914
914/6

PORSCHE

SERVICE INFORMATION

From model year 1970 on, the product range of the two companies Volkswagenwerk AG and Dr.-Ing. h.c. F. Porsche KG has been extended to include the two Roadster models 914 and 914/6.

The 914 Roadster is powered by the new 80 bhp four cylinder engine with electronically controlled fuel injection used in the VW 411 E, and the 914/6 Roadster with the well-known and unchanged 110 bhp six cylinder engine of the Porsche 911 T. Both cars can be supplied with a five speed manual gearbox or the optional Sportomatic transmission.

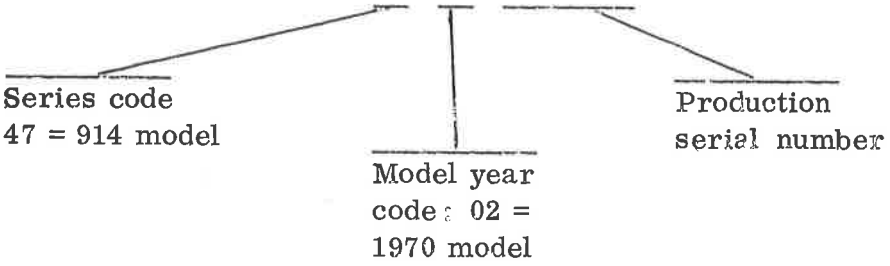
This 'Service Information' booklet contains a detailed description of both models, with specifications and the most important care and maintenance procedures.

The pages immediately following indicate the chassis, engine and gearbox number series and explain how these numbers should be interpreted.

Chassis, engine and gearbox number series for the 914 and 914/6 roadsters

914 : Chassis numbers

47 02 900 001 - etc.

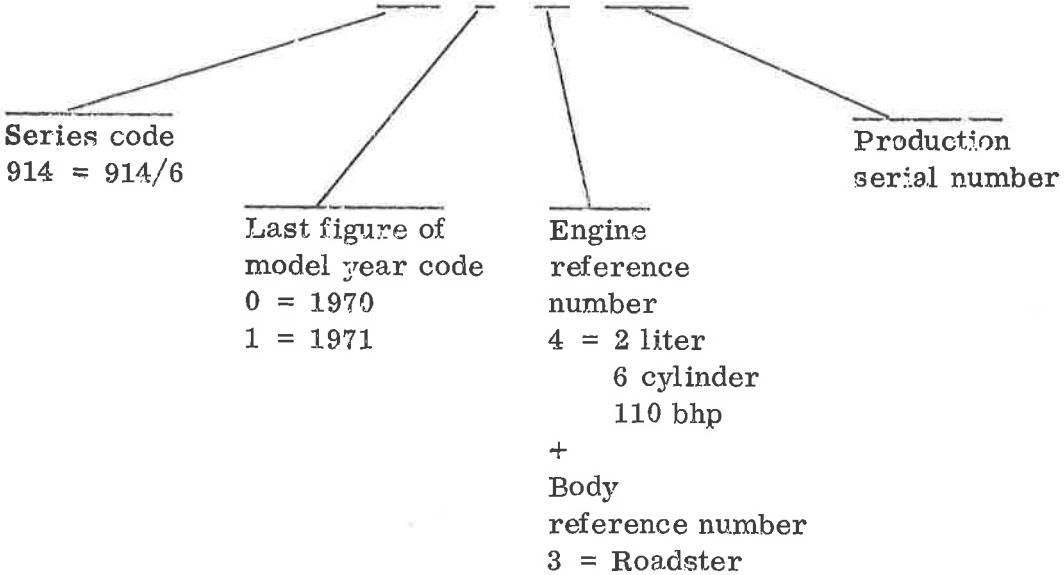


914/6 : Chassis numbers

Range of numbers :

914 0 43 0001 - 914 0 43 9999

XXX X XX XXXX



914 : Engine numbers

W 0 000 001 - etc.

4 cylinder
80 bhp

Production
serial number

914/6 : Engine numbers

Range of numbers:	Engine type internal	Engine type official	Remarks
640 0001 - 640 3000	901/36	914/6	
640 3001 - 640 4000	901/37	914/6	Sportomatic version
640 4001 - 640 7000	901/38	914/6	with exhaust emission control (USA)
640 7001 - 640 8000	901/39	914/6	with exhaust emission control and Sportomatic (USA)

Key to 914/6 engine numbers

X X X XXXX

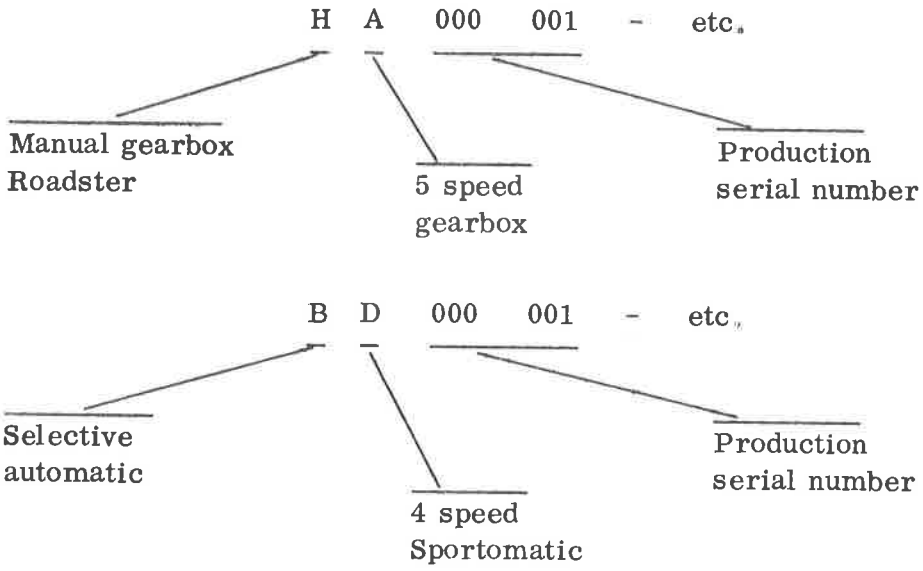
Number of
cylinders
6 = six
cylinder
engine

Engine type
4 = 2 liter
110 bhp

Last figure of
model year code
0 = 1970
1 = 1971

Production serial
number (1st figure
can be used for
further identification)

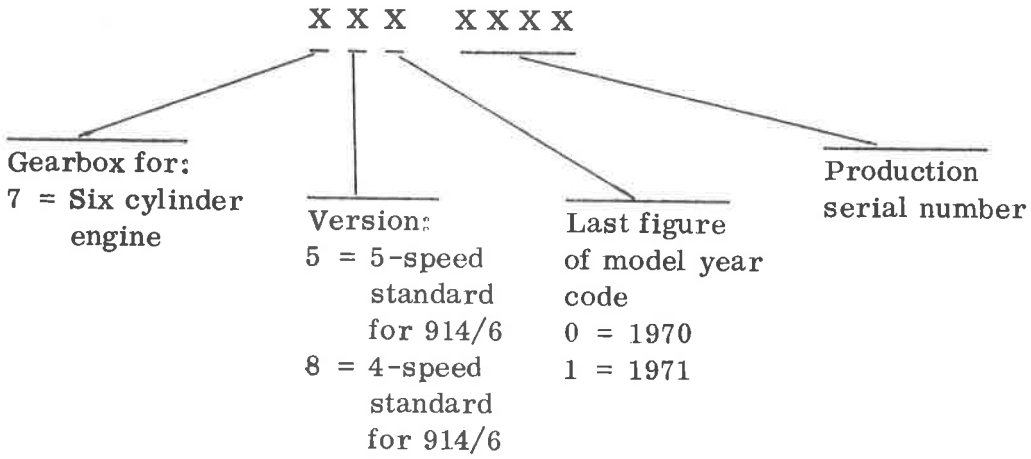
914 : Gearbox numbers



914/6 : Gearbox numbers

Range of numbers:			Gearbox type:
750 0001	-	750 9999	914/01
780 0001	-	780 9999	914/05

Key to 914/6 gearbox numbers



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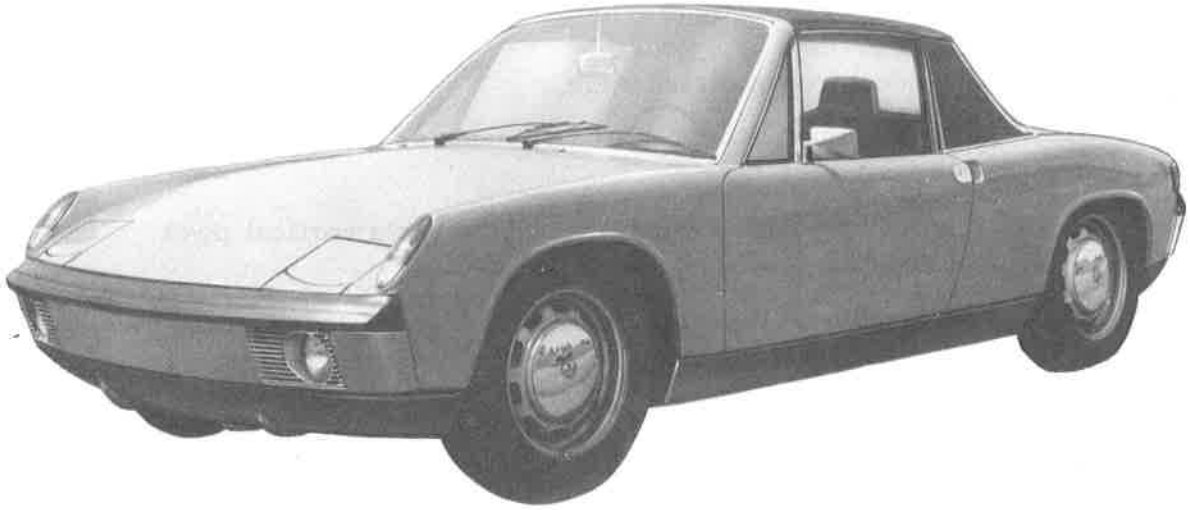
Type 914



Type 914/6

DESCRIPTION OF THE CARS

General

The character of these cars is determined by the central engine position. Placing the engine in front of the rear axle makes it impossible to install rear seats. To set against this, the layout guarantees the best possible handling and roadholding by providing:

- ideal weight distribution
- minimum alteration to axle loads as the car's payload increases
- low moment of inertia round the car's vertical pivot center.

The practical value of these sports cars is also enhanced by the inclusion of a second generously sized luggage compartment in the rear, accessible from the outside. The short, rigid plastic roof can be taken off in a few easy movements and stored in this rear luggage compartment without seriously affecting the amount of luggage which can be carried. A strong roll bar at the rear of the roof blends harmoniously into the general styling. The large windshield, curved in two planes, and the roll bar surrounding the vertical rear window ensure that the car can be driven for long distances in the open condition without the occupants suffering from the effects of wind turbulence.

Adequate luggage compartment space is provided at both the front and rear, despite the car's very low waistline. When retracted, the electrically operated headlamps are flush with the body and fully concealed; when operated they emerge to illuminate the road ahead from a satisfactory height.

Unlike many cars of a sporting appearance currently appearing on the market, this roadster possesses far mor than just the outward appearance of a sports car. The front and rear suspension, brakes, steering and bucket type seats have all been carefully matched to the requirements of high speed driving. The end result is a car with exceptionally fine handling and roadholding, capable of affording its occupants the maximum degree of protection and safety in the most critical situations they are ever likely to encounter on the roads.

BODY

Two door load bearing all steel bodyshell, with welded on roll hoop and detachable glass fiber reinforced plastic roof.

The body is divided by transverse bulkheads into the following compartments, from front to rear:

front luggage compartment, fuel tank compartment, passenger compartment, engine and mechanical equipment compartment, rear luggage compartment.

The rear luggage compartment and the mechanical equipment compartment each have a lid to provide access from outside the car. The front luggage compartment and the fuel tank compartment are accessible by opening a combined lid.

The floor panel assembly with longitudinal and lateral structural members, the transverse bulkheads, the door pillars, the front and rear fenders and the roll hoop are all welded together to form a unit.

The nose and tail panels and the outer side panels are sheet steel pressings which are bolted into position.

Doors

The doors are 1115 mm (43.9") wide, and are pivoted to the front door pillars by means of concealed hinges. The doors open to an angle of approximately 60^{o}; door restraints come into action at this point.

The outside door handles are recessed into the door panels. The door pull plate is flush with the outer surface of the door, and is mounted over the top of the finger recess. The doors can be locked from the outside on both sides of the car, and from inside by means of safety buttons.

If an inside safety button is pushed down to lock the door while the door is open, the locking mechanism will automatically release when the door is closed, so that the door can then be re-opened.

However, if the inside safety button is operated while the door is open, and the outside handle lifted up and kept in this position as the door is closed, the door will remain locked.

Below the window the door is provided with two seals. The inner seal is attached to the bodyshell and the outer lip type seal to the door itself.

The frameless door windows make contact when closed with single seals attached to the windshield pillars, roll bar and roof.

Compartment lids

The lid of the front luggage compartment is rear hinged, using concealed hinges. It is held in the open position by a tension spring, and provided with a rubber seal. The locking catch, with hook type second safety catch, is opened by Bowden cable when a lockable pull knob under the dashboard is operated.

The rear luggage compartment is also provided with a rubber seal, and is held open by a rod. The lid is secured at the rear end by a tenon lock operated by key.

The mechanical equipment compartment lid has no surrounding seal, and has front mounted concealed hinges. The locking catch is operated by wire pull from inside the car. The knob is located on the left side of the rear passenger compartment bulkhead. The lid of the mechanical equipment compartment has a center grill through which the engine draws its cooling, heating and combustion air supplies. A water deflector plate is mounted below the grill. Water trapped by the plate is led away through a hose.

Windows

The laminated safety glass windshield is curved in both planes and fitted electrothermically using an adhesive. In the center it is 1300 mm (51.2") wide and inclined at 35° to the horizontal. The clear height is 650 mm (25.6").

All other windows are approx. 5 mm (0.2") thick tempered glass.

The flat rear window is also inserted electrothermically with adhesive, and can be replaced as an option by a rear window with built in electric heating elements.

The doors are provided with fixed curved triangular windows at the front, and curved frameless winding windows operated by crank handle, and requiring 5.5 turns for a complete stroke.

Seats

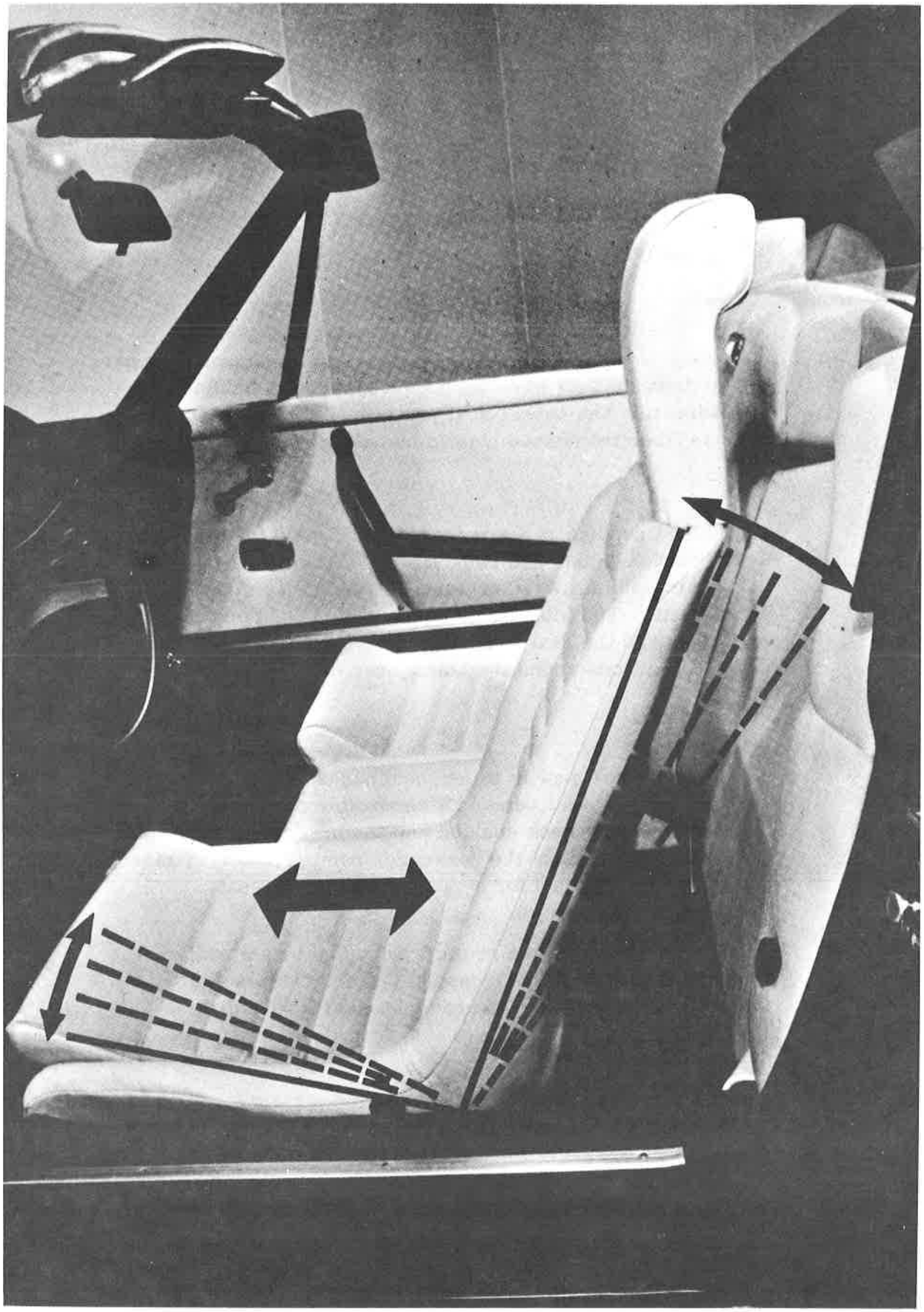
Seating is provided for three persons in line across the car. The driver's seat is of the bucket type, with moulded on headrest. The bucket seat pan is made in one piece from glass fiber reinforced plastic material.

The seat padding is made from cold formed foam material. The seat cushions are removable. The seat can be moved forward and backward on runners which rise slightly towards the front. The total range of movement is approx. 160 mm (6.3"), and the seat can also be tilted as a complete unit through three positions round the transverse horizontal axis.

The passenger seat is wider, and non-adjustable. It also uses a plastic seat pan and a removable seat cushion. The removable seat back cushion and the headrest are recessed into the rear wall of the passenger compartment. Passenger comfort is provided for by an adjustable footrest.

The space between the seats is occupied by a storage compartment with loose cushion, which can also be used in an emergency to provide a seat for a third person.

Seat adjustment



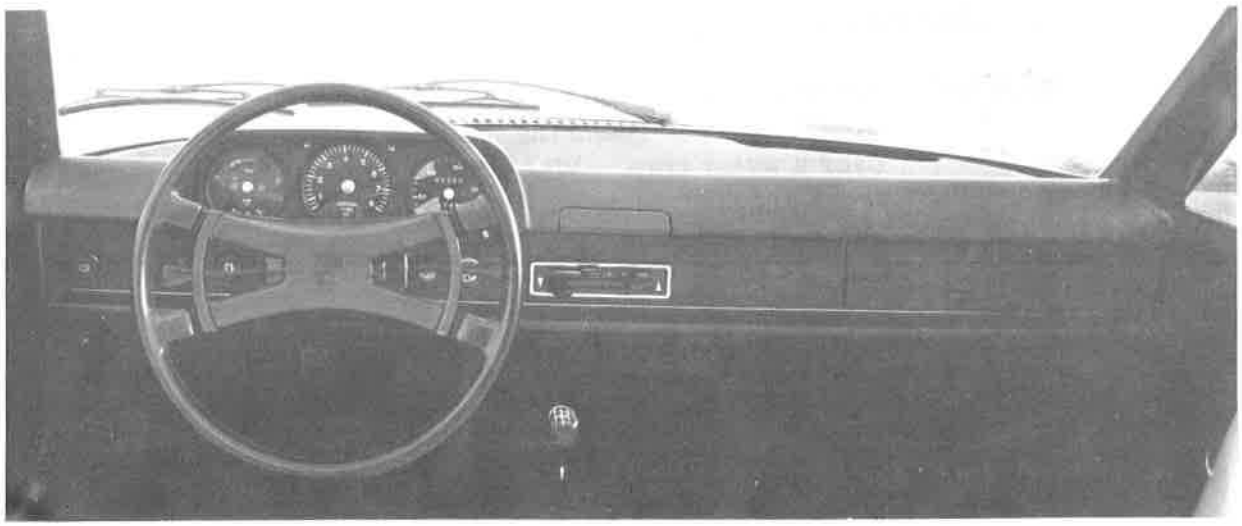
Dashboard

The dashboard is bolted to the body, and can be removed. The instruments — speedometer, revolution counter and combined instrument — are mounted on a removable instrument panel and positioned within the driver's line of vision.

Both the upper and lower edges of the dashboard are padded. Switches, warning lights and control levers are located in the space between, and recessed into pre-formed cutouts in the panel.

914 dashboard

914/6 dashboard



Interior equipment

The driver's side door is provided with a map pocket, and the passenger's door with an armrest and grab handle. The rear wall of the passenger compartment is treated with sound absorbing material and covered with a deep drawn foamed plastic sheet with a recess formed to accommodate the passenger's seat back cushion.

The floor is covered with brushed pile carpeting. A padded surround is located beneath the roll bar. The roof edges at the front are also padded.

Safety belt anchorages are provided for three passengers, and the holes are sealed by plastic plugs. The anchorages are suitable for the attachment of three point (lap and shoulder), diagonal or lap strap safety belts.

