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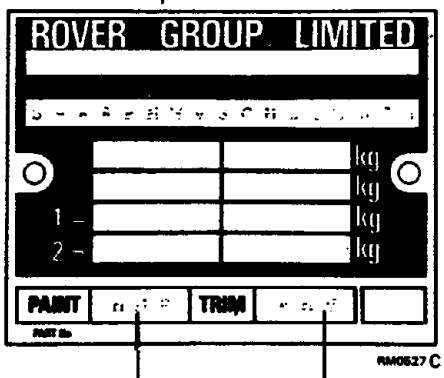
VEHICLE IDENTIFICATION NUMBER

Location

The Vehicle Identification Number (V.I.N.) is stamped on a plate attached to the LH suspension turret.



Vehicle identification number

S A R RH Y L A B A M 00001

- Geographic area
- Country
- Manufacturer
- Marque/Model
- Trim Level
- Body
- Engine
- Transmission and Steering
- Model change
- Assembly plant
- Serial number

Paint and Trim colour codes

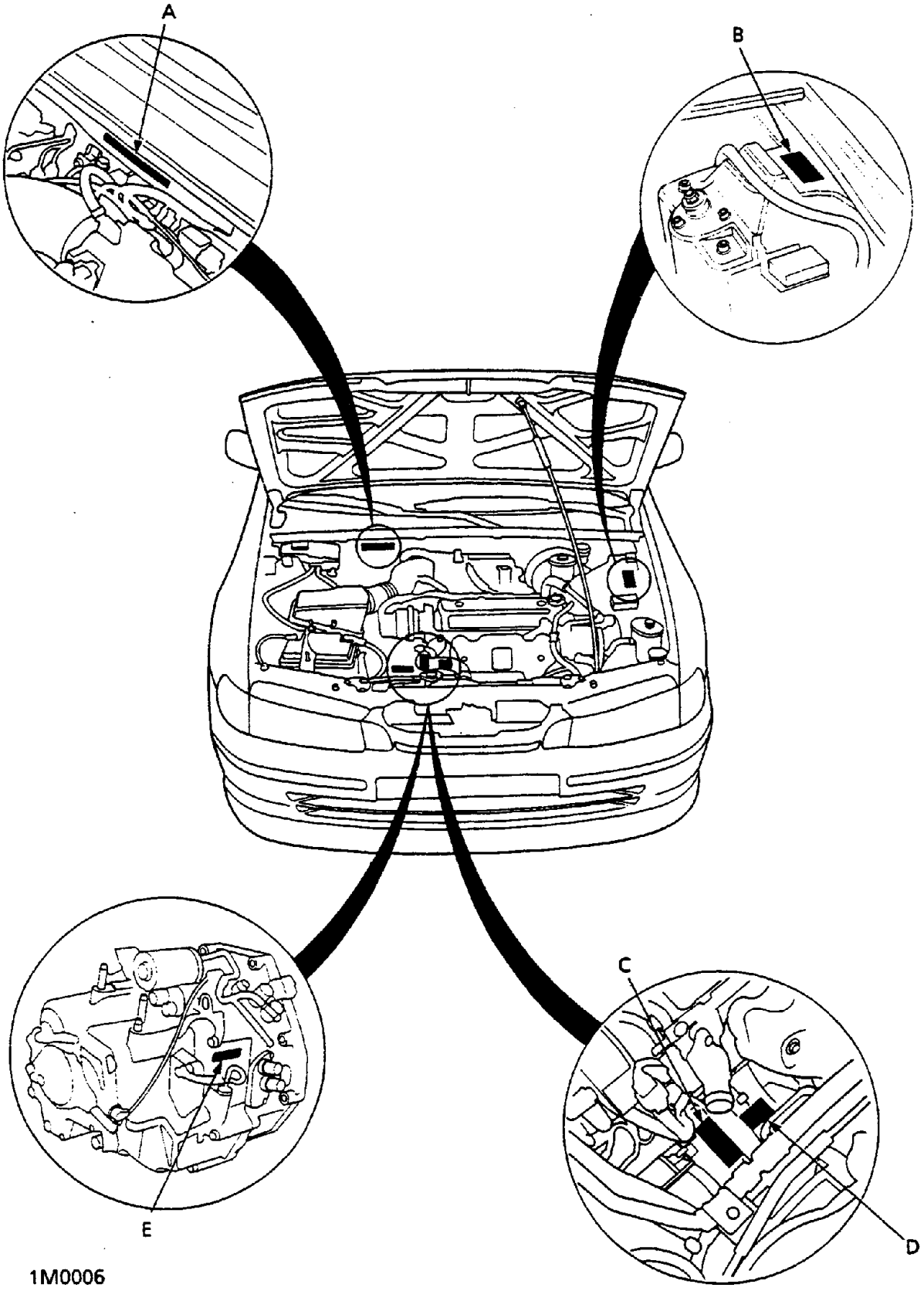
3 – letter codes identifying the original Paint and Trim colours are stamped on the VIN plate

Paint N N D

- Basic colour
- Marque identifier
- Colour/Shade name

Trim L O Y

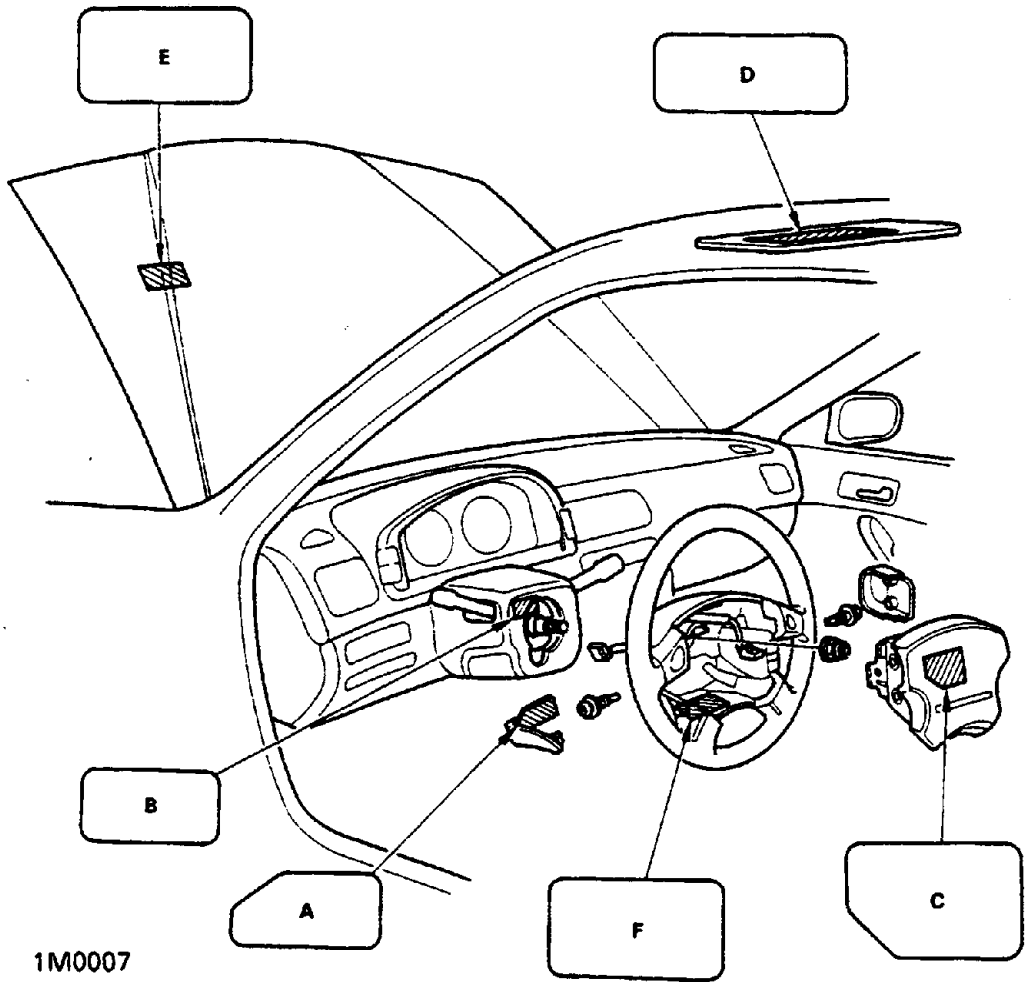
- Basic colour
- Marque identifier
- Colour/Shade name



