow the vehicle to coast and note any tendency to pull to one side, or evidence that the brakes are binding.

After stopping the vehicle (not immediately after a period of heavy braking), carefully check the brake temperature. A disc which feels hot, or appreciably hotter than the others, indicates that the brake is binding.

After completion of the test, check for:

- Oil, coolant, hydraulic, air and fuel leaks.

- Abnormal temperature of any moving components or assemblies, e.g. wheel hubs, transmission, axle etc., which might indicate overtightness or lack of lubrication.

General Information - Solvents, Sealants and Adhesives

Description and Operation



WARNING: Always handle all solvents, sealers and adhesives with extreme care. Some contain chemicals or give off fumes which can be dangerous to health. Always follow the manufacturers instructions. If in doubt about any substance, particularly a solvent, DO NOT use it.



CAUTION: If in doubt about the suitability of any proprietary solvent or sealer for a particular application, contact the manufacturer of the product for information regarding storage, handling and application.

The Solvents, Sealers and Adhesives subsection refers to some commonly used chemicals and materials, hazards associated with their use, and safety measures to be taken.

Adhesives and Sealers

Highly flammable, flammable, combustible – observe No Smoking policy.

Generally should be stored in 'No Smoking' areas. Cleanliness and tidiness in use should be observed e.g. 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 manufacturer's instructions.

Water - based Adhesives/Sealers

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

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 appropriate protective clothing and a thermostatically controlled heater with a thermal cut - out and adequate extraction.

Resin - based Adhesives/Sealers e.g. Epoxide and Formaldehyde Resin - based

Mixing should 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.

Anaerobic, Cyanoacrylate (Super - glues) and other Acrylic Adhesives

Many are irritant, sensitizing or harmful to the skin and/or respiratory tract. Some are eye irritants.

Skin and eye contact should be avoided and the manufacturer's 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 seek immediate medical attention. Do not attempt to pull tissue apart. Use in well ventilated areas as vapors can cause irritation to the nose and eyes.

For two - pack systems see Resin - based and Isocyanate Adhesives/Sealers.

Isocyanate (Polyurethane) Adhesives/Sealers

See also Resin - based Adhesives

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

Over exposure is irritating to the eyes and respiratory system. Excessive concentrations may produce effects on the nervous system including drowsiness. In extreme cases, loss of consciousness may result. Long term exposure to vapor concentrations may result in adverse health effects.

Prolonged contact with the skin may lead to skin irritation and, in some cases, dermatitis.

Splashes entering the eye will cause discomfort and possible damage.

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

Wear appropriate gloves, eye and respiratory protection.

General Information - Standard Workshop Practices

Description and Operation

Protecting the Vehicle

Always install covers to protect the fenders before commencing work in the engine compartment. Always install the interior protection kit, wear clean overalls and wash hands or wear gloves before working inside the vehicle. Avoid spilling hydraulic fluid, antifreeze or battery acid on the paintwork. In the event of spillage, wash off with water immediately. Use polythene sheets in the luggage compartment to protect carpets. Always use the recommended service tool, or a satisfactory equivalent, where specified. Protect temporarily exposed screw threads by replacing nuts or installing caps.

Vehicle in Workshop

When working on a vehicle in the workshop always make sure that:

- The parking 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 fumes is installed
- There is adequate room to jack up the vehicle and remove the wheels, if necessary
- Fender covers are always installed if any work is to be carried out in the engine compartment
- The battery is disconnected if working on the engine, underneath the vehicle, or if the vehicle is jacked up



CAUTION: When electric arc welding on a vehicle, always disconnect the generator wiring to prevent the possibility of a surge of current causing damage to the internal components of the generator.