Safety belt attachment points for the driver and passenger are located as follows: one anchorage on each side in the upper part of the roll bar, one on the inside web of the left and right bodyshell side members about 60 mm (2,4") behind the center point of seat adjustment. Level with these, one anchorage point on each side of the center tunnel, on the floor panels about 50 mm (2") in front of the rear bulkhead.

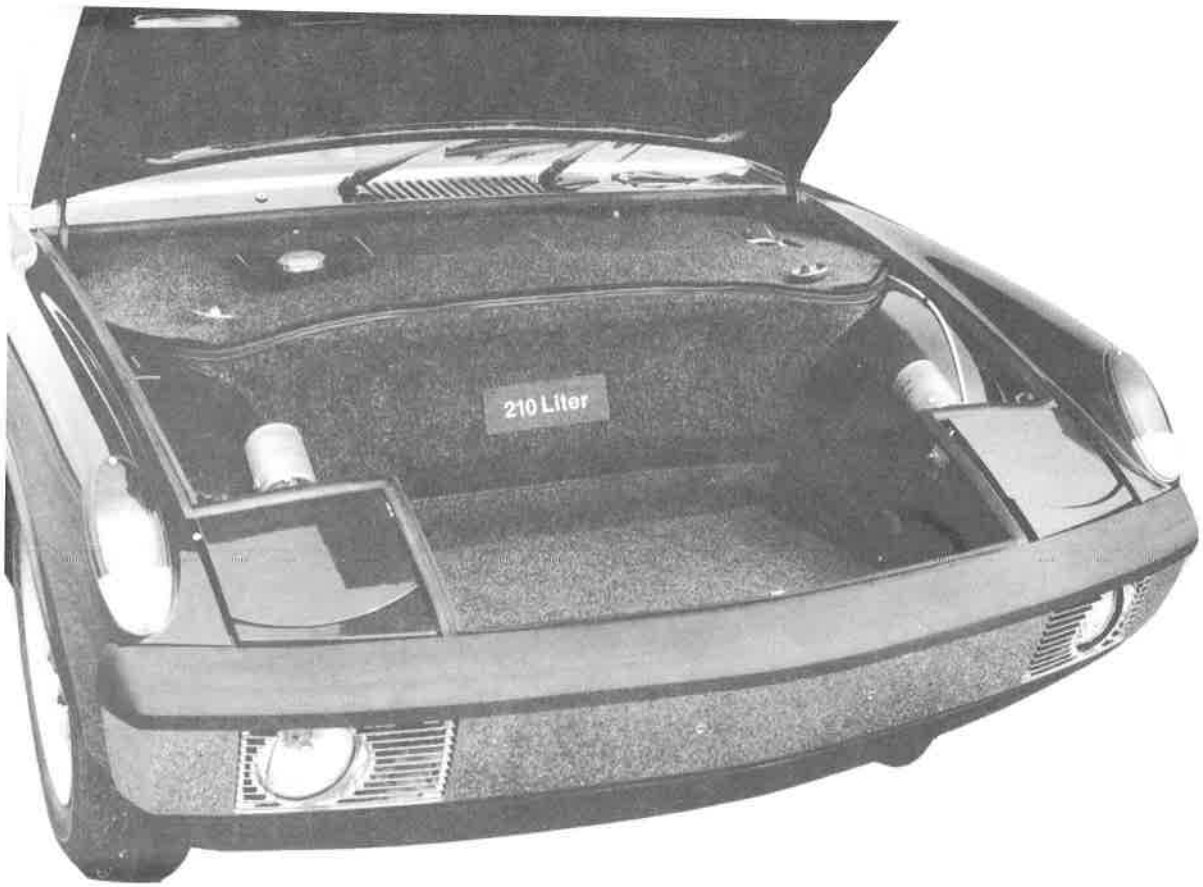
Ventilation

Air inlet slots at the base of the windshield allow low pressure air to reach the interior of the car after passing over a water trap. When driving slowly or if increased fresh air input is desired, a three speed electric blower can be switched on.

Fresh air is conducted through control boxes to the combined heating/ventilation outlet nozzles. The uppermost of the three levers on the dashboard can be moved to direct a continuously increasing airflow to the front footwells. Use of a two-chamber principle in the control boxes enables cold and warm air to be mixed independently. Constant stale air extraction from the car's interior takes place through air outlet apertures in the upper part of the rear door posts.

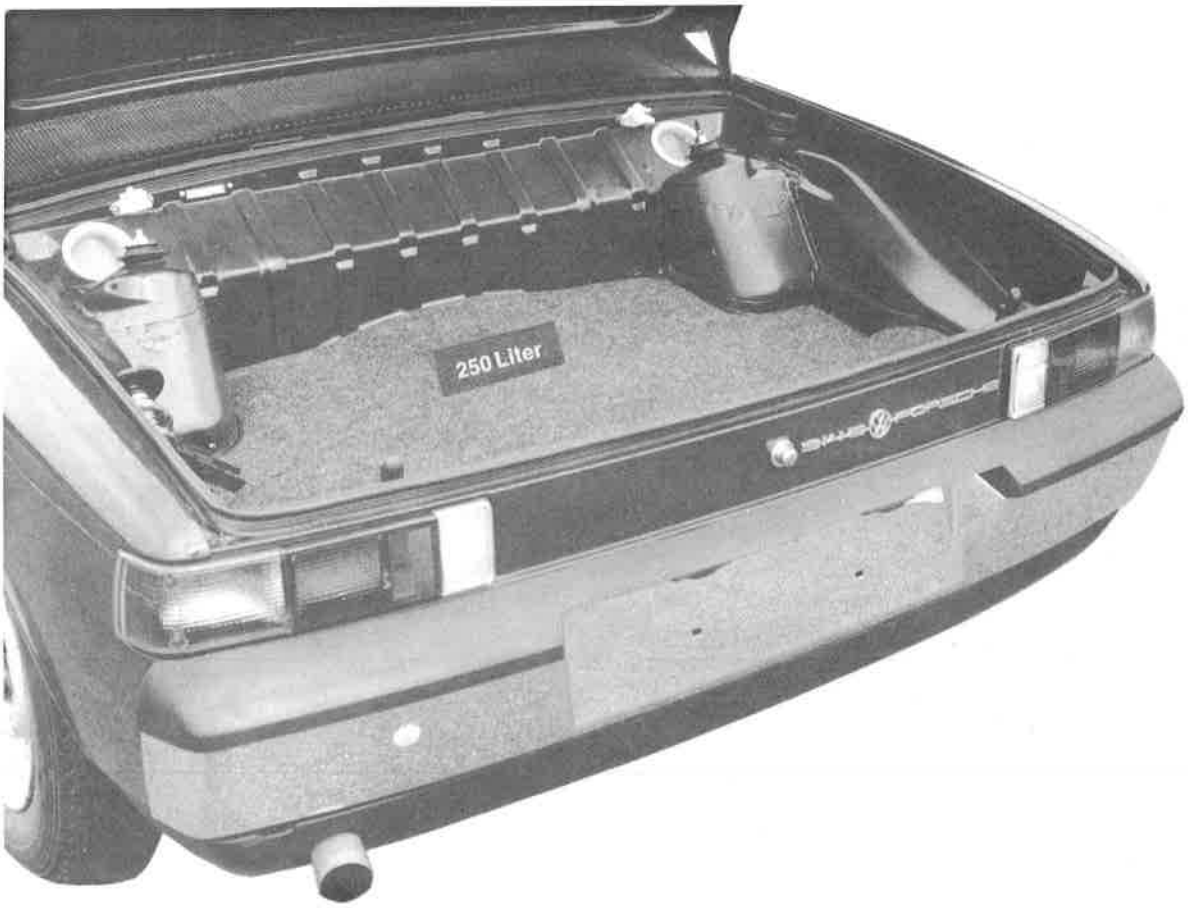
Front luggage compartment

The space under the front compartment lid is divided into two by a bulkhead. The front section contains the spare wheel, which is mounted flat, and above this a luggage compartment with 210 liter (7.4 cu.ft.) capacity. The bulkhead and floor are carpeted. Behind the bulkhead are housed the fuel tank, the fresh air supply and heating equipment, the windshield washer tank and pump and the brake fluid reservoir.



Rear luggage compartment

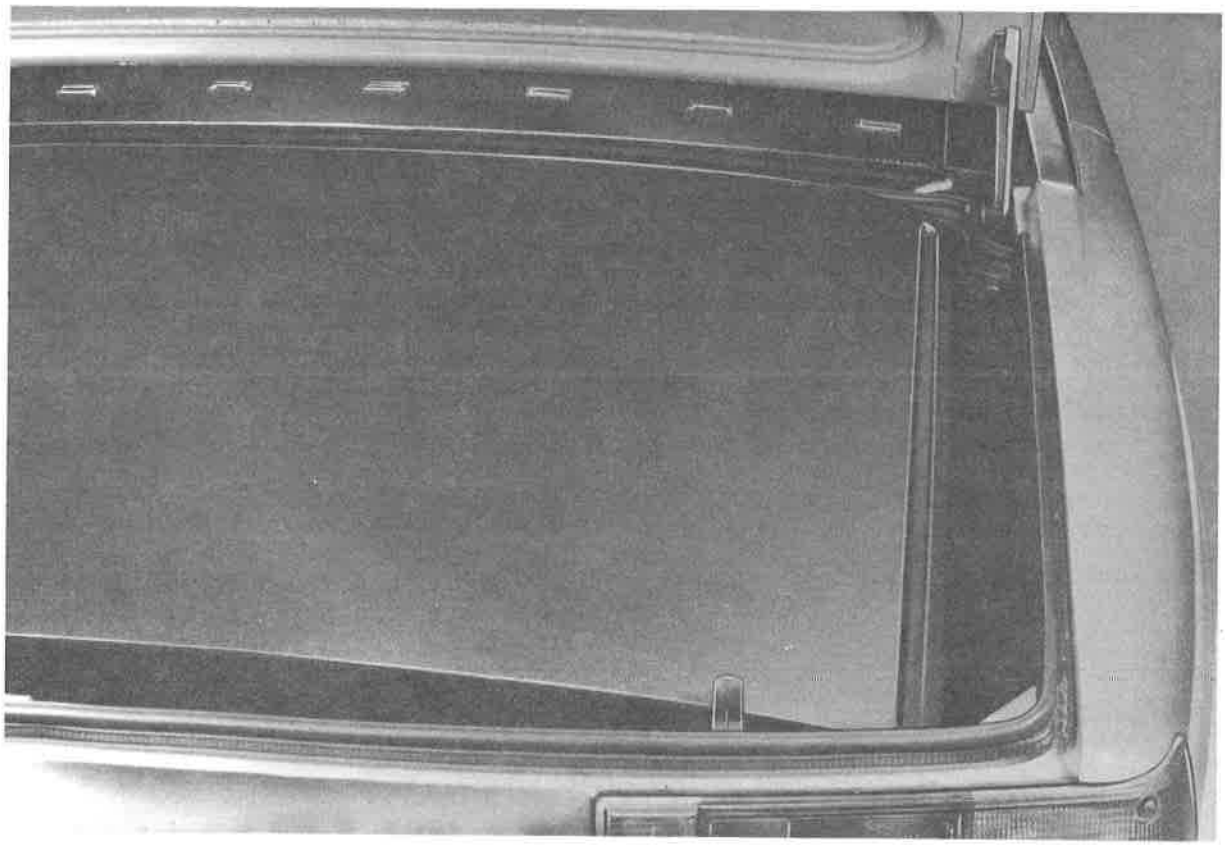
The rear luggage compartment has a lockable lid with surrounding seal, and holds 250 liters (8.8 cu.ft.) of luggage. It can be used to transport additional items and is also intended to house the car's removable plastic roof.



Roof

The roof is manufactured from glass fiber reinforced plastic, and is attached by quick-action fasteners to the windshield frame and the roll bar.

It weighs approx. 7.2 kg (15.9 lb), and can easily be taken off and stored in the rear luggage compartment without unduly restricting the amount of luggage that can be carried.



DIMENSIONS AND WEIGHTS

Type	914	914/6
Wheelbase	2450 mm (96.5")	2450 mm (96.5")
Track, front	1341 mm (52.8")*	1361 mm (53.6")*
Track, rear	1377 mm (54.2")*	1382 mm (54.3")*
Length	3985 mm (156.9")	3985 mm (156.9")
Width	1650 mm (65.0")	1650 mm (65.0")
Height (unladen)	1230 mm (48.4")	1240 mm (48.8")
Minimum ground clearance at permitted gross weight	120 mm (4.7")	130 mm (5.1")
Rim size	4 1/2 x 15	5 1/2 x 15
Tire size	155 SR 15	165 HR 15
Optional tire size	165 SR 15	
Weights		
Unladen weight (to German standard DIN 70020)	900 kg (1984 lb)	940 kg (2072 lb)
Payload	320 kg (705 lb)	320 kg (705 lb)
Permitted gross weight	1220 kg (2690 lb)	1260 kg (2778 lb)
Permitted front axle load	650 kg (1433 lb)	650 kg (1433 lb)
Permitted rear axle load	650 kg (1433 lb)	700 kg (1543 lb)

* Car loaded to DIN standard unladen weight + driver

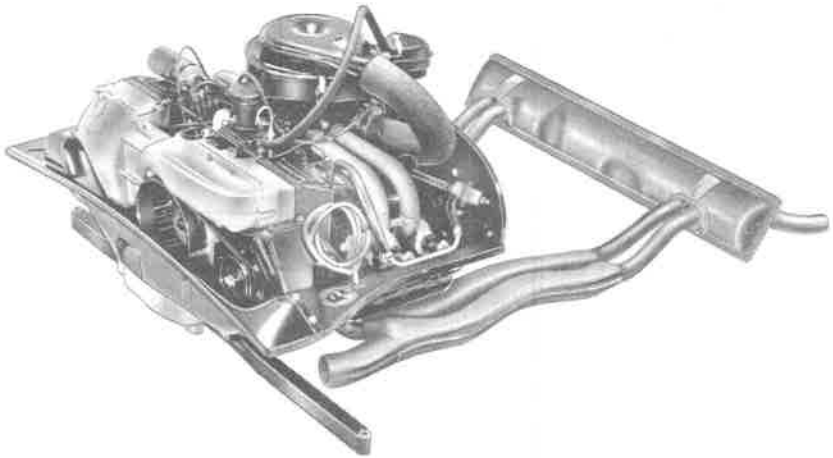
CAPACITIES

Type	914	914/6
Fuel tank	62 liters (16.4 US gal /13.6 Imp gal.) Octane number (Research method):	62 liters (16.4 US gal./13.6 Imp. gal.) Octane number (Research metho:
Engine oil in crankcase or oil tank	3.5 liters (7.4 US pints/6.2 Imp. pints) For oil change 3.0 liters (6.3 US pints/5.3 Imp. pints)	9 liters (19.0 US pints/15.8 Imp. pints) capacity, brand-name HD oil In summer SAE 30 At temperatures between 0° and -15°C SAE 20 At temperatures below -15°C SAE 10
Manual gearbox and final drive or Sportomatic	2.5 liters(5.3 US pints/4.4 Imp. pints) SAE 90 hypoid Oil change fill to edge of filler orifice	2.5 liters (5.3 US pints/4.4 Imp. pints) SAE 90 hypoid (In Scandinavian countries and arctic climates, use SAE 80) Oil change fill to edge of filler orifice
Torque convertor	Separate oil circuit 6.0 liters (12.7 US pints/10.6 Imp pints) DEXRON Automatic Transmission Fluid in a separate tank	Connected to engine oil circuit 11 liters initial oil capacity of engine and convertor together at oil change add only 9 liters (17 US pints/15.8 Imp. pints)
Steering	25 g LM-Kfz 3	25 g LM-Kfz 3
Brakes	0.35 liter (0.75 US pint/0.62 Imp. pint) Ate blue brake fluid	0.35 liter (0.75 US pint/0.62 Imp. pint) Ate blue brake fluid
Oilbath air cleaner	0.45 liter (0.85 US pint/0.8 Imp. pint) SAE 20 oil	
Windshield washer	2.5 liters (5.3 US pints/4.4 Imp. pints) water	2.8 liter (5.9 US pints/4.9 Imp. pints) water

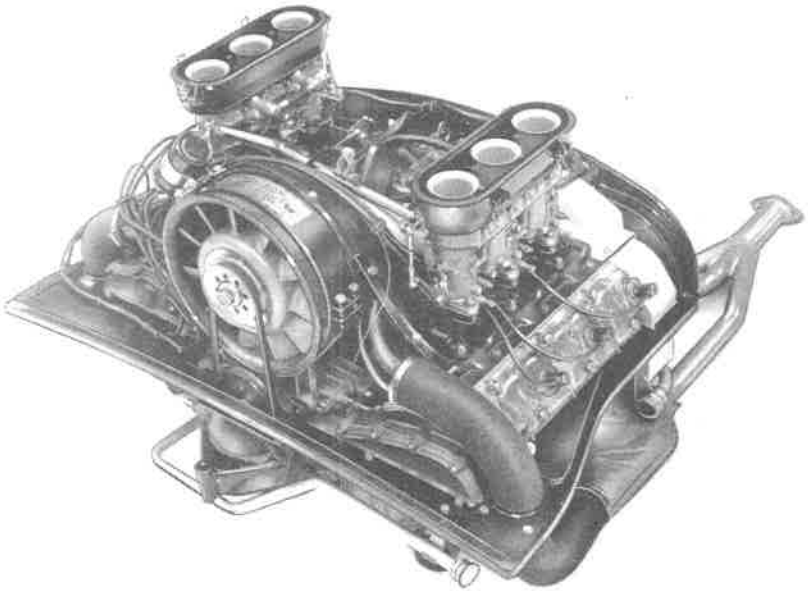
ENGINE

Official designation	Internal type reference	Displacement	Engine characteristics	Engine installed in vehicle type
914/6	901/36	2.0 liters (122 cu. in)	110 DIN HP (125 SAE HP) 6 cylinder with carburetors	914/6 with manual gearbox
914/6	901/37	2.0 liters (122 cu. in)	110 DIN HP (125 SAE HP) 6 cylinder with carburetors	914/6 with Sportomatic
914/6	901/38	2.0 liters (122 cu. in)	110 DIN HP (125 SAE HP) 6 cylinder with carburetors	914/6 with manual gearbox and exhaust emission control
914/6	901/39	2.0 liters (122 cu. in)	110 DIN HP (125 SAE HP) 6 cylinder with carburetors	914/6 with Sportomatic and exhaust emission control
914	47/1	1.7 liters (104 cu. in)	80 DIN HP (85 SAE HP) 4 cylinder with fuel injection	914 with manual gearbox
914	47/2	1.7 liters (104 cu. in)	80 DIN HP (85 SAE HP) 4 cylinder with fuel injection	914 with Sportomatic

Type 914



Type 914/6



Engine (specification, performance)	Type 914	Type 914/6
Design	Air cooled 4 cylinder horizontally opposed, with fuel injection, mounted in front of rear axle and forming a single unit with gearbox and final drive.	Air cooled 6 cylinder horizontally opposed, with carburetors ; engine and gearbox bolted together. This unit mounted centrally in vehicle with the engine ahead of the gearbox.
Number of cylinders	4	6
Bore	90 mm (3.54")	80 mm (3.15")
Stroke	66 mm (2.60")	66 mm (2.60")
Effective displacement	1679 cc (102.5 cu.in)	1991 cc (121.5 cu.in)
Fiscal displacement (according to German taxation formula)	1668 cc (101.8 cu.in)	1977 cc (120.6 cu.in)
Engine output (DIN standard)	80 bhp at 4900 rpm	110 bhp at 5800 rpm
Engine output (SAE standard)	85 bhp at 5000 rpm	125 bhp at 5800 rpm
Max. torque (DIN standard)	13.6 mkp (98.4 lb/ft) at 2700 rpm	16 mkp (115.7 lb/ft) at 4200 rpm
Max. permitted engine speed	5000 rpm	6500 rpm
Compression ratio	8.2 : 1	8.6 : 1
Mean piston speed	10.8 meters/sec (2125 fpm)	12.7 meters/sec (2500 fpm)
Cutout point of engine speed governor in ignition distributor	---	6500 $\pm$ 100 rpm
Minimum fuel octane rating	98 (Research method)	96 (Research method)
Weight of engine	approx. 139 kg (307 lb)	approx. 176 kg (388 lb)

Engine (specification, performance)	Type 914	Type 914/6
<u>Crankcase</u>		
Design	Split vertically through crankshaft and camshaft bearing shells, two piece casting	Split vertically through crankshaft and intermediate shaft bearing shells, two piece casting
Material	Pressure cast aluminum	Pressure cast magnesium
<u>Cylinders</u>		
Design	Individual cylinder barrels, special gray cast iron with cooling fins (manufactured by Croning process)	Individual cylinder barrels, gray cast iron with cooling fins
Nominal bore diameter	90 mm (3.543")	80 mm (3.150")
<u>Cylinder heads</u>		
Design	1 cylinder head for 2 cylinders; finned light alloy with 2 separate intake ports at top and 1 combined exhaust port beneath	Individual light alloy finned cylinder heads with intake port on top and exhaust port at bottom
Intake port diameter	34 mm (1.339")	32 mm (1.260")
Exhaust port diameter	32 mm (1.260")	32 mm (1.260")
Intake valve head diameter	39.3 mm (1.547")	42.0 mm (1.654")
Exhaust valve head diameter	33.0 mm (1.299")	38.0 mm (1.496")
Valve springs	Single, linear characteristic	Inner and outer springs, progressive rate

