SAAB TURBO

SERVICE MANUAL

M 1978

SAAB TURBO

SERVICE MANUAL

Ordering number 310813

Supplement to Service Manual 310763

SAAB–SCANIA AKTIEBOLAG
Saab Car Division
NYKÖPING SWEDEN

FOREWORD

This supplement to Service Manual 310763 describes the Saab TURBO 1978 model. It should be read together with the Service Manual. The grouping employed corresponds to the appropriate sections of the Service Manual.

SAAB-SCANIA AKTIEBOLAG
Saab Car Division
NYKÖPING SWEDEN

SAAB

CONTENTS

SAAB

TECHNICAL DEVIATIONS FROM STANDARD VERSION

Cars with turbocharged engines deviate from the standard version as follows:

Turbocharging system
Cars with turbocharged engines are equipped with a turbo unit of make Garrett AiResearch. The charging pressure from the turbo is governed by a charge pressure regulator fitted on the exhaust side of the engine and regulated by the exhaust pressure.
To protect it from overloading, the engine is equipped with a pressure switch and a pressure gauge actuated by the charging pressure, and an overpressure guard to prevent over-revving of the engine.

The engine
Altered compression ratio, special pistons.
Special camshaft.
Water pump with 8-vane impeller.

Injection system
Mixture control unit with increased capacity
Fuel boosting at full load

Cooling system
Radiator with greater number of cooling passages.
Radiator fan, new design and new location.
Thermostatically controlled air-cooled oil cleaner for engine lubricating oil.
Cooling of battery by means of special air intake

Exhaust emission control
Mechanically controlled deceleration system (dash pot).

Echaust system
Larger-bore exhaust pipe.
New type of flanged pipe joints.

Electrical system
Smaller, service-free battery with new location. Removable battery shelf.
Larger alternator with built-in charging relay.
Breakerless ignition system.
New fan motor.

Transmission
Heavier-duty clutch with greater compressive force.
Primary gear with special ratio and chain transmission.
Stronger gear wheel for third gear (increased surface hardness.
Modified mounting of speedometer drive in transmission.

Brakes
Special brake pads, front.

Suspension
Shock absorbers of same type as for Saab EMS.

Wheels
5 1/2-inch light alloy wheels with hub centring.

TECHNICAL DATA (DEVIATIONS FROM STANDARD VERSION)

Engine No.		BSI 20 P02 000 001–
Gearbox No.		S 00001–
Engine		
Power rating		145 hp SAE net (107 kW) at 5 000 rev/min
Maximum torque		174 lb-ft (235 Nm) at 3 000 rev/min
Compression ratio		7.2:1
Pistons		Special design, make Mahle
Piston rings		Compression rings of nodular iron
Camshaft		
Cam lifting height at valve clearance 0:		
Inlet valve		0.35 in (9.1 mm)
Exhaust valve		0.41 in (10.5 mm)
Valve timing:		
Inlet, nominal valve clearance	Starts	12° BTDC
	Ends	40° ABDC
Exhaust, nominal valve clearance	Starts	62° BBDC
	Ends	2° ATDC
Valve		Sodium-cooled exhaust valve

NOTE. Sodium-cooled valves require special handling and should not be mixed with other scrap. Please refer to the service manual 1975–1978

Fuel, minimum octane number	RON 97
Oil volume when changing oil, including filter change	3.0 Imp quarts (3.5 litres)
Total oil volume, including oil cleaner (the oil cleaner is not drained when changing oil)	3.5 Imp. quarts (4 liters)
Crankcase ventilation	Hose connection between valve cover and air cleaner
Oil cooler, opening temperature of thermostat	Approx. 174°F (75°C)
Turbo system	
Turbo compressor, make	Garrett AiResearch
Maximum charging pressure (see Measuring the charging pressure)	10.0 ± 0.7 psi (0.70 ± 0.05 bar)
Approximate length of spring in charge pressure regulator (basic setting)	Approx. 0.708 in (ca. 18 mm)
Actuating pressure of pressure switch	12.8 ± 1.4 psi (0.9 ± 0.1 bar)

Fuel system	
Line pressure:	
Test value	74.0–82.5 psi (5.2–5.8 bar)
Setting value	76.8–79.6 psi (5.4–5.6 bar)
Device for fuel boost	
Throttle valve switch (valve opening when circuit is closed)	62°
Speed transmitter (actuating speed)	80.0 ± 3.1 mph (130 ± 5 km/h)
Pressure regulator (reduced control pressure	35.6–41.2 psi (2.5–2.9 bar)
CO value with throttle valve switch depressed (CO value at idling speed set to 1.0–2.0 %)	approx. 4–6 % CO
Deceleration device	
Delay time from 3 000 rev/min to idling speed (warm engine)	3–6 s
Termostatically controlled air pre-heating	
Temperature when valve change position	+23°F (–5°C – ± 0°C)
Electrical system	
Battery, capacity	60 Ah
Alternator	
Type designation	Bosch K1–14 V 65 A 21
Rated voltage	14 V
Rated speed (speed at which alternator shall produce at least 2/3 of maximum current, i.e. 60 Ah)	2 100 rev/min
Maximum permissible continuous load	65 A/14 V
Resistance in rotor winding	2.8 ohm ± 10 %
Resistance in stator winding	0.10 ohm ± 10 %
Ignition system	
Type	Electronic ignition system without breaker points
Basic setting	20° BTDC at 2 000 rev/min and with disconnected vacuum hose
Distributor	
Type	IGFUD 4
Ordering No. Bosch	0 237 005 001
Electronic control unit	
Type	TSZ–2 g/1 4/SI
Ordering No. Bosch	0 227 100 014
Compensating resistor	
at starter motor rpm	0.6 ohm
total, when driving	1.0 ohm
Over-revving guard	Rotor with built-in centrifugal switch which cuts out ignition when engine speed exceed 6 000 + 200 rev/min – 100 rev/min

Radiator fan motor	
Type	Bosch
Output	190—290 W (depending on car speed)
Speed	About 2 500 rev/min

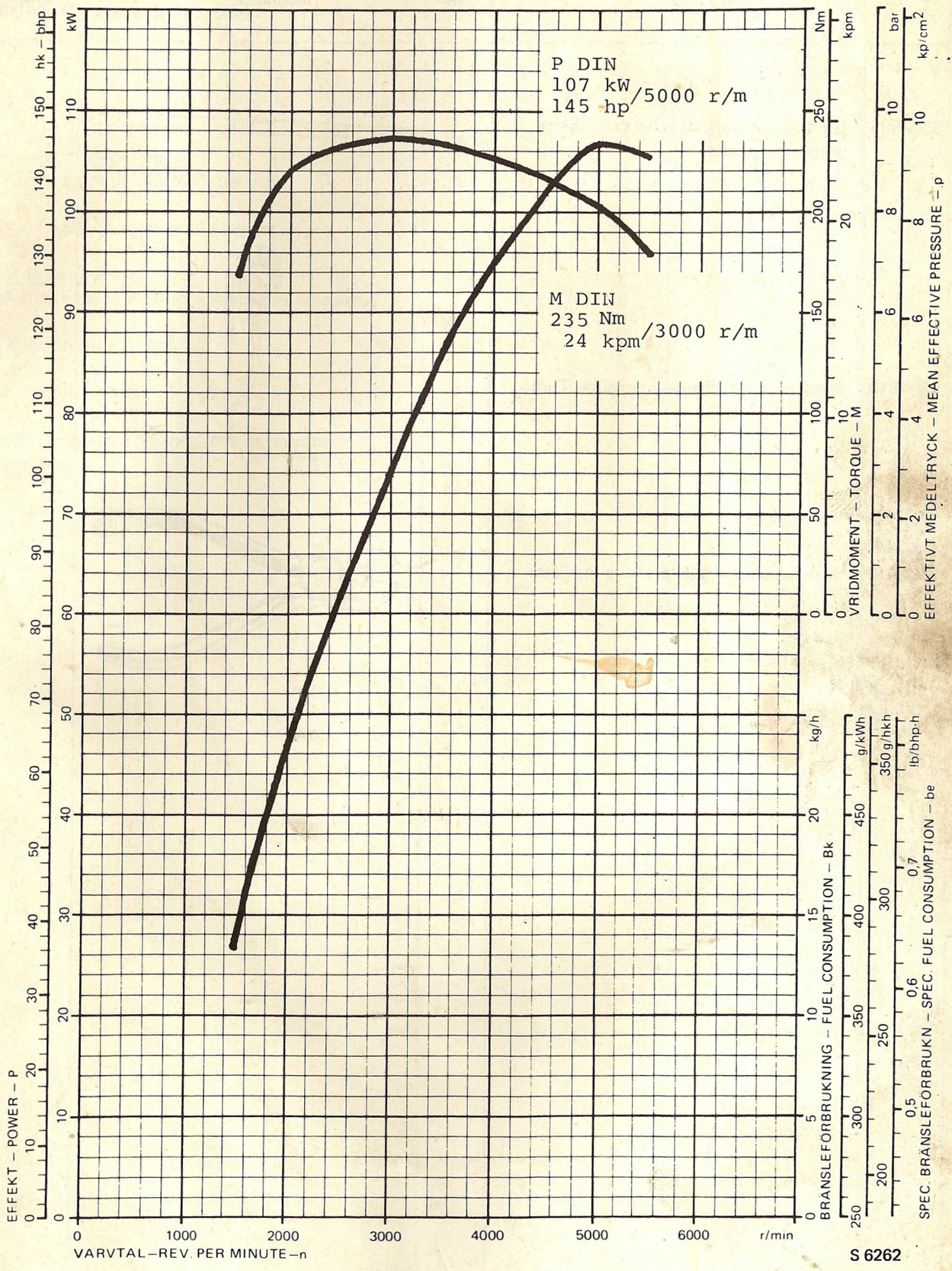
The fan switch is directly connected to battery voltage, i.e. not across the ignition switch. This implies that the fan may continue, or start to run after the engine has been switched off.

Headlight wiper motor	
Make, type left hand and right hand design	Bosch, AHO 12 V
Output rpm (double-strokes/min) idling	50—60 strokes
Current consumption	0.75—1.5 A
Current consumption blockated motor (e.g. frozen wiper blades)	4.0—5.5 A
The motor is protected against damage by means of a built in "PTC" series resistance.	

Transmission	
Clutch	
Type	Single dry-plate clutch with diaphragm spring
Diameter	8 1/2 in. (216 mm)
Disc thickness (new), compressive force 4 230 N (948 lb., 430 kg) between parallel plane surfaces	0.26—0.29 in. (6.8—7.4 mm)
The disc must move freely when the clutch is disengaged	0.05 in. (1.3 mm)

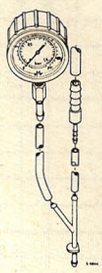
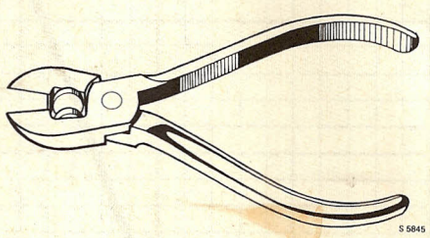
Transmission	
Oil quantity	2.6 Imp quarts (3.0 litres)
Reduction ratio primary gear	0.9:1
Total reduction ratio (engine: drive shaft)	
1st gear	12.0:1
2nd gear	7.2:1
3rd gear	4.9:1
4th gear	3.5:1
Reverse	13.2:1
Speed at 1 000 rev/min (tyres 12.0 in. (305 mm) radius):	
1st gear	9.55 km/h
2nd gear	15.85 km/h
3rd gear	23.62 km/h
4th gear	32.85 km/h
Reverse	8.69 km/h

Brakes	
Brake pads, front	
Outer pads (indirect acting)	DM 115 (semi-metallic lining of make Delco Moraine)
Inner pads (direct acting)	DB 820 (make Dan Block)



ENGINE PERFORMANCE GRAPHS

Special tools, engine

Part No.	Description	Class	Illustration	Remarks
8392805	Guide pin, milling of valve seat, charge pressure regulator		 S 5843	
8392813	Pressure gauge, charging pressure, Turbo			
8392912	Sealing pliers, charge pressure regulator		 S 5845	