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

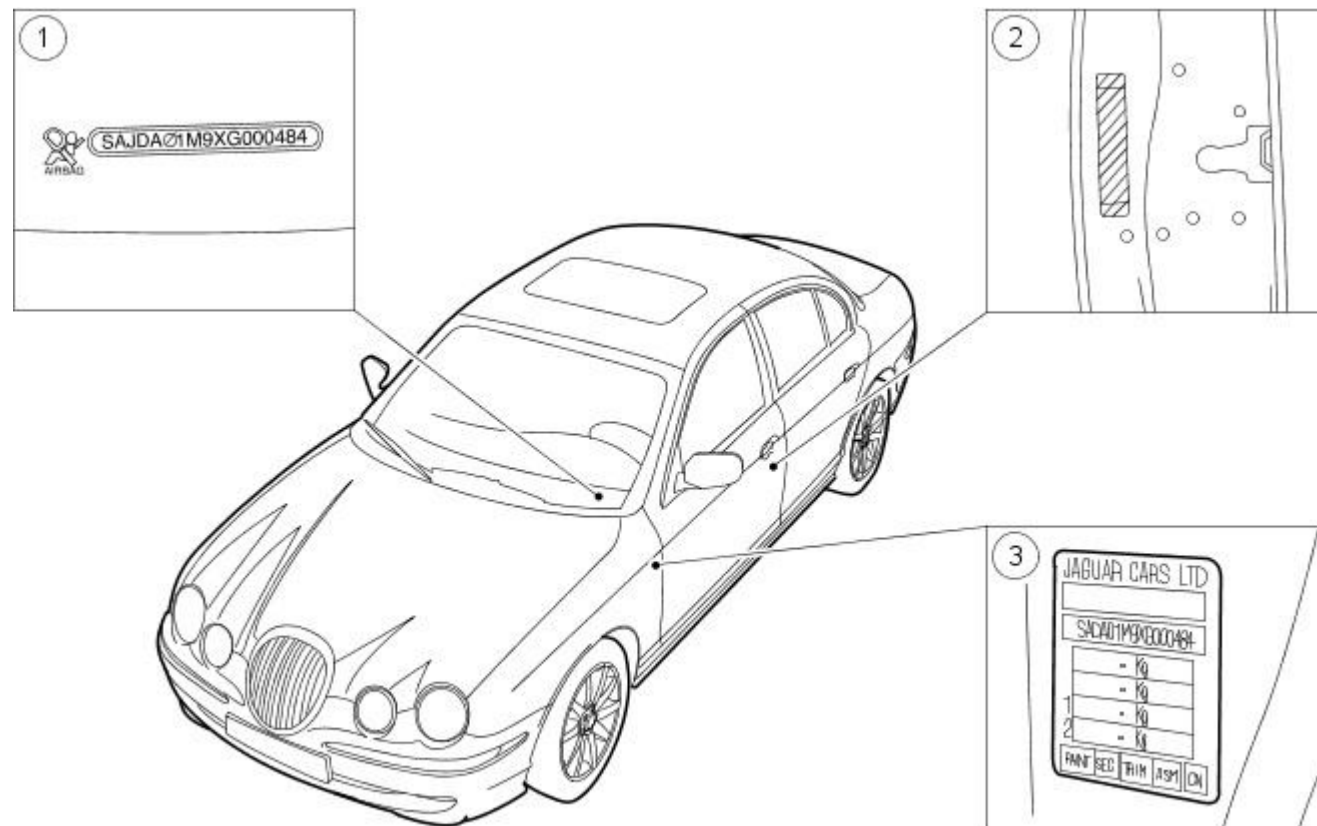
Identification Codes - Identification Codes VIN Range: M45255->N52047

Description and Operation

Vehicle Identification Number (VIN)

The official VIN for title and registration purposes is stamped on a metal plate and fastened to the instrument panel. It is positioned close on the left-hand side of the vehicle and is visible from the outside.

The vehicle identification number is also located on the vehicle certification label.