1M0006

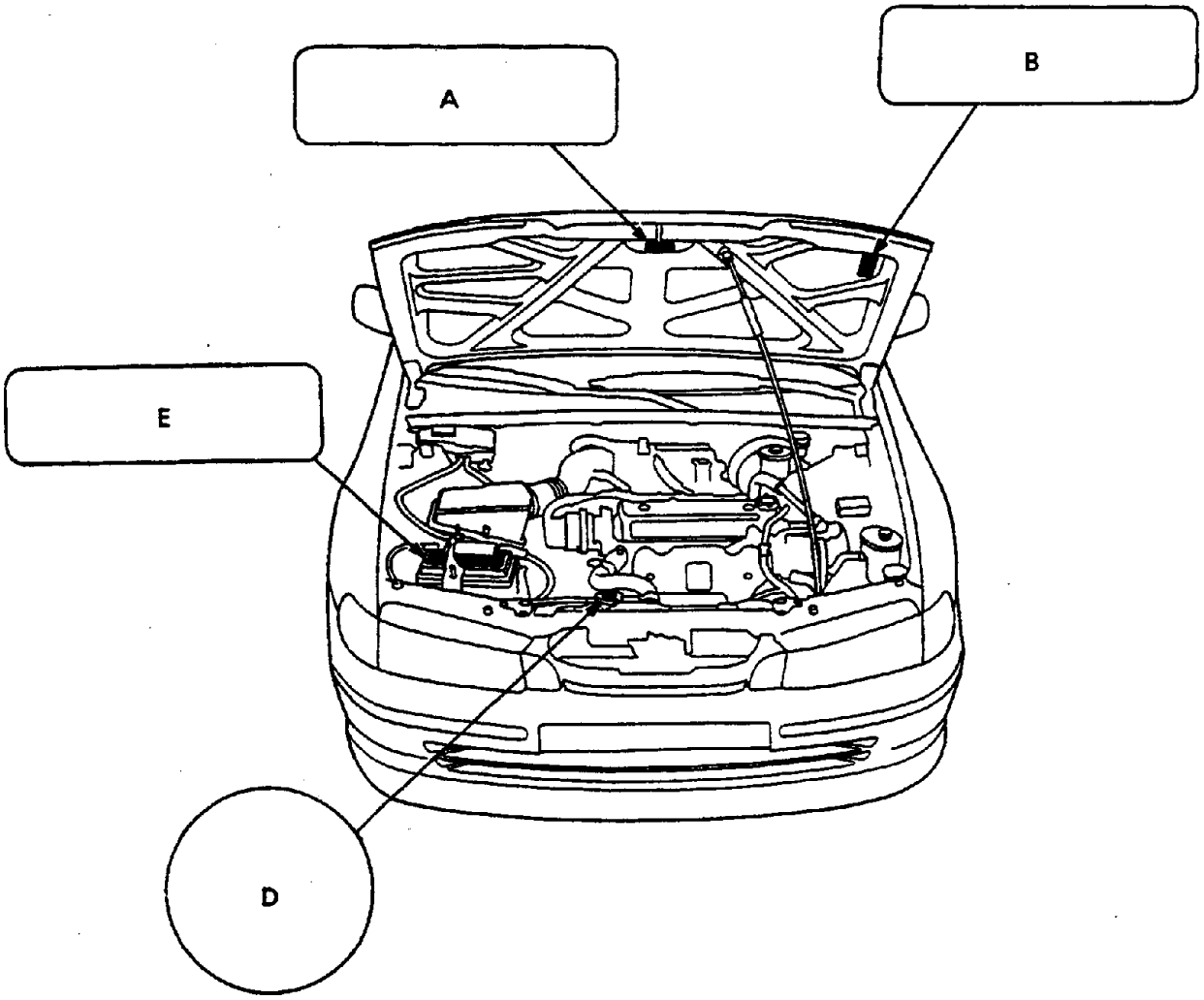
IDENTIFICATION NUMBER LOCATIONS

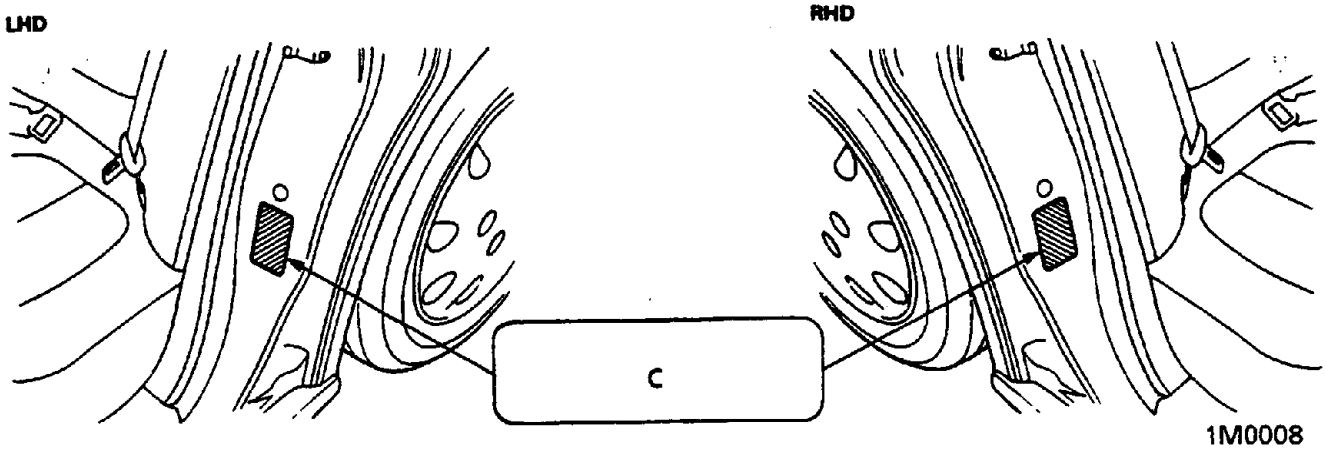
A Vehicle identification number
B Vehicle identification Number and Engine Number
C Transmission number (Manual)
D Engine number
E Transmission number (Automatic)



WARNING/CAUTION LABEL LOCATIONS

A Maintenance lid caution
B Slip ring caution
C Monitor caution
D Driver information (sunvisor)
E Warning (underneath bonnet)
F Cover caution

