

Workshop Manual

928

DR. ING. h. c. F. PORSCHE Aktiengesellschaft

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Structure of the Workshop Manual

This Workshop Manual describes all of the important operations for which special instructions are required to ensure proper completion. This manual is essential for shop foremen and mechanics who need this information to keep the vehicles in safe operating condition. The basic safety rules, of course, also apply to all repairs on vehicles, without exception.

Breakdown of the Workshop Manual

1. Overview of repair groups
2. Record sheet for supplements
3. List of contents
4. Technical data
5. Repair groups

Breakdown of the repair groups

1. Table of tightening torques
2. Special tools required
3. Exploded diagrams
4. Legends for the exploded diagrams
5. Notes on assembly/application of special tools
6. Diagnosis for the repair groups

The Workshop Manual will be updated regularly by means of supplements which must be filed immediately to maintain the usefulness of the manual. Appropriate entries must be made in the record sheet to prove that the manual is complete.

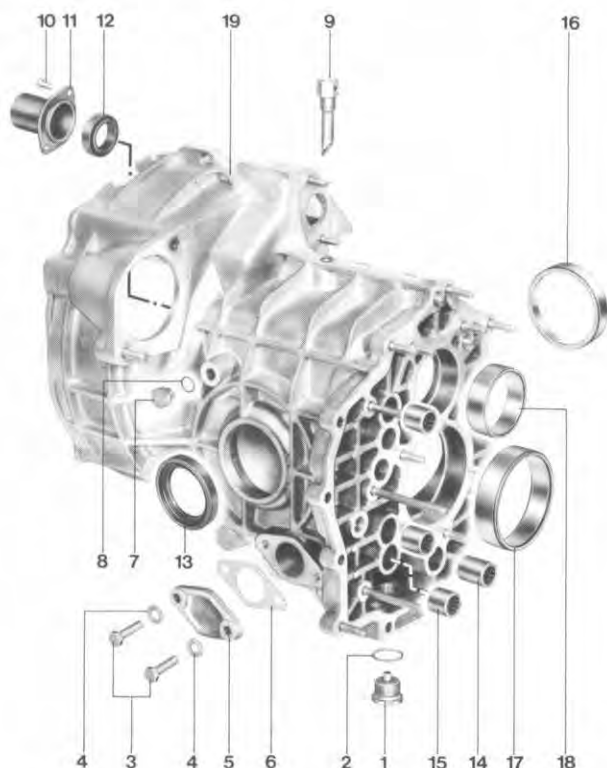
The content of this Workshop Manual will be supplemented with Technical Information Bulletins, which will be integrated into the manual from time to time.

Descriptions of design and function can be found in the service training course reference material.

Layout of the exploded diagram

A 34 B Manual Transmission, Controls, Case C 911 Carrera 4

Disassembling and assembling transmission



34 - 128 Disassembling and assembling transmission Printed in Germany - VII, 1988

D E F

C 911 Carrera 4 B Manual Transmission, Controls, Case A 34

No	Description	Qty.	Note when:	
			Removing	Installing
1	Screw plug	1		Clean, tighten with 30 Nm
2	Sealing ring	1		Replace
3	Hexagon head screw	2		Tighten with 23 Nm (17 ftlb)
4	Washer	2		
5	Flange	1		
6	Seal	1		Replace
7	Screw plug	1		Tighten with 23 Nm (17 ftlb)
8	Sealing ring	1		Replace
9	Breather	1		Tighten with 35 Nm (26 ftlb). Observe installation position
10	Fillister head screw	2		Tighten with 10 Nm (7 ftlb)
11	Guide tube	1		
12	Rotary shaft seal	1		Only install after assembling the gear set (also refer to Page 34-113)
13	Rotary shaft seal	1		Drive into position with Special Tool 9252. Pack space between sealing lips with Klüber Silubrin Grease S
14	Spherical sleeve	1	Pull out with a suitable internal puller (e.g. Schrem 14-20)	Press in with Special Tool 9254

Disassembling and assembling transmission Printed in Germany - VII, 1988

F E D

- A - Repair group, numbers
- B - Repair groups, text
- C - Type of vehicle to be repaired
- D - Page number
- E - Operation
- F - Impressum, supplement number, year of printing
- G - Diagram item number in the order of disassembling
- H - Special notes to be observed when installing or removing

The notes on assembly/application of special tools which are given after the exploded diagram are always arranged in the order of text → diagram.