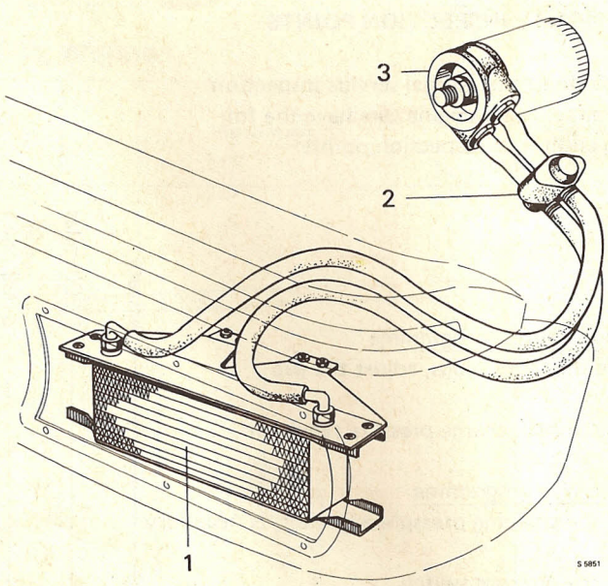
ADDITIONAL INSPECTION POINTS

In addition to the normal service inspection programme, turbo-engine cars have the following additional inspection points:

	Delivery	1 200 miles	3 000 miles	6 000 miles	9 000 miles	12 000 miles	15 000 miles	18 000 miles	21 000 miles	24 000 miles	27 000 miles	30 000 miles
Emission control programme												
Change the spark plugs, adjust the gap				○		○		○		○		○
Check the seal, charge pressure regulator	○			○		○		○		○		○
Maintenance programme												
Check the charging pressure adjusting as necessary				○		○				○		
Check the pressure switch	○					○				○		
Check the fuel booster	○					○				○		
Clean the diaphragm housing (charge pressure regulator)										○		
Change the air cleaner filter						○				○		

OIL COOLER

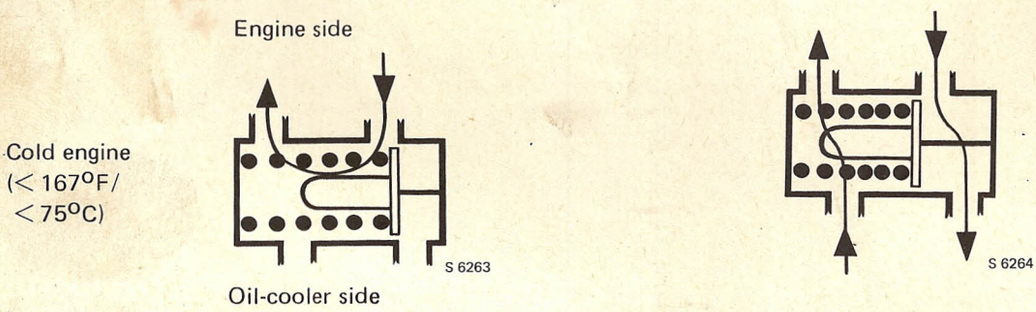
Cars with turbocharged engines are equipped with a special engine oil cooler located on the left-hand side of the car behind the opening in the spoiler. The radiator is connected by means of hoses to an adapter, located between the oil filter and the filter headpiece.
A thermostat is fitted between the adapter and the cooler, and it opens when the temperature exceeds about 167°F (75°C), allowing the oil to flow through the oil cooler. At lower temperatures, the oil circulates through the thermostat.



ENGINE OIL COOLER
1. Oil cooler
2. Thermostat
3. Adapter

CAUTION

OWING TO ITS SYMMETRICAL DESIGN, IT IS POSSIBLE TO FIT THE THERMOSTAT THE WRONG WAY ROUND, IN WHICH CASE THE ENGINE MAY BE DAMAGED.

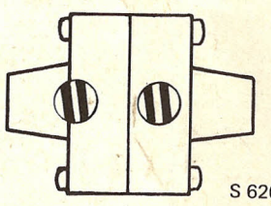


FLOW THROUGH THERMOSTAT

The side of the thermostat that should face the engine is marked by means of a red spot or the word, "inlet".

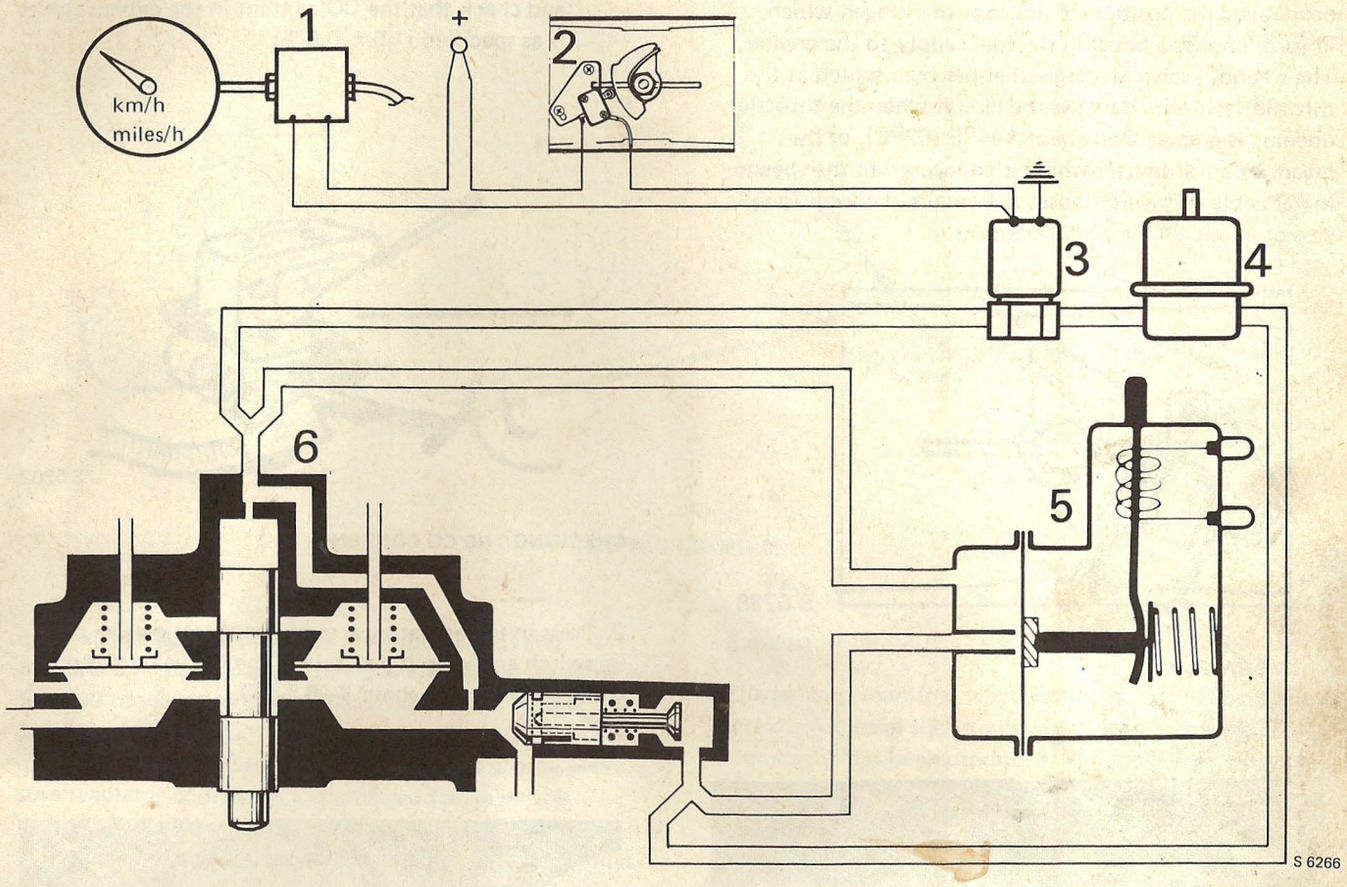
It is also possible to identify this side of the thermostat as follows:

When the thermostat is cold (< 167°F/< 75°C), the spring inside the valve will be visible through both holes on the side of the thermostat that should face the engine.



CHECKING THAT THE THERMOSTAT IS THE RIGHT WAY ROUND

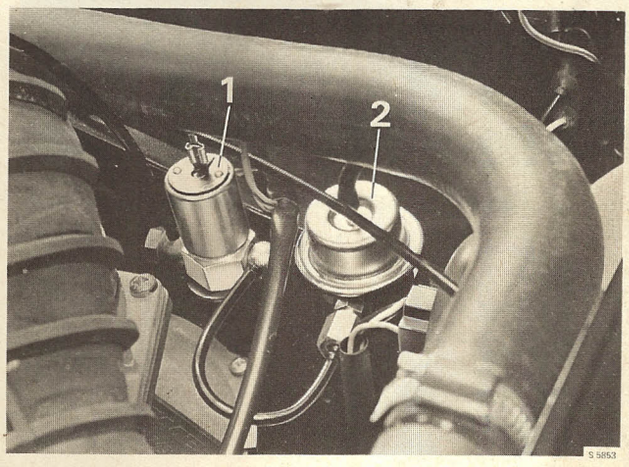
Fuel boosting system at high speeds and high loading



DEVICE FOR FUEL BOOSTING

1. Speed transmitter
2. Throttle valve switch
3. Solenoid valve
4. Pressure regulator
5. Control pressure regulator
6. Fuel distributor

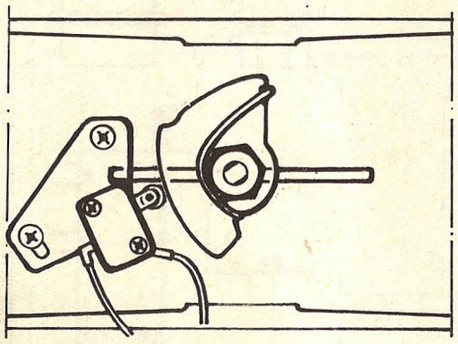
Turbocharged engines are equipped with a special device to provide the necessary boost in the fuel supply to the engine under heavy loads and to improve the cooling of the engine when running at sustained high speeds.
The device consists of a solenoid valve and a pressure regulator. The valve and pressure regulator are connected in parallel with the control pressure regulator in the control pressure system.



SOLENOID VALVE AND PRESSURE REGULATOR

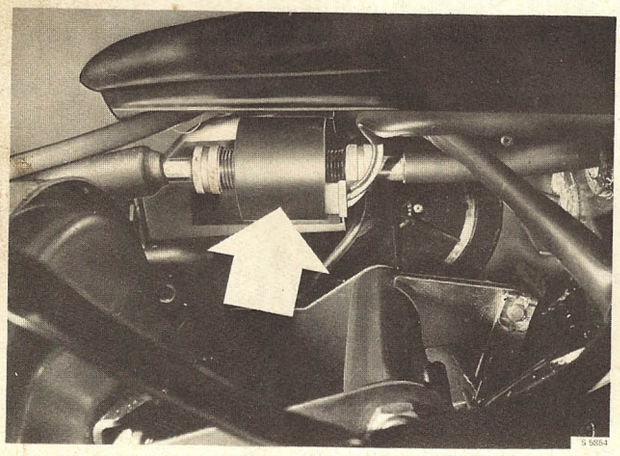
1. Solenoid valve
2. Pressure regulator

The pressure regulator is preset to a pressure approximately 1 bar lower than that of the control pressure regulator (warm engine), which means that the control pressure will drop from about 52.6 psi (3.7 bar) to about 38.4 psi (2.7 bar) when the solenoid valve opens. This pressure drop raises the position of the control plunger, which, in turn, implies a boost in the fuel supply to the engine. The solenoid valve is energised either by a switch at the throttle valve which makes the circuit when the throttle opening is greater than about 144°F (62°C), or by means of a transmitter which is connected to the speedometer cable and which closes the circuit at speeds in excess of about 80.0 mph (130 km/h).