Engine (specification, performance)	Type 914	Type 914/6
Installed length of valve springs		
Intake valve	39.5 mm (1.555")	36.0 ± 0.3 mm (1.417 ± 0.012")
Exhaust valve	39.5 mm (1.555")	36.0 ± 0.3 mm (1.417 ± 0.012")
Valve clearances (with engine cold)		
Intake and exhaust valves	0.10 mm (0.0039")	0.10 mm (0.0039")
Camshaft		
Design	Gray cast iron, induction hardened, with cast-in drive flange. Helical magnesium alloy pinion engages non-hardened steel pinion on crankshaft.	Gray cast iron, induction hardened; 1 camshaft for each bank of 3 cylinders, carried in 3 bearings in camshaft housing. Both camshafts driven by chain from the crankshaft by way of an intermediate shaft.
Cam lift		
Intake	38.71 mm (1.524")	36.25 mm (1.427")
Exhaust	38.26 mm (1.506")	35.51 mm (1.398")
Timing adjustment	Marks on camshaft pinion and steel crankshaft pinion	Lift of intake valve at top center on valve overlap stroke = 2.3 - 2.7 mm (0.091 - 0.106")

Engine (specification, performance)	Type 914	Type 914/6
Valve timing measured with 1 mm (0.039") valve clearance		
Intake valve opens	11°30' before TDC	15° before TDC
Intake valve closes	42° after BDC	29° after BDC
Exhaust valve opens	43° before BDC	41° before BDC
Exhaust valve closes	4° after TDC	5° before TDC
Pistons	Aluminum calotte pattern, with steel insert to limit and control thermal expansion	Light alloy chill molding
Piston rings	1 top compression ring with inner chamfer and ferrox filling	2 compression rings with inner chamfer
	1 lower compression ring (with projection), ferro-oxidized	1 oil scraper ring (oil slot and tubular spring)
	1 oil scraper ring (with tubular spring)	All rings above wrist pin
Wrist pins	Fully floating, retained by circlips	Fully floating, retained by circlips

Engine (specification, performance)		Type 914	Type 914/6
Connecting rods			
Design		Forged steel, I-section shaft; bearing cap retained by two M 9 x 1 through bolts with hex nuts Wrist pin bearing: pressed-in steel bushing with lead-bronze bearing surface	Forged steel, I-section shaft; upper and lower halves bolted together with two M 10 x 1.25 expansion bolts and hex nuts Wrist pin bearing: pressed-in Cuprodur bushing, turned to size
Crankshaft		Forged, with 4 main bearings	Forged, with 8 main bearings
Intake manifolds		Two curved steel pipes brazed to a cast flange which is bolted to the cylinder heads; one manifold assembly for each bank of cylinders. Intake pipes connected by rubber hoses to air distribution system. Cast flanges also accommodate fuel injection valves	Three pipes cast into a finned manifold plate assembly; one such assembly for each bank of three cylinders. Intake pipes plastic coated internally and externally to ensure a smooth airflow and corrosion protection
Intake pipe diameter	top	34 mm (1.339")	40 mm (1.575")
	bottom	34 mm (1.339")	32 mm (1.260")

Manual gearbox	Type 914	Type 914/6
Acceleration from 0 — 100 kph (0 — 62 mph) through gears	approx. 13 sec.	approx. 9.9 sec.
Consumption Fuel consumption measured in accordance with DIN 70 030 standard test method Oil consumption	approx. 8 liters/100 km (29.2 US mpg) (35.2 Imp. mpg) 0.5 — 1.0 liter/1000 km (700 — 1400 miles per pint)	approx. 9 liters/100 km (26 US mpg) (31.4 Imp. mpg) max. approx. 1.0 liter/1000 km (1400 miles per pint)

ROAD PERFORMANCE

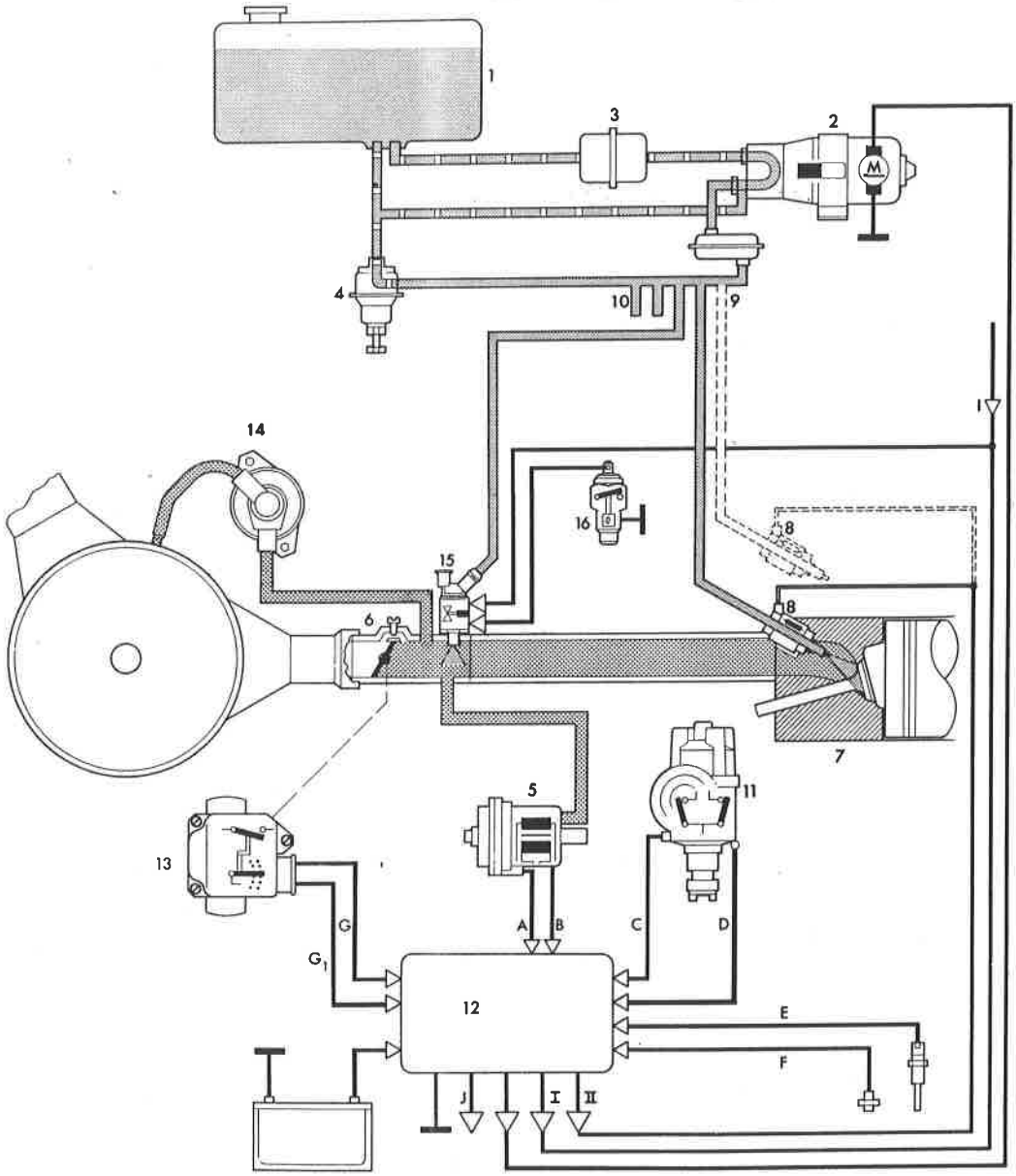
Sportomatic transmission	Type 914	Type 914/6
Top speed	approx. 170 kph (106 mph)	approx. 197 kph (122.5 mph)
Engine speed at maximum road speed	approx. 4800 rpm	approx. 5650 rpm
Road speeds in each speed range at engine speed corresponding to maximum power output	4900 rpm	5800 rpm
1st	approx. 60 kph (37 mph)	approx. 72 kph (45 mph)
2nd	approx. 95 kph (59 mph)	approx. 111.5 kph (69.2 mph)
3rd	approx. 134 kph (83 mph)	approx. 154 kph (96 mph)
4th	approx. 175 kph (109 mph)	approx. 202 kph (125.7 mph)
Reverse	approx. 61 kph (38 mph)	approx. 69.8 kph (43.4 mph)
Max. gradients with two persons in car, on good road surface		
1st	approx. 32% (1 in 3.1)	approx. 39% (1 in 2.6)
2nd	approx. 18% (1 in 5.5)	approx. 23% (1 in 4.4)
3rd	approx. 11% (1 in 9.1)	approx. 7.5% (1 in 13.3)

Sportomatic transmission	Type 914	Type 914/6
Acceleration from 0 - 100 kph (0 - 62 mph)	approx. 14 sec.	approx. 11 sec.
Consumption Fuel consumption measured in accordance with DIN 70 030 standard test method for carburetor engines	approx. 8.5 liters/100 km (27.8 US mpg) (33.2 Imp. mpg)	approx. 9.5 liters/100 km (24 . 8 US mpg) (29 . 7 Imp. mpg)
Oil consumption	0.5 - 1.0 liter/1000 km (600-1200 miles per quart)	max. approx 1.0 liter/1000 km (1200 miles per quart)

ELECTRONIC FUEL INJECTION FOR TYPE 914

Description of the system

SCHEMATIC OF FUEL INJECTION SYSTEM



1 Fuel tank

2 Fuel pump

3 Fuel filter

4 Pressure regulator

5 Pressure sensor

6 Intake air distributor

7 Cylinder head

8 Injection valve

9 Fuel distributor

10 Fuel distributor with connection for cold start device

11 Ignition distributor with actuating contacts I and II

12 Control unit

13 Throttle butterfly switch with acceleration enrichment

14 Additional air slide

15 Cold start jet

16 Thermo-switch for cold start device

A + B	from pressure sensor (load condition instruction)
C + D	from ignition distributor contacts (engine speed and release instructions)
E + F	from temperature sensors (warm running instruction)
G	from throttle butterfly switch (fuel supply cutoff on overrun)
G 1	acceleration enrichment
H	from pressure switch (full load enrichment instruction)
J	from starter, magnetic switch terminal 50 (starting enrichment instruction)
I	to injection valves, cylinders 1 and 4
II	to injection valves, cylinders 2 and 3

Fuel is drawn from tank (1) by fuel pump (2) through filter (3) and delivered under pressure to the annular fuel line. To prevent the transmission of noise an acoustic damper is installed at the start of the pressure line.

A pressure regulator (4) is connected to the end of the annular fuel line, and restricts fuel pressure to 2 atm (28.5 psi). Electromagnetic injection valves (8) are connected to the annular fuel line by fuel distributors (9) and (10). From the pressure regulator excess fuel can return to the fuel tank by a second fuel line in the center tunnel of the car.

The overflow line from the fuel pump also discharges into this second fuel line. The fuel pump incorporates an excess pressure valve which operates when pressure noticeably exceeds the nominal value — possibly as a result of a defect in pressure regulator (4). A non-return valve in the pressure connection to the fuel pump prevents pressure from dropping immediately in the annular fuel line if the pump is switched off.

Control unit (12) opens the injection valves (8) electrically in two groups (J) and (K). As a result of the fuel pressure in the system, fuel is injected when the valves are opened. The outlet passages of the injection valves are accurately calibrated; as a result of this, and in view of the fact that fuel pressure is kept at a constant level, the quantity of fuel injected on each occasion depends only on the period of time for which the injection valve is open.

This duration of injection is 'calculated' by the control unit. The values — or items of information processed electronically in the control unit are supplied by individual sensors and contacts on the engine. The process operates as follows:

The moment when injection commences is determined — depending on the position of the camshaft — by instructions obtained from distributor contacts I and II (C) and (D).

The duration of the injection period (quantity of fuel injected) is determined initially by two factors: engine speed and engine load condition. Engine speed is fed into the control unit by distributor contacts I and II (actuating contacts). The load condition (part load or full load) can be deduced from the pressure present in the intake air distributor (manifold depression). The pressure at this point at any given moment is converted to an electrical quantity by pressure sensor (5) — which is connected by a hose to intake air distributor (6) — and also fed into the control unit (A) and (B).

The control unit processes these instructions and issues an instruction of its own: the injection valves accordingly remain open for a shorter or longer period (I) and (II). The control unit is thus capable of reacting to engine load and speed and of instructing the injection valves electrically to allow a greater or less quantity of fuel to pass into the cylinders. This is how the 'basic injection volume' is determined.

In addition to the basic injection volume it is necessary when starting the engine at low outside temperatures, during the warming-up period or when the engine is operating under full load to inject a specific quantity of additional fuel into the cylinders (enrichment).

The warming-up enrichment volume is related to engine temperature. The temperature of the engine is measured electrically by two temperature sensors (E) and (F), one in the intake air distributor and one at the cylinder head.

These instructions too are processed by the control unit in the correct relationship to the basic fuel volume, and transmitted electrically to the injection valves. On the overrun (engine braking, for instance when driving downhill), no fuel should be injected into the cylinders.

This operating condition is identified by the closed throttle butterfly and an increased engine speed. The throttle butterfly switch (G) cuts off the fuel supply on the overrun whenever engine speed is in excess of 1800 rpm. If engine speed on the overrun then falls as low as 1250 rpm the fuel supply is switched on again to ensure correct transition to the 'engine idle' condition.

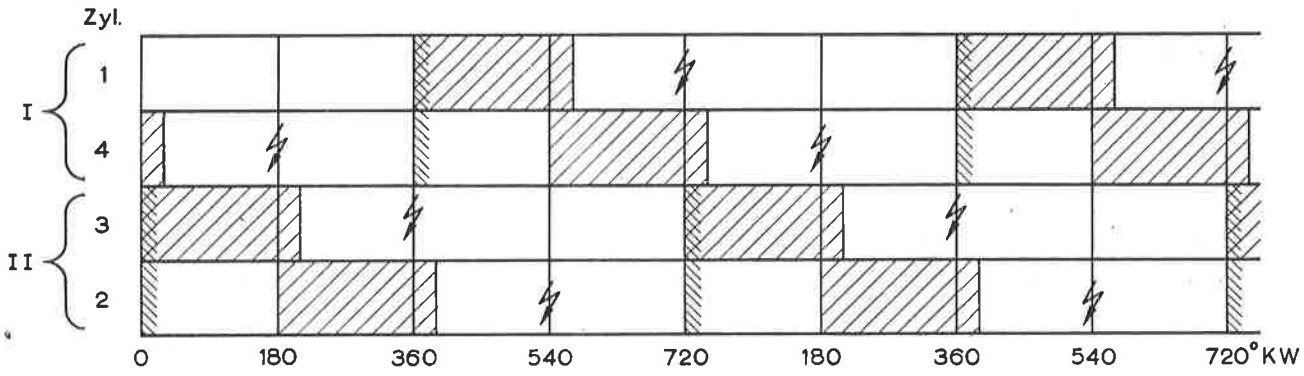
To reduce the expense of the control unit and the cost of the complete fuel injection system, pairs of valves are switched in parallel.

(Valve group I = cylinders 1 and 4; valve group II = cylinders 2 and 3.)

Both injection valves in each group open to inject fuel into the intake pipe at the same time. Thus the valves for cylinders 1 and 3 inject fuel during the induction stroke past the open intake valves into the combustion chambers. The injection valves for cylinders 2 and 4, on the other hand, inject fuel while the burned gases are still being ejected from the cylinder, so that the fuel strikes the closed intake valves and is 'stored' at that point until the induction stroke starts. This system of injection valve control has proved effective in practice.

During normal driving the quantity of air supplied to the engine is regulated by a throttle butterfly in the intake air distributor.

At idle speed the throttle butterfly is completely closed. Air for engine idling reaches the intake pipes only by way of the bypass in the intake air distributor. Adjustment of idle speed is by varying the cross section of the bypass. For this purpose an adjusting screw with locknut is provided on the intake air distributor.



Induction stroke

Start of injection

Ignition point

Injection valve groups I, II

The engine also requires an additional air supply before it reaches its normal operating temperature. This is regulated by the additional air slide (disc valve). It alters the effective cross section of the additional air pipe in accordance with engine compartment temperature and the temperature of the electric heater built into a housing in the additional air slide.

The disc valve is turned by the action of a bimetallic spring. This bimetallic spring reacts to the temperature factors mentioned above. The supply for the electric heating in the additional air slide is taken from terminal 87 of the pump relay.

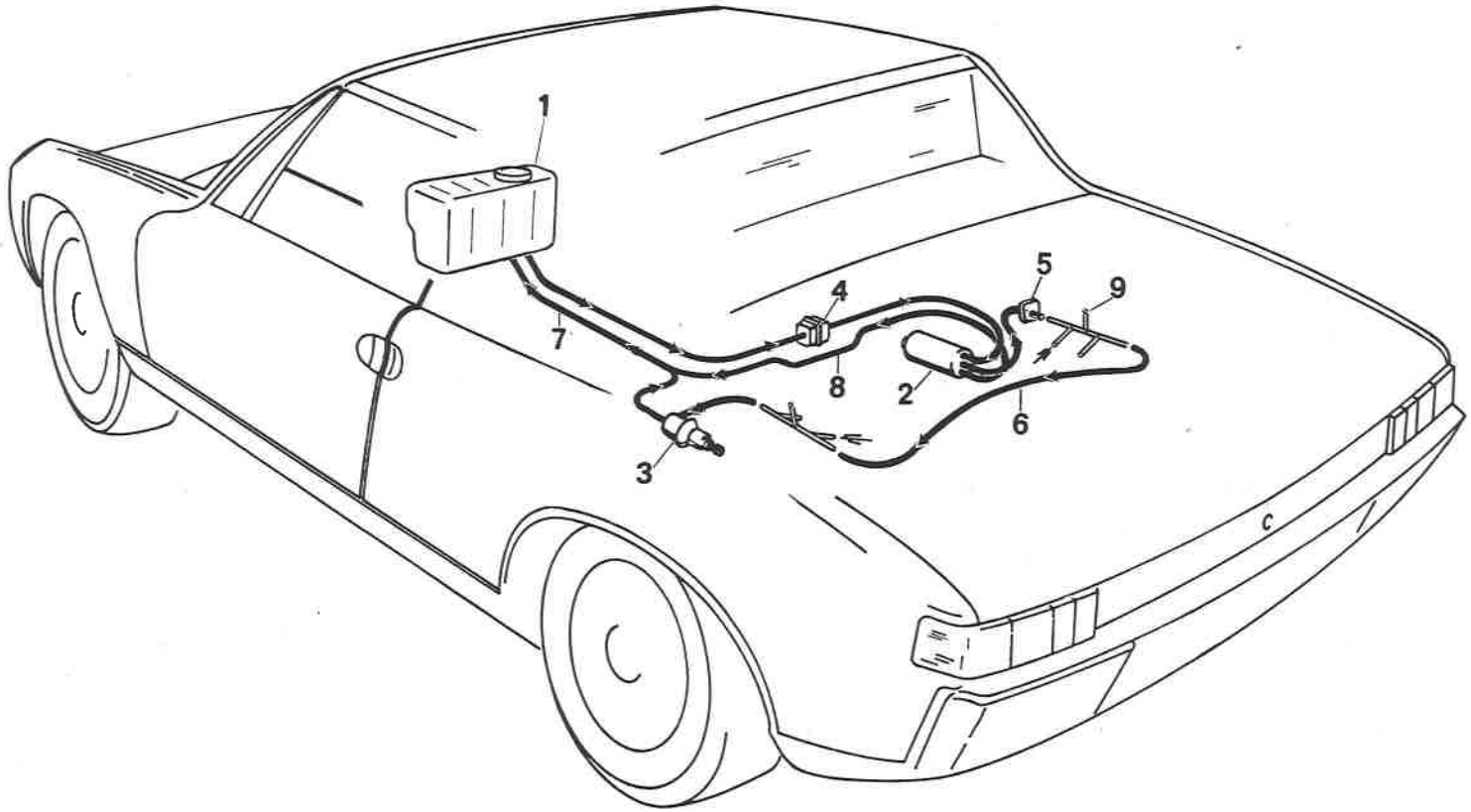
COLD START DEVICE

At temperatures of $+5^{\circ}C$ ($+41^{\circ}F$) it is necessary for the additional quantity of fuel to be injected direct into the intake air distributor, so that the best possible fuel/air mixture can be prepared for cold starting purposes. A spiral jet is built into the intake air distributor.

Fuel is supplied to the spiral (cold start) jet through an electro-magnetic fuel valve, controlled by a thermal switch which cuts in at a temperature of $+5^{\circ}C$ ($+41^{\circ}F$). The cold start device operates when electric power is supplied to the engine starter (terminal 50), provided that the thermal switch has cut in.

FUEL SYSTEM

Fuel contained in the fuel tank (1) is pumped by an electric fuel pump (2) through micro filter (4) into the fuel delivery line. An annular fuel line (6) is connected to the delivery line, and supplies fuel to the injector valves. The pressure limiter (3) restricts pressure in the annular line to 2 atm (29 psi). From here, excess fuel can flow back to the tank through the return line (7) or equalizing line (8). The delivery line includes a damping unit (5) to prevent pulsation in the fuel supply system. Both fuel distributor blocks (9) are provided with a connection for checking line pressure with a pressure gauge.



AIR SYSTEM

The four cylinders are supplied with air through four intake pipes connected to the intake air distributor. At the entry to the intake air distributor an intake manifold containing a throttle butterfly valve is mounted. The throttle butterfly is operated by Bowden cable from the accelerator pedal. The intake manifold is linked by a curved rubber tube to the air cleaner.

Idle speed air system

The air system for engine idling takes the form of an idle air passage in the intake manifold. This bypasses the throttle butterfly and emerges in the air distributor. The effective cross section of the idle air passage can be adjusted by means of the idle air screw (idle speed adjustment).

Warm-up air system

An additional air pipe from the air cleaner passes through a heated additional air slide and leads to the intake air distributor; this is the warm-up air system of the engine.

Additional air slide

During the warm-up period the engine requires an additional air supply, and this is regulated by the additional air slide in accordance with two factors: engine compartment temperature and the heat generated by an electrical heating element built into the additional air slide housing.

To illustrate the functioning of the fuel injection system, as described in the section following we here give details of the individual electrical and electronic components and assemblies.