This workshop manual describes all of the important operations for which special instructions are required to assure proper completion. This manual is essential for the shop foremen and mechanics, who need this information to keep the vehicles in a safe operating condition. The basic safety rules, of course, also apply to repairs on vehicles without exception.

The information is grouped according to repair numbers which are identical to the first two digits of the repair time and warranty code.

The repair group index, an alphabetical index and the register table are quick guides to find information in the manual.

Descriptions of design and function can be found in the service training course reference material.

This workshop manual will be kept up to date with workshop bulletins, which will be made part of the manual from time to time. We recommend that these workshop bulletins be filed in the special folder provided for this purpose.

SUPPLEMENT TO 928 REPAIR MANUAL
(XVIII)

Information Sheet - Extension of the 928 Repair Manual to 7 Volumes

Overview of Repair Manual Volumes:

Volume	I	= Drive Unit
Volume	I - A	= Drive Unit
Volume	II	= Drive Train
Volume	III	= Drive Train
Volume	IV	= Chassis, Heating, Air Conditioning
Volume	V	= Bodywork, Car Electrics
Volume	VI	= Car Electrics (Circuit Diagrams)
Volume	VII	= Car Electrics (Circuit Diagrams, '88 Models Onward)

Please file the pages in the volumes of the Repair Manual as follows:

1. Please file pages 20 - 1 to 28 - 71 of the original Volume I - Drive Unit in the new Volume I-A - Drive Unit.
 2. The new Volume VII Car Electrics (Circuit Diagrams, '88 Models Onward) contains pages 97 - 281 to 97 - 305.
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NEW INTERNATIONAL UNIT SYSTEM

The "Legislation Concerning Units of Measurement" was passed in the Federal Republic of Germany on July 5, 1970. The new units have to be applied in official and business transactions by the end of the allocated transition period on December 31, 1977 (some even earlier).

The new units are derived from the international system of basic units.

Basic Units

Factor	Unit	
	Name	Symbol
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electric strength of current	Ampere	A
Temperature	Kelvin	K
Intensity of light	Candela	cd
Substance quantity	Mol	mol

Decimal multiples and parts of units can be made by adding prefixes in front of the unit symbols.

Prefixes

Power of ten	Prefix	Prefix Symbol
10^{12}	Tera	T
10^9	Giga	G
10^6	Mega	M
10^3	Kilo	k
10^2	Hecto	h
10	Deka	da
10^{-1}	Deci	d
10^{-2}	Centi	c
10^{-3}	Milli	m
10^{-6}	Micro	μ
10^{-9}	Nano	n
10^{-12}	Pico	p

Examples:

1. Unit m (meter). By adding prefix k (kilo) we have km (kilometer = 1,000 m).
2. Unit s (second). By adding prefix m (milli) we have ms (millisecond = 1/1000 s).

The following list is a survey of important units used frequently in motor vehicle repair operations.

List of Units

Factor	Basic Unit	Other Acceptable Units	Remarks
Length	m	μm , mm, cm, dm, km etc.	No longer acceptable: μ for 0.001 mm
			0.001 mm = 1 μm
Area	m^2	mm^2 , cm^2 , dm^2 etc.	No longer acceptable: qm, qmm, qcm etc.
Volume	m^3	mm^3 , cm^3 , dm^3 etc. l, ml, cl etc.	No longer acceptable: cbm, cmm, ccm etc., ltr., Ltr.
			1 l = 1 dm^3
Plane angle	rad (radian)	° (degree) ' (minute) " (second)	1 rad = 1 m/m 1° = $\pi/180$ rad 1° = 60' 1' = 60"
			* not acceptable for inch
Solid angle	sr (steradian)	m^2/m^2	1 sr = 1 m^2/m^2
Mass	kg	g, mg, dag etc. t, kt, Mt etc.	No longer acceptable: pound, hundredweight, double-hundredweight
			1 t = 1000 kg
			Weight is given in kg