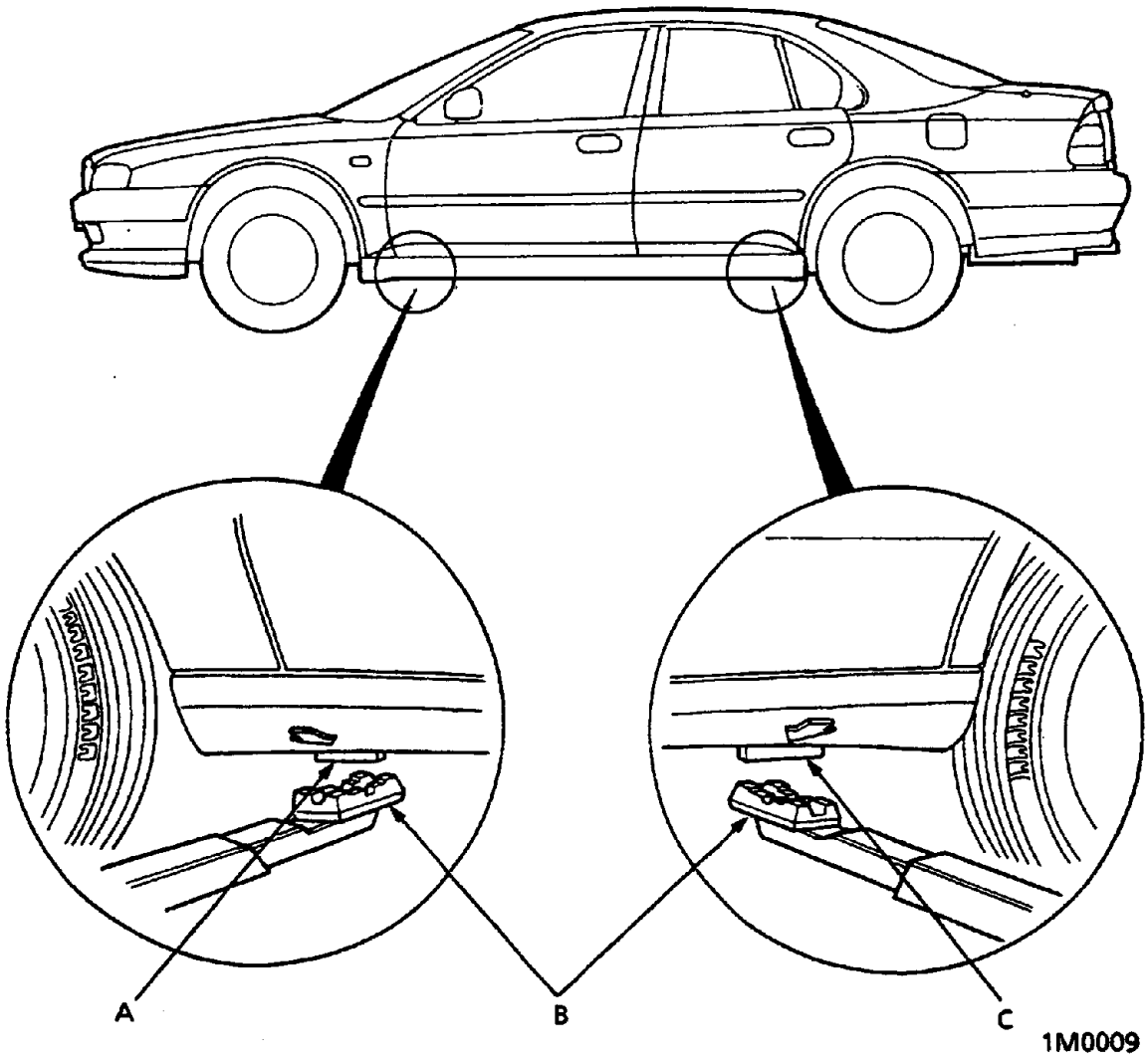




A Battery fluid frozen caution
B ABS caution
C Tyre information
D Radiator cap caution
E Battery caution

Note: *In addition to the above labels, there is a cooling fan label on the fan cowl and a fuel label on the fuel filler flap.*

LIFT AND SUPPORT POINTS



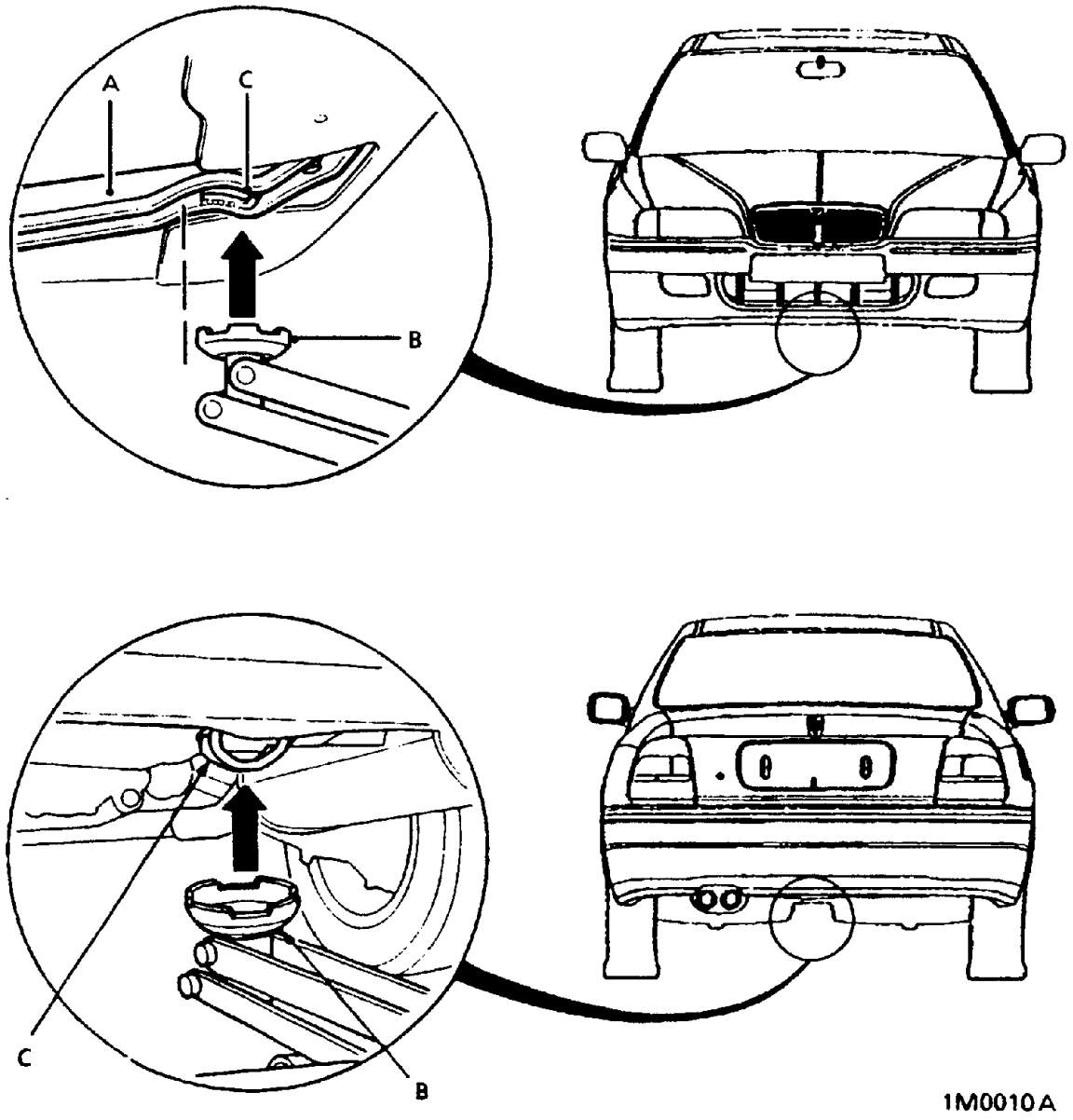
A Front support point
B Lift blocks
C Rear support point

Lift

WARNING: When heavy rear components such as suspension, fuel tank, spare tyre and boot lid are to be removed, place additional weight in the boot before hoisting. When substantial weight is removed from the rear of the car, the centre of gravity may change and can cause the car to tip forward on the hoist.

Note: *Since each tyre/wheel assembly weighs approximately 14 kg, placing the front wheels in the boot can assist with weight distribution.*

1. Place the lift blocks as shown.
2. Raise the hoist until the tyres are slightly off the ground and rock the car to be sure it is firmly supported.
3. Raise the hoist to full height and inspect lift points for solid support.