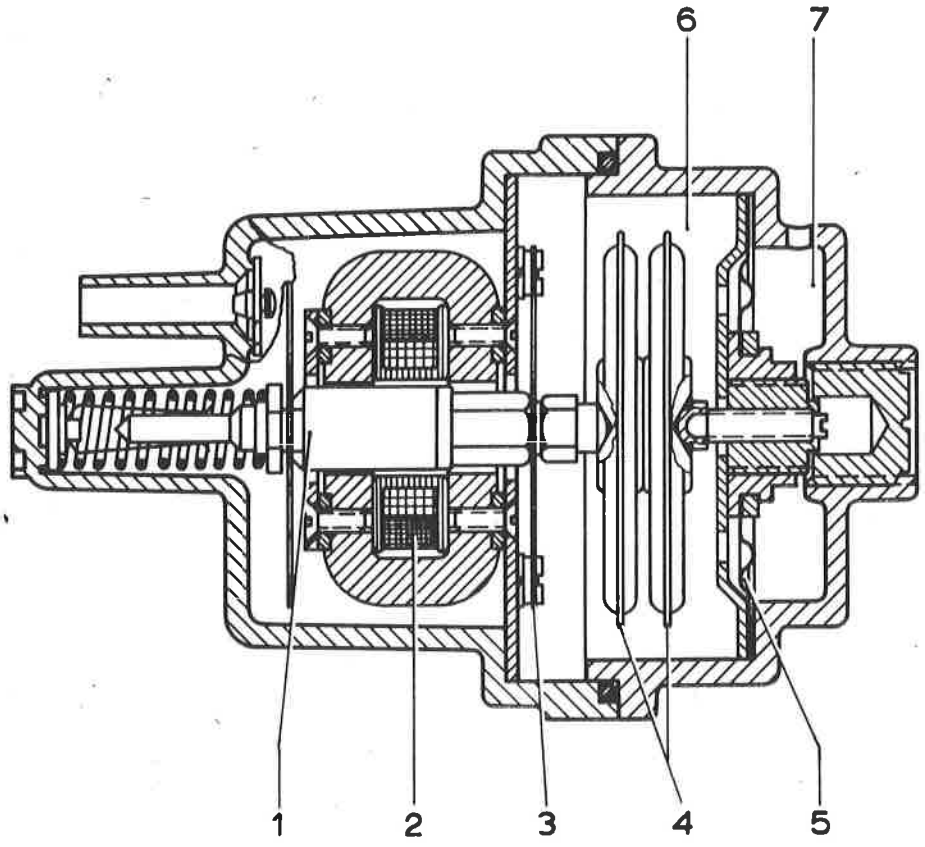
Pressure sensor with full load mixture enrichment device

This regulates the basic quantity of fuel injected into the cylinder per stroke, by relating the fuel volume to the pressure in the intake air distributor and thus to engine load. The device consists of a set of barometric vessels which move an iron core inside an arrangement of coils, and thus alter the inductivity of the coils (the inductivity is an electrical unit of measurement applied to coils). An additional diaphragm reacts to the difference between pressure in the intake pipe and the atmospheric pressure outside the car, and if necessary corrects the position of the iron core again. In this way the degree of mixture enrichment required at full engine load is selected.

The iron core (armature) is provided with two frictionless leaf spring mountings. The barometric vessels are housed in a chamber connected by hose to the intake air distributor. The additional diaphragm, used to measure outside atmospheric pressure, provides an airtight seal between this chamber and the atmosphere. The space immediately behind the additional diaphragm is connected to the outside atmosphere by a drilled passage in the housing, so that at any time the atmospheric pressure surrounding the car is also present in the space. Since the pressure ruling in the intake air distributor at any given moment is also present inside the barometric vessels, their length will be altered in proportion to the absolute pressure value (pressure differential) to which they are exposed, and the position of the armature in relation to the coils will be adjusted accordingly.

In this way the pressure sensor converts any change in the pressure conditions obtaining in the intake pipe into a change in the inductivity of its coils. This inductivity is an electrical quantity which can be processed by the control unit of the fuel injection system.

In order to avoid flutter in the barometric vessel or at the diaphragm as a result of the pulsating pressures encountered in the intake pipe, a damper/restrictor is installed at the connection stub pipe of the pressure sensor. A flap valve is used to open a passage round the throttle butterfly, and thus ensure that the pressure sensor reacts as rapidly as possible when the throttle valve is suddenly opened (during acceleration).



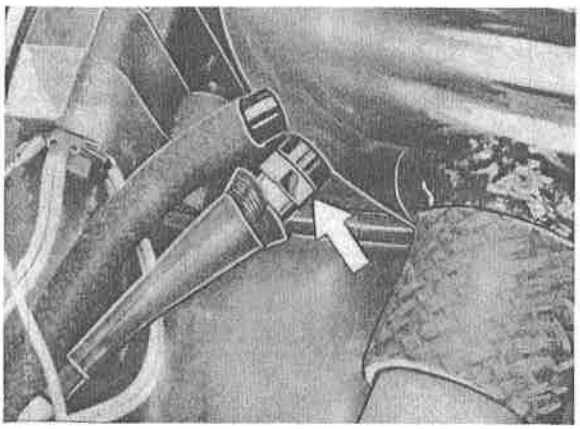
1 Armature
2 Winding
3 Leaf springs
4 Barometric vessels
5 Diaphragm for full load mixture enrichment
6 Absolute pressure area
7 Atmospheric pressure area

The actuating contacts

in the ignition distributor govern the moment at which fuel injection commences, and determine the group of cylinders in which injection is to take place. The two contacts are displaced through 180° in relation to one another in the lower section of the distributor, and are operated by an additional cam. The relative positions of cam and actuating contacts in relation to the engine timing, as represented by the cam layout on the camshaft, are arranged so that injection starts at the same time as the intake valves commence to open. Since both actuating contacts are operated by a single cam, the period of time which elapses between the opening of the first contact and the opening of the second is governed by engine speed. In this way the actuating contacts in the ignition distributor are able to relate the basic quantity of fuel injected per stroke to the engine speed at any given moment.

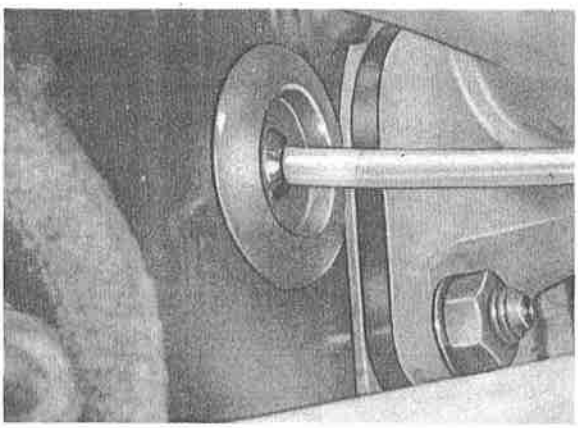
Temperature sensor I

in the intake air distributor and



Temperature sensor II

in the cylinder head are used to control mixture enrichment during the warm-up period.

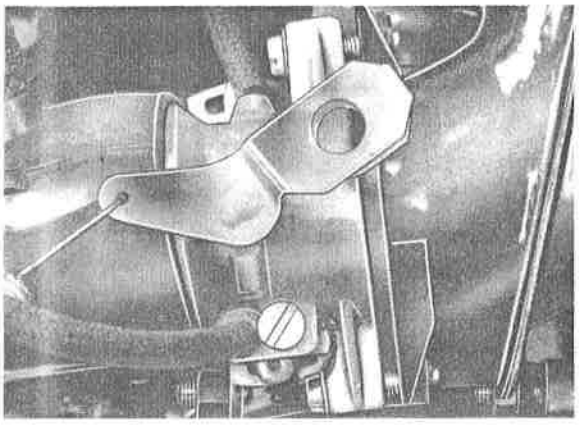


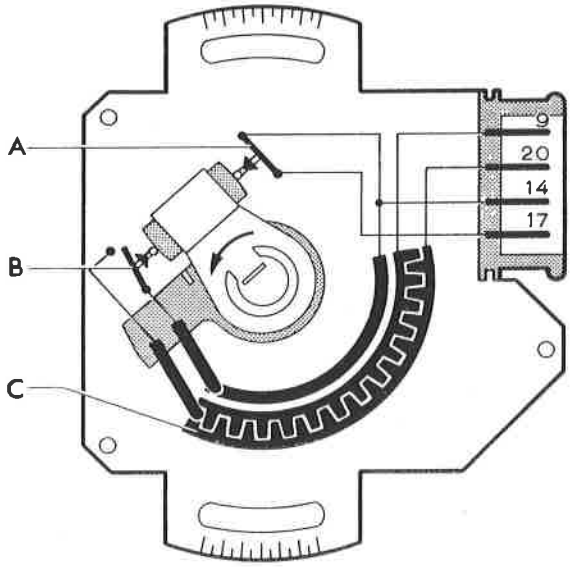
These temperature sensors are effectively resistors, the ohm rating of which varies in relation to their temperature. If the temperature rises, the resistance drops. For this reason the mode of operation of temperature sensors of this type is described as 'negative temperature coefficient'. The NTC resistor rods are enclosed within protective metal jackets which ensure good heat conduction.

Throttle butterfly switch with mixture enrichment during acceleration

This switch has the function of shutting off fuel supply on engine overrun. A switch contact is built into the unit, and closes when the throttle butterfly is in the idle speed position.

As soon as the throttle butterfly is opened more than 2^{o} from the engine idle position, the switch also opens.





A = Switch contact for overrun
B = Repeater contact
C = Contact wiper tracks

The throttle butterfly switch also contains two wiper contact tracks with 2 x 10 contacts (for mixture enrichment during acceleration). A second switch contact (repeater contact) ensures that the contact tracks for accelerating mixture enrichment come into operation only when the throttle butterfly is moved from the closed to the open position. When the throttle butterfly moves from the open to the closed position, the repeater contact interrupts the accelerating mixture enrichment process.

The function of the mixture enrichment device for accelerating conditions involves wiping contact with 9 or 10 of the contacts in each track whenever the throttle butterfly is opened from zero to full.

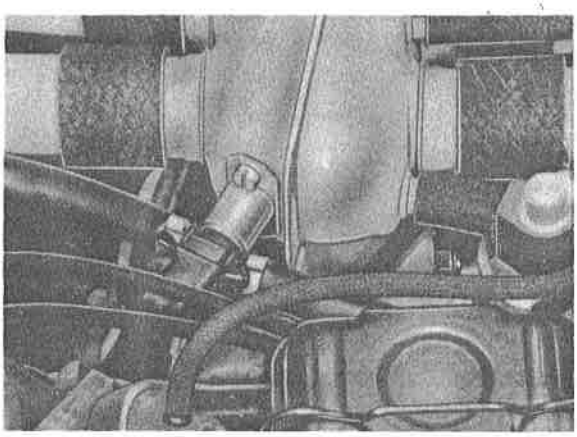
The movement transmits electrical impulses to the fuel injection control unit which correspond to the degree of throttle butterfly opening. From these electrical instructions the control unit is able to construct the information it requires in order to initiate the necessary mixture enrichment process for the acceleration phase.

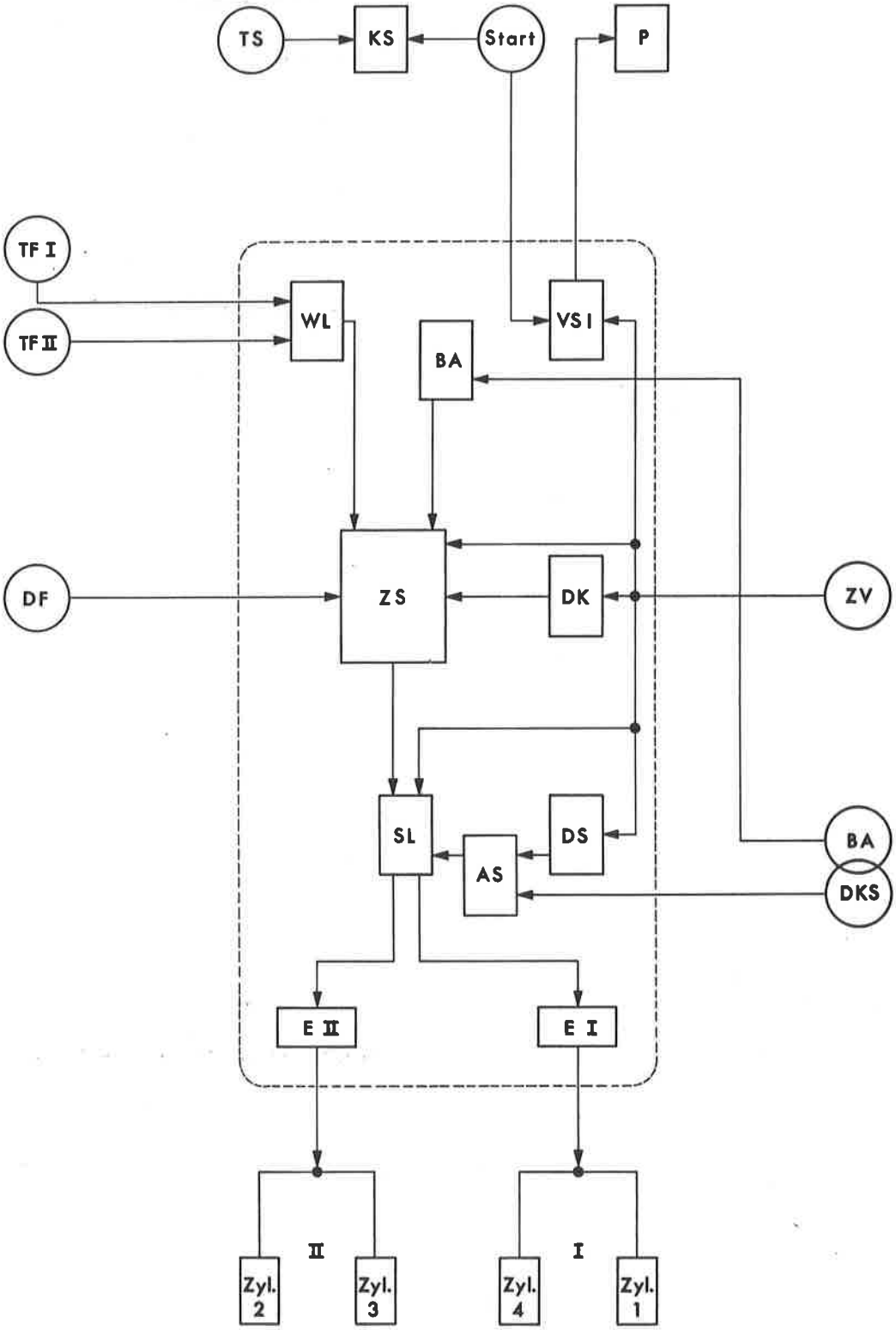
The temperature sensitive switch for the cold start device

switches on the electromagnetic cold start valve when engine compartment temperature is below + 5° C (+ 41° F).

The cold start valve with spiral jet

regulates the additional quantity of fuel for cold starting. It is an electro-magnetic valve drawing its power supply from terminal 50 on the starter motor. This circuit ensures that the cold start device can only be switched on while the engine is being started.




TS
KS
Start
P
TF I
TF II
WL
VS I
BA
DF
ZS
DK
ZV
SL
DS
AS
BA
DKS
E II
E I
II
I
Zyl. 2
Zyl. 3
Zyl. 4
Zyl. 1

KEY TO BLOCK DIAGRAM:

Zv	Ignition distributor contacts
BA	Acceleration mixture enrichment
DKS	Throttle butterfly switch
TF I	Temperature sensor I
TF II	Temperature sensor II
DF	Pressure sensor
Zyl 1 - Zyl 4	Injection valves for cylinders 1 to 4
KS	Cold start valve
TH	Thermo switch
P	Fuel pump
St	Start instruction
VSi	Overflow safety device
WL	Warm-up enrichment
Zs	Time switch
DK	Engine speed correction
DS	Engine speed switch
AS	Shut-off function
SL	Switching logic
E I, E II	Final stages for injection valve groups I and II

The control unit

consists mainly of the two final stages (switching transistors) E I and E II, the logical switching unit (SL) and the most important item of control equipment, the time control stage (ZS). This time stage takes the form of a monostable timebase circuit. This means that the electronic circuit is designed to return to a stable position without requiring a new actuating impulse. In the case of this unit the stable condition is 'switched off'.

When an impulse is received from either of the actuating contacts in the ignition distributor, the time stage is switched on. At the same time the actuating impulse excites the logical switching unit and causes it to operate the final stage of the correct injection valve group (e.g. group I). In our example this would mean that the injection valves for cylinders 4 and 1 would be opened. They remain open until the time stage returns to its stable condition (switched off). The time elapsing between the switching on of the time stage and its reversion to the stable condition (switching off) determines the volume of fuel injected into the cylinders.

The time arrived at as described above can be influenced indirectly by the various sources of information attached to or built into the engine. The instructions which these information sources transmit to the control unit must be converted into a different form inside the unit. This takes place for reasons implicit in the circuitry, but also so that comparison and matching of the signals can occur. For the latter process, stages deriving their information from warm-up (WL), engine speed correction (DK) and acceleration mixture enrichment (BA) provide data. Only the pressure sensor and the two actuating contacts feed directly into the time stage. All the stages referred to until now are incorporated with a view to determining the stabilization period of the time stage. In other words, the sections of the control unit described above are responsible for determining the quantity of fuel injected. Their individual functions will be evident from the descriptions we have applied to them.

The engine speed switch (DS), together with the shut-off function (AS) and the throttle butterfly switch (DKS) cause a complete interruption in the fuel supply when the engine is operating in the overrun condition, since both instructions together have the effect of blocking the logical switching unit.

In addition, the control unit contains a time switch circuit (VSi), which ensures that the fuel pump operates only when the starter motor is in action or the engine itself is rotating at a speed above 100 rpm. This is designed to prevent fuel filling the combustion chambers in the event of engine or fuel injection system failure (overflow safety device).

Mixture enrichment dependent on low outside temperatures (cold start enrichment) is regulated by a unit separate from the main control unit (KS).

The logical switching system (SL) is built into the control unit to ensure that in the event of actuating contact chatter in the distributor the duplicated actuating signal cannot cause the wrong group of injection valves to operate.

GEARBOX

Type 914				Type 914/6			
Standard equipment 5 speed manual shift gearbox				Standard equipment 5 speed manual shift gearbox			
Gear ratios (914.300.012.13)				Gear ratios (914.300.012.03)			
1st	A	11/34	3.091 : 1	1st	A	11/34	3.091 : 1
2nd	F	18/34	1.889 : 1	2nd	GA	18/32	1.778 : 1
3rd	N	23/29	1.261 : 1	3rd	0/3	23/28	1.218 : 1
4th	V	27/25	0.926 : 1	4th	V	27/25	0.926 : 1
5th	ZD	31/22	0.710 : 1	5th	ZA	29/22	0.759 : 1
Reverse		11/16 20/43	3.127 : 1	Reverse		11/16 20/43	3.127 : 1
Final drive ratio (crown wheel and pinion)		K + T 7/31	4.429 : 1	Final drive ratio (crown wheel and pinion)		K + T 7/31	4.429 : 1

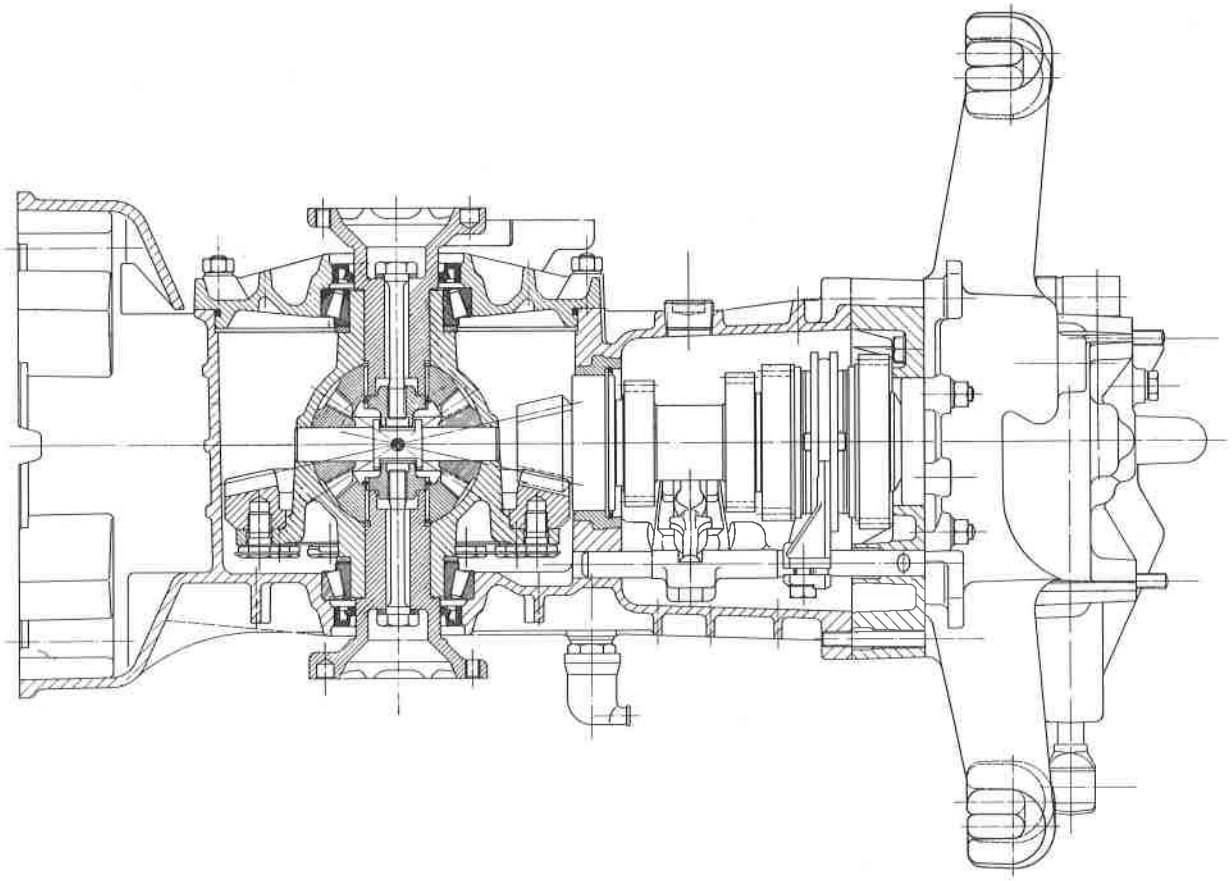
GEARBOX

Type 914	Type 914/6
Optional Sportomatic 4 speed transmission	Optional Sportomatic 4 speed transmission
Gear ratios (914.300.010.15) 1st C 15/36 2.400 : 1 2nd J 21/31 1.476 : 1 3rd S 25/26 1.040 : 1 4th Z 29/23 0.793 : 1	Gear ratios (914.300.012.05) 1st C 15/36 2.400 : 1 2nd I 20/31 1.550 : 1 3rd Q4 24/27 1.125 : 1 4th X 28/24 0.858 : 1
Reverse 15/18) 20/42) 2.380 : 1	Reverse 15/18) 20/42) 2.380 : 1
Max. conversion ratio 2.090 : 1	Max. conversion ratio 2.100 : 1
Final drive ratio (crown wheel/pinion) K + T 7/27 3.857 : 1	Final drive ratio (crown wheel/pinion) K + T 7/27 3.857 : 1

MANUAL GEARBOX

On type 914 cars the well-known 5 speed gearbox of existing design will be installed. The gear ratios will be matched to the type of engine used. As on Porsche 1970 models, the gear pinions of the 1st and 2nd gear sets have been slightly widened.