S 5738

VALVE SWITCH

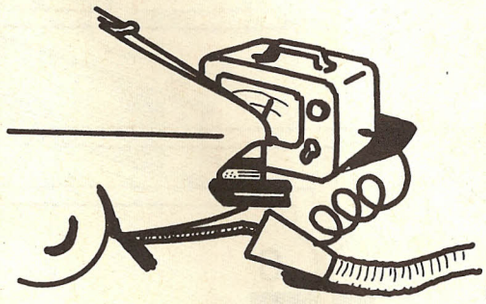


SPEED TRANSMITTER

Checking the fuel-boosting function

A. Checking of the throttle valve switch, solenoid valve and pressure regulator should be carried out in conjunction with measuring of the CO emission as follows:

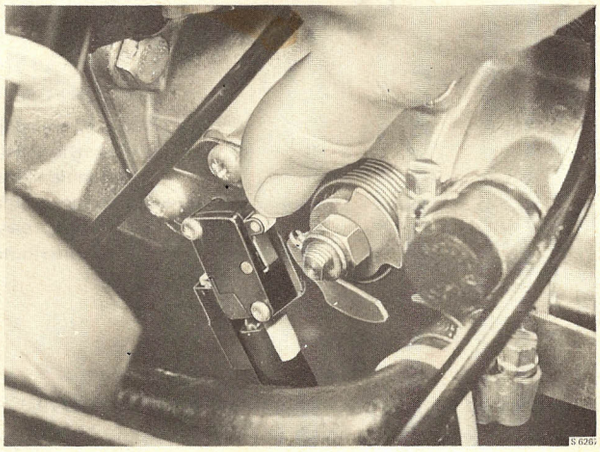
1. Run the engine until hot, connect the CO meter and check that the CO content in the exhaust gases is as specified (1.5 ± 0.5 %)



S 5202

CHECKING THE CO CONTENT

2. Press in the actuating arm on the throttle valve switch and keep it depressed. The CO value should now increase to about 4–6 % CO.

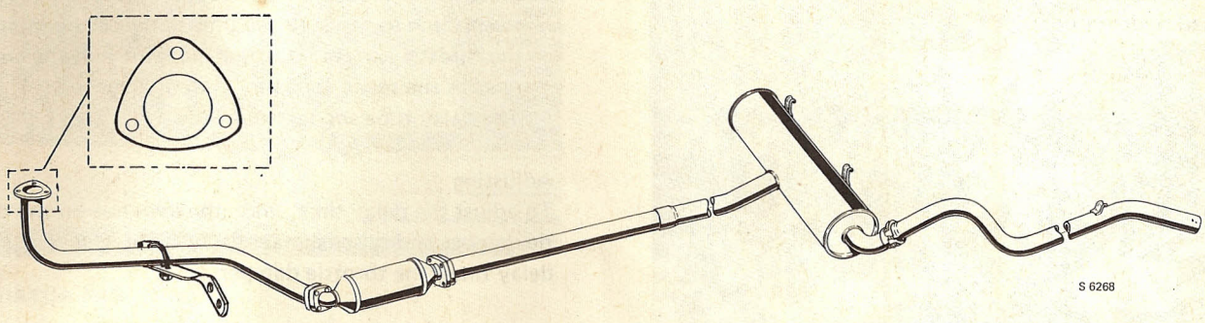


PRESSING IN THE THROTTLE VALVE SWITCH ACTUATING ARM

3. Release the actuating arm and check that the CO value is 1.5 ± 0.5 %.

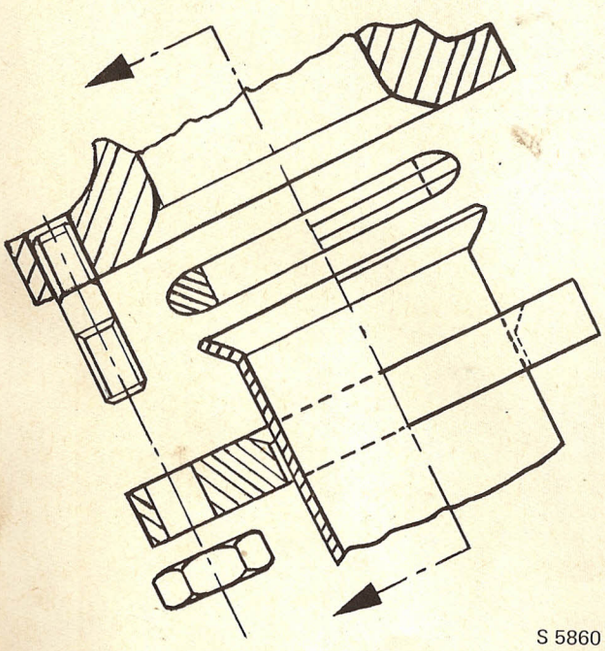
NOTE

Fit the flange so that the side closest to the holes faces the turbo.
(On later flanges, this side is marked by means of a spot of paint.)



EXHAUST SYSTEM

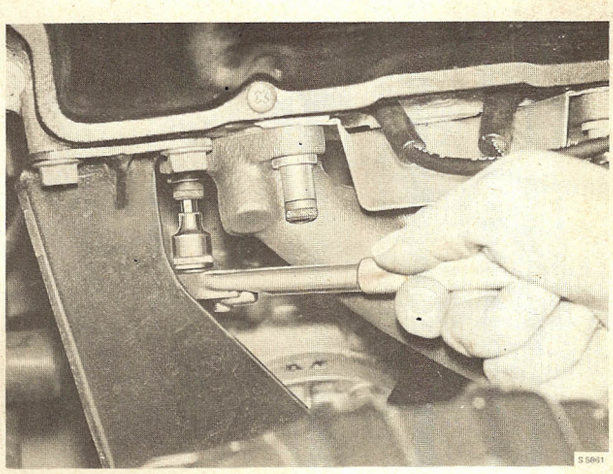
The exhaust system on cars with turbocharged engines comprises pipes of a larger diameter than those on other Saab 99 models, but the intermediate and rear suspension points are the same.
The joint between the exhaust pipe and the charge pressure regulator consists of a chamfered flange on the charge pressure regulator, a taper seal ring, swaging on the exhaust pipe, a loose chamfered flange and three nuts.



THE EXHAUST PIPE CONNECTION TO THE CHARGE PRESSURE REGULATOR

Exhaust manifold

The exhaust manifold is secured by means of socket head screws. A special socket allowing improved access to the rear screws has been produced. The socket has spare part No. 83 92 797.

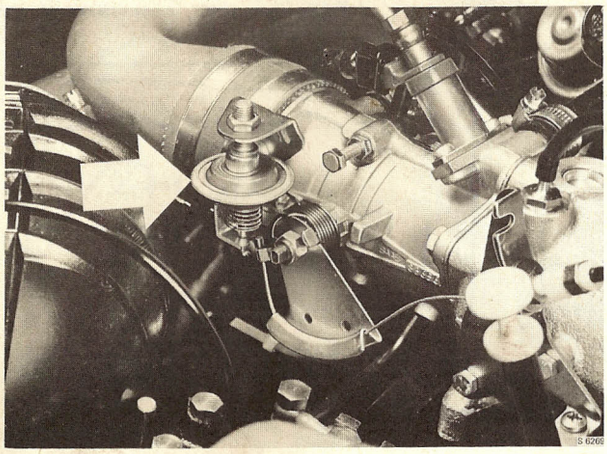


REMOVING THE EXHAUST MANIFOLD SCREWS
Tool 83 92 797

EXHAUST EMISSION CONTROL

Deceleration function

On turbocharged engines, the vacuum-operated deceleration valve has been replaced by a mechanical throttle damper (dash pot) designed to delay the closing of the throttle. As a result, combustion takes place during engine overrun, thereby preventing the emission of unburned hydrocarbons.



THE THROTTLE DAMPER (DASH POT)

CHECKING AND ADJUSTING OF THE THROTTLE DAMPER

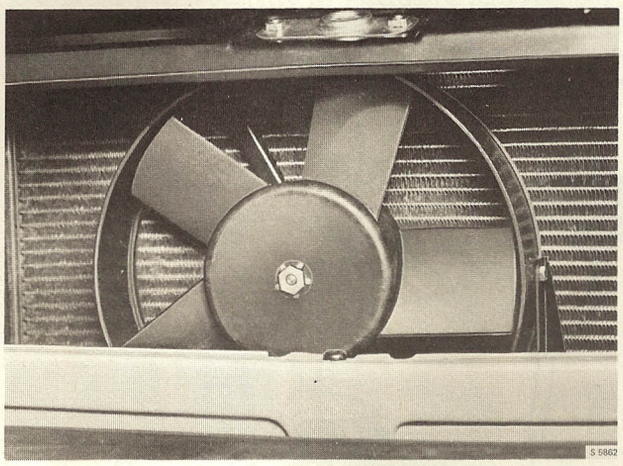
Checking

1. Run the engine until it has warmed up properly.
2. Connect a tachometer and set the idling speed to 875 rev/min.
3. Increase the engine speed to 3 000 rev/min and use a stop watch to measure the time between the moment the throttle is released to the moment that the engine reaches the speed specified in item 2 above.
   The delay time should be: 3–6 s.

Adjusting

To adjust the delay time, undo the lock nut on the throttle damper and raise (shorter delay time) or lower (longer delay time) the throttle damper.

RADIATOR FAN



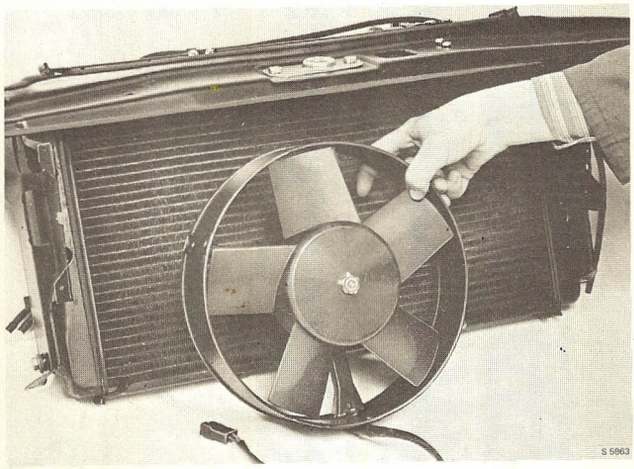
RADIATOR FAN

The radiator fan is of new design and is located in front of the radiator.
The fan hub is in the form of a cover, behind which the fan motor is mounted.
The fan motor is mounted on the fan cover, which, in turn, is bolted to the radiator frame.

> NOTE
> The nut securing the impeller to the impeller shaft has a left-hand thread.

Removal

Remove the front body section and radiator and then unbolt and remove the fan unit.

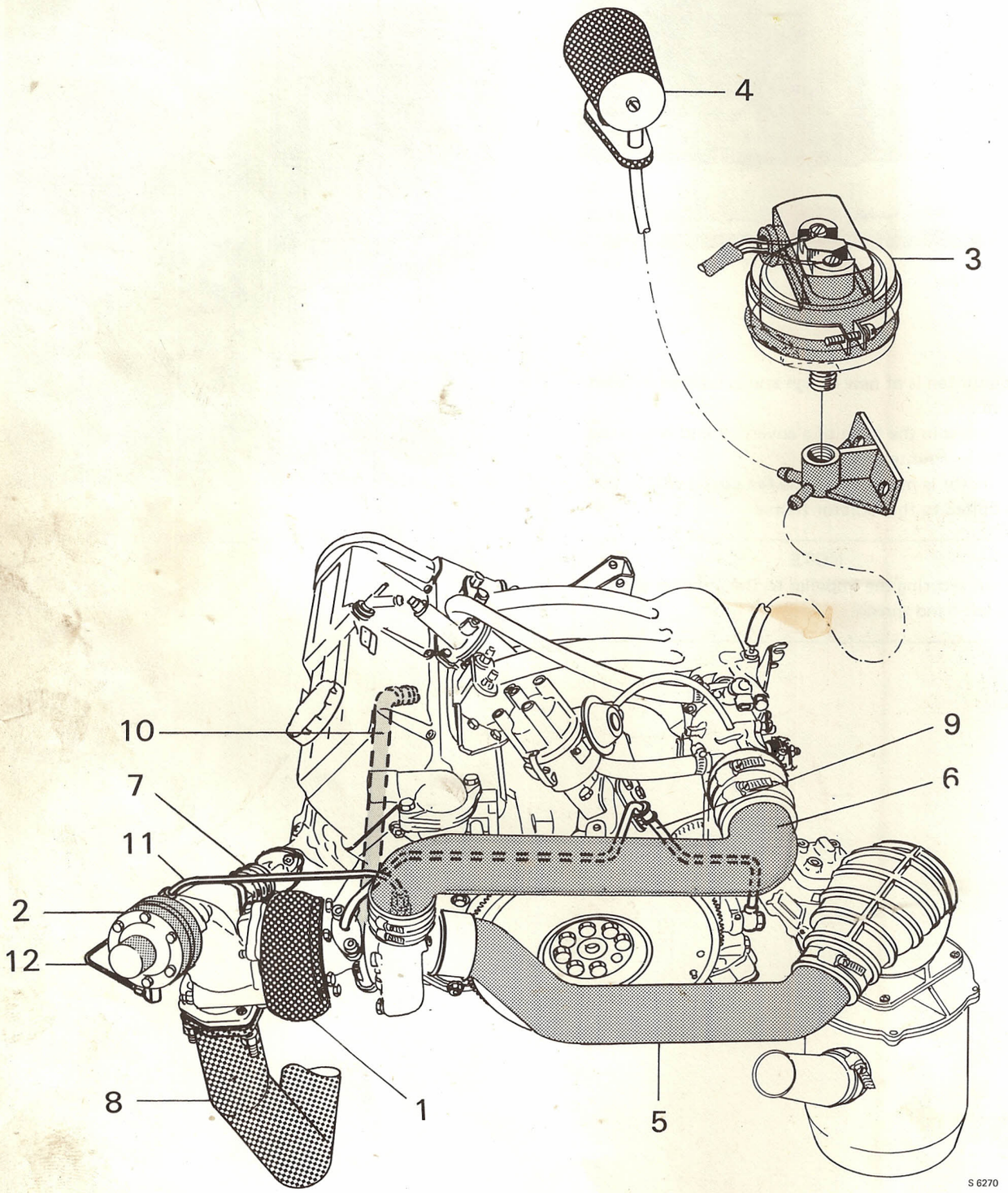


REMOVING THE FAN UNIT

TURBO SYSTEM

Supercharging, general

In contrast to conventional engines, a supercharged engine provides improved charging on the induction stroke, which produces more effective combustion of the mixture and an increase in power output and torque. With a supercharged engine, it is possible to achieve performance that is comparable to that of a larger engine, while, at the same time, maintaining the advantages of a smaller engine with respect to fuel economy, space, weight, etc.