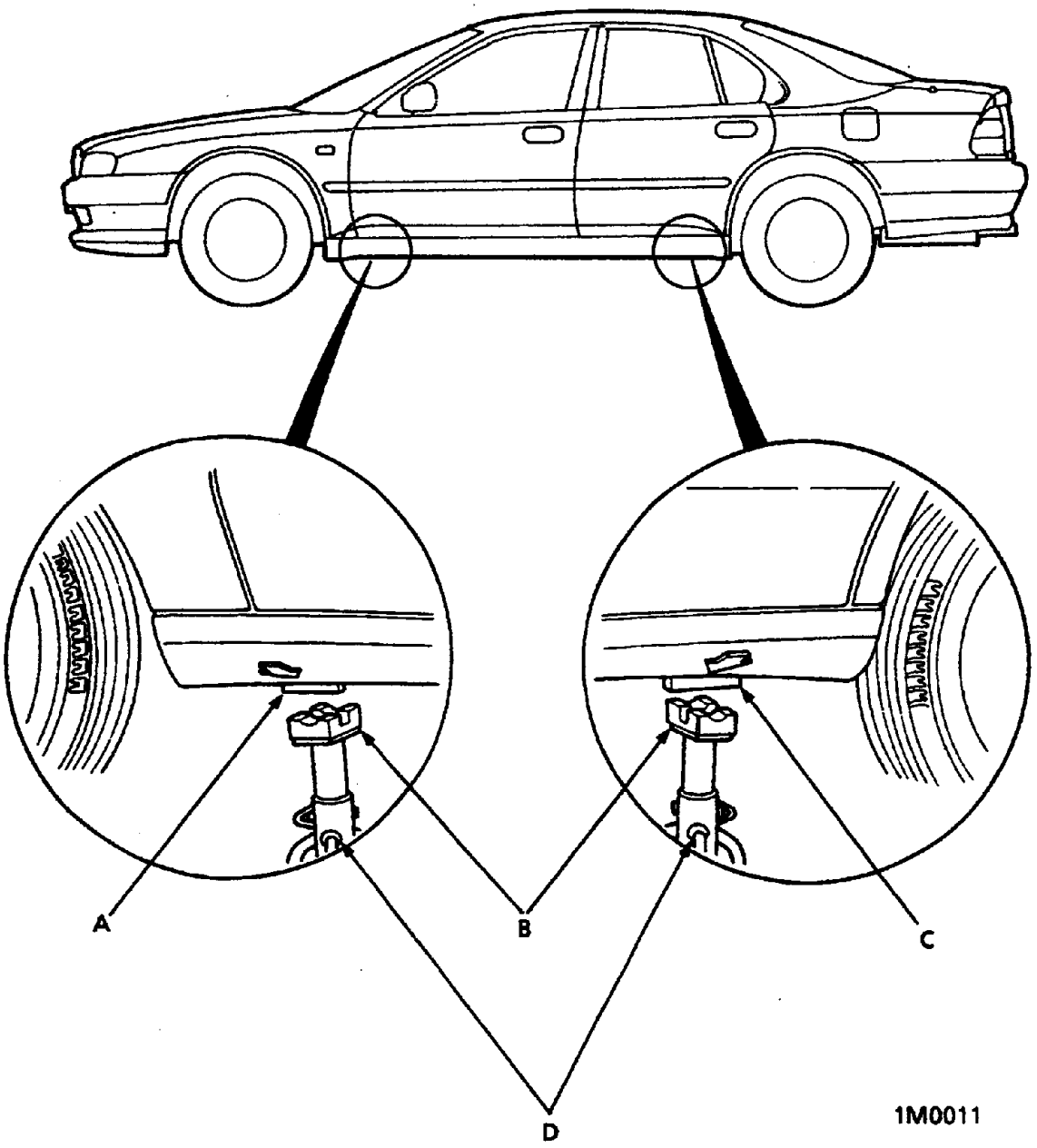


1M0010A

A Centre beam
B Lift platform
C Centre the jacking bracket in the middle of the jack lift platform.

Floor Jack

1. Set the parking brake and block the wheels that are not being lifted.
2. When lifting the rear of the car, put the gearshift lever in reverse (Automatic transmission in P position).



A	Front support point	C	Rear support point
B	Rubber attachments	D	Safety stands

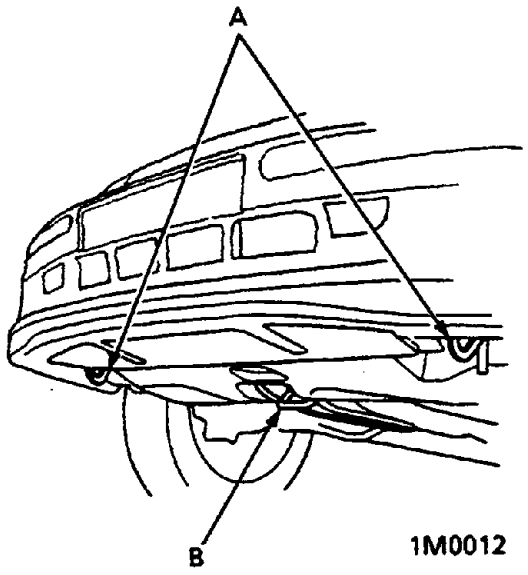
Safety Stands

1. Raise the car high enough to insert the safety stands.
2. Adjust and place the safety stands as shown so the car will be approximately level, then lower the car onto them.

WARNING:

- ***Always use safety stands when working on or under any vehicle that is supported only by a jack.***
- ***Never use a bumper jack to lift or support the car.***

TOWING



A Tie down hooks
B Towing hooks

If the car needs to be towed, call a professional towing service. Never tow the car behind another car with just a rope or chain. It is very dangerous.

Emergency Towing

There are three popular methods of towing a car:

Flat - bed Equipment

The operator loads the car on the back of a truck. This is the best way of towing the car.

Wheel Lift Equipment

The tow truck uses two pivoting arms that go under the tyres (front and rear) and lifts them off the ground. The other two wheels remain on the ground.

Sling - type Equipment

The tow truck uses metal cables with hooks on the ends. These hooks go around parts of the frame or suspension and the cables lift that end of the car off the ground. The car's suspension and body can be seriously damaged if this method of towing is attempted.

If the car cannot be transported by flat - bed, it should be towed with the front wheels off the ground. If due to damage, the car must be towed with the front wheels on the ground, do the following:

5 - Speed manual Transmission only

- Release the parking brake.
- Shift the transmission to Neutral.

Automatic Transmission only

- Release the parking brake.
- Start the engine.
- Shift the transmission to D4.
- Shift the transmission to N.
- Switch off the engine.

CAUTION: *Improper towing preparation will damage the transmission. Follow the above procedure exactly. If you can not shift the transmission your car must be transported in a flat - bed. It is best to tow the car no further than 50 miles (80 km), and keep the speed below 35 mph (55 km/h). Trying to lift or tow the car by the bumpers will cause serious damage. The bumpers are not designed to support the car's weight.*

ABBREVIATIONS

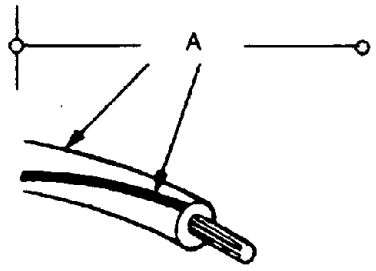
A/C	Air Conditioning, Air conditioner
ACG	Alternator
ABS	Anti – lock Brake System
A/T	Automatic Transmission
ATF	Automatic Transmission Fluid
A/F	Air Fuel Ratio
AMP	Ampere (s)
ANT	Antenna
ASSY	Assembly
AUX	Auxiliary
APPROX	Approximately
ATDC	After Top Dead Centre
AUTO	Automatic
ATT	Attachment
ACL	Air Cleaner
API	American Petroleum Institute
BARO	Barometric
BAT	Battery
BTDC	Before Top Dead Centre
BDC	Bottom Dead Centre
CKP	Crankshaft Position
CYP	Cylinder Position
CAT	Catalytic Converter
CO	Carbon Monoxide
CYL	Cylinder
CPC	Clutch Pressure Control
CARB	Carburettor
COMP	Complete
CPU	Central Processing Unit
CHG	Charge
DI	Distributor Ignition
DLC	Data Link Connector
DTC	Diagnostic Trouble Code
DIFF	Differential
DOHC	Double Overhead Camshaft
DPI	Dual Point Injection
EVAP	Evaporative
EGR	Exhaust Gas Recirculation
ECM	Electronic Control Module
ECT	Engine Coolant Temperature
EX	Exhaust
ELD	Electrical Load Detector
EFI	Electronic Fuel Injection
EPS	Electronic Power Steering
F	Front
FP	Fuel Pump
FWD	Front Wheel Drive
FR	Front Right
FL	Front Left
FSR	Fail Safe Relay
GAL	Gallon
GND	Ground
H/B	Hatchback
HO2S	Heated Oxygen Sensor
HC	Hydrocarbons
IAC	Idle Air Control
ICM	Ignition Control Module
IAT	Intake Air Temperature
IMA	Idle Mixture Adjustment
IN	Intake
IG, IGN	Ignition
ID	Identification
	Inside Diameter
INJ	Injection
INT	Intermittent
KE	European specification
KG	German specification
KS	Scandinavian specification
L	Left
LH	Left Hand
LHD	Left Hand Drive
L/C	Lock – up Clutch
LSD	Limited Slip Differential
LF	Left Front
LR	Left Rear
L – 4	In – line four cylinder (engine)
LED	Light Emitting Diode
M/S	Manual Steering
MAP	Manifold Absolute Pressure
MIL	Malfunction Indicator Light
M/T	Manual Transmission
MCK	Motor Check
MAX	Maximum
MIN	Minimum
MPI	Multi Point Injection
N	Neutral
NOx	Nitrogen. Oxides of
02S	Oxygen Sensor
OBD	ON Board Diagnostic
OD	Outside Diameter
P	Park
PAIR	Pulsed Secondary Air Injection
PSP	Power Steering Pressure
PCV	Positive Crankcase Ventilation
	Proportioning Control Valve
P/S	Power Steering
PGM – Fi	Programmed – fuel Injection
PGM – IG	Programmed Ignition
PRI	Primary
P/N	Part Number
PL	Pilot Light
PMR	Pump Motor Relay
PSW	Pressure Switch
PSF	Power Steering Fluid

Qty	Quantity
R	Right
	Reverse
	Rear
RR	Rear Right
RHD	Right Hand Drive
REF	Reference
RL	Rear Left
RON	Research Octane Number
SAE	Society of Automotive Engineers
SOHC	Single Overhead Camshaft
SOL	Solenoid
SPEC	Specification
S/R	Sun Roof
SRS	Supplemental Restraint System
STD	Standard
SW	Switch
SCS	Service Check Signal
SEC	Second
	Secondary
T	Torque
TCM	Transmission Control Module
TWC	Three Way Catalytic Converter
TDC	Top Dead Centre
TB	Throttle Body
TP	Throttle Position
TC	Torque Converter
T/B	Timing Belt
T/N	Tool Number
TCS	Traction Control System
VSS	Vehicle Speed Sensor
VC	Viscous Coupling
VIN	Vehicle Identification Number
VVIS	Variable Volume Intake System
W	With
W/O	Without
WOT	Wide Open Throttle
2WD	Two Wheel Drive
4WD	Four Wheel Drive
4AT	4 – speed Automatic Transmission
5MT	5 – speed Manual Transmission
P	Park
R	Reverse
N	Neutral
D4	Drive (1st through 4th gear)
D3	Drive (1st through 3rd gear)
2	Second
1	First
1ST	Low (gear)
2ND	Second (gear)
3RD	Third (gear)
4TH	Fourth (gear)
5TH	Fifth (gear)

WIRE COLOUR CODES

The following abbreviations are used to identify wire colours in the circuit diagrams:

WHT	White
YEL	Yellow
BLK	Black
BLU	Blue
GRN	Green
RED	Red
ORN	Orange
PNK	Pink
BRN	Brown
GRY	Grey
PUR	Purple
LT BLU	Light Blue
LT GRN	Light Green



86M 1924

The wire insulation has one colour with another colour stripe. The second colour is the stripe.