The gearbox is installed back to front in the vehicle, that is to say it is located behind the engine. For constructional reasons this position means that the crown wheel of the rear axle drive must be housed in the left half of the casing, on the same side as the starter. When installing the gearbox and rear axle make sure that the differential with the crown wheel is in place before the pre-assembled intermediate plate with input and drive shafts is installed.

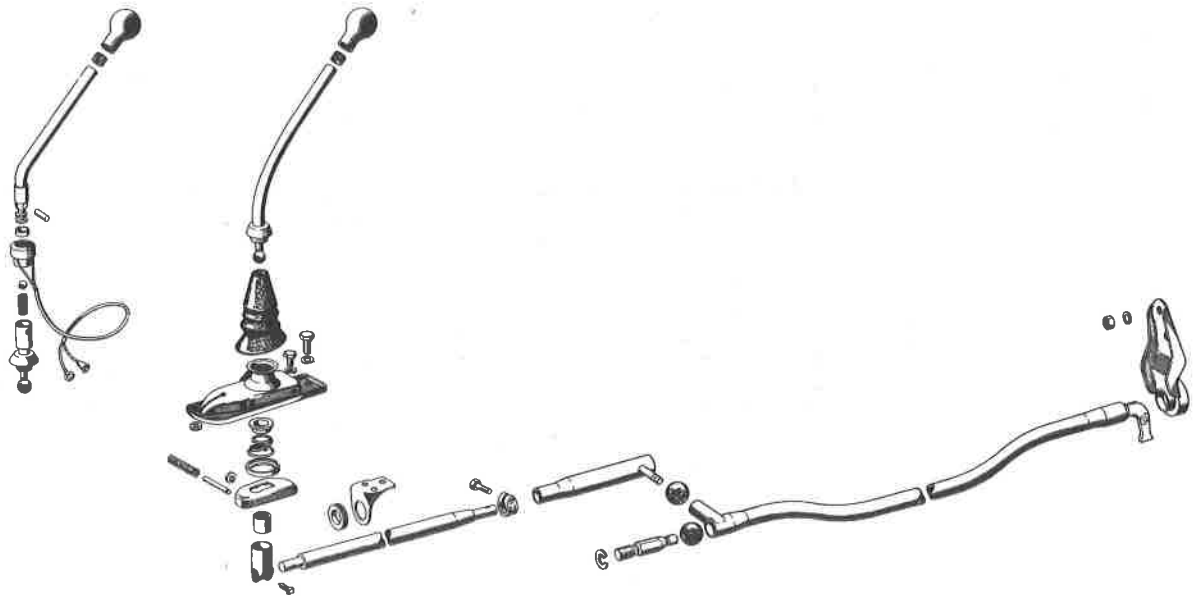


Since the method of gearbox installation has now been changed, it has also been necessary to redesign what is now the rear gearbox cover. This cover now has two cast arms at the sides for gearbox mounting.

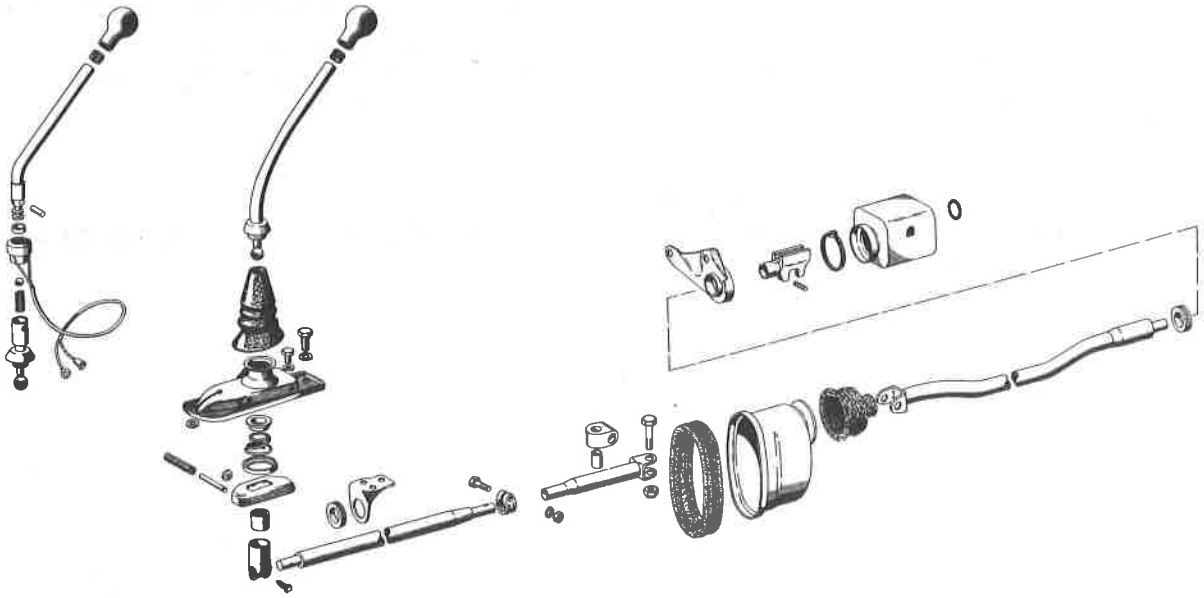
The only modifications to the gear selection linkage involve a lengthened selector rod with screwed on sheet steel support plate at the gearbox end. A rocking lever in the gearbox cover transfers movement of the selector rod to an internal selector lever in the gearbox.

In view of the differing shapes and sizes of the 914 and 914/6 engines, the selector rod and the inner selector lever must be of the pattern suited to the vehicle in question.

914 gear selector linkage



914/6 gear selector linkage

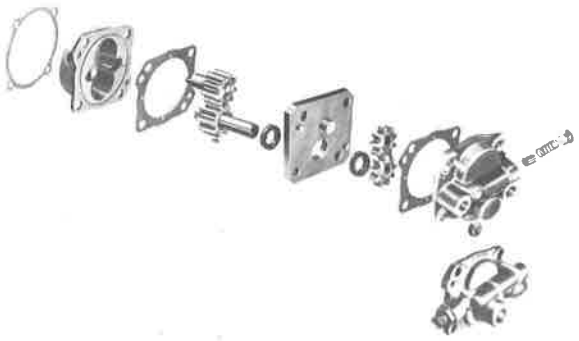


TORQUE CONVERTOR

The convertor consists of an impeller, a turbine wheel and a stator with freewheel, all enclosed in an oil-filled housing welded together from two dish shaped steel pressings. It is supported at the rear on plain bearings in a freewheel mounting screwed to the housing, and at the front by the engine crankshaft. Drive is taken from the engine by a sheet steel driving disc.

The impeller is rigidly connected to the convertor housing; the turbine wheel drives the drive disconnection clutch and through this the gearbox. The stator, with its jamming roller type freewheel is supported by the freewheel mounting. The rear side of the convertor is provided with a welded on sheet metal ventilator ring which also carried the starter ring gear.

The convertor is supplied with oil by a pump driven by the engine.

914	914/6
The convertor oil pump is mounted on an extension of the engine oil pump. The first pump chamber supplies engine oil, the second oil for the convertor. Engine oil pump — Convertor oil pump  Use only ATF - DEXRON automatic transmission fluid. Total capacity is app. 6 liters (12.7 US pints/10.6 Imp. pints).	The convertor oil pump is mounted on the face of the right side camshaft housing (at rear, looking in normal direction of travel). The oil — normal engine oil in this case — is drawn from the engine oil tank and delivered under pressure to the torque convertor. It enters between the convertor hub and the freewheel support, and leaves between the turbine shaft and the freewheel. The oil then returns directly to the oil tank.

DRIVE DISCONNECTING CLUTCH

The convertor turbine wheel drives the turbine shaft by means of a splined section. The rear end of the turbine shaft is in the form of a flange for attachment of the clutch support disc. This is the main component of a single dry plate clutch with diaphragm spring. The clutch is disengaged by a ball throwout bearing operating towards the rear (away from the driving plate). The throwout bearing is located in a guide tube pressed into the gearbox housing and is moved axially by a throwout arm also pivoting in the gearbox housing.

CLUTCH OPERATION

Engine manifold depression acts upon a vacuum servo mechanism, the diaphragm of which moves a pull rod axially. This pull rod is connected by a suitable reverse motion linkage to the clutch throwout arm.

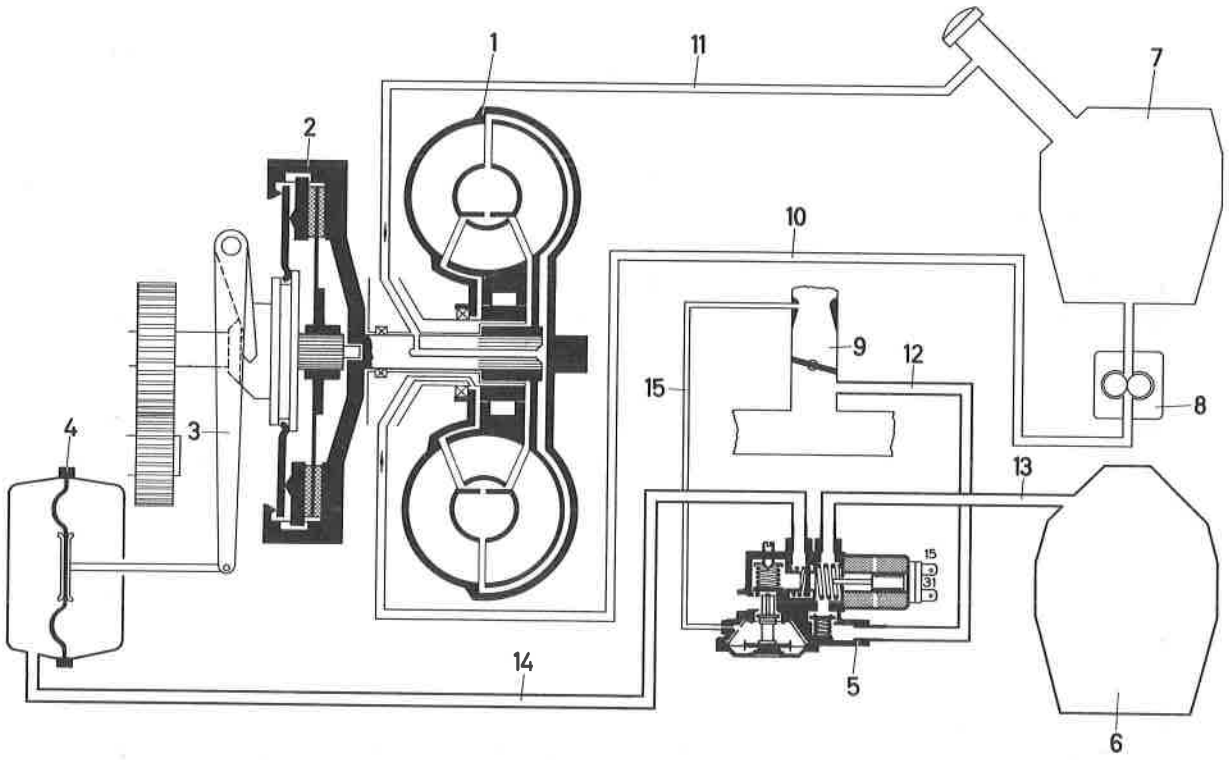
Vacuum is built up in a pressed steel reservoir and electromagnetic control valve regulates the degree of vacuum applied to the servo mechanism.

Warning:

On the type 914 model, operation of the control valve (which is dependent on throttle butterfly position) is regulated by depression in the intake air distributor, but on the type 914/6 the control valve is regulated mechanically by means of the throttle linkage (cam disc).

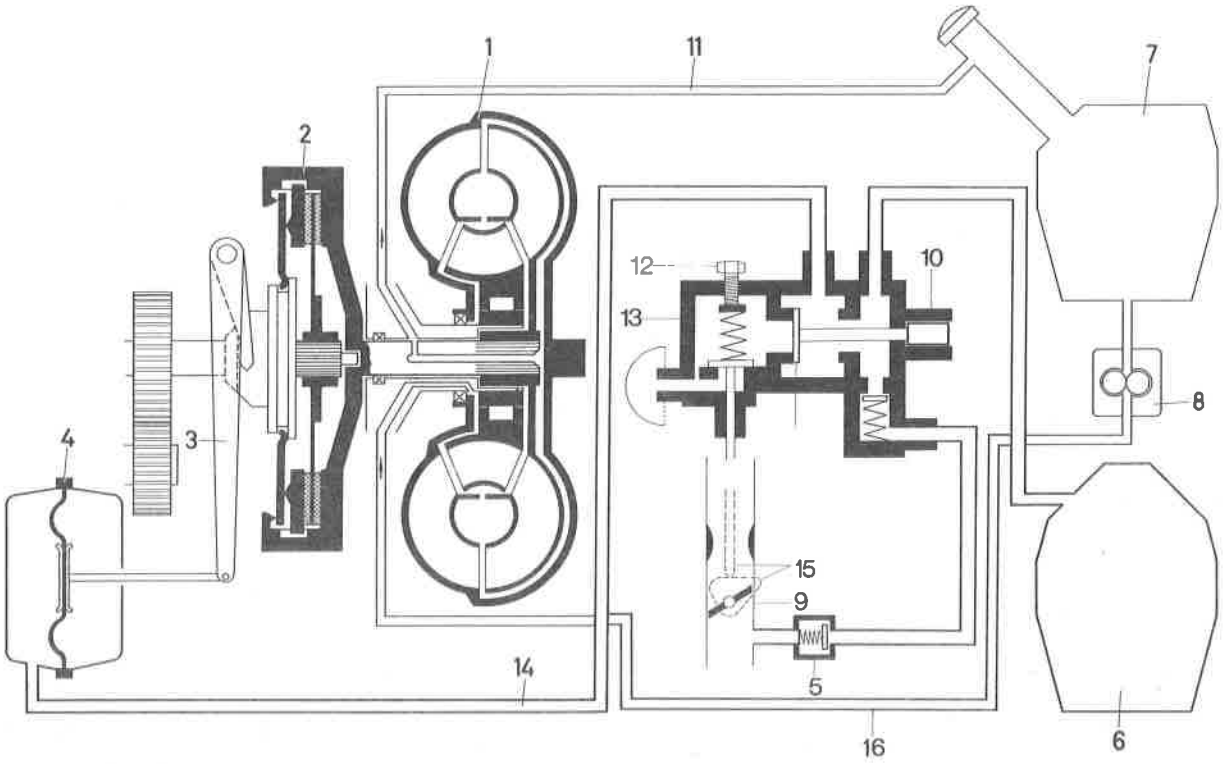
CONTROL VALVE AND OIL CIRCUIT

914



1 Hydraulic torque convertor
2 Gear shift clutch
3 Throwout arm
4 Servo mechanism
5 Control valve
6 Vacuum reservoir
7 Convertor oil tank
8 Convertor oil pump
9 Intake air distributor
10 Oil pressure line
11 Oil return line
12 Vacuum pipe
Intake air distributor - control valve
13 Vacuum pipe
Control valve - reservoir
14 Vacuum pipe
Control valve - servo mechanism
15 Vacuum pipe
For regulating control valve

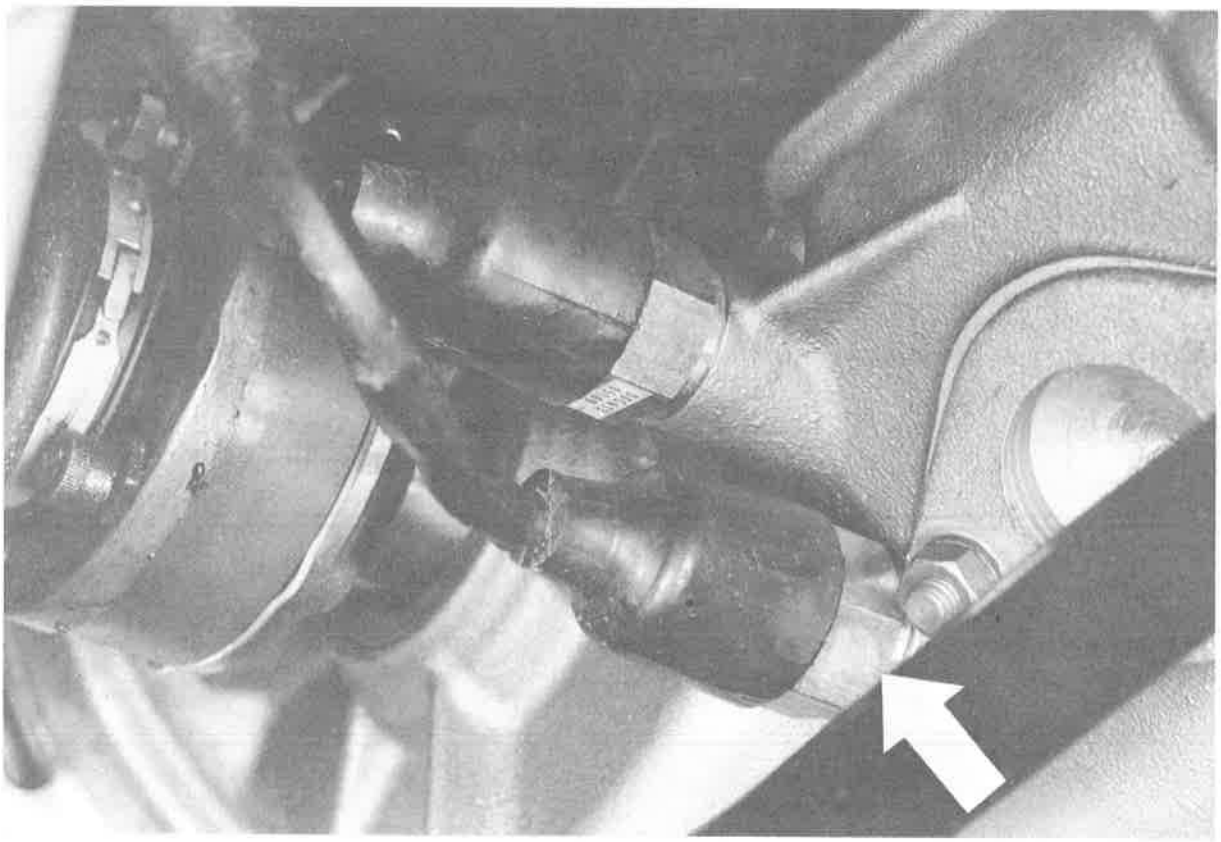
914/6



1	Hydraulic torque convertor	10	Stroke limiting solenoid
2	Gear shift clutch	11	Oil return line
3	Throwout lever	12	Adjusting screw (delay)
4	Servo mechanism	13	Control valve
5	Non-return valve	14	Vacuum pipe
6	Vacuum reservoir		Control valve-servo mechanism
7	Oil tank	15	Plunger and cam disc
8	Convertor oil pump	16	Oil pressure line
9	Engine intake pipe		

The electromagnetic control valve receives its impulses from a contact switch in the gear lever.

The internal selector lever in the gearbox housing, when in neutral, operates by means of a pressure pin and electric contact switch (bridging switch), which keeps the clutch disengaged while the gearbox is in neutral.