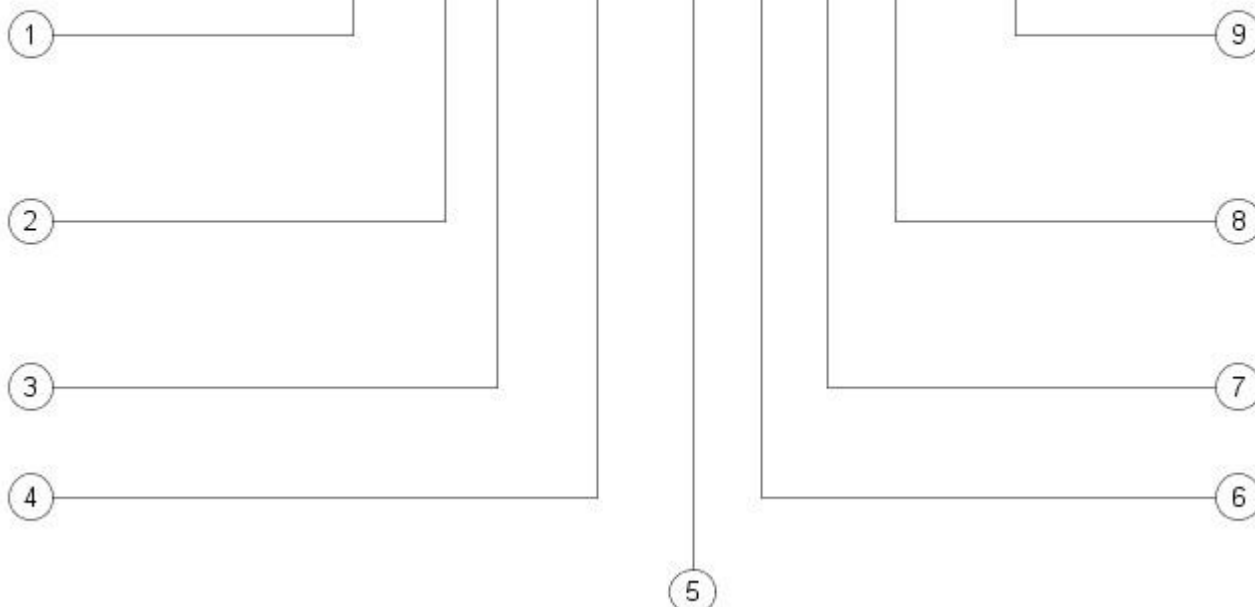


VUJ0005676

Item	Part Number	Description
1	—	VIN plate
2	—	Bar code label (America)
3	—	Vehicle identification label (Europe/rest of the world shown)

Vehicle Identification Number (Typical)

SAJ A A 01 R ? X F L 00001



VUJ0001849

Item	Part Number	Description
1	—	World manufacturer identifier
2	—	Market, air bag specification
3	—	Transmission and steering code
4	—	Body code
5	—	Emission control system
6	—	Check digit
7	—	Model year
8	—	Assembly plant, model line
9	—	Production sequence number

World Manufacturer Identifier

VIN Positions 1, 2 and 3

Codes	Manufacturer	Make	Type
SAJ	Jaguar Cars Limited, England	Jaguar	Passenger Car

Market, Air Bag Specification

VIN position 4

VIN code	Description
A	Rest of the world with twin air bags, side air bags and curtain air bags (from 2002.5my)

Transmission, Steering Code

VIN Position 5

VIN Code	Description
A	Automatic LHS
B	Manual LHS
C	Automatic RHS
D	Manual RHS

Body Code

VIN Position 6 and 7

VIN Code	Description
01	4-Door,5 seat saloon high series
02	Entry series
03	Sport series (from 2002.5my)

Engine Emission System

VIN Position 8

VIN Code	Description
N	2.5L Normally aspirated with evaporative emissions
P	3.0L Normally aspirated with stage 3 evaporative emissions
R	4.2L Normally aspirated with stage 3 evaporative emissions
S	4.2L Supercharged with stage 3 evaporative emissions

Check Digit

VIN Position 9

VIN Code	Description
0 - 9 or X	Calculated in accordance with American standard CFR part 565

Model Year

VIN Position 10

VIN Code	Description
1	2001 model year
2	2002 model year

Assembly Plant and Model Line

VIN Position 11

VIN Code	Description
F	Castle Bromwich 3.0L
H	Castle Bromwich 4.2L Normally aspirated
1	Castle Bromwich 4.2L Super charged
J	Castle Bromwich 2.5L