Factor	Basic Unit	Other Acceptable Units	Remarks
Density	kg/m^3	kg/dm^3 , kg/l , g/cm^3 etc.	No longer acceptable: specific weight
Time	s	min (minute) h (hour) d (day) a (year)	3h = 3 hours 3 ^h = 3 o'clock For time data, e.g. 3 ^h 40 ^m 20 ^s min can be abbreviated in m
			No longer acceptable: Sec., sec., hr.
Volumetric flow (flow rate)	m^3/s	cm^3/min l/s, l/h etc.	
Frequency	Hz (Hertz)	kHz, MHz etc.	1 Hz = 1/s
Speed of revolvment	$\frac{1/\text{s}}{\text{s}^{-1}}$	1/min min^{-1}	No longer acceptable: U/min, Upm
Speed of travel	m/s	km/h	
Accelera- tion	m/s^2		g (acceleration of fall) $g \approx 9.81 \text{ m/s}^2$
Force	N (Newton)	kN, MN etc.	No longer acceptable: p, kp, Mp, dyn
			1 N = 1 kg m/s ² 1 kp = 9.81 N \approx 10 N
Pressure	N/m^2 Pa (Pascal)	bar, mbar etc.	No longer acceptable: kp/cm^2 , atm, at, ata, atü, atu, mmHg, Torr, mWs
			Pressure or vacuum must be specified, e.g.: 2 atü \approx 2 bar pressure = 3 bar 0,4 atu \approx 0,4 vacuum = 6 bar 5 ata \approx 5 bar

Factor	Basic Unit	Other Acceptable Units	Remarks
			$1 \text{ N/m}^2 = 1 \text{ Pa}$ $1 \text{ mbar} = 100 \text{ Pa}$ $1 \text{ bar} \approx 1 \text{ kp/cm}^2 = 1 \text{ at}$ $1 \text{ bar} = 750 \text{ Torr}$
Mechanical stress (strength)	N/m^2	N/m^2	No longer acceptable: $\text{kp/cm}^2, \text{kp/mm}^2$
Dynamic viscosity	Pa s	mPa s, $\mu\text{Pa s}$	No longer acceptable: P (Poise), cP, kg s/m^2 , dyn s/cm^2
			$1 \text{ Pa s} = 10 \text{ P}$ $\approx 0.1 \text{ kg s/m}^2$
Kinematic viscosity	m^2/s	$\text{cm}^2/\text{s}, \text{mm}^2/\text{s}$	No longer acceptable: St (Stokes), cSt, E (Engler degree)
	1		$1 \text{ cm}^2/\text{s} = 1 \text{ St}$
Torque	Nm	Ncm, Nmm	No longer acceptable: kpm, kpcm, etc.
			$1 \text{ Nm} \approx 0.1 \text{ kpm}$ $1 \text{ Nm} = 1 \text{ kgm}^2/\text{s}^2$
Work, energy, heat quantity	J (Joule)	mJ, kJ etc. Nm, kWh, Ws	No longer acceptable: kpm, erg, cal, kcal, PSh, We (thermal unit)
			$1 \text{ J} = 1 \text{ Nm} = 1 \text{ Ws}$ $1 \text{ J} \approx 0.1 \text{ kpm}$ $1 \text{ cal} = 1 \text{ WE} \approx 4.19 \text{ J}$ $1 \text{ PSh} \approx 0.736 \text{ kWh}$
Specific fuel consumption	kg/kWh	g/kWh, kg/J	No longer acceptable: g/PSh, kg/PSh
Power	W (watt)	mW, kW etc.	No longer acceptable: PS
			$1 \text{ PS} \approx 0.736 \text{ kW}$

Factor	Basic Unit	Other Acceptable Units	Remarks
Weight coefficient	kg/W	kg/kW	No longer acceptable: kg/PS
Temperature	K (Kelvin)	°C	No longer acceptable: °K (degrees Kelvin), grd. (temperature dif- ference)
			1° C = 1 K
Electric current strength	A (ampere)	µA, mA etc.	
Electric voltage	V (volt)	µV, mV, etc.	1 V = 1 W/A
Electric resistance	Ω (Ohm)	mΩ, kΩ etc.	1 Ω = 1 V/A
Electric charge, electrical quantity	C (Coulomb)	Ah, As	1 C = 1 As
Electric capacitance	F (Farad)	pF, µF, mF	1 F = 1 C/V
Sound level	phon	dB (decibel)	
Light flux	lm (Lumen)		1 lm = 1 cd sr
Light intensity	lx (Lux)		1 lx = 1 lm/m ²

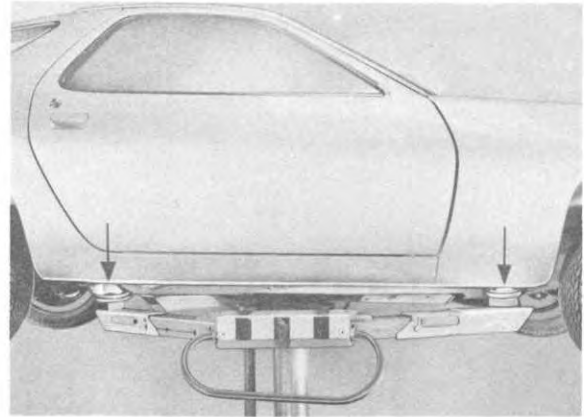
LIFTING CAR

1. Lifting with hoist

Only use lift points shown.