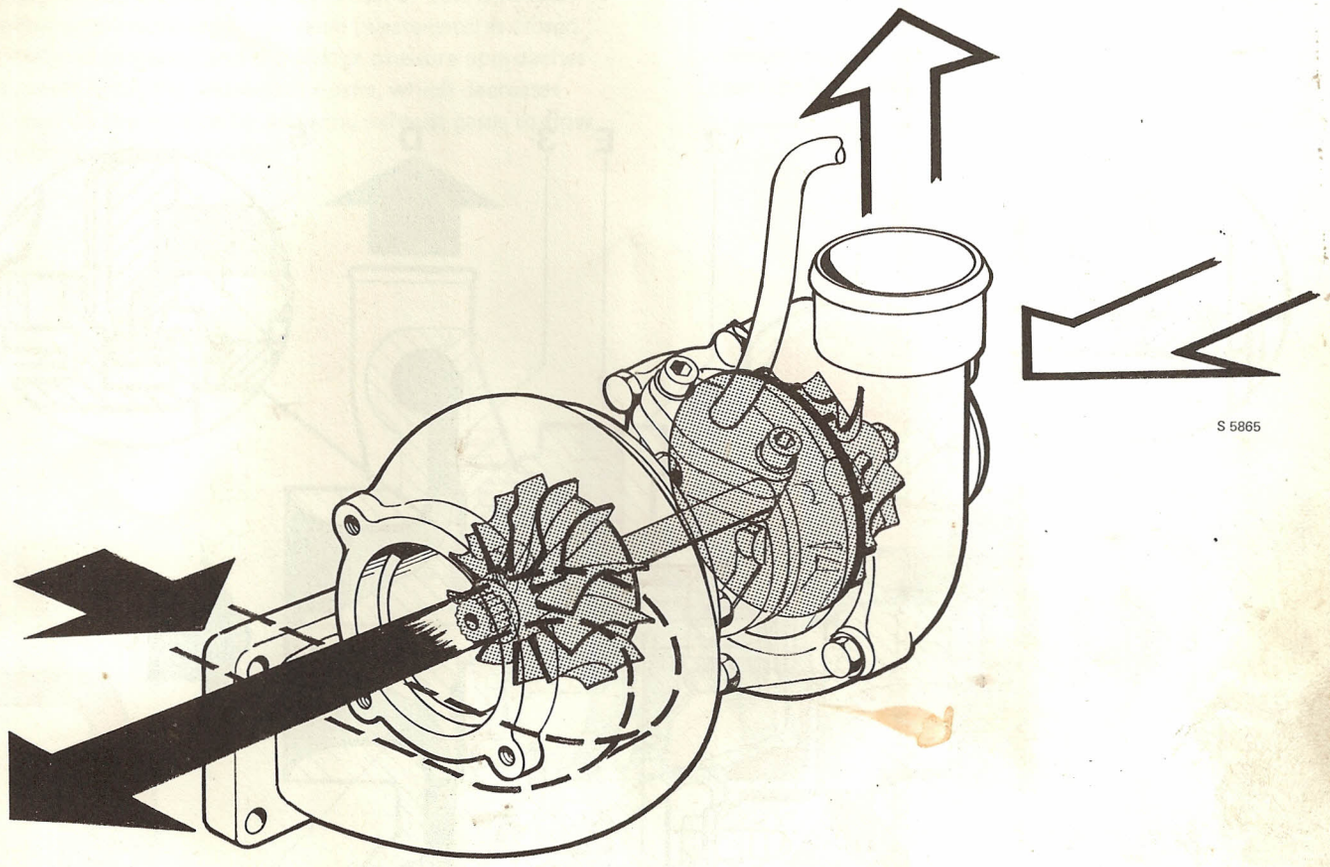


TURBO ENGINE

1. Turbo-compressor
2. Charge pressure regulator
3. Pressure switch
4. Turbo instrument
5. Suction pipe
6. Pressure pipe
7. Bellows pipe
8. Exhaust pipe
9. Oil supply line
10. Oil return line
11. Cooling air pipe
12. Exhaust pressure line

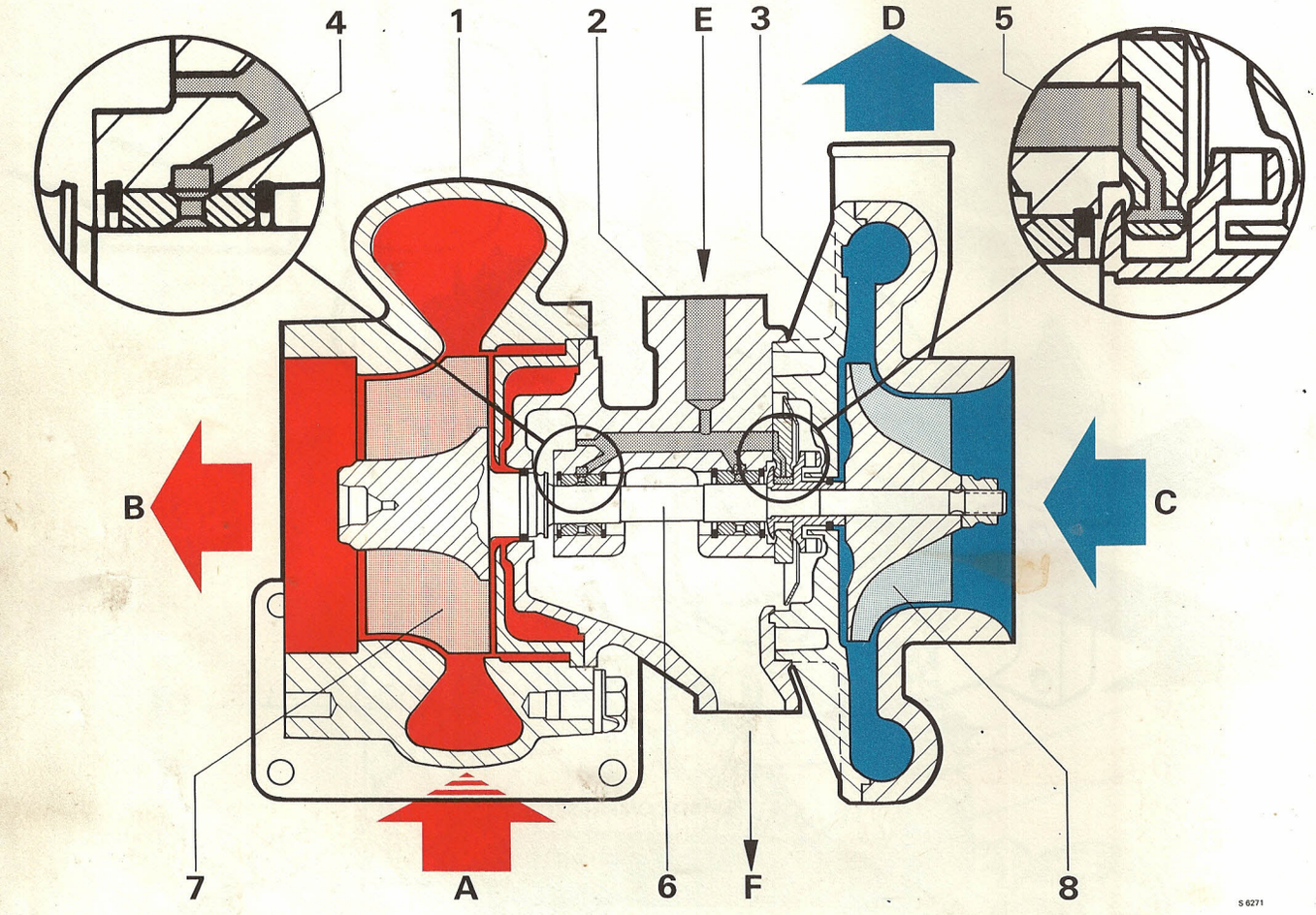
Turbocharging

Turbocharging is achieved by means of a turbo-compressor which implies utilizing the exhaust gases from the engine to drive the turbine.
The exhaust gases are led to an exhaust gas turbine, causing the turbine wheel to rotate. The turbine wheel is mounted on the same shaft as a compressor impeller which rotates at the same speed.
The compressor is located in the induction system where it effects an increase in the charging pressure in the combustion chamber.



TURBO-COMPRESSOR

The Saab Turbo has been designed to start operating at relatively low engine speeds, in order to provide increased torque at engine speeds typical of normal driving conditions. In contrast to the Saab Turbo, earlier turbochargers have been designed to provide increased performance, which implies that they are only utilized at full throttle.
The turbine shaft which rotates at very high speed has been very accurately balanced. The shaft is mounted in a floating sliding-contact bearing through which there is a relatively high oil flow. Thus, during rotation, the shaft floats on a film of oil.
The lubricating oil is supplied by the engine lubricating system through a special line running from the oil pump. Return oil flows through a relatively large-bore pipe back to the sump.
Sealing between the shaft and the bearing housing consists of sealing rings (piston ring type) installed in grooves in the shaft.



Inlet air

Exhaust gases

TURBO-COMPRESSOR, SECTION

1. Turbin housing
2. Bearing housing
3. Compressor housing
4. Radial bearing
5. Axial bearing
6. Turbo shaft
7. Turbine impeller
8. Compressor impeller