ENGINE

Type:	
618i, Si	F18A3 (SOHC)
620i	F20Z2 (SOHC)
620Si, SLi & GSi	F20Z1 (SOHC)
Cylinder Arrangement	Transverse In – line, 4 – cylinder
Bore	85.0 mm
Stroke (F18A3 engine)	81.5 mm
Stroke (F20Z1, F20Z2 engines)	88.0 mm
Capacity (F18A3 Engine)	1850 cm^3 .
Capacity (F20Z1, F20Z2 engines)	1997 cm^3
Compression Ratio	
F18A3 engine	8.9 : 1
F20Z1 engine	9.5 : 1
F20Z2 engine	9.0 : 1
Valve clearances:	
Inlet	0.26 mm
Exhaust	0.30 mm
Ignition timing	15° ± 2° (RED) BTDC
Fast idle speed	1400 ± 200 rev/min
Idle speed (no load)	770 ± 50 rev/min
Idle CO	0.2% max.
Valve Train	Belt driven, 4 valves per cylinder, single over head camshaft
Lubrication System	Forced and wet sump, torochoid pump
Oil Pump Displacement (At oil temp. 36°C)	53.7 l/min at 6,000 pump rev/min
Fuel Required	Premium UNLEADED grade gasoline with 95 Research Octane Number or higher

Cylinder head/valve train

Cylinder Compression
(at 250 rev/min with throttle fully open)

Nominal	12.5 kgf/cm^2 (178 lbf/in^2)
Minimum	9.5 kgf/cm^2 (135 lbf/in^2)
Maximum variation	2 kgf/cm^2 (28 lbf/in^2)
Cylinder head	
Warpage	0.05 mm
Height	99.95 – 100.05 mm
Camshaft	
End play:	
New	0.05 – 0.15 mm
Service Limit	0.5 mm
Camshaft – to – holder oil clearance:	
New	0.050 – 0.089 mm
Service Limit	0.15 mm
Total runout:	
New	0.03 mm max.
Service Limit	0.04 mm
Cam lobe height (F18A3 engine):	
Intake	38.095 mm
Exhaust	38.387 mm
Cam lobe height (F20Z1 engine):	
Intake	38.741 mm
Exhaust	38.972 mm
Cam lobe height (F20Z2 engine):	
Intake	38.095 mm
Exhaust	38.890 mm

Valves

Valve clearance:

Intake	0.24 – 0.28 mm
Exhaust	0.28 – 0.32 mm

Valve stem OD

Intake – New	5.485 – 5.495 mm
Intake – Service Limit	5.455 mm
Exhaust – New	5.450 – 5.460 mm
Exhaust – Service Limit	5.420 mm

Stem – to – guide clearance:

Intake – New	0.020 – 0.045 mm
Intake – Service Limit	0.08 mm
Exhaust – New	0.055 – 0.080 mm
Exhaust – Service Limit	0.12 mm

Stem installed height:

Intake – New	48.245 – 48.715 mm
Intake – Service Limit	48.915 mm
Exhaust – New	50.315 – 50.785 mm
Exhaust – Service Limit	51.035 mm

Valve seat

Inlet:

Width – New	1.25 – 1.55 mm
Width – Service Limit	2.0 mm

Exhaust:

Width – New	1.25 – 1.55 mm
Width – Service Limit	2.0 mm

Valve spring

Free length (F18A3, F20Z1 engines):

Intake	53.42 mm *1, *2, *3
Exhaust	54.66 mm *1, *2, *3

Free length (F20Z2 engine):

Intake	54.55 mm *1
	54.54 mm *2
	53.42 mm *3
Exhaust	59.88 mm *1, *2
	54.66 mm *3

1: CHUO HATSUJO manufactured valve spring

2: NIHON HATSUJO manufactured valve spring

3: SCHERDEL manufactured valve spring

Valve guide

Internal Diameter:

Intake – New	5.515 – 5.530 mm
Intake – Service Limit	5.53 mm
Exhaust – New	5.515 – 5.530 mm
Exhaust – Service Limit	5.53 mm

Installed height:

Intake	23.75 – 24.25 mm
Exhaust	15.05 – 15.55 mm

Rocker arm

Arm – to – shaft clearance:

Intake – New	0.017 – 0.050 mm
Intake – Service Limit	0.08 mm
Exhaust – New	0.018 – 0.054 mm
Exhaust – Service Limit	0.08 mm

Engine Block

Warpage of surface:	
New	0.07 mm max.
Service Limit	0.10 mm
Bore diameter:	
A – New	85.010 – 85.020 mm
A – Service Limit	85.07 mm
B – New	85.000 – 85.010 mm
B – Service Limit	85.07 mm
Bore taper	0.05 mm
Reboring limit	0.5 mm

Piston

Skirt OD (at 21mm from bottom of skirt):	
No Letter – New	84.980 – 84.990 mm
No Letter – Service Limit	84.970 mm
Letter B – New	84.970 – 84.980 mm
Letter B – Service Limit	84.960 mm
Clearance in cylinder:	
New	0.020 – 0.040 mm
Service Limit	0.05 mm
Groove width (for ring):	
Top – New	1.220 – 1.230 mm
Top – Service Limit	1.25 mm
Second – New	1.220 – 1.230 mm
Second – Service Limit	1.25 mm
Oil – New	2.805 – 2.820 mm
Oil – Service Limit	2.85 mm

Piston ring

Ring – to – groove clearance:	
Top – New	0.035 – 0.060 mm
Top – Service Limit	0.13 mm
Second – New	0.030 – 0.055 mm
Second – Service Limit	0.13 mm
Ring end gap:	
Top – New	0.20 – 0.35 mm
Top – Service Limit	0.60 mm
Second – New	0.40 – 0.55 mm
Second – Service Limit	0.70 mm
Oil – New	0.20 – 0.70 mm
Oil – Service Limit	0.80 mm

Piston Pin

Outer diameter	21.994 – 22.000 mm
Pin – to – piston clearance	0.012 – 0.024 mm

Connecting rod

Pin – to – rod interference	0.013 – 0.032 mm
Small end bore diameter	21.968 – 21.981 mm
Large end bore diameter – Nominal	48.0 mm
End play installed on crankshaft:	
New	0.15 – 0.30 mm
Service Limit	0.40 mm

Crankshaft

Main journal diameter:	
No. 1 and 4 journals	49.984 – 50.008 mm
No. 2 journal	49.976 – 50.000 mm
No. 3 journal	49.972 – 49.996 mm
No. 5 journal	49.988 – 50.012 mm
Rod journal diameter	44.976 – 45.000 mm
Taper:	
New	0.005 max.
Service Limit	0.006 mm
Out – of – round:	
New	0.005 max.
Service Limit	0.006 mm
End play:	
New	0.10 – 0.35 mm
Service Limit	0.45 mm
Total runout:	
New	0.03 mm max.
Service Limit	0.04 mm

Main Bearings

Main Bearing – to – journal clearance:	
No. 1 and 4 journals – New	0.013 – 0.037 mm
No. 1 and 4 journals – Service Limit	0.050 mm
No. 2 journal – New	0.021 – 0.045 mm
No. 2 journal – Service Limit	0.050 mm
No. 3 journal – New	0.025 – 0.049 mm
No. 3 journal – Service Limit	0.055 mm
No. 5 journal – New	0.009 – 0.033 mm
No. 5 journal – Service Limit	0.040 mm
Rod bearing – to – journal oil clearance:	
New	0.015 – 0.043 mm
Service Limit	0.050 mm