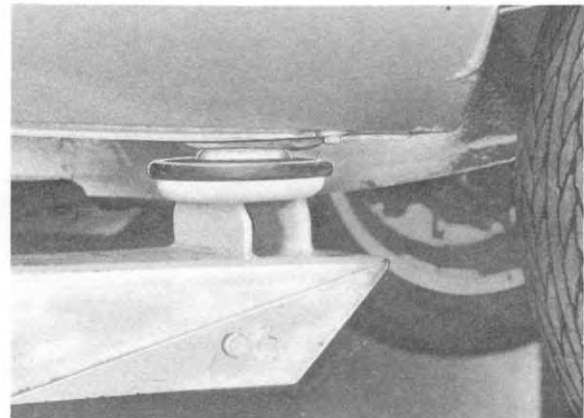
Caution

When driving car on hoist platform, make sure that there is sufficient space between hoist and car.



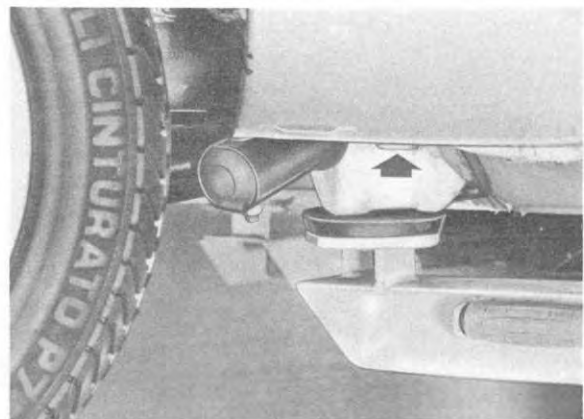
Front

On car jack pick-up point.



Rear

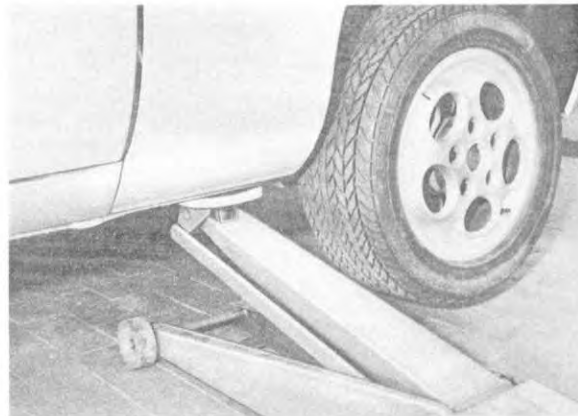
On rear axle control arm bracket.



2. Lifting with floor jack

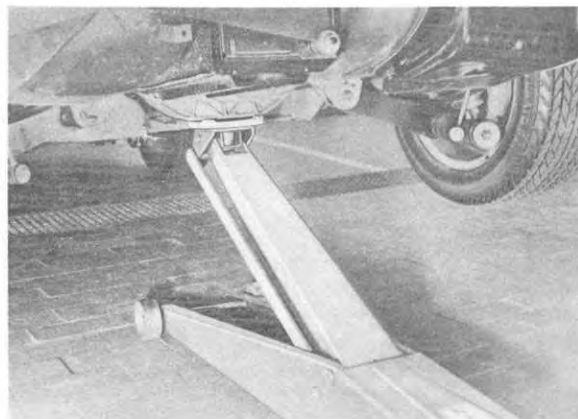
Side

Front or rear on pick-up points for car jack. Use an appropriate piece of wood between jack lifting plate and pick-up point.



Rear

On cross member for rear axle control arm.



Note

Never raise car on engine oil pan or transmission, since this could cause serious damage.

TECHNICAL DATA

(Adjusting specifications and wear limits are listed in each individual repair group.)

Note: USA values in brackets.