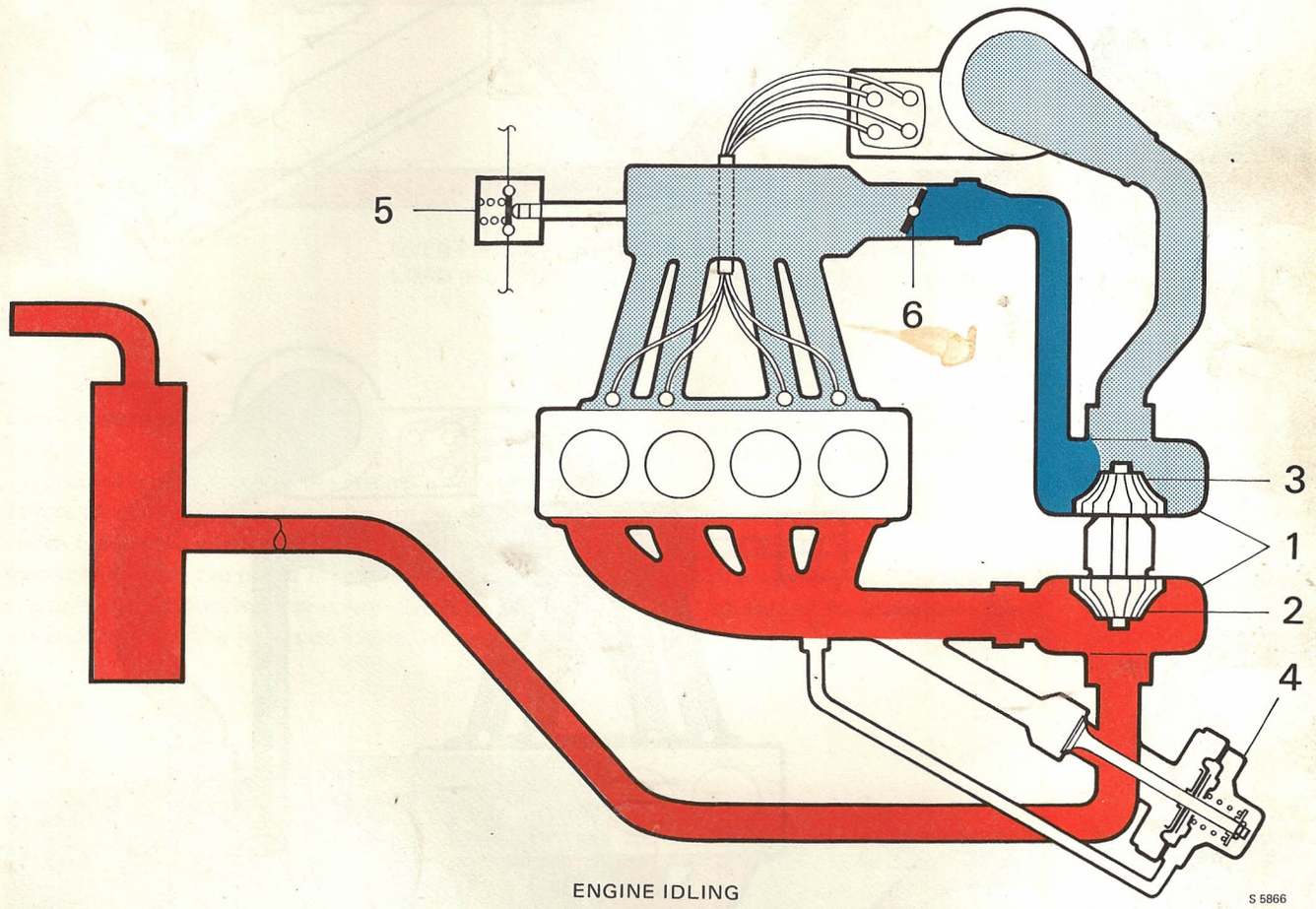
A. From exhaust manifold
B. To exhaust pipe
C. From air cleaner
D. To inlet manifold
E. Lubricating oil line
F. Lubricating oil return pipe

Charging pressure regulation

The charging pressure in the inlet manifold is governed mainly by the speed and loading of the engine. However, under high load conditions, the charging pressure is limited by a charge pressure regulator.
The charge pressure regulator is located on the exhaust side of the engine and controls the exhaust gas flow by means of a by-pass passage at the side of the turbine.
When the load on the engine is normal or below normal the charge pressure regulator valve (waste-gate) is closed. As the load increases and the charge pressure approaches the preset limit, the waste-gate opens, which decreases the load on the turbine by allowing exhaust gases to flow through the by-pass passage.

The charge pressure regulator contains a spring-loaded diaphragm valve which is kept closed under normal conditions by means of the spring. The valve is connected by means of a pipe to the exhaust manifold and is actuated by the exhaust gas pressure. Presetting of the charging pressure is achieved by adjustment of the spring.
The valve spindle of the charge pressure regulator is cooled by means of a pipe running from the compressor to the charge pressure regulator bearing housing.

CAUTION
Never increase the preset pressure as specified in section 0 as this is likely to damage the engine.



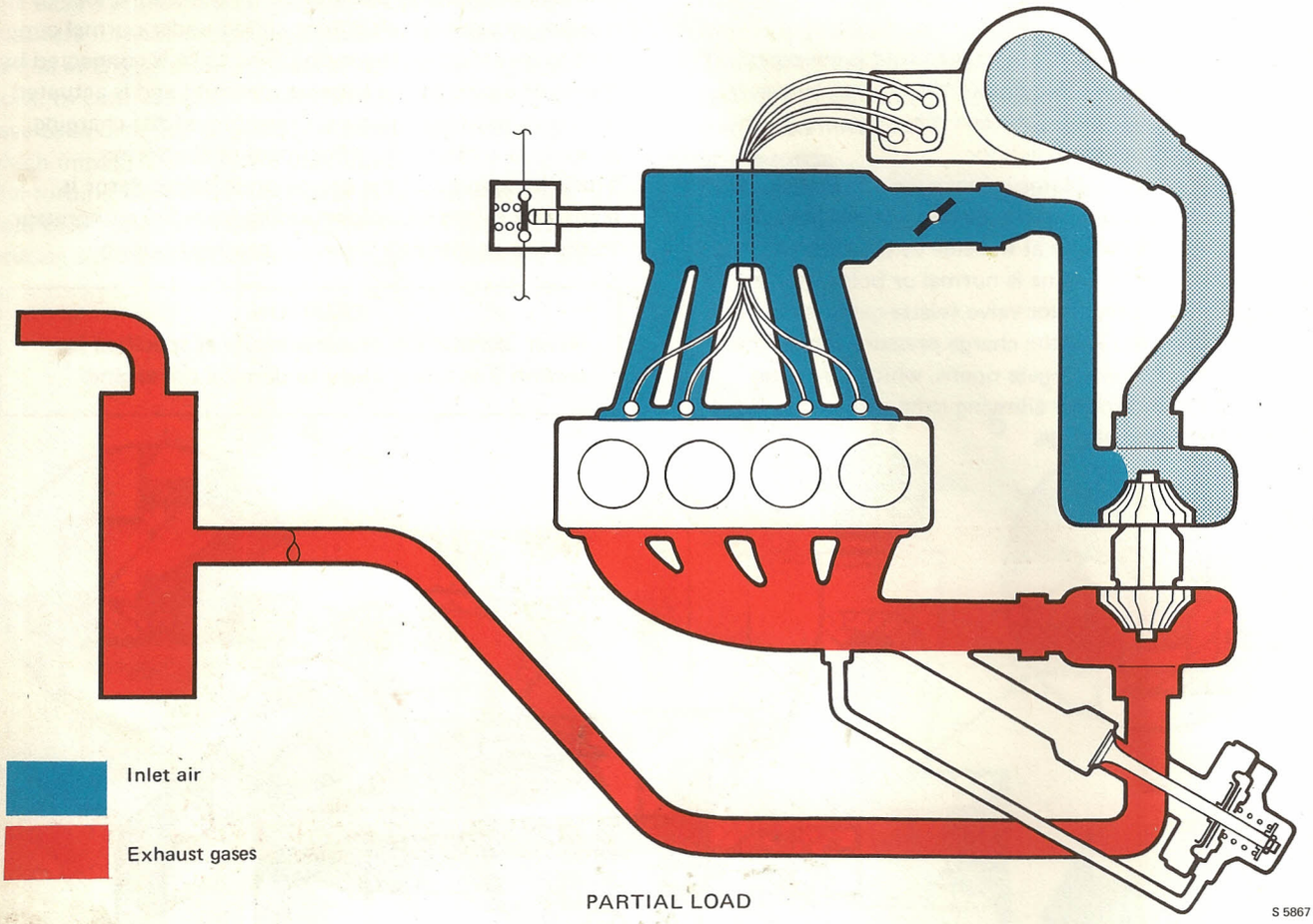
S 5866

ENGINE IDLING

1. Turbo-compressor
2. Turbin impeller
3. Compressor impeller
4. Charge pressure regulator
5. Pressure switch
6. Throttle valve