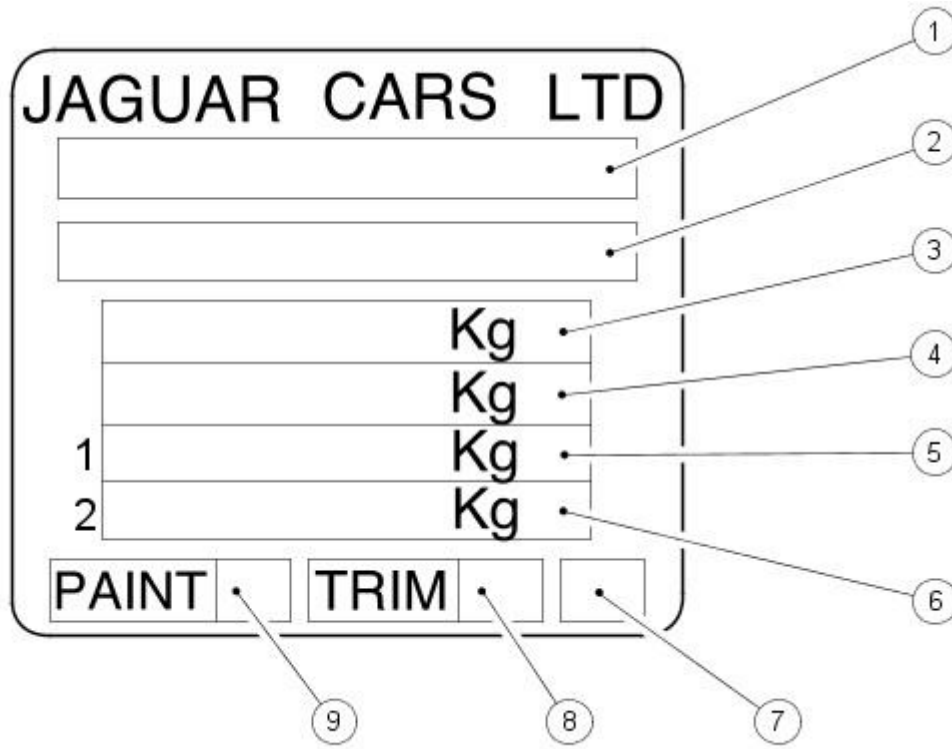
Production Sequence Number

VIN Position 12 through 17

Sequence Number
L00001 - L99999
M00001 - M99999
N00001 - N99999
P00001 - P99999
R00001 - R99999

Vehicle Identification Label

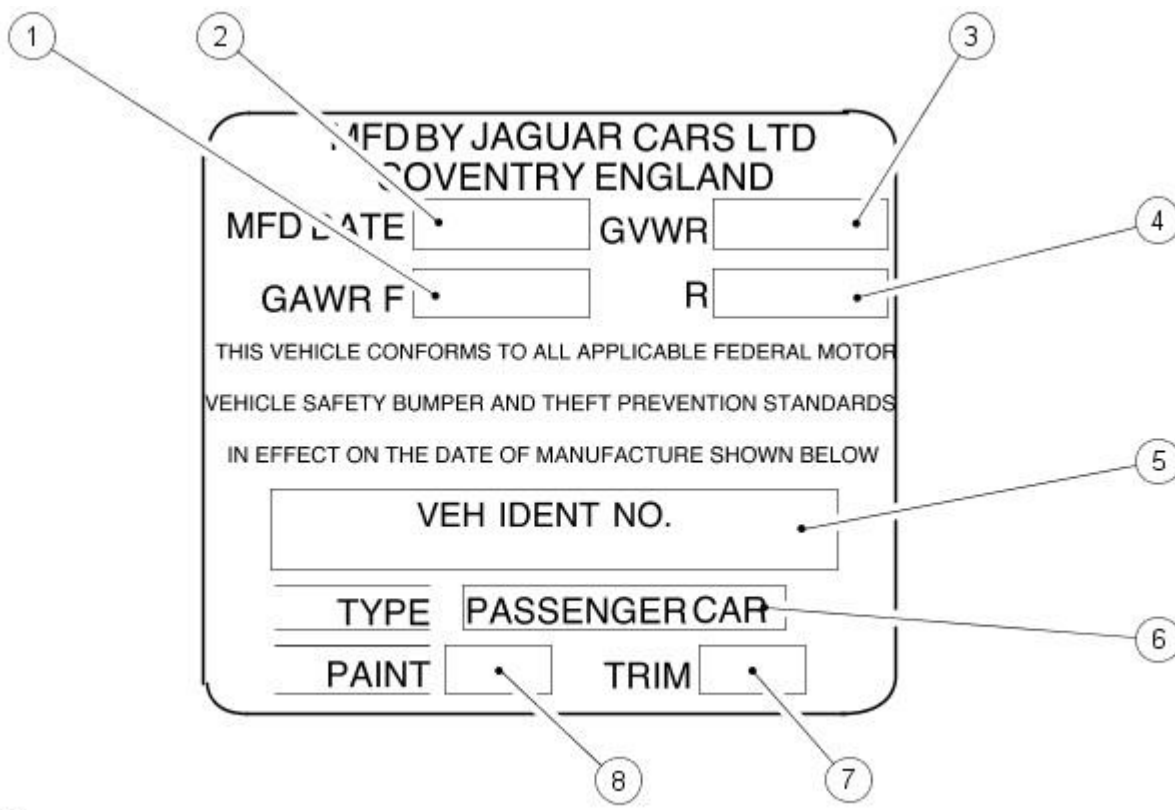
The vehicle certification label also contains a 17 character vehicle identification number. This number is used for warranty identification of the vehicle.