Engine

Internal engine code		M 28/03 w/man. trans. M 28/04 w/auto. trans.
No. of cylinders		8
Bore	mm/in.	95.0/3.74
Stroke	mm/in.	78.9/3.11
Displacement (actual)	cm ³ /in. ³	4474/272.97
Compression ratio		8.5 : 1
Max. engine power, DIN 70020	kW/HP	169/230
Net power, SAE J 245	kW/HP	164/219
at engine speed	rpm	5250
Max. torque, DIN 70020	Nm/kpm	343/35.0
Net torque, SAE J 245	Nm/ft lbs	333/245
at engine speed	rpm	3600
Max. specific power output,		
DIN 70020	kW/l / HP/l	40/54
SAE J 245	kW/l / HP/l	38/51
Engine speed limit		6300 ± 200
(by electronic cut-off of fuel pumps)		
Engine weight (dry)	kg/lb	260/573

Engine Design

Type	8 cylinder, 4 stroke, internal combustion V-engine
Crankcase	Two-piece, cast light alloy, without cylinder liners
Crankshaft	Forged steel, 5 bearings
Connecting rods	Forged sintered steel
Pistons	Cast light alloy, chrome plated or iron coated bearing surfaces

Camshaft		Cast steel, runs in camshaft housing without bearing shells
Camshaft drive		Toothed belt and tensioning roller
Cylinder head		Aluminum
Valve arrangement		1 intake, 1 exhaust, overhead, in-line
Valve train		By overhead camshaft and hydraulic cam followers
Timing (1 mm lift, zero valve clearance)	Int. opens	8° ATDC
	Int. closes	55° ABDC
	Exh. opens	38° BBDC
	Exh. closes	2° BTDC
Valve clearance		Automatic hydraulic adjustment
Engine Cooling		Closed cooling system, mechanical fan with viscous coupling (electric fan and thermo switch for air conditioning)
Engine Lubrication		Pressure lubricating system with sickle type pump
Oil filter		Full flow
Oil pressure at 5000 rpm		Approx. 5 bar at 80 to 100° C/176 to 212° F oil temperature
Oil pressure indication		Indicator lamp and pressure gage
Oil consumption	1/1000 km qt/600 mi.	Approx. 1.5
Exhaust System		Double pipes up to catalytic converter, intermediate and main mufflers
Emission control		EGR, air pump
Heating		Warm water heater with heat exchanger and blower
Fuel System		CIS (continuous) fuel injection
Fuel supply		2 elec. delivery pumps, connected in series

Fuel octane requirement	RON/MON/CLC	91/84/87
 Electrical System		
Battery voltage	V	12
Battery capacity	Ah	66
Battery capacity (optional)	Ah	88
Alternator output	A/W	90/1260
Ignition (breakerless)		Transistorized/coil ignition
Firing order		1 - 3 - 7 - 2 - 6 - 5 - 4 - 8
Basic ignition setting		31° BTDC at 3000 rpm with vacuum hose disconnected
Spark plugs		Bosch W 145 T 30 Beru 145/14/3 A
Spark plug gap	mm/in.	0.7 + 0.1/0.028 + 0.004
 Transmission		
		Rear-mounted (5-speed manual transmission) combined with final drive. Connected to front-mounted engine/clutch by central tube.
Clutch		Double disc, diaphragm spring dry clutch
Pressure plate		MFZ 2/215 Ks ph
 Body Type		
		Coupe with integral steel body, 2 doors, rear lid and retractable headlights. Aluminum hood, doors and bolted front fenders. (sliding roof optional)

Dimensions		(at total permissible weight)	
Length	mm/in.	4462/175.67	
Width	mm/in.	1836/72.28	
Height	mm/in.	1311/51.61	
Wheelbase	mm/in.	2500/98.43	
Track			
front at curb weight	mm/in.	1545/60.82	
at total weight	mm/in.	1551/61.06	
rear at curb weight	mm/in.	1514/59.60	
at total weight	mm/in.	1530/60.23	
Ground clearance	mm/in.	119/4.69	
Overhang angle	front	22°	
	rear	18° 30'	
Weights			
Curb weight without options		Man. trans.	Auto. trans.
	Front	kg/lb	745/1642
	Rear	kg/lb	745/1642
	Total	kg/lb	1490/3285
Curb weight with options		Man. trans.	Auto. trans.
	Front	kg/lb	765/1686
	Rear	kg/lb	795/1753
	Total	kg/lb	1560/3492
Max. axle load,	front	kg/lb	900/1984
	rear	kg/lb	1000/2200
Max. total weight		kg/lb	1870/4123
Max. roof load, including roof rack		kg/lb	35/77
Max. trailer load			
	without trailer brakes	kg/lb	750/1653 (up to grades of 16 %)
	with trailer brakes	kg/lb	1600/3527 (up to grades of 16 %)
Max. towing weight		kg/lb	3470/7650
Max. tongue weight		kg/lb	50/110