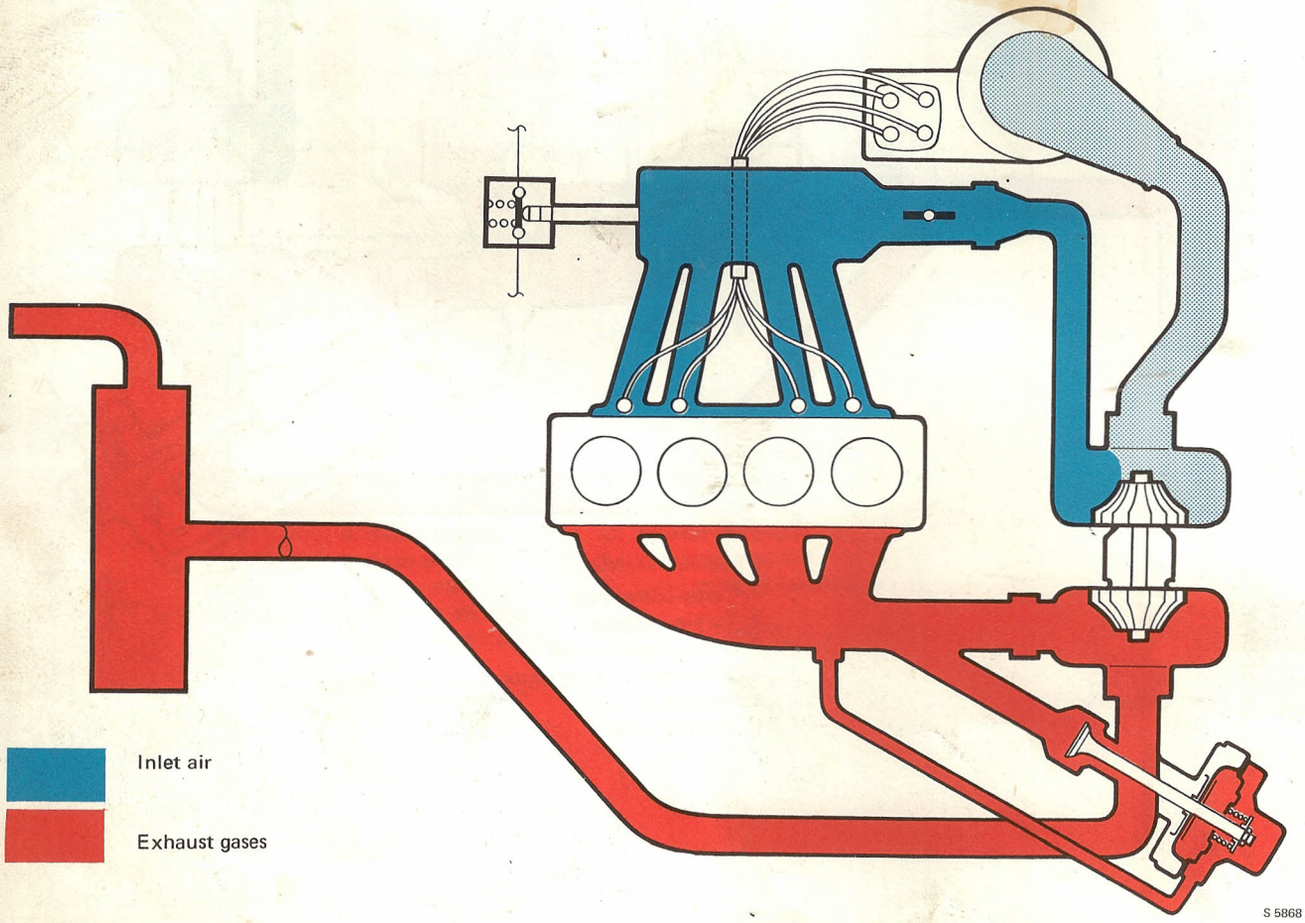
Inlet air

Exhaust gases



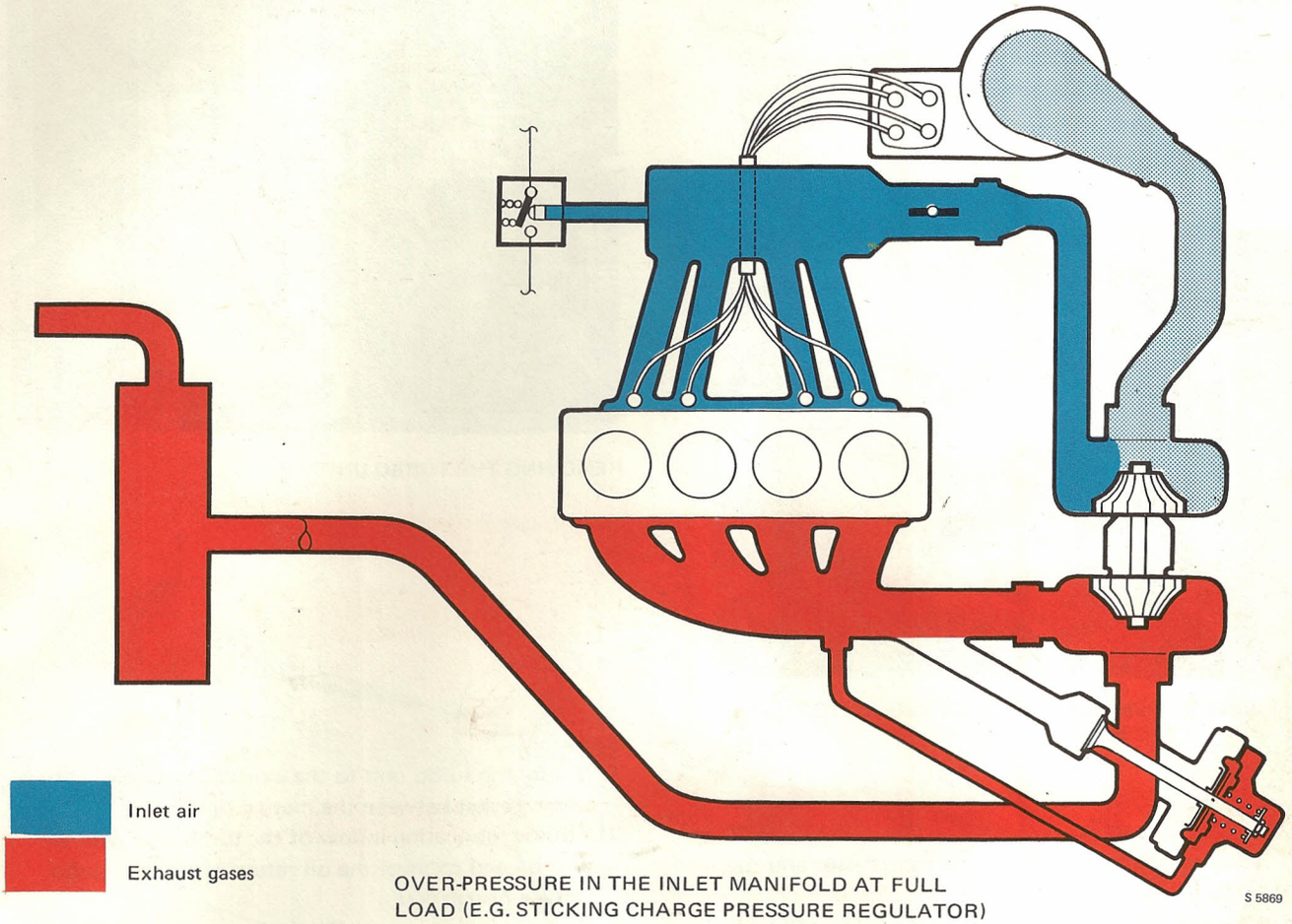
PARTIAL LOAD

S 5867



S 5868

FULL LOAD



OVER-PRESSURE IN THE INLET MANIFOLD AT FULL LOAD (E.G. STICKING CHARGE PRESSURE REGULATOR)

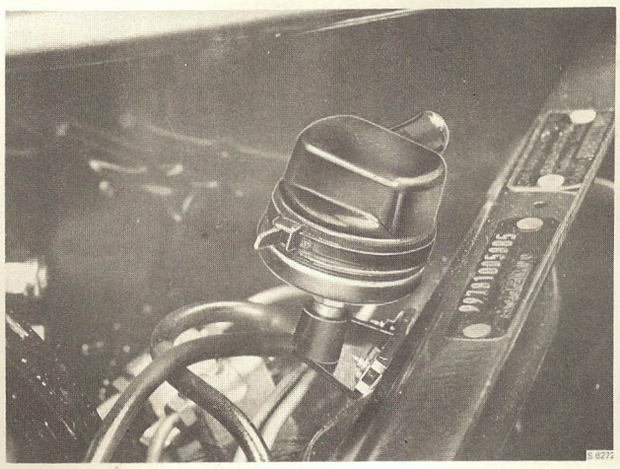
S 5869

Over-pressure guard

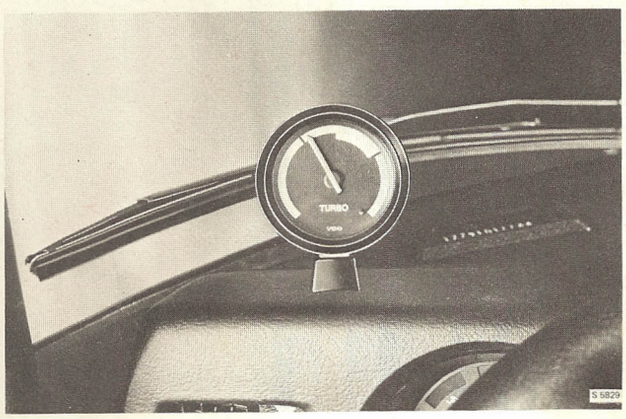
To prevent overstressing of the engine in the event of failure of the charge pressure valve, on over-pressure guard, which is actuated when the charging pressure in the intake manifold exceeds the preset limit, is provided. The over-pressure guard comprises a pressure switch connected to the inlet manifold by means of a hose. When the charging pressure exceeds a preset limit, the switch will break the current to the fuel pump.

A rotor with a built-in centrifugal switch prevents over-revving of the engine by breaking the ignition at excessive engine speeds.

A pressure gauge showing the charging pressure is fitted on top of the instrument panel.



PRESSURE SWITCH



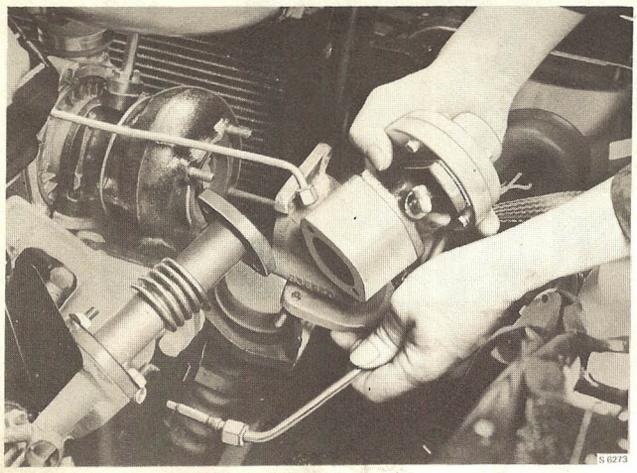
S 5829

TURBO PRESSURE GAUGE

Turbo unit

Removal

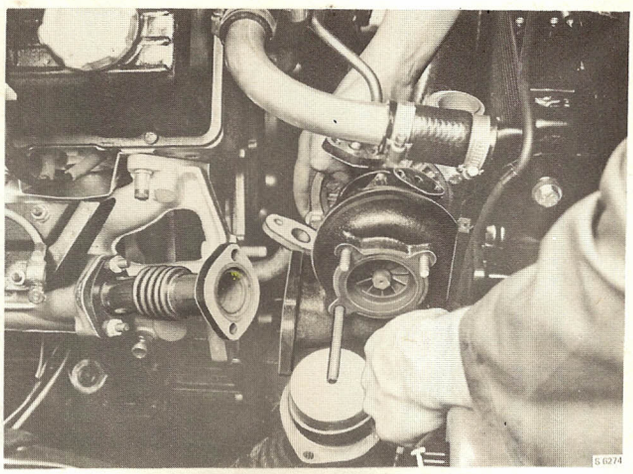
1. Remove the battery, heat shield and battery shelf.
2. Remove the charge pressure regulator and blank off the exhaust pipe.



REMOVING THE CHARGE PRESSURE REGULATOR

3. Disconnect the hose between the compressor and the throttle housing.
4. Disconnect the oil supply line and the oil return line at the turbo unit.
5. Remove the bolts securing the turbo to the exhaust manifold and remove the turbo unit.

Plug all holes in the turbo unit.



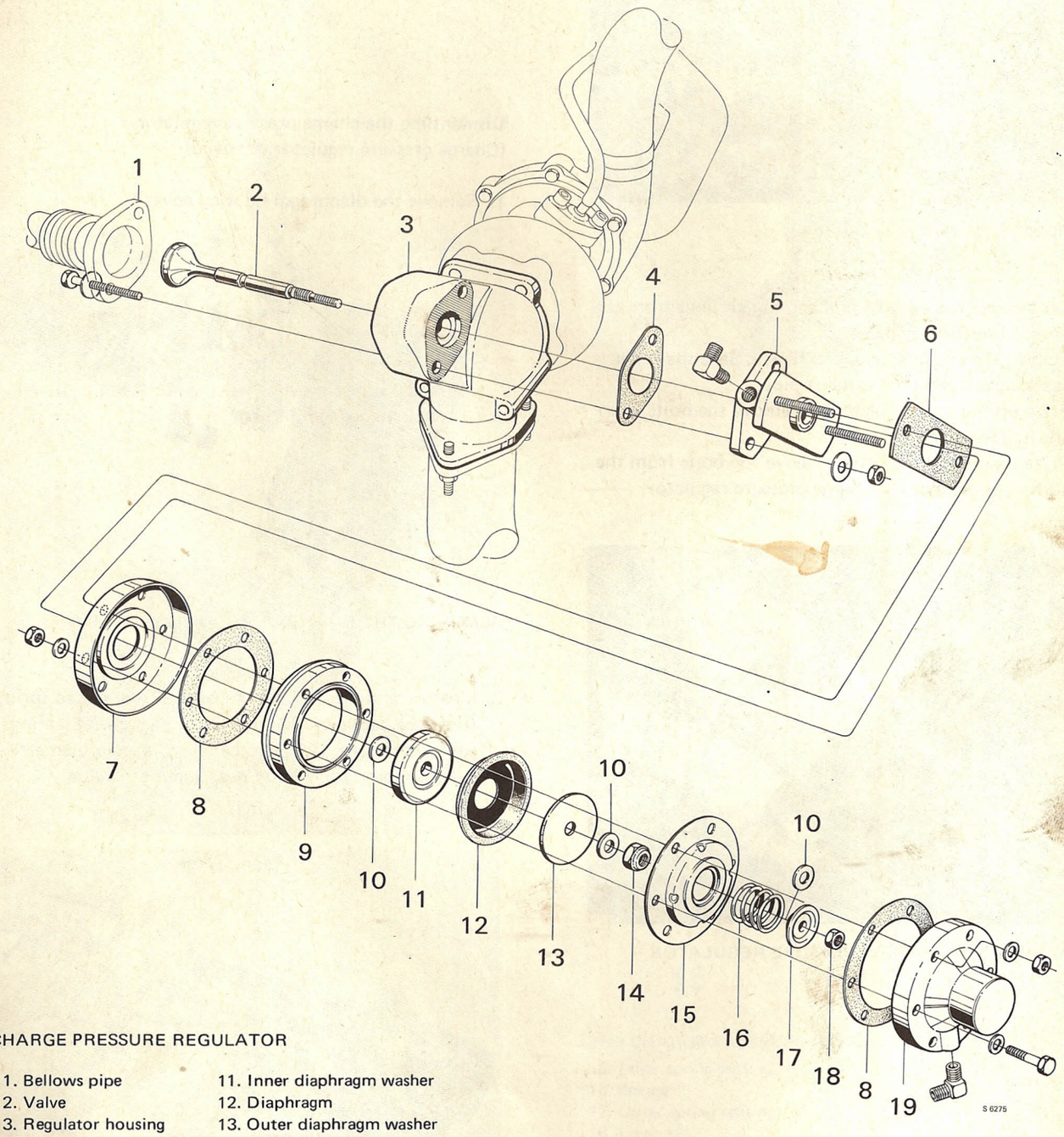
REMOVING THE TURBO UNIT

Assembly

1. Secure the turbo unit to the exhaust manifold, fitting a new gasket between the mating flanges.
2. Fill the lubricating inflow of the turbo unit with engine oil and connect the oil return line at the turbo, using a new gasket.
3. Connect the oil supply line, using a new gasket and new seals.
4. Fit the hose between the compressor and throttle housing and the hose between the air flow meter and the compressor.
5. Fit the charge pressure regulator using new gaskets and locking plates.
6. Mount the battery shelf, heat shield and battery.
7. Turn the engine on the starter for about 30 seconds with terminal 15 on the ignition coil disconnected, in order to fill the lubricating system of the turbo before the engine starts running.