VUJ0001850

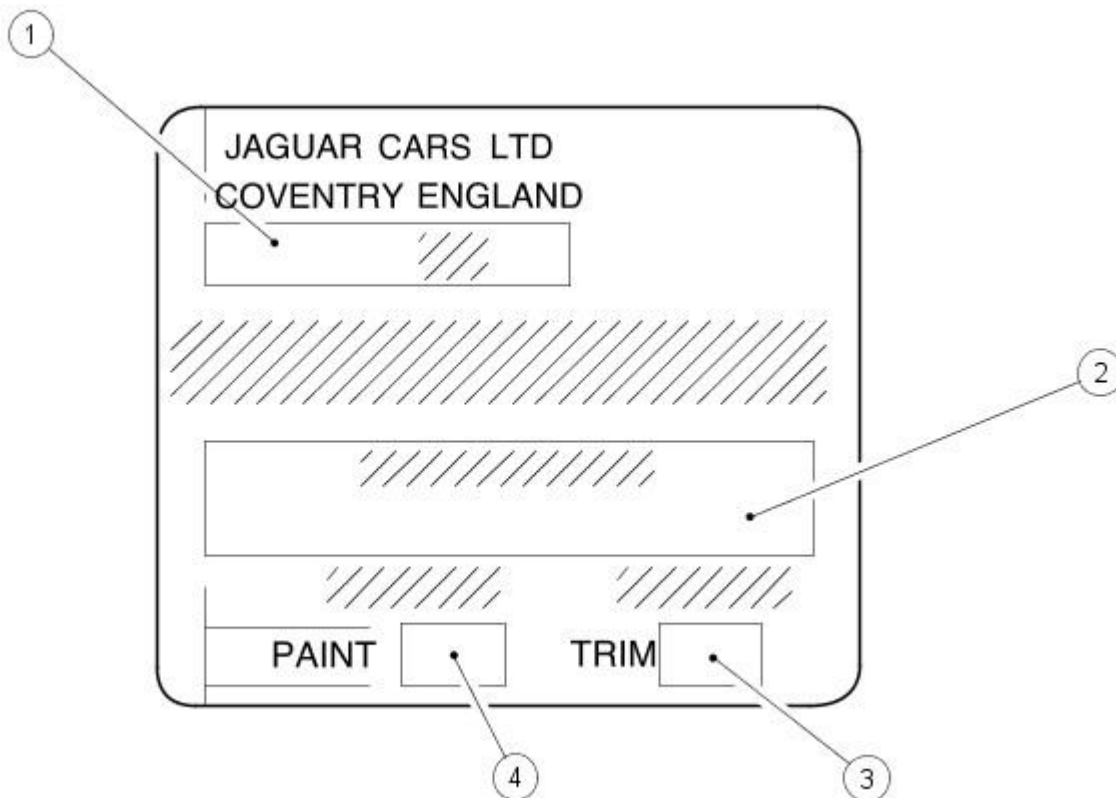
Item	Part Number	Description
1	—	Whole Vehicle Type Approval (WVTA) number printed here when applicable
2	—	Vehicle identification number
3	—	Gross vehicle weight
4	—	Gross train weight
5	—	Maximum permitted front axle loading
6	—	Maximum permitted rear axle loading
7	—	Date of manufacture
8	—	Interior trim code
9	—	Paint code