Balancer shaft

Journal diameter:	
No. 1 front journal – New	42.722 – 42.734 mm
No. 1 front journal – Service Limit	42.71 mm
No. 1 rear journal – New	20.938 – 20.950 mm
No. 1 rear journal – Service Limit	20.92 mm
No. 2 journal – New	38.712 – 38.724 mm
No. 2 journal – Service Limit	38.70 mm
No. 3 journal – New	34.722 – 34.734 mm
No. 3 journal – Service Limit	34.71 mm
Journal taper	0.005 mm
End play:	
Front	0.10 – 0.35 mm
Rear	0.06 – 0.18 mm
Total runout:	
New	0.02 mm
Service Limit	0.03 mm
Shaft – to – bearing oil clearance:	
No. 1 rear journal – New	0.050 – 0.075 mm
No. 1 rear journal – Service Limit	0.09 mm
No. 1 front and No. 3 journals – New	0.066 – 0.098 mm
No. 1 front and No. 3 journals – Service Limit	0.12 mm
No. 2 journals – New	0.076 – 0.108 mm
No. 2 journals – Service Limit	0.13 mm

Balancer shaft bearing

Internal Diameter:	
No. 1 front journal – New	42.800 – 42.820 mm
No. 1 front journal – Service Limit	42.83 mm
No. 1 rear journal – New	21.000 – 21.013 mm
No. 1 rear journal – Service Limit	21.02 mm
No. 2 journal – New	38.800 – 38.820 mm
No. 2 journal – Service Limit	38.83 mm
No. 3 journal – New	34.800 – 34.820 mm
No. 3 journal – Service Limit	34.83 mm

Engine Lubrication

Engine oil Capacity:	
After engine overhaul	4.9 litre
Oil change, including filter	3.8 litre
Filter only	0.3 litre

Oil pump

Inner – to – outer rotor clearance:	
New	0.02 – 0.16 mm
Service Limit	0.20 mm
Pump body – to – outer rotor clearance:	
New	0.10 – 0.19 mm
Service Limit	0.21 mm
Pump body – to – rotor axial clearance:	
New	0.02 – 0.07 mm
Service Limit	0.12 mm
Relief valve pressure at 80°C	
Idle	0.7 kgf/cm²
3,000 rev/min	3.5 kgf/cm²

COOLING

Radiator

Coolant capacity	
F18A3 engine – Manual	6.4 litres (overhaul)
F20Z1 & F20Z2 engine – Manual	6.3 litres (overhaul)
	2.7 litres (coolant change)
F20Z1 engine – Automatic	6.2 litres (overhaul)
	2.6 litres (coolant change)
F20Z2 engine:	
Reservoir capacity	0.6 litres
Radiator cap Opening pressure	0.95 – 1.25 kgf/cm²

Thermostat

Starts to open	76 – 80°C
Fully open	90°C
Valve lift when fully open	8.0 mm

Cooling fan

'ON'	90 – 96°C
'OFF'	Subtract 2 – 7°C from 'ON' temperature
Timer 'ON'	103 – 109°C
Timer 'OFF'	Subtract 2 – 5°C from 'ON' temperature

FUEL AND EMISSIONS

Fuel pump

Delivery in 10 secs:	
New	0.23 litres
Service Limit	0.11 litres
Relief valve opening pressure	4.5 – 6.0 kgf/cm²
Fuel Pressure (vacuum hose disconnected)	2.8 – 3.3 kgf/cm²
Fuel tank	
Capacity	65 litres

CLUTCH

Clutch Type	
M/T	Single plate dry, diaphragm spring
A/T	Torque converter
Clutch pedal	
Height	210 mm
Stroke at pedal	142 mm
Clutch pedal free play	9 – 15 mm
Disengagement height:	
To the floor	90 mm
To the carpet	80 mm
Flywheel	
Clutch surface runout:	
New	0.05 mm (max)
Service Limit	0.15 mm
Clutch disc	
Rivet head depth:	
New	1.4 mm (min)
Service Limit	0.2 mm
Surface runout:	
New	0.6 mm (max)
Service Limit	1.0 mm
Thickness:	
New	8.5 – 9.2 mm
Service Limit	6.5 mm
Pressure plate	
Finger height:	
New	0.6 mm (max)
Service Limit	0.8 mm
Warpage:	
New	0.03 mm (max)
Service Limit	0.15 mm

MANUAL GEARBOX

Gear Ratios – F20Z2 engine

1st	3.307 : 1
2nd	1.809 : 1
3rd	1.185 : 1
4th	0.903 : 1
5th	0.735 : 1
Reverse	3.000 : 1

Gear Ratios – F18A3, F20Z1 engines

1st	3.307 : 1
2nd	1.809 : 1
3rd	1.230 : 1
4th	0.933 : 1
5th	0.757 : 1
Reverse	3.000 : 1

Gearbox Capacity

Oil change	1.9 litres
After overhaul	2.0 litres

Mainshaft

End play	0.10 – 0.16 mm
Diameter of ball bearing contact area:	
New	27.977 – 27.990 mm
Service Limit	27.93 mm
Diameter of needle bearing contact area:	
New	37.984 – 38.000 mm
Service Limit	37.93 mm
Diameter of ball bearing contact area:	
New	27.987 – 28.000 mm
Service Limit	27.94 mm
Runout	
New	0.02 mm max.
Service Limit	0.05 mm

Mainshaft 3rd and 4th gears

Internal Diameter:	
New	43.009 – 43.025 mm
Service Limit	43.080 mm
End play	
New	0.06 – 0.21 mm
Service Limit	0.30 mm
3rd gear thickness	
New	32.42 – 32.47 mm
Service Limit	32.3 mm
4th gear thickness	
New	30.92 – 30.97 mm
Service Limit	30.8 mm

Mainshaft 5th gear

Internal Diameter:	
New	43.009 – 43.025 mm
Service Limit	43.080 mm
End play:	
New	0.06 – 0.21 mm
Service Limit	0.30 mm
Thickness:	
New	30.92 – 30.97 mm
Service Limit	30.8 mm

Countershaft

End play:
- New . . . . . 0.05 – 0.40 mm
- Service Limit . . . . . 0.50 mm

Diameter of needle bearing contact area A:
- New . . . . . 38.000 – 38.015 mm
- Service Limit . . . . . 37.95 mm

Diameter of ball bearing and needle bearing contact area C:
- New . . . . . 24.987 – 25.000 mm
- Service Limit . . . . . 24.94 mm

Diameter of 1st gear contact area B:
- New . . . . . 39.984 – 40.000 mm
- Service Limit . . . . . 39.93 mm

Runout
- New . . . . . 0.02 mm max.
- Service Limit . . . . . 0.05 mm

Countershaft 1st gear

Internal Diameter:
- New . . . . . 46.009 – 46.025 mm
- Service Limit . . . . . 46.08 mm

End play . . . . . 0.06 – 0.23 mm

Countershaft 2nd gear

Internal Diameter:
- New . . . . . 47.009 – 47.025 mm
- Service Limit . . . . . 47.08 mm

End play . . . . . 0.05 – 0.10 mm
- Service Limit . . . . . 0.18 mm

Thickness:
- New . . . . . 28.92 – 28.97 mm

Spacer collar (countershaft 2nd gear)

Internal Diameter:
- New . . . . . 36.48 – 36.49 mm
- Service Limit . . . . . 36.50 mm

Outside Diameter:
- New . . . . . 41.989 – 42.000 mm
- Service Limit . . . . . 41.94 mm

Spacer collar (Mainshaft 4th and 5th gears)

Internal Diameter:
- New . . . . . 31.002 – 31.012 mm
- Service Limit . . . . . 31.06 mm

Outside Diameter
- New . . . . . 37.989 – 38.000 mm
- Service Limit . . . . . 37.94 mm
- Dimension A . . . . . 56.45 – 56.55 mm
- Dimension B . . . . . 26.03 – 26.08 mm

Reverse idler gear

Internal Diameter	
New	20.016 – 20.043 mm
Service Limit	20.09 mm
Gear – to – reverse gear shaft clearance	
New	0.036 – 0.084 mm
Service Limit	0.160 mm

Synchro ring

Ring – to – gear clearance (ring pushed against gear)	
New	0.85 – 1.10 mm
Service Limit	0.40 mm

Double cone synchro

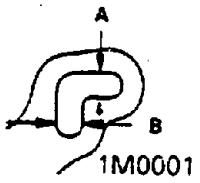
Clearance (ring pushed against gear)	
Outer synchro ring – to – synchro cone – New	0.5 mm (min)
Service Limit	0.3 mm
Synchro ring – to – gear – New	0.5 mm (min)
Service Limit	0.3 mm
Outer synchro ring – to – gear – New	0.95 mm
Service Limit	0.6 mm