Charge pressure regulator

The following operations are included:
- Removal, fitting
- Dismantling, assembly (charge pressure regulator removed)
- Grinding of valve (charge pressure regulator dismantled)
- Changing the diaphragm (in the car)
- Measuring the charging pressure
- Adjusting the charging pressure
- Cleaning the diaphragm housing (every 24 000 miles)
- Sealing the charge pressure regulator

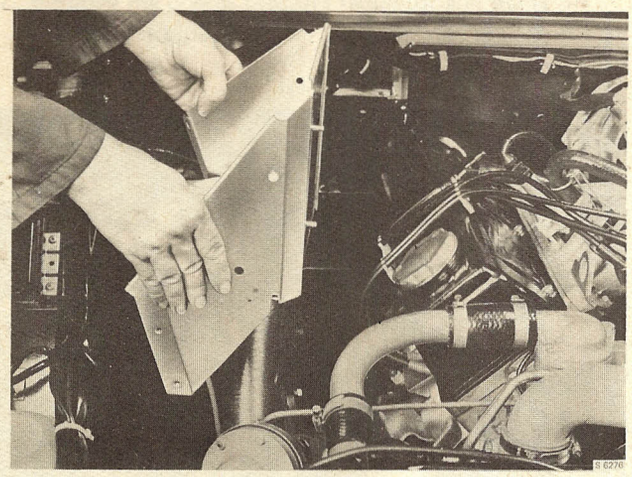


CHARGE PRESSURE REGULATOR

1. Bellows pipe
2. Valve
3. Regulator housing
4. Gasket
5. Bearing housing
6. Gasket
7. Heat shield
8. Gasket
9. Diaphragm housing
10. Flat washer
11. Inner diaphragm washer
12. Diaphragm
13. Outer diaphragm washer
14. Diaphragm nut
15. Inner spring seating
16. Spring
17. Inner spring seating
18. Lock nut
19. Diaphragm housing cover

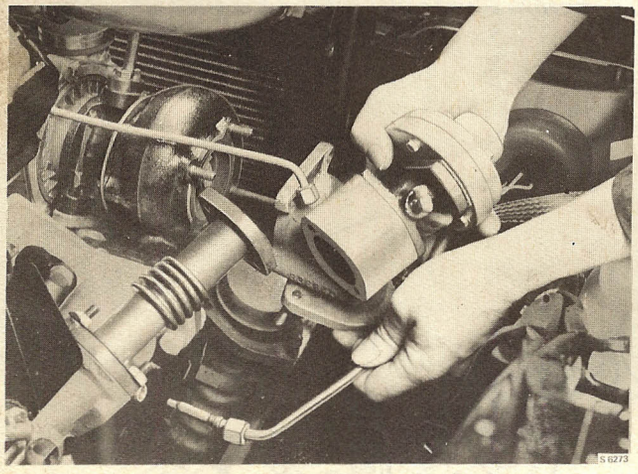
Removing the charge pressure regulator

1. Remove the battery, heat shield and battery shelf.



REMOVING THE BATTERY SHELF

2. Disconnect the exhaust and cooling air lines from the charge pressure regulator.
3. Unbolt the exhaust manifold flange. Save the taper seal ring and plug the exhaust pipe.
4. Prize up the locking plate and remove the bolts from the bellows pipe.
5. Prize up the locking plate, remove the bolts from the turbo and remove the charge pressure regulator.



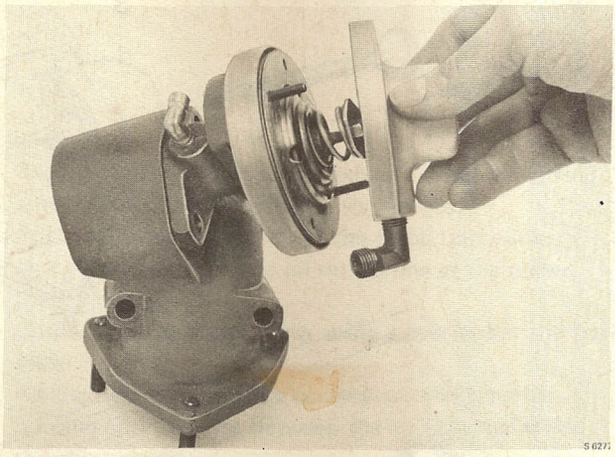
REMOVING THE CHARGE PRESSURE REGULATOR

Fitting the charge pressure regulator

1. Bolt the charge pressure regulator to the turbo (fit new gasket) and lock the nuts by means of locking plates.
2. Fit the bellows pipe retaining bolts, locking them by means of the locking plate.
3. Remove the plug from the exhaust pipe and connect the pipe with taper seal ring to the charge pressure regulator housing.
4. Connect the exhaust and cooling air lines.
5. Fit the battery shelf and the battery.
6. Test drive the car, checking the charging pressure and adjusting as necessary.
7. Seal the charge pressure regulator and fit the heat shield.

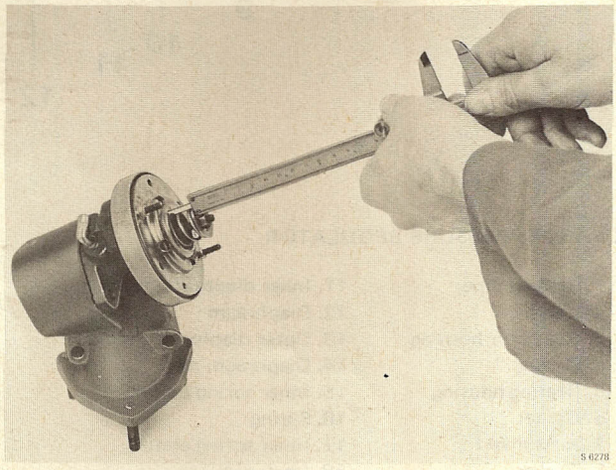
Dismantling the charge pressure regulator
(Charge pressure regulator removed)

1. Remove the diaphragm housing cover.

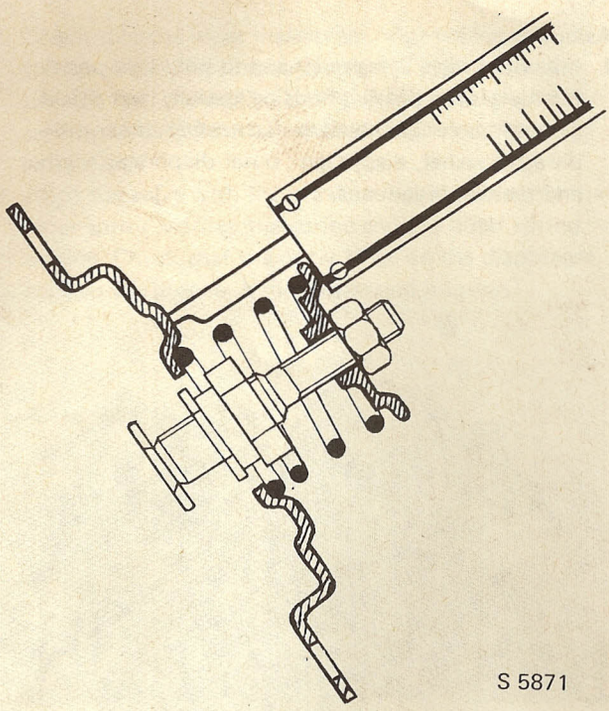


REMOVING THE DIAPHRAGM HOUSING COVER

2. Measure and note the length of the compressed spring (distance between the outer and inner spring seatings, see illustration). Measure the length at two diametrically opposed points and note the mean value.



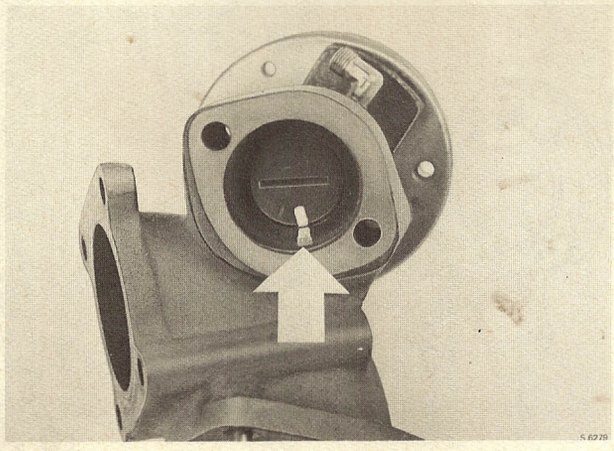
MEASURING THE LENGTH OF THE COMPRESSED SPRING



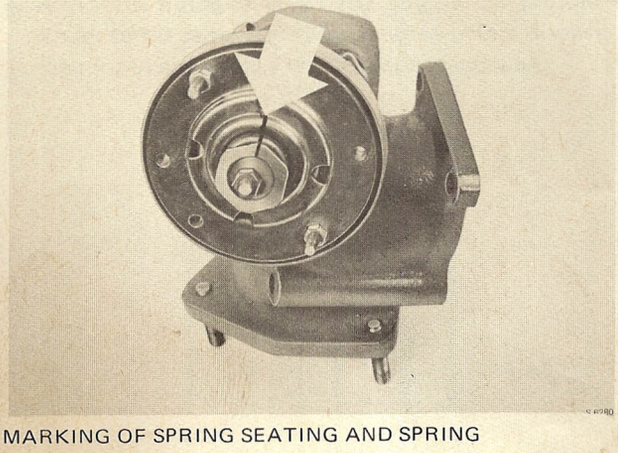
S 5871

MEASURING THE LENGTH OF THE COMPRESSED SPRING

3. Mark the position of the valve and outer spring seating so that they can be refitted in the same position.



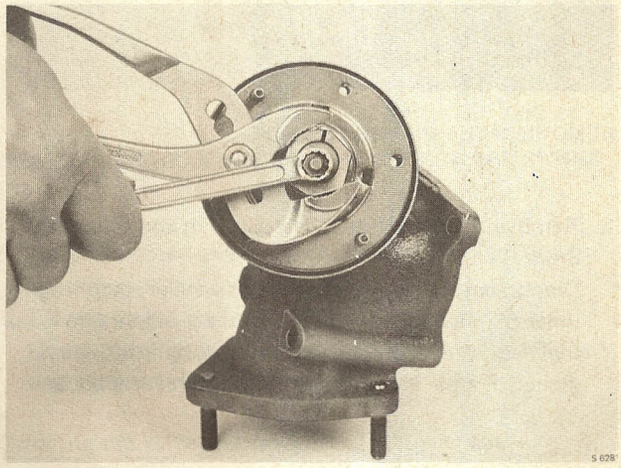
MARKING THE VLAVE FOR FITTING



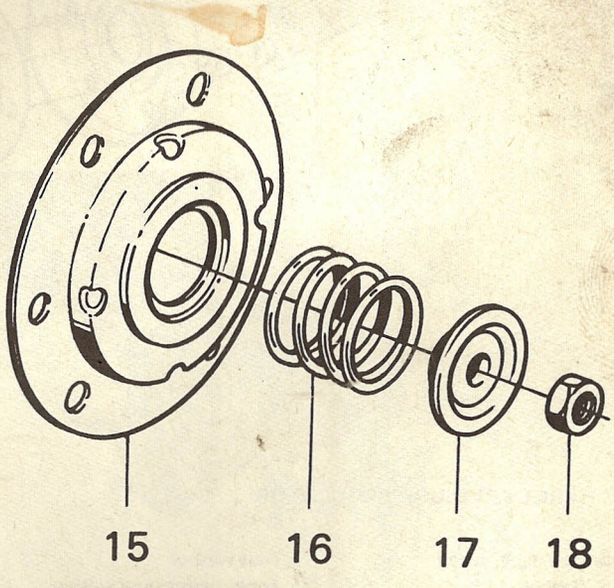
MARKING OF SPRING SEATING AND SPRING

4. Loosen the lock nut using a 10 mm ring spanner and polygrip pliers and then remove the nut, the outer spring seating, the spring and the inner spring seating.

> CAUTION
> Always grip the valve seat when removing the spindle nut to avoid damaging the diaphragm.



REMOVING THE LOCK NUT

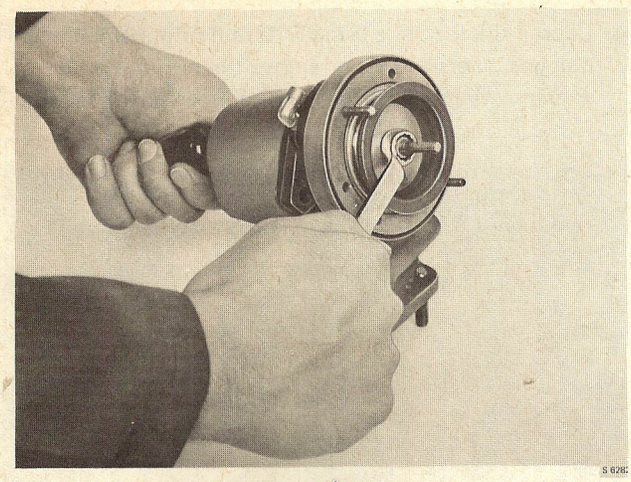


S 5872

THE CHARGE PRESSURE REGULATOR SPRING

15. Inner spring seating
16. Spring
17. Outer spring seating
18. Lock nut

5. Remove the diaphragm nut (13 mm ring spanner). Prevent the valve from turning by inserting a short, thick screwdriver in the groove in the valve disc.