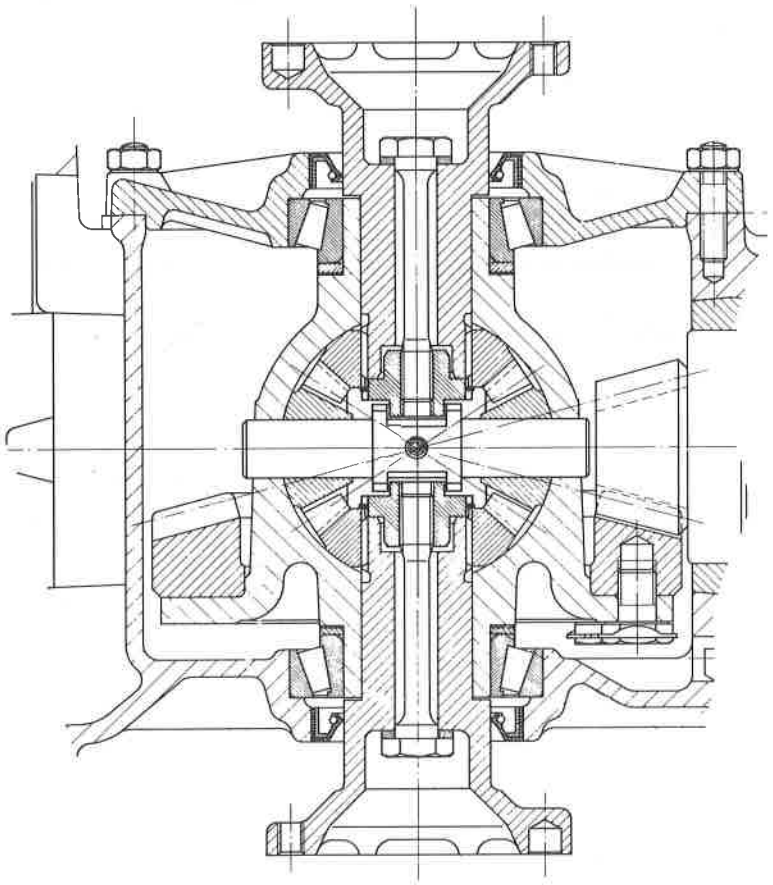
The differential housing is the strengthened version as used in 1970 model Porsche cars, with a diameter of 92 mm (3.62"). In this version the differential bevel pinions and the differential pinion shaft have also been strengthened.

Note:

In place of the differential pinion shaft, later versions of the differential will be provided with a new retaining system consisting of a central core. This core piece will be inserted over the differential pinion shaft between the small bevel pinions and secured with a spiral pin.

When the changeover is made, new expansion bolts will be used to attach the gearbox flange (without centering pin).

Diagram of differential (new version)



Effective immediately, on all gearboxes the deviation of the drive shaft head from the nominal dimension will only be expressed as a plus value.

This measure has become necessary because matching of the drive shafts is now carried out electronically and the tolerance can therefore only be expressed as a plus value.

Instructions for adjusting drive shaft:

Design dimension "R" (previously 63.50 mm/2.500")	Manual gearbox	63.20 mm (2.488")
Design dimension (previously 54.50 mm/2.146")	Sportomatic	54.20 mm (2.134")

Deviation "r" is engraved on the face of the drive shaft head as 1/100 mm+.

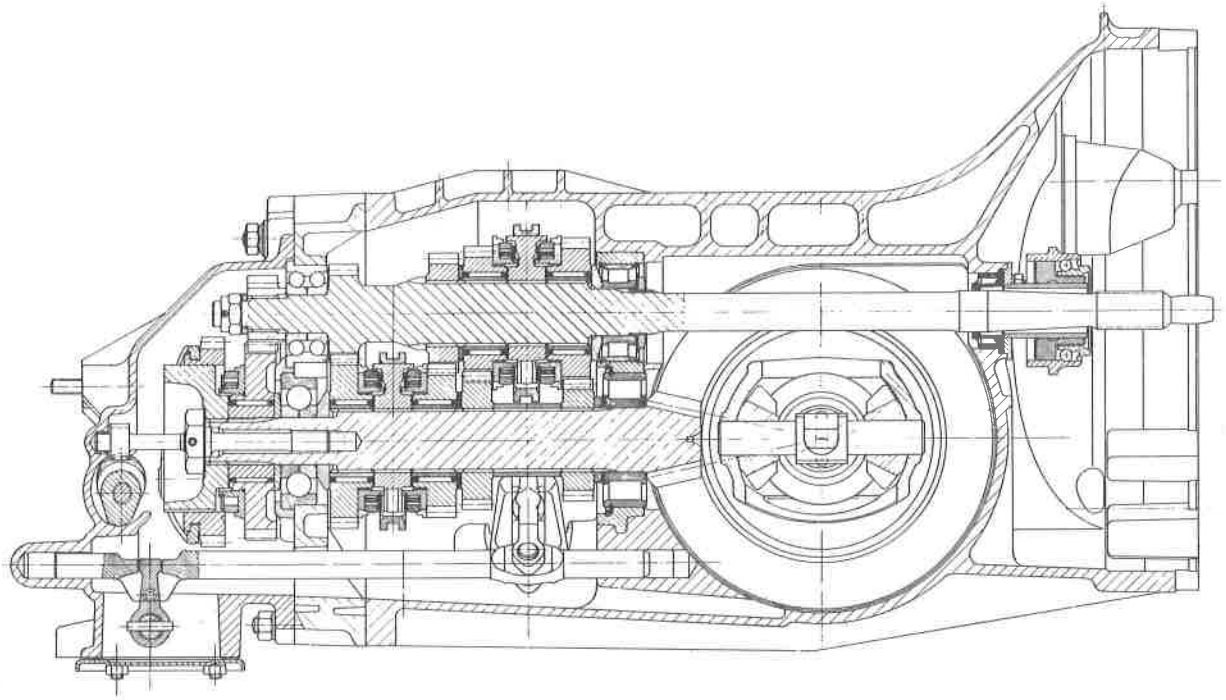
The code reference "N" (meaning "new") is stamped in front of the tolerance value.

Example:

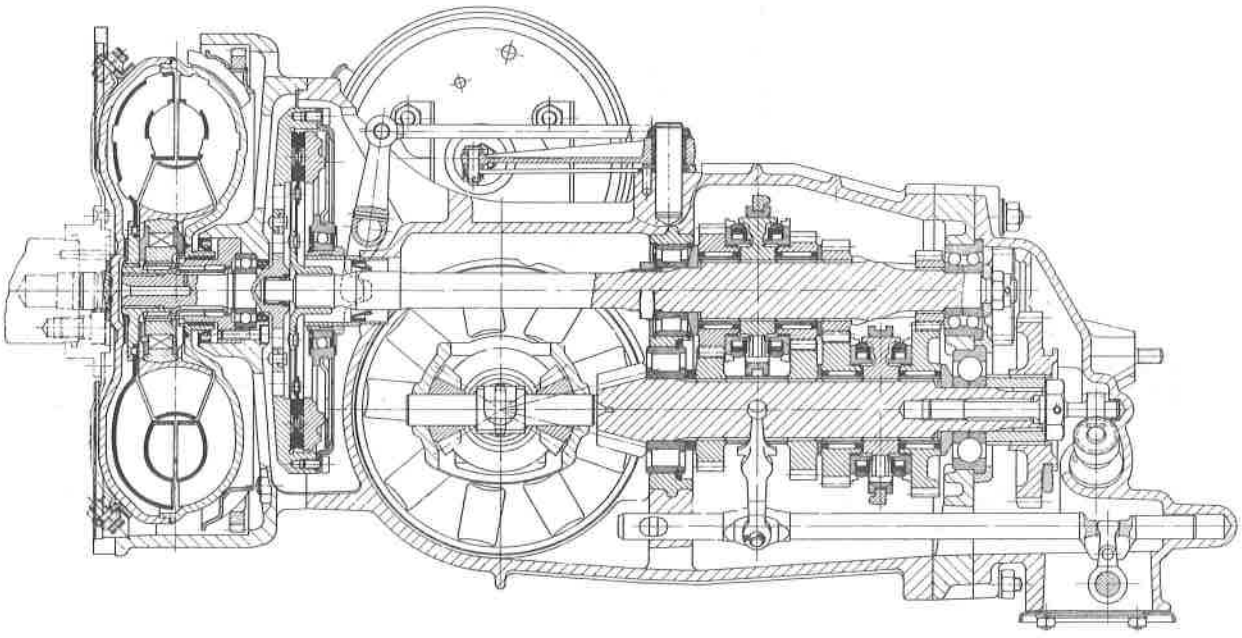
Design dimension "R"	63.20 mm (2.488")
Deviation value "r" = N 18	+ 0.18 mm (0.00[illegible])
Adjustment dimension "E"	63.38 mm (2.495")

For type 914 cars with manual gearbox a limited slip-differential with 40% locking action can be specified as an option. The operating principle and design of this limited slip-differential is identical to the version used on 1970 model type 911 cars.

Sectional view - Manual gearbox



Sectional view - Sportomatic gearbox



FRONT AXLE

General:

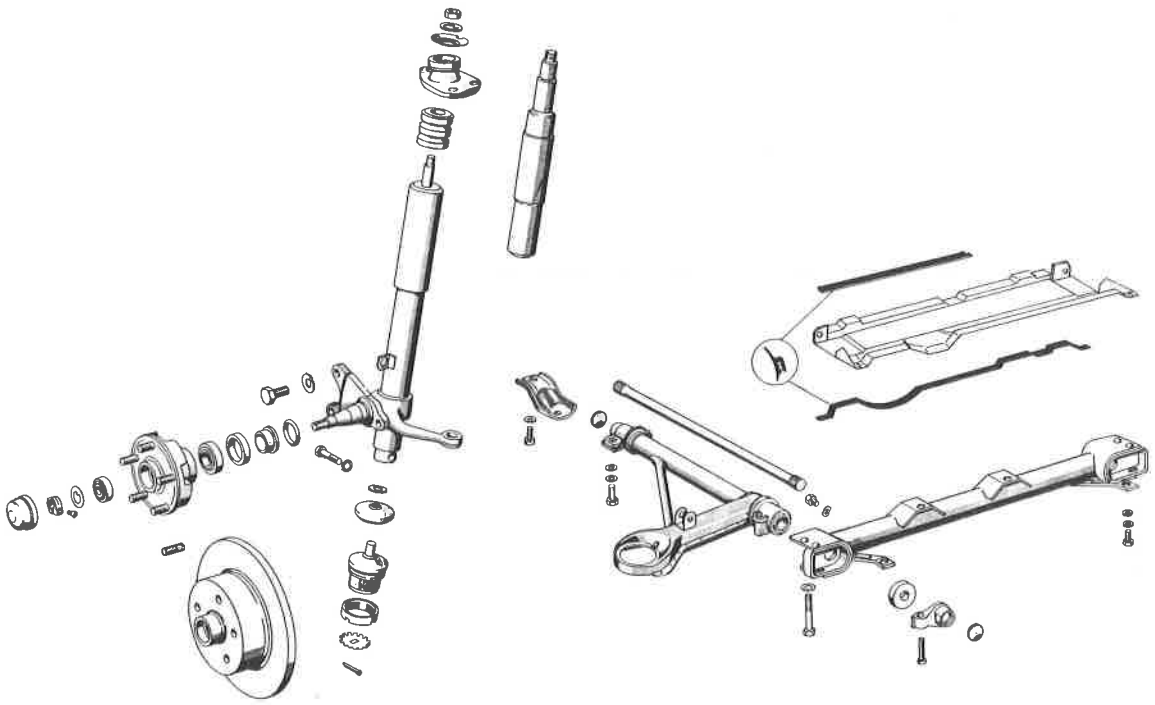
Double-acting shock absorber struts, upper thrust mounting attached to bodyshell with adjustment of camber angle and of castor angle (movable thrust bearing shell).

The auxiliary support tube is used to provide a mounting for the lower wishbone and the rack and pinion steering.

The lower wishbone has a ball-joint mounting for the shock absorber strut and a pick-up point for the end of the torsion bar.

There is one lengthwise mounted torsion bar on each side of the car (17.9mm / 0.7" diameter).

A progressive acting hollow rubber spring above the shock absorber strut piston rod also restricts upward wheel travel.



Variations:

Component	914	914/6
Shock absorber strut (Exchange kit will be available)	Knuckle joint and bearing distance ring in one piece, straight steering arm	Bearing distance ring pressed on to steering knuckle, cranked steering arm
Lower wishbone	left)) Part numbers not yet known right)	left Part number 901.341.001.02 right Part number 901.341.002.02 (Splined for torsion bar as Type 911)
Torsion bars	left Part number 914.343.107.00 right Part number 914.343.108.00 17.9 mm (0.7") diameter	left Part number 914.343.101.00 right Part number 914.343.102.00 17.9 mm (0.7") diameter (Splined as Type 911)
Wheel hubs	Brake disc and wheel combined 4-hole wheel fastening with threaded holes for wheel bolts.	Hub with 5 hole wheel fastening and wheel studs. (as Type 911, width 47 mm (1.85")

Variations:

Component	914	914/6
Cap for frontwheel hub	Part number 131.405.692 (as Type 411)	Part number 914.341.684.00 (similar to Type 911)
Taper roller bearing, front hub (inner)	Part number 311.405.625	Part number 999.059.006.00
Taper roller bearing, front hub (outer)	Part number 311,405.645 (Bearing dimensions smaller than 914/6)	Part number 999.059.009.00 (Bearing dimensions as 911)
Radial seal, wheel hub	Part number 311.405.641. B	Part number 999.113.077.50
Thrust washer	Part number 311.405.661	Part number 901.341.663.00 (as Type 911)
Clamping nut	left Part number 131.405.669 right Part number 131.405.670	Part number 914.341.671.00 (as Type 911)

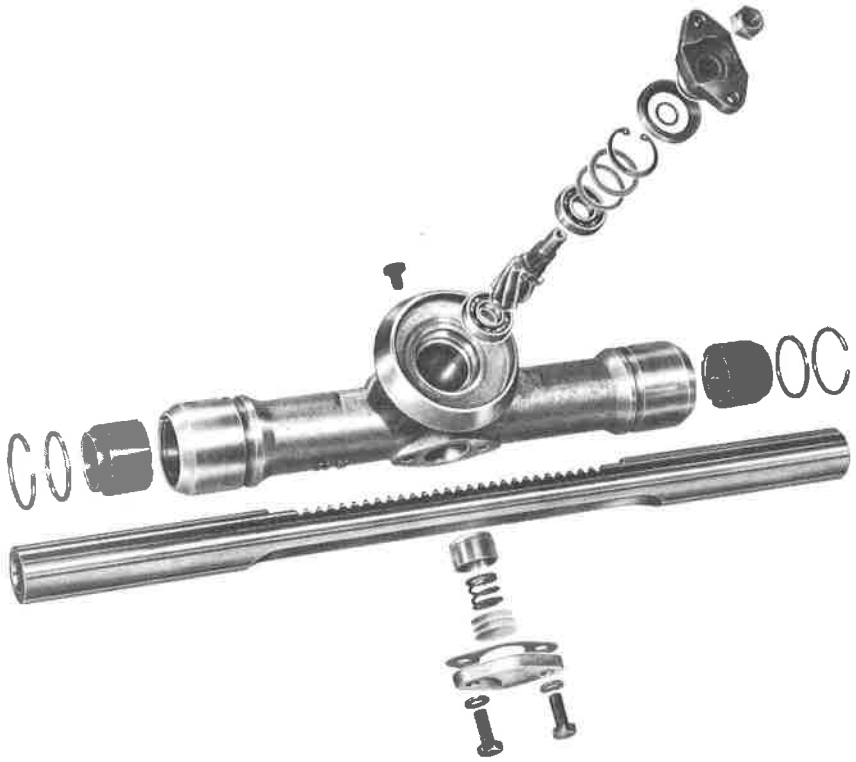
Special tools for front axle (new)

VW 637/2	Dust cap puller for front wheel hub (for 914 and 914/6 models)
P - 286 C	Test gauge for type 914 shock absorber strut
P - 284 C	Test gauge for type 914 steering arm

STEERING:

Both type 914 and type 914/6 cars are provided with ZF safety rack and pinion steering. The steering arm, intermediate shaft and steering column are mounted at an angle and joined together by means of no-maintenance splined universal joint couplings. A four-spoke steering wheel with padded horn push gives the driver a clear view of the instruments and ensures maximum protection.

Steering gear components:



Specification

Steering wheel diameter	380 mm (15")
Reduction ratio	
Max. wheel lock, inner wheel	34°
Max. wheel lock, outer wheel	33°
Min. turning circle (overall)	11 m (36')
Min. turning circle (track)	10.35 m (34')
Number of turns of steering wheel between locks	3
Steering torque (with track rods disconnected, measured at drive pinion)	6 - 8 cmkp

Variations:

Component	914	914/6
Steering wheel 380mm (15") diameter	Part number 914.347.804.10 Steering wheel with hard rubber rim, hub to suit unified steering column switch	Part number 914.347.803.10 Steering wheel with hard rubber rim, hub to suit combined turn/ headlamp switch
Steering column tube	Part number 914.347.061.04 Mounting and locking pawls for steering lock to suit vehicle	Part number 901.347.061.01 Mounting and locking pawls for steering lock as Type 911
Universal joints (Steering intermediate shaft - steering tube)	Part number 914.347.025.00 (with seating surface for steering tube bearing)	Part number 914.347.025.01 as for Type 911
Horn push	Part number 914.613.805.10 with badge: "Wolfsburg"	Part number 914.613.805.00 with badge:"Porsche"
Contact finger	Part number 914.347.832.00 to suit release ring Part number 914.347.835.00	Part number 914.347.831.00 to suit release ring as Type 911

Assembly instructions

1. If the steering shaft bearing requires replacement, the fuel tank must be removed.

2. To remove the steering gear from the car, the auxiliary support tube must also be taken off.

3. When re-installing the steering gear, the steering shaft must be inserted immediately into the lower universal joint in such a way that the hex screw can be installed. It is not possible to install the universal joint when the steering gear is already in position.

4. When re-assembling the steering gear, adjust clearance at the pressure pad as follows:

   a) Measure the distance from the pressure pad (in position) to the contact surface on the steering gear housing with a depth gauge.

   b) measure the recess in the housing cover with the gasket in position.

   c) The depth of the recess in the housing cover, with gasket in position, must be 0.2 mm (0.008") greater than measurement a).
   Make up the difference with 0.1 mm (0.004") shims.
   When the housing cover is in position, the pressure pad must have 0.2 mm (0.008") clearance.

5. The steering gear should be packed with approx. 25 g (0.9 oz.) of LM - KFZ 3 or LM 47 L grease.

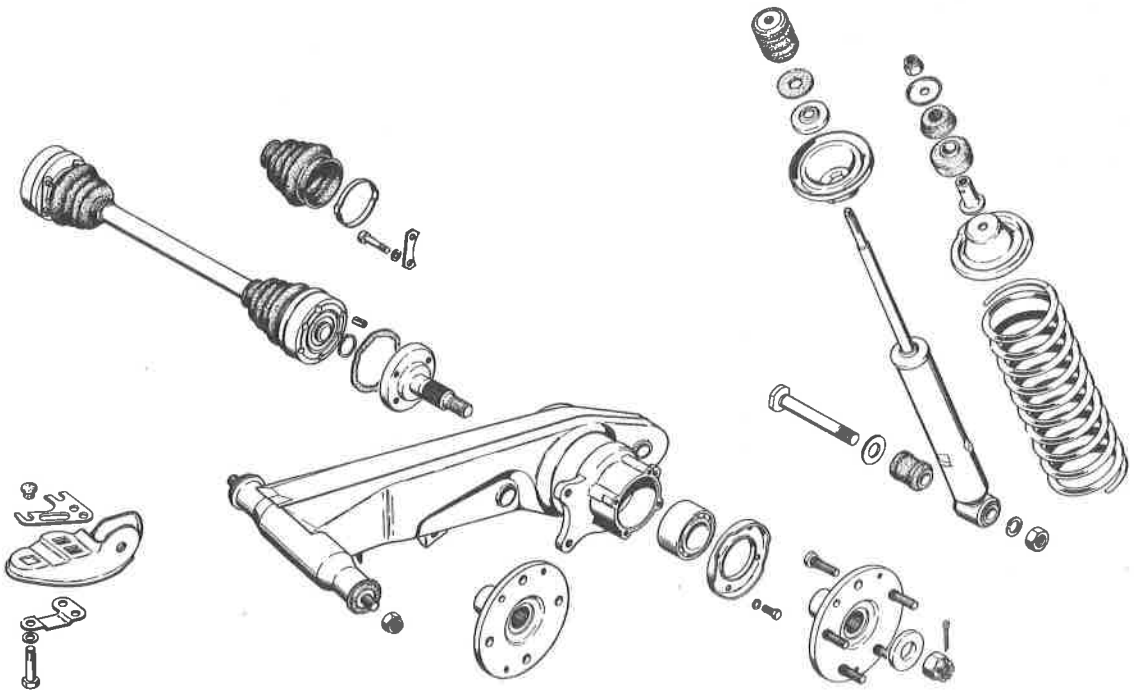
Tools required

Depth gauge)	
Torsiometer 0-25 cmkp)	
Kukko extractor 22-1)	
Kukko internal puller	available commercially
No. 21/2)	
Kukko internal puller	
No. 21/4)	

REAR AXLE

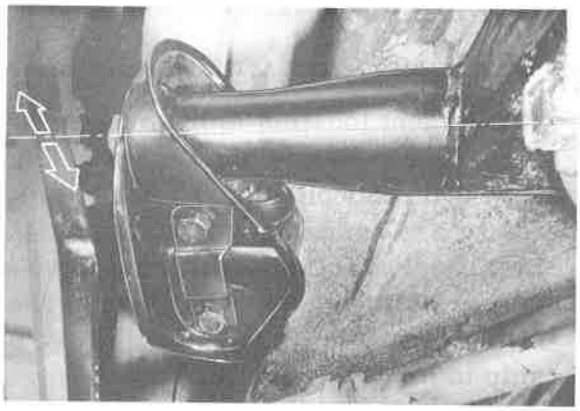
General:

Rear wheel location is by semi-trailing arms, the geometry of which has been chosen to give the best possible camera angle and track variation for good roadholding. The body is suspended by means of spring struts. These are combined assemblies with coil springs of linear characteristic, progressive action hollow auxiliary springs made from foamed Vulkollan and double-acting shock absorbers. The leverage of the long travel spring strut at the semi-trailing arm and at the body causes a constantly varying relationship to be developed between spring compression and wheel movement, thus providing the desired progressive increase in suspension stiffness on the wheel bump stroke. Double universal joint half shafts transmit power from the engine to the rear wheels.