Shift fork

Finger thickness	6.2 – 6.4 mm
Fork – to – synchro sleeve clearance:	
New	0.35 – 0.65 mm
Service Limit	1.0 mm

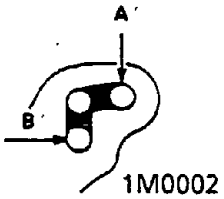
Reverse shift fork

Pawl groove width	13.0 – 13.3 mm
Fork – to – reverse idler gear clearance	
New	0.5 – 1.1 mm
Service Limit	1.8 mm
Groove width at A	7.05 – 7.25 mm
Groove width at B	7.4 – 7.7 mm



Fork – to – 5th/reverse shift shaft clearance at A:
- New . . . . . 0.05 – 0.35 mm
- Service Limit . . . . . 0.5 mm

Fork – to – 5th/reverse shift shaft clearance at B:
- New . . . . . 0.4 – 0.8 mm
- Service Limit . . . . . 1.0 mm



Shift arm

Internal Diameter . . . . . 15.973 – 16.000 mm
Shift arm – to – shaft clearance . . . . . 0.005 – 0.059 mm
Shift fork diameter at contact area . . . . . 12.9 – 13.0 mm
Shift – arm – to – shift fork shaft clearance:
- New . . . . . 0.2 – 0.5 mm
- Service Limit . . . . . 0.6 mm

Select lever

Shaft outer diameter . . . . . 15.941 – 15.968 mm
Shift arm cover clearance . . . . . 0.032 – 0.102 mm

Shift lever

Outside Diameter . . . . . 15.941 – 15.968 mm
Transmission housing clearance . . . . . 0.021 – 0.041 mm

Interlock

Bore diameter . . . . . 16.00 – 16.05 mm
Shift arm clearance . . . . . 0.032 – 0.109 mm

AUTOMATIC GEARBOX

Gear Ratio

1st	2.705 : 1
2nd	1.366 : 1
3rd	1.028 : 1
4th	0.731 : 1
Reverse	2.047 : 1

Transmission fluid Capacity:

Fluid change	2.4 litre
After overhaul	6.0 litre

Hydraulic pressure at 2000 rev/min:

Line pressure in N or P position:

New	8.0 kgf/cm² (throttle fully closed) 8.5 kgf/cm² (throttle more than 3/16 open)
Service Limit	7.5 kgf/cm² (throttle more than 3/16 open)

4th clutch pressure in D4 position:

New	5.3 kgf/cm² (throttle fully closed) 8.5 kgf/cm² (throttle more than 3/16 open)
Service Limit	4.8 kgf/cm² (throttle fully closed) 7.5 kgf/cm² (throttle more than 3/16 open)

3rd and 2nd clutch pressure at 2,000 rev/min in D4 position:

New	5.0 kgf/cm² (throttle fully closed) 8.5 kgf/cm² (throttle more than 3/16 open)
Service Limit	4.5 kgf/cm² (throttle fully closed) 7.5 kgf/cm² (throttle more than 3/16 open)

2nd clutch pressure at 2,000 rev/min in position 2:

New	8.0 – 8.5 kgf/cm²
Service Limit	7.5 kgf/cm²

1st & 1st – hold clutch pressure in position 1:

New	8.0 – 8.5 kgf/cm²
Service Limit	7.5 kgf/cm²

Throttle B pressure

Throttle fully closed	0 kgf/cm²
Throttle fully open	8.0 – 8.5 kgf/cm²
Service Limit	7.5 Kgf/cm²

Stall speeds

Stall speed (car on level ground)	2,350 – 2,650 rev/min

Clutch

Clutch initial clearance

1st – hold	0.80 – 1.00 mm
1st, 2nd	0.65 – 0.85 mm
3rd, 4th	0.4 – 0.6 mm

Return spring free length 1st, 2nd, 3rd, 4th:

New	33.5 mm
Service Limit	31.5 mm
Disc thickness (New)	1.88 – 2.00 mm
Service limit	Renew when grooves worn out.

Clutch plate thickness

1st	1.95 – 2.05 mm
1st – hold	1.55 – 1.65 mm
2nd	2.55 – 2.65 mm
3rd, 4th	2.25 – 2.35 mm

Clutch end plate thickness
- Mark 1 ..... 2.05 – 2.10 mm
- Mark 2 ..... 2.15 – 2.20 mm
- Mark 3 ..... 2.25 – 2.30 mm
- Mark 4 ..... 2.35 – 2.40 mm
- Mark 5 ..... 2.45 – 2.50 mm
- Mark 6 ..... 2.55 – 2.60 mm
- Mark 7 ..... 2.65 – 2.70 mm
- Mark 8 ..... 2.75 – 2.80 mm
- Mark 9 ..... 2.85 – 2.90 mm

Valve body

Stator shaft needle bearing contact ID:
- Torque converter side ..... 27.000 – 27.021 mm
- Oil pump side ..... 29.000 – 29.013 mm

Oil pump gear, side clearance:
- New ..... 0.03 – 0.05 mm
- Service Limit ..... 0.07 mm

Oil pump gear – to – body clearance:
- Drive gear ..... 0.210 – 0.265 mm
- Driven gear ..... 0.070 – 0.125 mm

Oil pump driven gear ID ..... 14.016 – 14.034 mm

Oil pump shaft OD ..... 13.980 – 13.990 mm

Shifting device, and throttle control system

Reverse shift fork finger thickness:
- New ..... 5.90 – 6.00 mm
- Service Limit ..... 5.40 mm

Throttle cam stopper height ..... 17.0 – 17.1 mm

Servo body

Shift fork shaft bore ID ..... 14.000 – 14.010 mm

Shift fork shaft valve bore ID:
- New ..... 37.000 – 37.039 mm
- Service Limit ..... 37.045 mm

Regulator valve body

Sealing ring contact ID:
- New ..... 35.000 – 35.025 mm
- Service Limit ..... 35.050 mm

Accumulator body

Sealing ring contact ID:
- New ..... 32.000 – 32.025 mm
- Service Limit ..... 32.050 mm

Stator shaft

Sealing ring contact ID:
- New ..... 29.000 – 29.013 mm
- Service Limit ..... 29.050 mm

Transmission

Diameter of needle bearing contact area	
On mainshaft of stator shaft	22.984 – 23.000 mm
On mainshaft of 3rd gear collar	45.984 – 46.000 mm
On mainshaft of 4th gear collar	31.984 – 32.000 mm
On countershaft of 1st gear collar	40.984 – 41.000 mm
On countershaft of 4th gear	31.975 – 31.991 mm
On countershaft of parking gear	39.984 – 40.000 mm
On countershaft of reverse gear	35.979 – 36.000 mm
On secondary shaft of 1st gear	31.975 – 31.991 mm
On secondary shaft of 2nd gear	31.975 – 31.991 mm
On reverse idler gear shaft	14.990 – 15.000 mm
Inside diameter:	
Mainshaft 3rd gear	52.000 – 52.019 mm
Mainshaft 4th gear	38.005 – 38.021 mm
Countershaft 1st gear	47.000 – 47.016 mm
Countershaft 4th gear	38.000 – 38.016 mm
Countershaft reverse gear	42.000 – 42.016 mm
Countershaft idler gear	48.000 – 48.016 mm
Secondary shaft 1st gear	36.000 – 36.016 mm
Secondary shaft 2nd gear	37.000 – 37.016 mm
Reverse idler gear shaft holder	14.800 – 14.824 mm
Mainshaft 3rd gear collar length	19.50 – 19.55 mm
Mainshaft 4th gear collar length	47.50 – 47.55 mm
Countershaft 1st gear collar length	27.50 – 27.55 mm
Thrust washer thickness	
Countershaft 1st gear	1.45 – 1.50 mm
Countershaft idler gear	3.45 – 3.55 mm
Countershaft parking gear length	25.030 – 25.048 mm
Secondary shaft 1st gear distance collar length	4.95 – 5.00 mm
Secondary shaft 2nd gear spline washer thickness	4.02 – 4.05 mm
	4.07 – 4.10 mm
	4.12 – 4.15 mm
	4.17 – 4.20 mm
	4.22 – 4.25 mm
	4.27 – 4.30 mm
	4.32 – 4.35 mm
	4.37 – 4.40 mm
	4.42 – 4.45 mm