Vehicle Identification Label (North America)



VUJ0001851

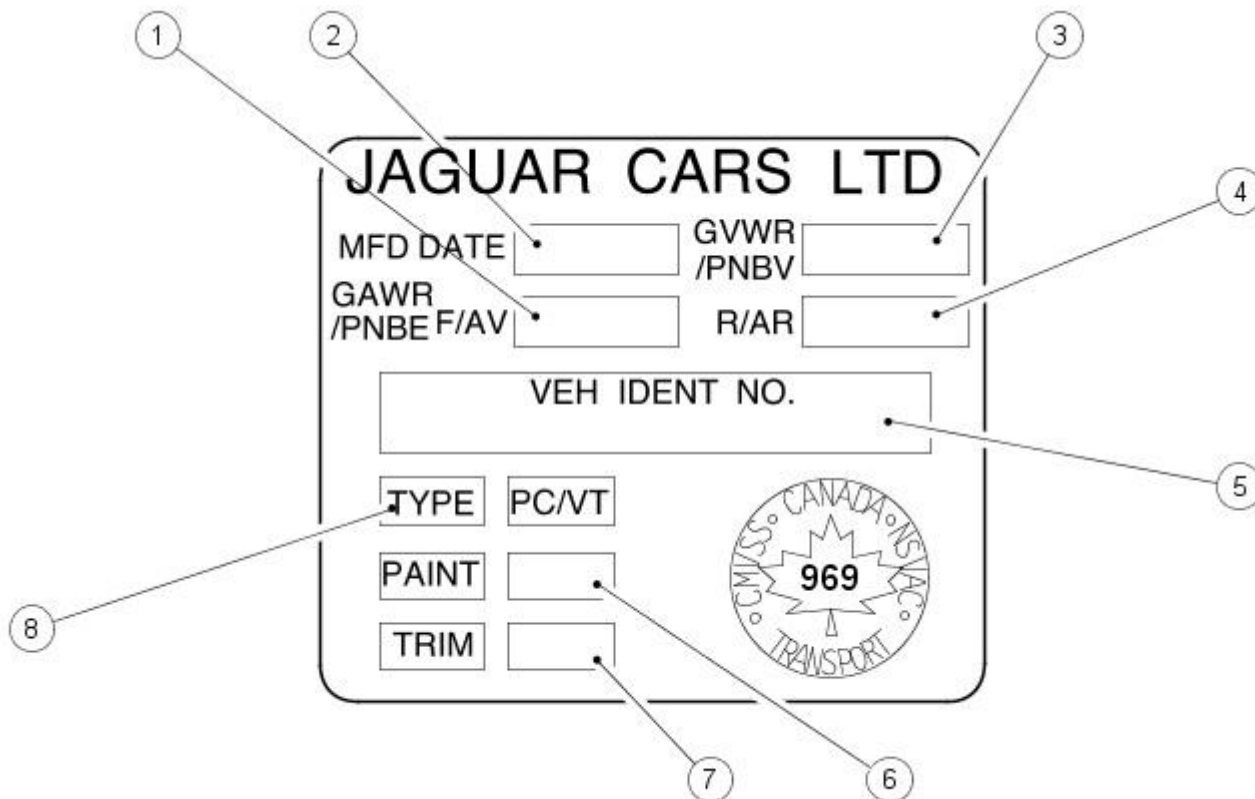
Item	Part Number	Description
1	—	Maximum permitted front axle loading
2	—	Date of manufacture
3	—	Maximum permitted rear axle loading
4	—	Gross vehicle weight
5	—	Vehicle identification number
6	—	Type
7	—	Interior trim code