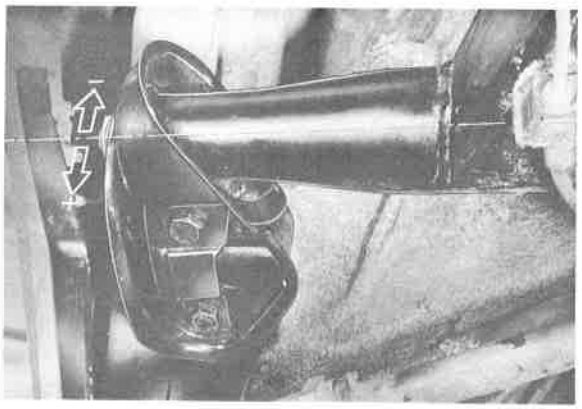


Adjustment of camber and toe -in adjustment

The outside rear axle locating arm bearings can be moved forward or backward along the lengthwise axis of the vehicle after the retaining bolts have been loosened. This makes it possible to alter the position of the left and right semi-trailing arms and thus to modify wheel alignment (toe -in).



Shim plates are inserted between the floor panel of the body shell and the outside semi-trailing arm pivots. The thickness of these shims controls the tilt angle of the rear axle locating arms and thus the camber angle of the wheels. Camber angle can be adjusted by inserting shims of different thicknesses.



The following shim thicknesses can be supplied:

2mm	Part No.	914.331.533.03
3mm	Part No.	914.331.533.04
4mm	Part No.	914.331.533.05

Guide value: 1mm shim thickness
= 10' camber angle variation

Variations:

Component	914	914/6
Rear wheel hub	Part number 914.331.605.06 4-hole version with ~~threaded~~ ~~holes~~ for wheel bolts	Part number 914.331.065.00 5-hole version with pressed-in wheel studs
* Vibration damper (variations in tension and compression phases, also cup spring alignment)	Part number 914.333.051.02 BOGE Color gray	Part number 914.333.051.01 BOGE Color black
Coil springs	Part number 914.333.531.04	Part number 914.333.531.05
Universal joint halfshafts for 914 and 914/6 - identical version Part number 914.332.009.00	Universal joint halfshafts available in component form (complete unit made by VW)	Universal joint halfshafts only available complete (made by Löbro)

* Option of Koni shock absorbers will be offered later.

Assembly instructions:

1. To remove the universal joint shafts both heat exchangers must first be detached.

2. When re-assembling the vibration damper, the coil spring should be pre-loaded with a suitable tensioning device (see special tools).

3. When driving out the wheel hubs, the inclined ball thrust bearings will be destroyed. New bearings must always be installed when re-assembling.

4. The new inclined ball thrust bearings must be inserted with a pressing-in device (see special tools). Never strike the inner race of the bearing or apply pressure to it, or else the complete bearing will be rendered useless.

5. The semi-trailing arms are provided with an aperture through which the brake pistons in the fixed calipers can be pushed back when replacing the brake pads.

   On the type 914/6 model this procedure can only be carried out on the right side of the vehicle when the suspension has been compressed. When the suspension is extended, the aperture in the semi-trailing arm is obstructed by the right heat exchanger. We recommend use of a 1/4" ratchet wrench with extension in conjunction with a 4 mm internal hex socket head.

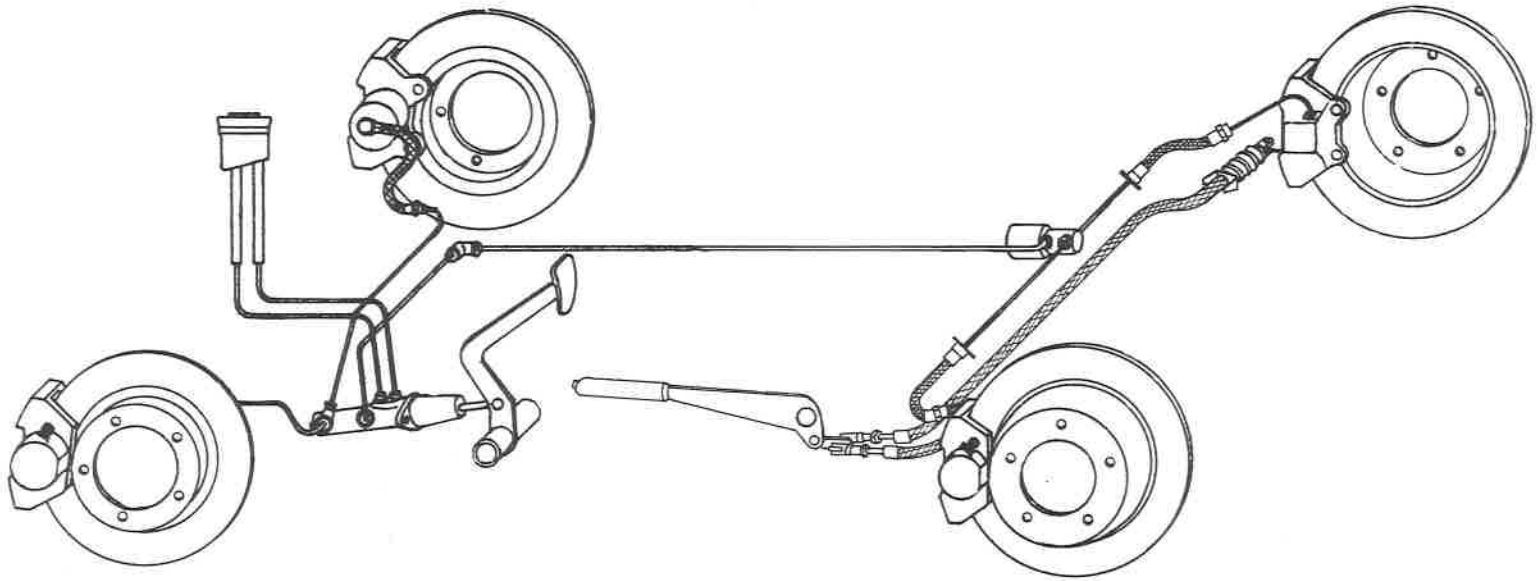
Special tools for rear axle (new)

VW 340 P - 303	Coil spring tensioner
P - 297 a	Wheel hub extractor
P - 302	Pressing-in tool for inclined ball thrust bearing

BRAKES:

Dual circuit disc brakes with pressure limiter; handbrake operating on rear brake pads

SCHEMATIC DRAWING



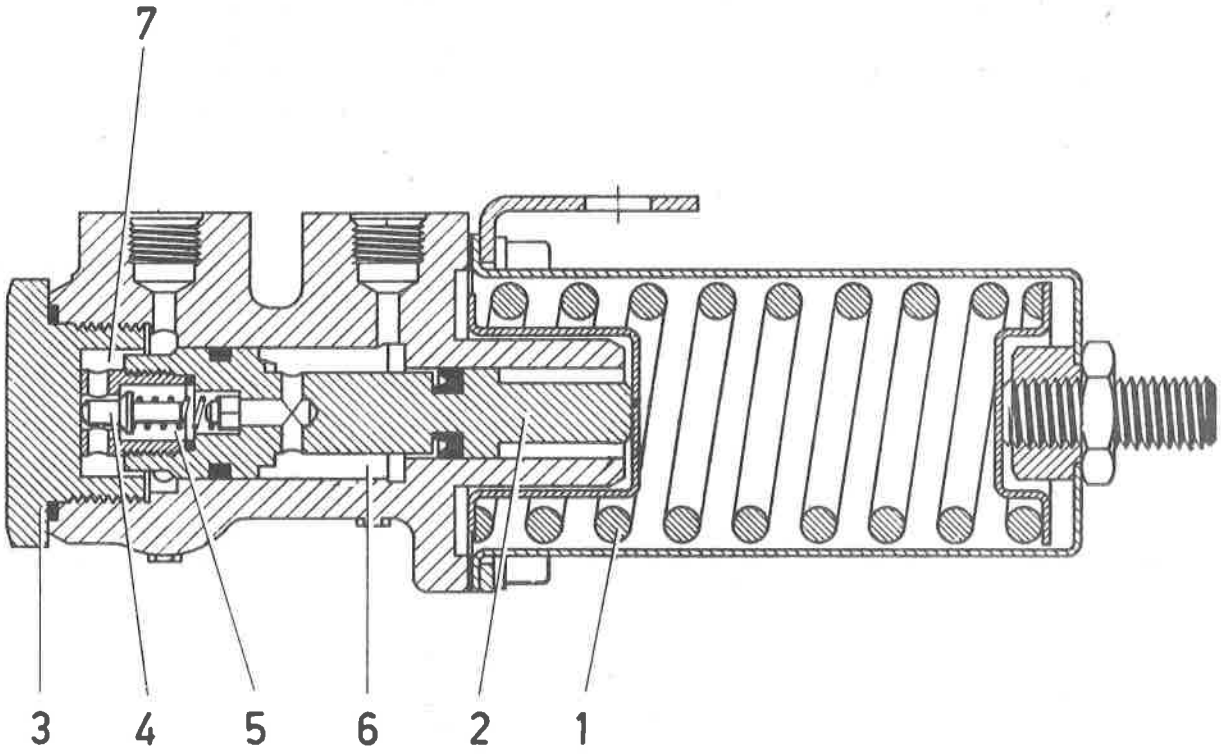
Specification

Description		914	914/6
Master brake cylinder		17.45 mm (0.687") diameter	19.05 mm (0.75") diameter
Brake disc diameter	front	281 mm (11.06")	282.5 mm (11.12")
	rear	282 mm (11.1")	286.0 mm (11.26")
Type of disc	front	solid	ventilated
	rear	solid	solid
Fixed caliper	front left	Part number 411.615.107	Part number 901.351.965.22
	front right	Part number 411.615.108	Part number 901.351.966.22
	rear left	Part number 914.352.423.00	Part number 914.352.901.00
	rear right	Part number 914.352.424.00	Part number 914.352.902.00
Set of brake pads	front	Part number 411.698.151	Part number 914.351.901.00
	rear	Part number 411.698.151	Part number 914.352.903.00
Friction area (per wheel)			
	front	50 cm^2 (7.75 sq.in)	52.5 cm^2 (8.14 sq.in.)
	rear	40 cm^2 (6.2 sq.in)	52.5 cm^2 (8.14 sq.in.)
Brake piston diameter			
	front	42 mm (1.65 in.)	48 mm (1.89 in.)
	rear	33 mm (1.3 in.)	38 mm (1.5 in.)
Brake pressure limiter		Part number 914.355.065.00 (changeover pressure 48 atm/685 psi)	Part number 914.355.067.00 (changeover pressure 37 atm/525 psi)

Brake force limiter

The rear wheel brake circuit includes a brake force limiter. When pressure in the rear brake circuit reaches a predetermined level (changeover pressure), the limiter prevents the rear wheel brake force from increasing further at the same rate as the front wheel brake force. In this way rear wheel locking is prevented as weight is transferred to the front of the car when braking.

Operation:



1 Regulating spring
2 Stepped piston
3 End plug
4 Taper valve
5 Spring for taper valve
6 Annular space
7 Space

Instructions for testing the brake circuit:

The system can be checked quickly for correct operation if one mechanic presses down the brake pedal sharply once only, while a second mechanic places a hand on the brake force limiter to check that the piston moves inside the body. (When the brake pedal is released a slight shock should be detectable by holding the brake force limiter.)

For checking pressures accurately and adjusting the brake force limiter, two high pressure gauge units with hoses and connectors are necessary.

Pressure gauge: Range 0 - 160 atm (0 - 2275 psi) with 800 mm (31.5") hose and connector.

Combined fixed rear caliper

General design

The rear wheel brake pistons are mounted in fixed calipers and are provided with continuous automatic compensation for bad wear, including a non-return mechanism.

The fixed calipers also include a mechanical handbrake linkage acting on the inner brake pistons.

1.) Function of hydraulic brake (service brake)

When pressure builds up on application of the brake the pistons move the brake pads (5a, 5b) against the brake disc after overcoming air gap S1 and S2, and force the pads against the disc in accordance with the pressure built-up in the system.

When the brakes are correctly adjusted, air gap S1 and S2 corresponds to the basic brake pad clearance provided by the automatic wear compensation device.

As soon as the pads begin to wear, air gap S1 or S2 will become larger than the basic clearance, and the automatic adjusting mechanism will begin to operate.

Actuating component (11) will then be moved axially as a result of the locking action of taper (14) in housing (13), which is connected with the piston by means of spring circlip (7) (safety connection).

The diagonal slot (12) in the actuating component is turned through one complete adjustment step by the threaded sleeve (16), which is screwed onto the spindle (17 or 22).

This adjustment step is very small and does not correspond to the total piston travel required for one stroke. As a result, severe pad wear is compensated for only after the brakes have been operated several times.

This design ensures that air gap S1 or S2 is not seriously affected by caliper expansion or brake pad compression, and cannot in any circumstances amount to less than 0.05 mm (0.002").

Release:

When pressure drops in the brake system the pistons are pulled back by coil spring (24) and by the roll-back action of sealing ring (33), which surrounds the piston and its clamp.

Purpose and function of safety connection

If the maximum permitted piston stroke provided for in the design is exceeded, for instance when the brake is operated without the pads in position, the safety connection at ring circlip (7) will be released in order to prevent damage to the adjusting mechanism.

In this condition the service brake can be used normally but the handbrake is out of action.

If the process described above has taken place, the piston must be pushed back using ATE return pliers 3.9314 - 1800.2 until the safety circlip is felt or heard to engage.

2.) Function of the mechanical handbrake

The brake cable (19) is attached to the operating lever (18). When the cable is pulled, shaft (20) will rotate. The eccentric ball cup in shaft (20) moves pressure pad (21), drive spindle (22) and its coupled piston toward the brake disc. The force thus exerted causes pad 5a on piston 6a to be pressed against the brake disc. Air gap S1 is overcome by elastic deformation and mounting clearance. Since the piston is locked by the adjusting mechanism its reactive force can be employed.

When the handbrake is released the operating lever is assisted by an externally mounted torsion spring to return to its stop, and the drive shaft is moved back to its initial position by spring 23.

ASSEMBLY INSTRUCTIONS

Tools:

1/4" ratchet spanner with extension
4 mm internal hex socket head wrench
0.2mm feeler gauge

1.) Adjusting air gap

a) Cover side:

Loosen lock nut (26) and adjust air gap S1 by turning spindle (17) counter clockwise with the 4mm hex socket wrench, then re-tighten lock nut.

b) Flange side:

Adjust air gap S2 by turning return shaft (28) clockwise with 4 mm hex socket head wrench.

Operate the handbrake once, check air gaps and adjust again if necessary.

Install end plugs (31 and 32).

Brake disc runout must not exceed 0.15mm (0.006"), and wheel bearing axial play must not exceed 0.3 mm (0.012").

Do not move the fixed caliper until air gaps S1 and S2 have been adjusted to 0.2 mm (0.008") each.

2.) Replacing brake pads

Pull out retaining pins;
remove spreader springs;
remove old pads;
clean the fixed caliper in the region of the end plugs (31 and 32),
remove the end plugs

Move back the piston as follows until the new pads can be inserted.

a) Place ATE return pliers 3.9314 - 1800.2 between the pistons and preload slightly.

b) Cover side:

Loosen lock nut (26) and move back the piston by turning spindle (17) clockwise with 4mm hex socket head wrench. Make sure that preload force is applied to the piston return pliers.

After this, re-tighten the lock nut.

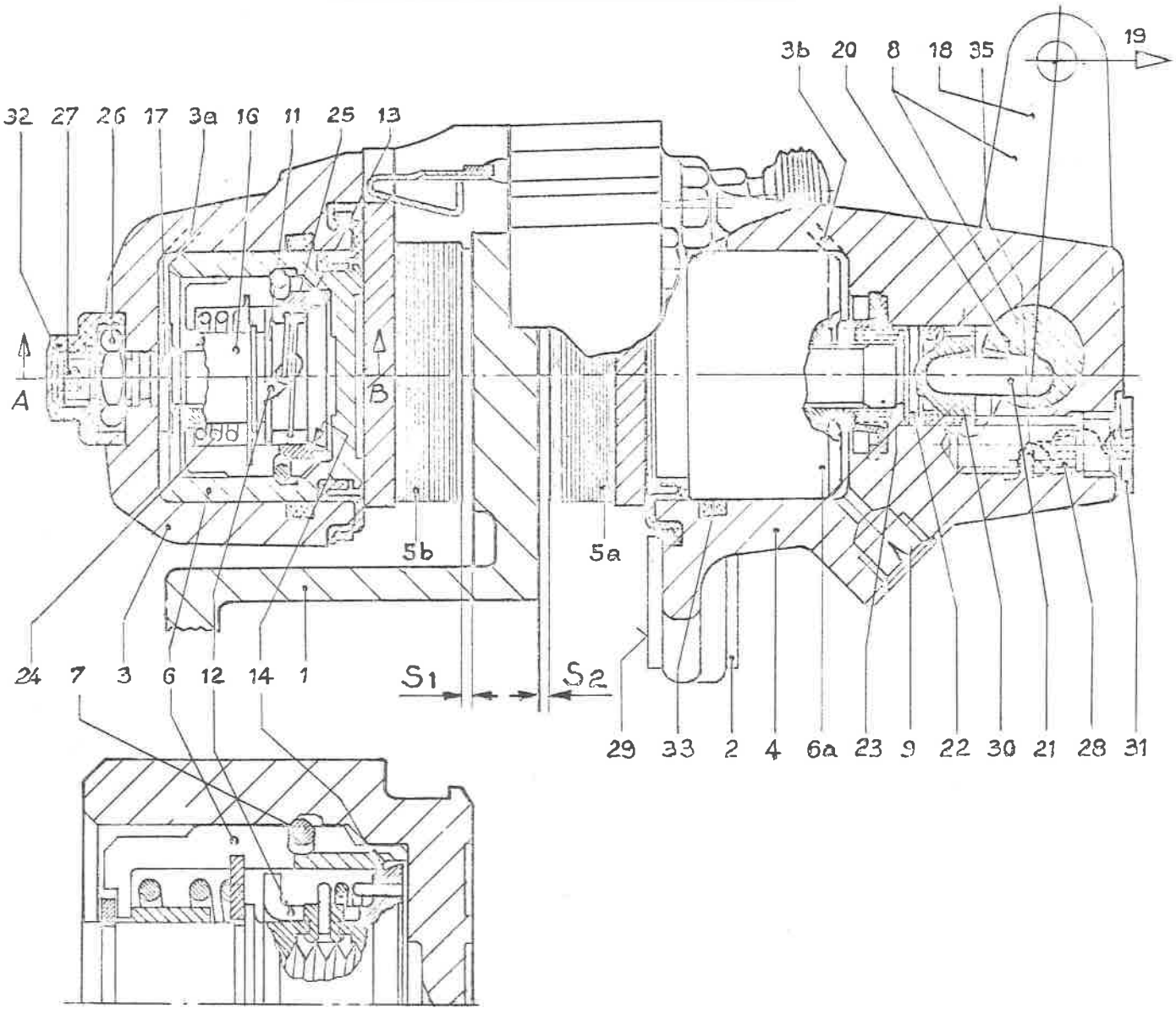
c) Flange side:

Move the piston back by turning return shaft (28) counter clockwise with the 4mm hex socket head wrench, making sure that the preload force of the return pliers is not lost.

Install the new brake pads.

Adjust the air gaps as described above.

DIAGRAM - Rear fixed brake caliper



WHEEL ALIGNMENT DATA:

The measurements given all relate to an unladen weight in accordance with German standard DIN 70020, and apply to both Type 914 and Type 914/6 cars.

Front axle:

1.) Height : 90 mm $\pm$ 5mm (3.54" $\pm$ 0.2") - (from wheel center line to torsion bar center line.)

Variation between left and right sides of vehicle max. 5mm (0.2"). (Height is to be measured after compressing the suspension several times by hand, then releasing the car body and allowing the suspension to extend before the measurement is made.)

2.) Toe-in (compressed with a force of 15 kp/33lb.)+ 20' $\pm$ 10' (both wheels)

3.) Camber angle 0 $\pm$ 20'
Difference between left and right max. 20'.

4.) Castor angle $6^{o} \pm 30'$
Difference between left and right max. 30'

5.) Toe-out on turns at 20^{o} wheel lock
0 + 30' (both wheels)

Rear axle:

1.) Height : 25 mm $\pm$ 10 mm (0.98" $\pm$ 0.4") - (wheel center line to support arm pivot center line)

Difference between left and right sides of car max.10mm (0.4")

2.) Toe-in 0 + 15' (per wheel)

3.) Camber angle -30' $\pm$ 20'
Difference between left and right max. 20'.

Wheel load variation:

The difference in wheel load between the left and right sides of the car must not exceed max. 15 kp (33lb.). If a correction is necessary, wheel load can be adjusted by turning the front wheel torsion bars. However, the correct height tolerances must be respected.

HEATING AND VENTILATION

Type 914 and 914/6 cars have the same heating and ventilation systems.

When the continuously variable heater plenum chamber flaps are opened, air passes from the heat exchangers to the interior of the car.

A fresh air blower is provided so that warm air can be mixed with a cool air supply and distributed to the upper or lower part of the interior as desired.

The type 914 car is provided with an additional heated air delivery blower in the engine compartment, which is automatically switched on when the heater lever is pulled.

The heating and ventilation system combines four separate functions:

1. Continuously variable warm air supply from the heat exchangers (with additional warm air delivery blower on the 914 model).