DIFFERENTIAL - MANUAL GEARBOX

Final Drive Ratio	4.266
Final driven gear	
Backlash:	
New	0.085 - 0.145 mm
Service Limit	0.20 mm
Differential carrier	
Pinion shaft contact area ID	18.000 - 18.018 mm
Carrier - to - pinion clearance:	
New	0.017 - 0.047 mm
Service Limit	0.10 mm
Driveshaft contact area ID	28.005 - 28.025 mm
Carrier - to - driveshaft clearance - right	
New	0.025 - 0.066 mm
Service Limit	0.12 mm
Carrier - to - driveshaft clearance - left	
New	0.055 - 0.091 mm
Service Limit	0.15 mm
Differential pinion gear	
Backlash	0.05 - 0.15 mm
ID	18.042 - 18.066 mm
Pinion gear - to - pinion shaft clearance:	
New	0.055 - 0.095 mm
Service Limit	0.15 mm
Tapered roller bearing preload	
Starting torque	1.4 - 2.6 Nm

DIFFERENTIAL - AUTOMATIC GEARBOX

Final Drive Ratio	4.285
Final driven gear	
Backlash:	
New	0.085 - 0.142 mm
Service Limit	0.20 mm
Differential carrier	
Pinion shaft contact area ID	18.000 - 18.018 mm
Carrier - to - pinion clearance:	
New	0.013 - 0.047 mm
Service Limit	0.10 mm
Driveshaft contact area ID	28.005 - 28.025 mm
Carrier - to - driveshaft clearance:	
New	0.025 - 0.066 mm
Service Limit	0.12 mm
Differential pinion gear	
Backlash	0.08 - 0.15 mm
Internal Diameter	18.042 - 18.066 mm
Pinion gear - to - pinion shaft clearance:	
New	0.055 - 0.095 mm
Service Limit	0.12 mm
Tapered roller bearing preload	
Starting torque:	
New bearing	2.8 - 4.0 Nm
Reused bearing	2.5 - 3.7 Nm

STEERING

Type	Power assisted, rack and pinion
Overall Ratio	16.4
Turns, Lock – to – Lock	3.14
Steering Wheel Diameter	380 mm
Rotational play at steering wheel circumference	0 – 10 mm
Angle of gearbox rack – guide – screw loosened from locked position	20 deg + 5° – 0°
Steering pump pressure with shut – off valve closed	80 – 90 kgf/cm²
Power steering fluid	Unipart Power Steering Fluid
System Fluid capacity	1.8 litre
Reservoir Fluid Capacity	0.5 litre
Power steering belt tension	
Used belt	12.5 – 16.0 mm Deflection with 100 N (10 kg) between pulleys
New belt *	9.5 – 11.5 mm Deflection with 100 N (10 kg) between pulleys

* New belt; adjust deflection to new belt values. Run the engine for 5 minutes then turn it off. Readjust deflection to used belt values.

SUSPENSION

Type, Front	Independent double wishbone, coil spring with stabilizer
Type, Rear	Independent double wishbone, coil spring with stabilizer
Shock Absorbers	Telescopic, hydraulic nitrogen gas – filled
Wheel alignment	
Camber:	
Front	0° 00' ± 1°
Rear	– 0° 30' ± 30'
Caster	3° 00' ± 1°
Total toe:	
Front	0 ± 3.0 mm
Rear	IN 2.0 mm ± 2.0 mm
Front wheel turning angle:	
Inward wheel	39° 00' ± 2°
Outward wheel	30° 00'
Road Wheel	
Rim axial runout (Aluminium wheel)	
New	0 – 0.7 mm
Service Limit	2.0 mm
Rim radial runout (Aluminium wheel):	
New	0 – 0.7 mm
Service Limit	1.5 mm
Rim axial runout (Steel wheel)	
New	0 – 1.0 mm
Service Limit	2.0 mm
Rim Radial runout (Steel wheel):	
New	0 – 1.0 mm
Service Limit	1.5 mm
Wheel bearing	
End play	0 – 0.05 mm

BRAKES

Type Front	Power – assisted self – adjusting ventilated disc
Type Rear	Power – assisted self – adjusting solid disc
Pad and Lining Surface Area:	
Front A/T	58.0 cm^2 x 2
Front M/T	49.4 cm^2 x 2
Rear	29.7 cm^2 x 2
Parking Brake Type	Mechanical actuating, two rear wheel brakes
Parking brake lever	To be locked when pulled 7 – 11 notches with 200 N force applied
Brake pedal height (with floor mat removed):	
M/T	190 mm minimum
A/T	195 mm minimum
Brake Pedal Free play	1 – 5 mm
Master cylinder Piston – to – pushrod clearance	0 – 0.04 mm
Front Disc thickness:	
New	23.0 mm
Service Limit	21.0 mm
Rear Disc thickness:	
New	10.0 mm
Service Limit	8.0 mm
Disc runout	0.10 mm max
Disc parallelism	0.015 mm
Front Pad thickness – M/T:	
New	12.5 mm
Service Limit	1.6 mm
Front Pad thickness – A/T:	
New	11.0 mm
Service Limit	1.6 mm
Rear Pad thickness:	
New	9.0 mm
Service Limit	1.6 mm
Anti – lock braking system:	
Up to VIN 144844	ABS 2
From VIN 144845	ABS BY4

AIR CONDITIONING

Compressor Type/Make	Swash – plate type/NIPPONDENSO
Compressor Clutch Type:	Dry, single plate, V ribbed belt drive
Condenser Type	Corrugated fin type
Evaporator Type	Corrugated fin type
Blower Type	Sirocco fan, 5 speed
Refrigerant Type	R134a
Quantity	750 +0 –50 g
Lubricant capacity:	
Condenser	10 – 20 ml
Evaporator	20 – 30 ml
Line or hose	10 ml
Receiver	10 ml
Compressor	160 + 15 – 0 ml
Compressor Stator coil resistance	3.4 – 3.8 Ohms at 20°C
Compressor Pulley – to – pressure plate clearance	0.35 – 0.65 mm
Compressor belt tension:	
Used belt	10.0 – 12.0 mm Deflection with 100 N (10 kg) between pulleys
New belt	4.5 – 7.0 mm Deflection with 100 N (10 kg) b pulleys

ELECTRICAL

Ignition coil	
Rated voltage	12 volts
Primary winding resistance at 20 deg C	0.6 – 0.8 Ohms
Secondary winding resistance at 20 deg C	13 – 19 kilo – Ohms
Spark Plug	
Type	see **ELECTRICAL**
Gap	1.0 – 1.1
Ignition timing (At idle)	15° ± 2° (RED) BTDC
Alternator belt tension	
Without A/C:	
Used belt	10 – 12 mm Deflection with 100 N (10 kg) between pulleys
New belt *	8.5 – 11 mm Deflection with 100 N (10 kg) between pulleys
With A/C:	
Used belt	10 – 12 mm Deflection with 100 N (10 kg) between pulleys
New belt *	4.5 – 7 mm Deflection with 100 N (10 kg) between pulleys
Alternator	
Output 13.5 V at hot	70/80 Amps
Coil resistance (rotor)	2.8 – 3.0 Ohms
Slip ring OD:	
New	14.4 mm
Service Limit	14.0 mm
Brush length:	
New	10.5 mm
Service Limit	5.5 mm
Brush spring tension	300 – 360 grams
Starter motor	
Type	Spur gear reduction, permanent magnet
Output:	
M/T	1.4 kW
A/T	1.6 kW
Mica depth:	
New	0.4 – 0.5 mm
Service Limit	0.15 mm
Commutator runout:	
New	0 – 0.02 mm
Service Limit	0.05 mm
Commutator OD:	
New	28.0 – 28.1 mm
Service Limit	27.5 mm
Brush length:	
New	15.8 – 16.2 mm
Service Limit	10.0 mm
Brush spring tension	16 – 18 N

* New belt; adjust deflection to new belt values. Run the engine for 5 minutes then turn it off. Readjust tension to used belt values.

GENERAL DATA

DIMENSIONS

Overall Length	4.645 mm
Overall Width (including mirrors)	1.915 mm
Overall Height *	1.380 mm
Wheelbase	2.720 mm
Track:	
Front	1.475 mm
Rear	1.480 mm
Ground Clearance *	155 mm

* At unladen weight

WEIGHT

Approx. Unladen Weight	
618i	1275 kg
620i	1275 kg
620Si M/T	1290 kg
620Si A/T	1320 kg
620SLi M/T:	1310 kg
620SLi A/T	1340 kg
620GSi M/T	1310 kg
620GSi A/T	1335 kg
623GSi M/T	1350 kg
623GSi A/T	1380 kg
Max. gross vehicle weight:	
618	1820 kg
620 M/T	1820 kg
620 A/T	1880 kg
All 623 models	950 kg