VUJ0001852

Item	Part Number	Description
1	—	Date of manufacturer
2	—	Vehicle identification number
3	—	Interior trim code
4	—	Paint code

Vehicle Identification Label (Canada)



VUJ0001853

Item	Part Number	Description
1	—	Maximum permitted front axle loading
2	—	Date of manufacturer
3	—	Maximum permitted rear axle loading
4	—	Gross vehicle weight
5	—	Vehicle identification number
6	—	Paint code
7	—	Interior trim code
8	—	Type

Automatic Transmission Number

The serial number of the transmission unit is displayed on a metal label or bar code (where equipped) attached to the transmission casing.

Engine Number (V6)

The engine number is contained on a bar code label on the front cover and is also stamped in the cylinder block casting on the left hand side of the engine below the engine mounting.

Engine Number (V8)

The serial number is stamped on an engine web on the left hand side of the cylinder block behind the engine mounting. The emission code is also located here, on the transmission flange.

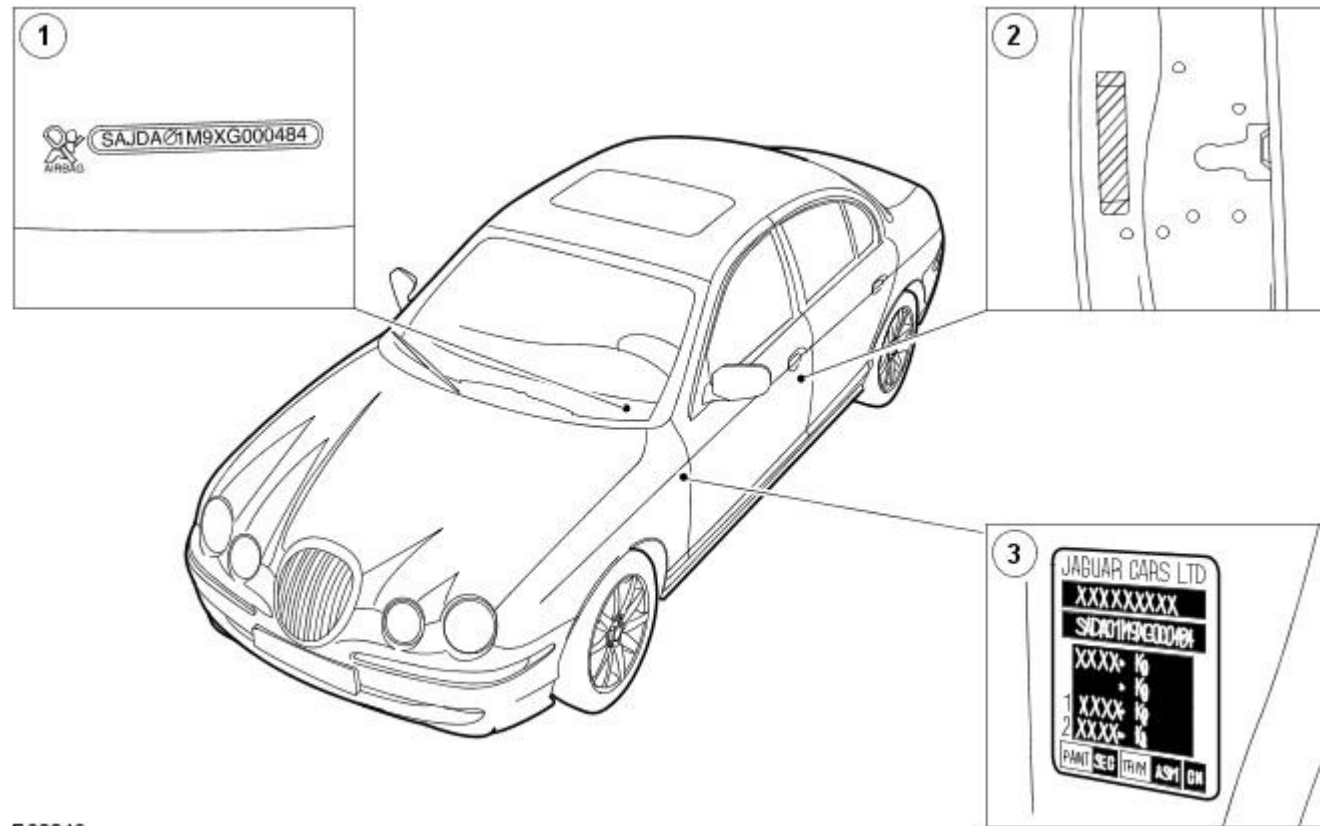
Identification Codes - Identification Codes VIN Range: N52048->N99999