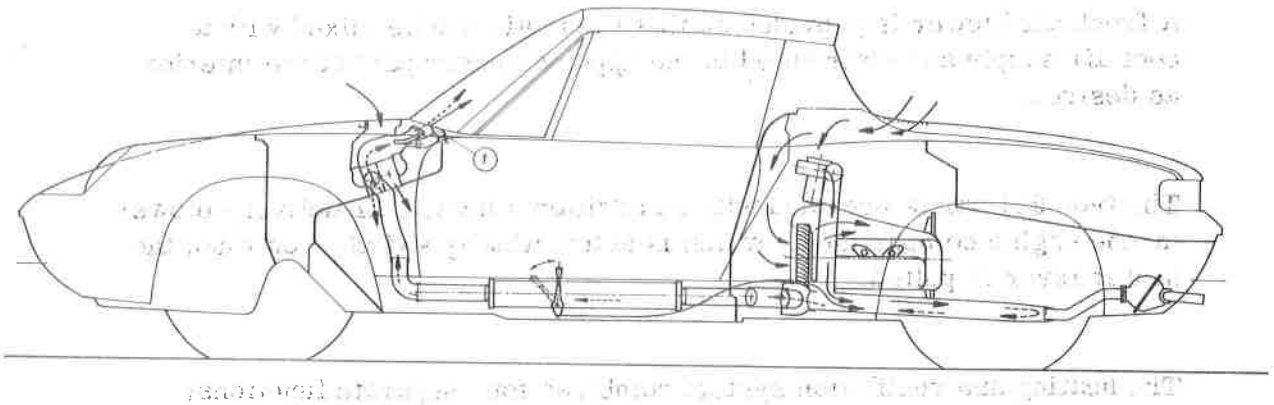
2. Continuously variable direction of warm air to the upper part of the car or the footwells.

3. Fresh air supply, with 3-speed blower.

4. Control of the proportion of fresh air (depending on blower speed setting) to the upper or lower sections of the car's interior.

Diagram of heating and ventilation

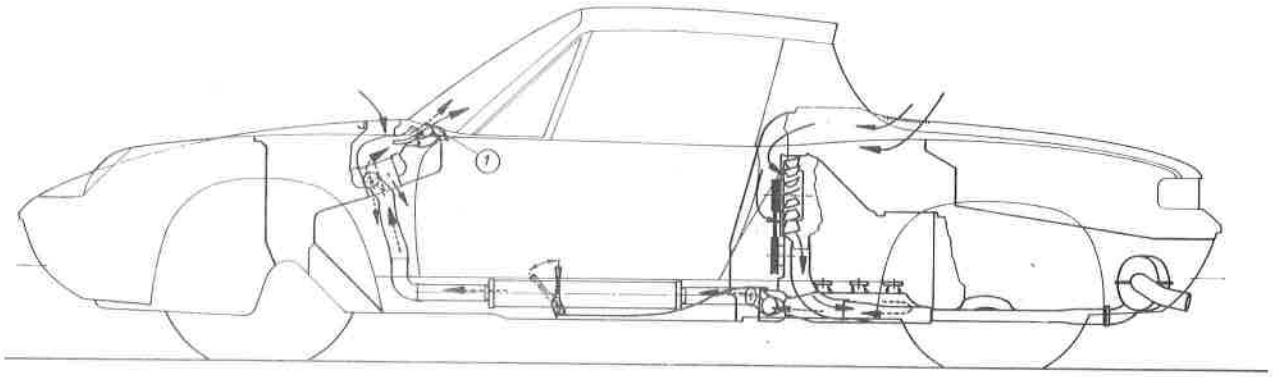
Type 914



← Cool air

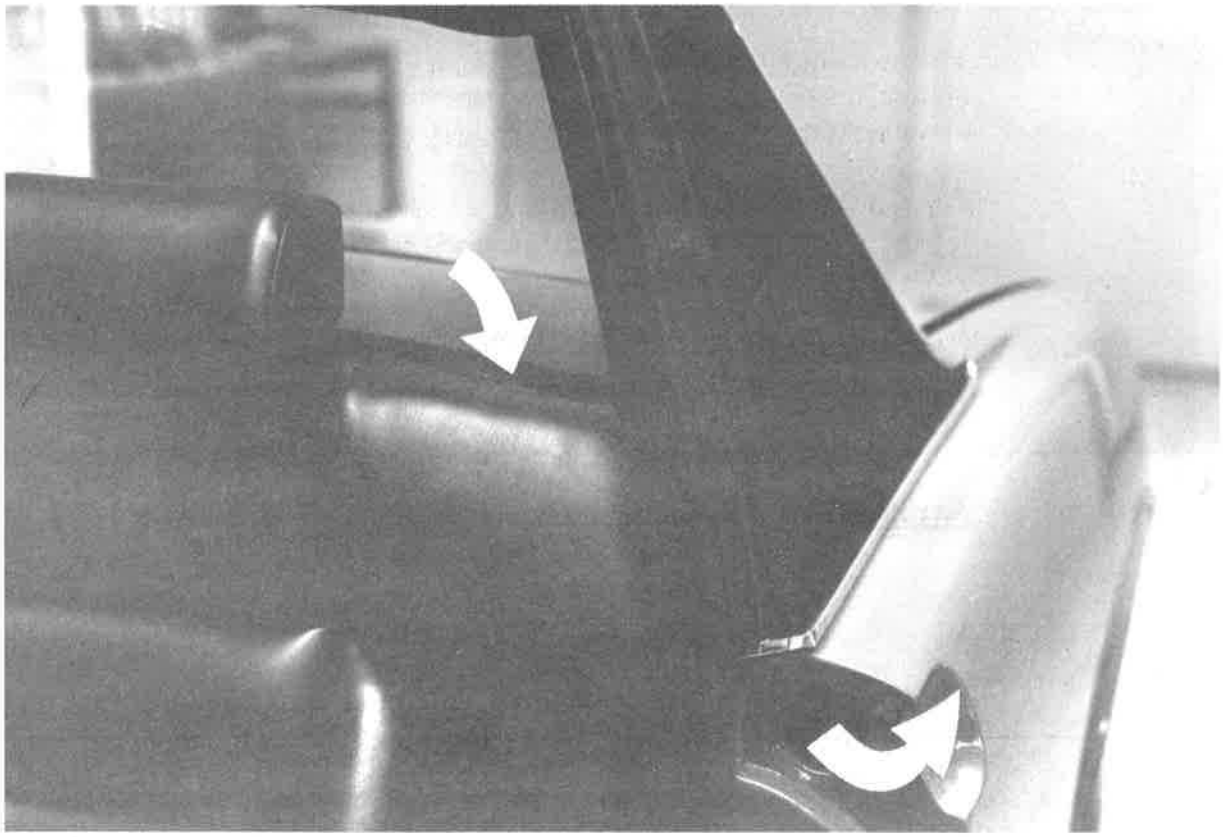
← Warm air

Type 914/6



Forced stale air extraction

Air is extracted from the interior of the car through two extractor ducts on the left and right of the passenger compartment behind the seat backs, and from there passes to outlets in the door posts close to the outside door handles.

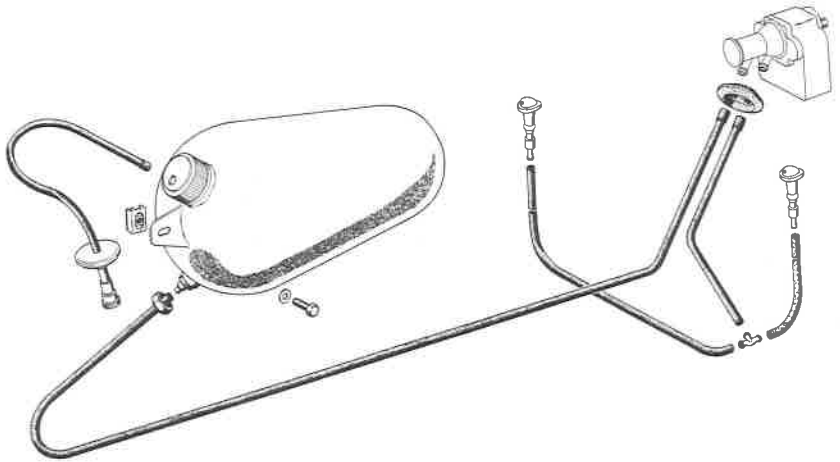


3.) Windshield washers

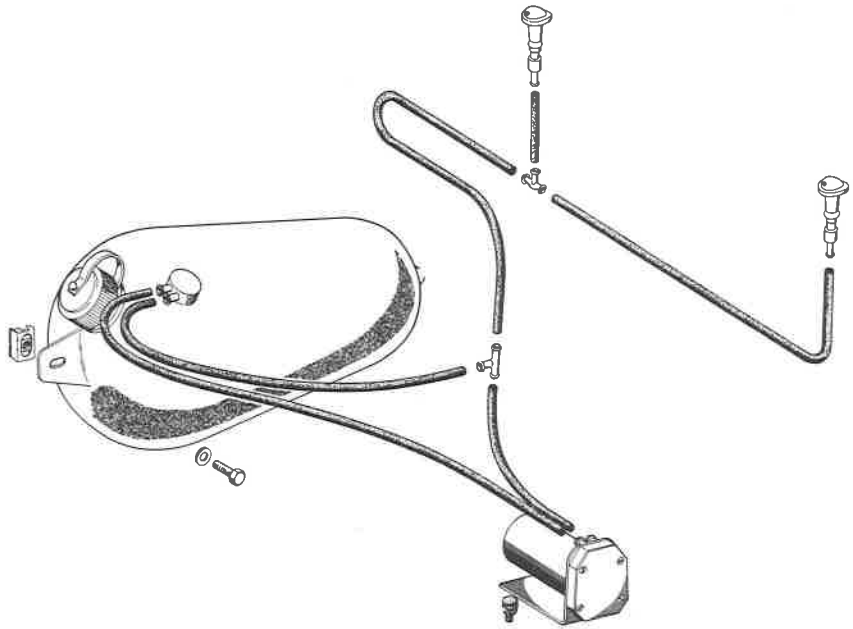
914	914/6
Pneumatic system Water (approx. 2.5 liters / 5.3 US pints /4.4 Imp. pints) is stored in the reservoir together with compressed air at approx. 2.5 atm (36 psi). There are dual spray jets at left and right in front of the windshield. The washers are operated by a push button in the windshield wiper switch.	Electric system Water is drawn out of the reservoir (capacity approx. 2.8 liters / 5.9 US pints / 4.9 Imp. pints) and directed under pressure to the two dual spray jets at left and right in front of the windshield. The washers are operated by a combined wiper/ washer switch which is pulled toward the steering wheel rim.

Windshield Washers

914



914/6



ASSEMBLY INSTRUCTIONS

1.) To adjust the beam settings of the pop-up headlamps the sheet metal housing must be unscrewed and removed.

Warning:

Take special care when working on the pop-up headlamps or the motor and crank drive mechanisms. (There is a risk of injury to the hands.)

a) When the cover for the crank drive mechanism has been removed, no unauthorised person should operate the light switch.

b) If the pop-up headlamp operating motor is rotated further with the hand wheel when the light switch is pulled out, the built-in microswitch will operate a contact which causes the motor to keep running until the crank drive has completed a half-turn (180^{o}).

2.) The instruments are inserted into the instrument panel with a special section rubber ring.

To simplify assembly the instruments can be pulled out into the passenger compartment. This is best done by using a rubber suction pad of suitable size and shape pressed onto the instrument glass. If necessary the instrument can be raised at one side with a wood or plastic wedge.

Warning:

The connecting cables to the instruments are quite short. Make sure that when the instruments are pulled out the connecting cables are not damaged or torn away.

3.) The fusebox with twelve fuses, is underneath the dashboard in the left footwell. The fusebox cover is marked with symbols indicating the individual current consuming items of equipment.

BULBS

			914 and 914/6	
Headlamp bulbs	High beam		45	Watt
	Low beam		40	Watt
Additional headlamps	H3 - bulbs	each	55	Watt
Stop and tail lights)		each	21/5	Watt
Backup lights)	spherical bulbs	each	25	Watt
Turn indicators)		each	21	Watt
Licence plate	tubular bulbs	each	4	Watt
Side lights	spherical bulbs	each	5	Watt
Interior light	festoon bulb		10	Watt
Instrument lighting		each	2	Watt

POSITION OF IDENTIFICATION NUMBERS

Manufacturer's plate	=	riveted to right headlamp housing
Chassis number	=	stamped on the right wheelbox looking forward in front of the suspension thrust mounting, parallel to vehicle center line.
Engine number		
Type 914	=	stamped at top of left crankcase half below breather tower.
Type 914/6	=	stamped from above on left crankcase half (looking forward) close to clutch flange.
Gearbox number	=	stamped on gearbox housing (cast web), visible from below.

WHEELS AND TIRES

Version:		Type 914	Type 914/6
STANDARD	Rims	Pressed steel perforated disc wheels with well base rims, black painted, 4-hole mounting, chrome trims with embossed VW badge. Rim size 4 1/2 J x 15	Pressed steel perforated disc wheels, silver metallic finish, 5-hole mounting, center wheel caps with Porsche emblem riveted on. Rim size 5 1/2 J x 15
Special option:	Rims	---	Polished aluminum perforated disc wheels, decorative center caps. Rim size 5 1/2 J x 15
STANDARD:	Tires	155 SR 15 radial ply *	165 HR 15 radial ply
Special option:	Tires	165 SR 15 radial ply *	---
Tire pressures		front 1.6 atm (23 psi) rear 1.8 atm(26 psi)	front 1.8 atm (26 psi) rear 2.0 atm (28 psi)

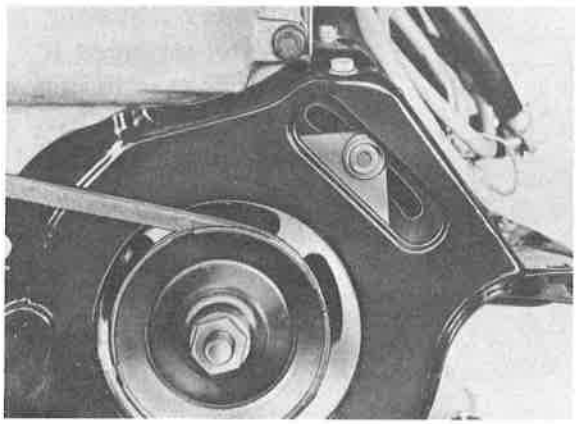
* Winter tires can be used without restriction on all wheels. Snow chains up to 95 mm (0.6") in depth can be used with standard tires on the rear wheels.

Tensioning V-belt

914: a) Take off alternator cover plate cap.

b) Loosen nut on alternator mounting.

c) Move the alternator to one side until the center of the V-belt can be pressed in by approx. 15 mm (0.6 in.) with powerful thumb pressure.



914/6: The second person will be needed when loosening the nut on the alternator.

a) Using hook wrench P 208, stand on the left side of the vehicle and hold the blower fan.

b) Get a second person standing on the right side of the vehicle to unscrew the blower wheel nut, using a slightly cranked 22 mm ring spanner.

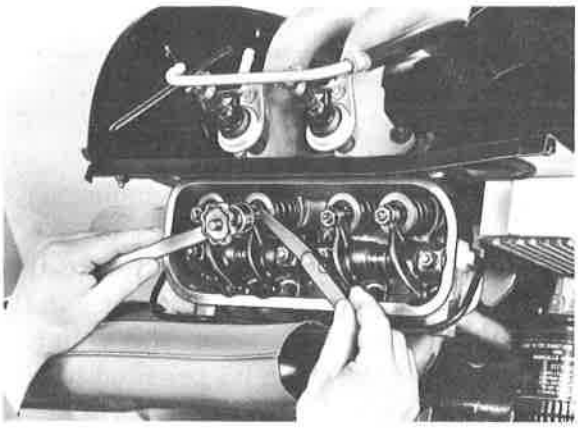
Apply this spanner to the nut so that the end faces to the rear.

c) Add or remove spacing washers as required. Make sure that none of the washers fall into the engine mounting bracket. (These cannot be extracted without removing the engine.)

d) Re-tighten the alternator nut. Support hook wrench P 208 on the front engine shield plate.

Adjusting valve clearances

914: To provide adequate space for adjusting valve clearances it is necessary to unscrew and remove the two connecting pipes at left and right between the heat exchanger and the heater plenum chambers.



914/6 : Note :

1) The markings (120^{o}) for turning the engine when adjusting valve clearances have been placed on the flywheel or on the torque convertor drive plate so that they can be seen more easily. An inspection hole is provided on top of the gearbox flange. As before, the markings should be aligned with the deviding line between the two halves of the crankcase (turn the engine through 120^{o} in its normal direction of rotation, and check valve clearances in accordance with the firing order 1 - 6 - 2 - 4 -3 - 5).

2) We recommend turning the engine by means of one rear wheel with a gear engaged while adjusting valve clearances. The second rear wheel must not be allowed to turn. This procedure is possible only on manual gearbox cars.

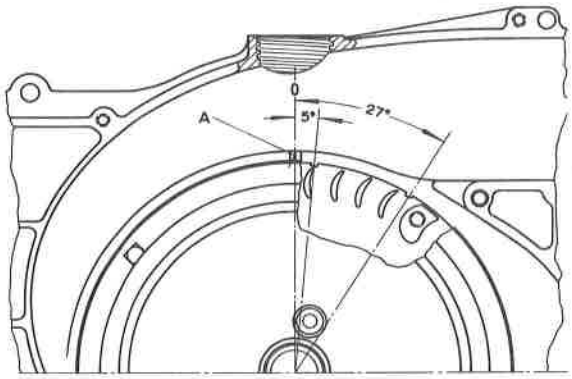
   On cars with Sportomatic transmission the engine must be turned as previously with a 19 mm ring spanner on the V-belt pulley bolt.

Checking and adjusting ignition timing

914: Ignition point = 27° before TDC at 3500 rpm

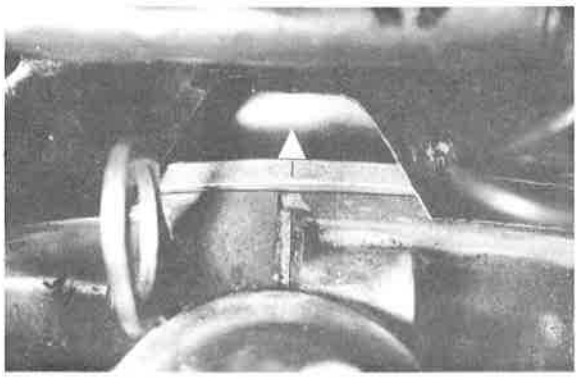
Remove vacuum hoses from advance and retard reservoirs on the ignition distributor.

The firing point (27° before TDC) is indicated on the blower wheel by a red notch. The inspection hole on the cooling blower housing should be opened. For basic ignition timing a second mark (5° before TDC) is also provided.



914/6: Ignition timing = 35° before TDC at 6000 rpm

The firing point (35° before TDC) is marked on the flywheel or torque convertor drive plate (pointer) and can be seen through the inspection hole on the gearbox housing flange.



Replacing contact breaker points, adjusting dwell angle and ignition timing

914: The contact breaker points can be replaced without removing the ignition distributor.

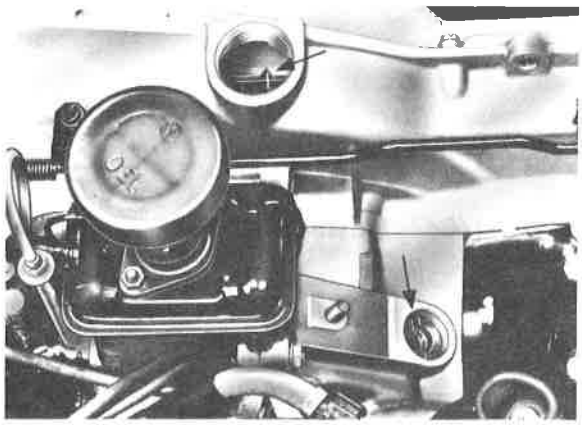
If the ignition distributor or the distributor drive pinion must be removed or replaced for any reason, proceed as follows when re-installing:

a) Place the engine at TDC on the ignition stroke

b) Install the distributor drive pinion so that the slot in the head which is displaced from the center line is located at an angle of approx. 12° to the longitudinal axis of the engine. The smaller segment of the circle will then be on the outside.

c) Place the distributor rotor against the marking for cylinder 1.

d) Install the ignition distributor and retime the ignition.



914/6: The ignition distributor must be removed before the contact breaker points can be replaced.

The breaker points should be replaced and the distributor installed exactly as described in Service Bulletin M 1/68.

Checking wheel alignment

See table of wheel alignment data on page 86.

Checking brake system

See discription of brake system.

Changing engine oil

914: Change engine oil for the first time after 1000 km (600 miles), then after 5000 km (3000 miles) and subsequently every 5000 km (3000 miles).

914/6 Follow Type 911 instructions without change.

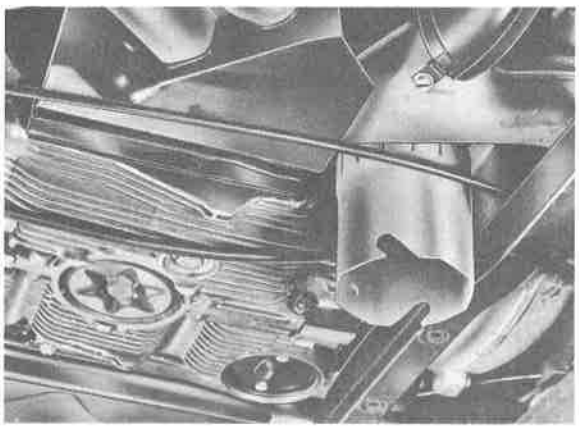
Replacing full-flow oil filter

914: The full-flow oil filter is screwed onto the base of the engine.

To unscrew or attach the filter, use the installation sleeve made available for this purpose.

This sleeve is designed to enable the filter to be removed using a round iron bar. However, the filter can only be tightened by hand.

The full-flow filter should be tightened only to a torque of approx. 1.3 mkp (9.5 lb./ft.)



914/6: Unchanged, as Type 911.

FUEL SYSTEM(914/6)

Fuel is drawn from the tank (1) by an electric fuel pump (2) and supplied to the two Weber triple carburetors by way of the suction (S) and pressure (D) lines. Excess fuel flows back to the tank through return line (R). A cold start valve (3), which opens at temperatures between approx. + 45°C (+113°F) and approx. -30°C (-22°F), injects additional fuel into the six intake venturi of the carburetors during the cold start process. The injection nozzles (4) are situated in the upper section of the air cleaner.