Filling Capacities

Engine oil		HD oils to API classification SD or SE, viscosity: summer SAE 30, winter SAE 20, at continuous temperatures between - 15 ⁰ C and 0 ⁰ C SAE 20 W 20, or SAE 10 W for continuous temperatures below - 15 ⁰ C. (multi-grade oils: 15 W 50 or 20 W 50 when approved).
Engine oil change	1 tr/qt	Approx. 6.5/6.85 (level on dipstick is important)
Engine coolant	1 tr/qt	Approx. 16/17
Transmission oil		Hypoid oil SAE 90 to MIL-L 2105 B. API classification GL 5.
Transmission and differential	1 tr/qt	Approx. 3.8/4
Fuel tank	1 tr/gal.	Approx. 86/22,5, of which 11 liters 2,9 gal. for reserve
Brake fluid reservoir	1 tr/qt	Approx. 0.2/0.2
Windshield washer and headlight cleaner reservoir	1 tr/qt	Approx. 8/8,5 (water)
Cleaning solution reservoir	1 tr/qt	Approx. 0.6/0.6
Performance		(with 5-speed transmission)
Top speed	km/h / mph	above 230 / 144
Acceleration 0 - 100 km/h, 0 - 62 mph	s	6.8
1000 m from standing start	s	27.0
Power to weight	kg/kW / kg/HP	8.3 / 6.0
Hill Climbing		(with 5-speed transmission)
1st gear	%	71
2nd gear	%	41
3rd gear	%	28
4th gear	%	18
5th gear	%	11

TECHNICAL DATA - 1980, 1981, 1982 Models

(Adjusting specifications and wear limits are listed in each individual repair group.)

Engine		
Internal engine code		M 28/13, automatic M 28/14 from 1981: M 28/15, automatic M 28/16
No. of cylinders		8
Bore	mm/in.	95,0/3.74
Stroke	mm/in.	78,9/3.11
Displacement (actual)	cm ³ /in. ³	4474/272.97
Displacement (rounded off)	cm ³	4420
Compression ratio		9,0 : 1
Max. engine power, DIN 70020	kW/HP	170/231
Net power, SAE J 245 at engine speed	kW/HP rpm	165/220 5250 (5500)
Max. torque, DIN 70020	Nm/kpm	360/36.7
Net torque, SAE J 245 at engine speed	Nm/ft. lbs, rpm	348/265 4000
Max. specific power output, DIN 70020	kW/1 / HP/1	38/52
SAE J 245	kW/1 / HP/1	37/49
Engine speed limit		without
Engine weight (dry)	kg/lb	245/540

Engine Design

Type	8 cylinder, 4 stroke, internal combustion V-engine
Crankcase	Two-piece, cast light alloy, without cylinder liners
Crankshaft	Forged steel, 5 bearings
Connecting rods	Forged sintered steel
Pistons	Cast light alloy, chrome plated or iron coated bearing surfaces

Camshaft		Cast steel, runs in camshaft housing without bearing shells
Camshaft drive		Toothed belt and tensioning roller
Cylinder head		Light alloy
Valve arrangement		1 intake, 1 exhaust, overhead, in-line
Valve timing		By overhead camshaft and hydraulic cam followers
Timing (1 mm lift, zero valve clearance)		Intake opens 12° after TDC Intake closes 48° after BDC Exhaust opens 32° before BDC Exhaust closes 6° before TDC
Valve clearance		Automatic hydraulic adjustment
Engine Cooling		Closed cooling system, mechanical fan with viscous coupling (electric fan and thermo switch for cars with air conditioner)
Engine Lubrication		Pressure lubricating system with sickle type pump
Oil filter		Full flow
Oil pressure at 5000 rpm		Approx. 5 bar at 80 to 100° C/176 to 212° F oil temperature
Oil pressure indication		Indicator lamp and pressure gauge
Oil consumption	1/1000 km qt/600 mi.	Approx. 1,5
Exhaust System		Twin pipes up to catalytic converter, then single pipe to center and final mufflers
Emission control		Oxygen sensor with 3-way catalytic converter; from 1981 additional secondary air injection
Heating		Warm water heater with heat exchanger and blower
Fuel System		AFC (Air Flow Controlled) fuel injection
Fuel supply		Electric delivery pump