Description and Operation

Vehicle Identification Number (VIN)

The official Vehicle Identification Number (VIN) for title and registration purposes is stamped on a metal plate and fastened to the instrument panel. It is positioned close on the left-hand side of the vehicle and is visible from the outside.

The VIN is also located on the vehicle certification label.

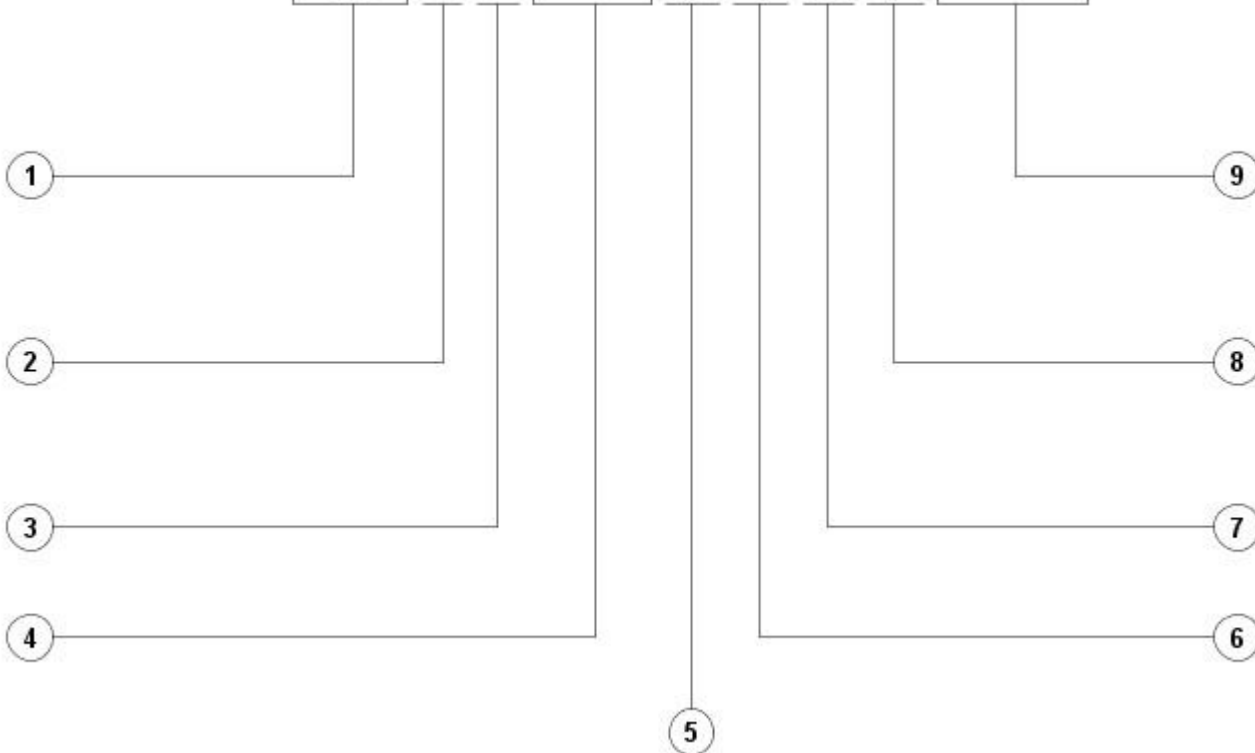


E63049

Item	Part Number	Description
1	—	VIN plate
2	—	Bar code label (USA)
3	—	VIN label (Europe/Rest of World shown)

Vehicle Identification Number (Typical)

SAJ A A 83 R ? X F N 00001



E63050