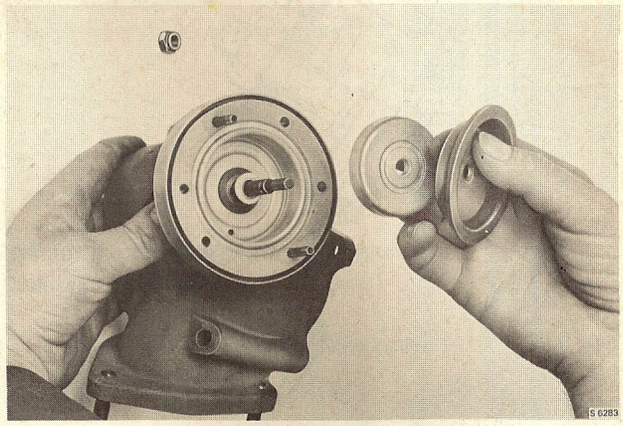


REMOVING THE DIAPHRAGM NUT

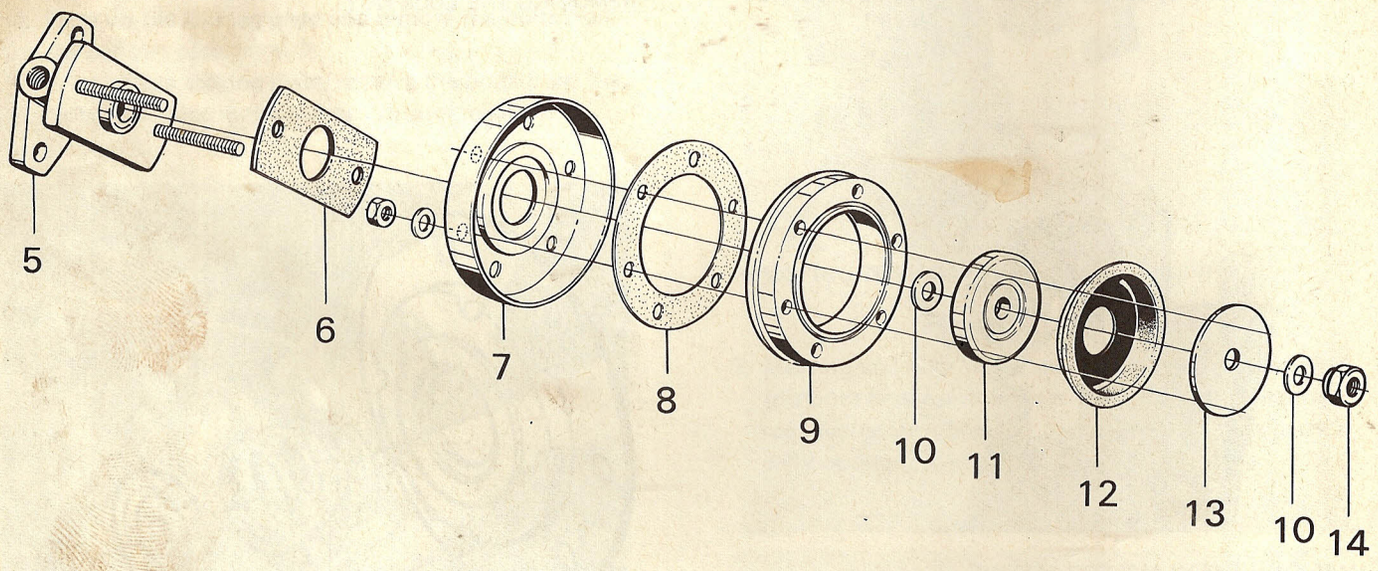
6. Remove the parts (see illustration) in the following order:
   Diaphragm nut, outer diaphragm washer, diaphragm, inner diaphragm washer, flat washer, diaphragm housing, gasket, heat shield, gasket, bearing housing and gasket. Fit the valve assembly in the reverse order.

Assembly

1. Insert the valve using one hand to hold it in position. Fit the gasket, bearing housing, gasket, heat shield, gasket, diaphragm housing, flat washer, inner diaphragm washer, diaphragm, outer diaphragm washer and the diaphragm nut.



FITTING THE DIAPHRAGM

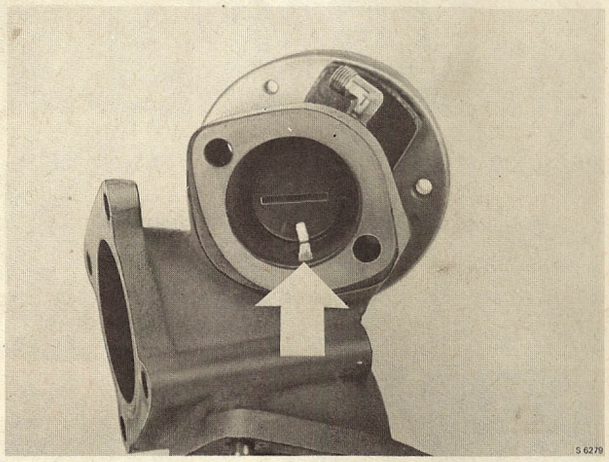


S 6318

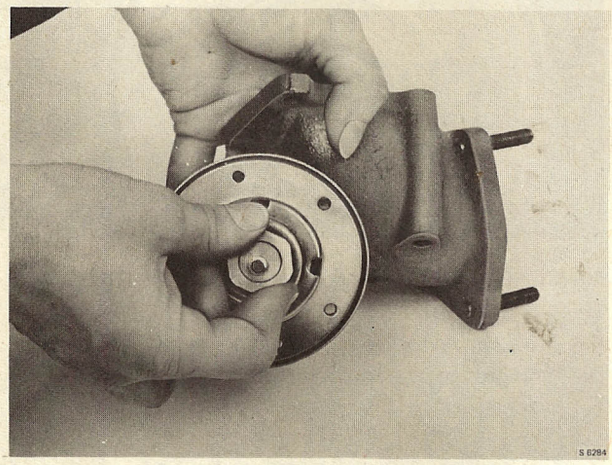
CHARGE PRESSURE REGULATOR

5. Bearing housing
6. Gasket
7. Heat shield
8. Gasket
9. Diaphragm housing
10. Flat washer
11. Inner membrane washer
12. Diaphragm
13. Outer diaphragm washer
14. Diaphragm nut

2. Check that the inner diaphragm ridge engages the groove in the diaphragm washer and tighten the diaphragm nut, preventing the valve from turning by inserting a short, thick screwdriver in the groove in the valve disc.
3. Align the valve with the previous markings and fit the inner spring seating, the spring and the outer spring seating. Check that the outer ridge on the diaphragm engages the groove in the diaphragm housing.

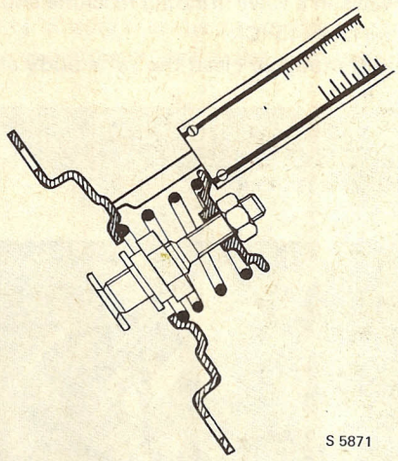


MARKING THE VALVE FOR FITTING



FITTING THE OUTER SPRING SEATING

4. Adjust the spring roughly by setting the compressed length to the same value as was noted before dismantling (or in accordance with the specifications).

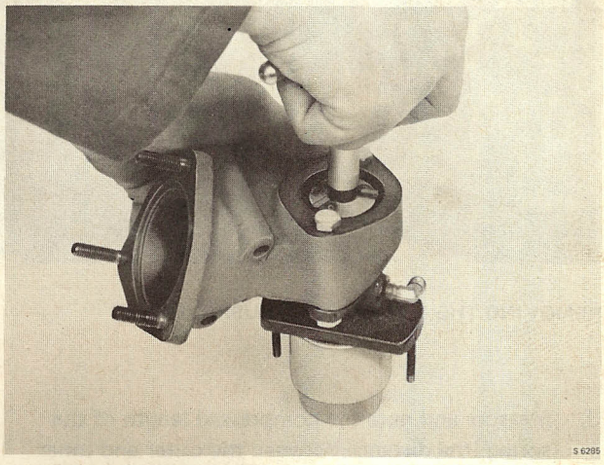


MEASURING THE LENGTH OF THE COMPRESSED SPRING

5. Fit and tighten the lock nut, using polygrip pliers to hold the spring seating.
6. Fit the gasket and cover to the diaphragm housing. Check the charging pressure and adjust as necessary, and then seal the charge pressure regulator.

Grinding the valve and valve seat (charge pressure regulator removed)

1. Secure the valve body and bearing housing together by means of two bolts.
2. Fit guide pin 83 92 805 in the valve spindle guide.
3. Grind the valve seat using a 45° valve cutter. (The grinding work will be easier if the hard surface is first removed by means of emery cloth.)

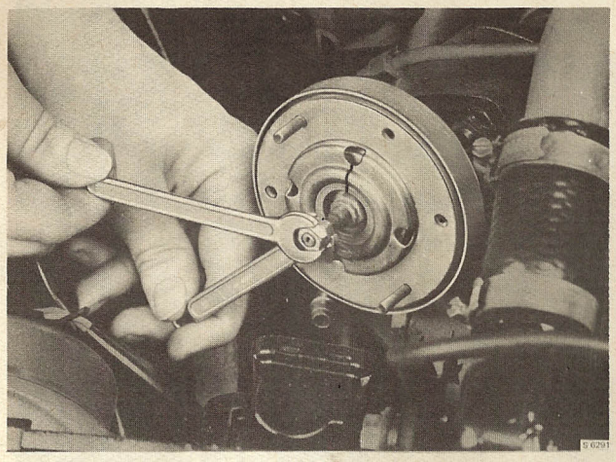


GRINDING THE VALVE SEAT

CAUTION

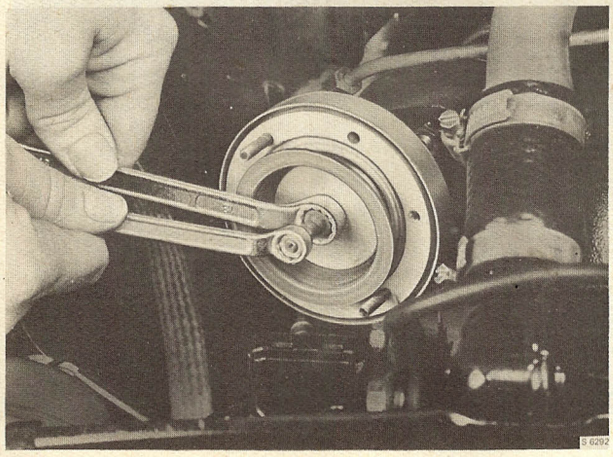
Always grip the valve seat when removing the spindle nut to avoid damaging the diaphragm.

6. Fit two nuts to the outer thread on the valve spindle and tighten both nuts.



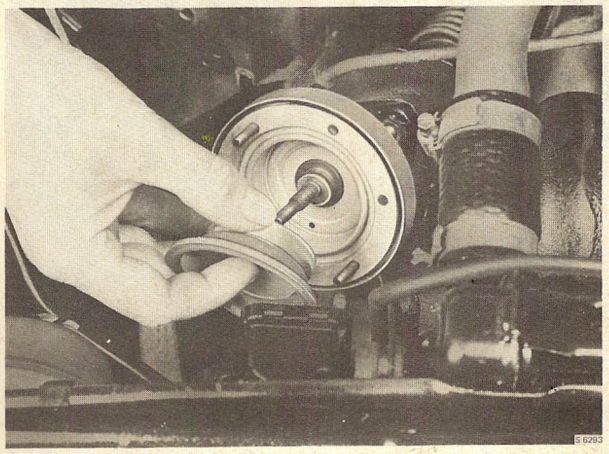
FITTING THE NUTS TO THE OUTER THREAD ON THE SPINDLE

7. Holding the two nuts, undo the diaphragm nut.



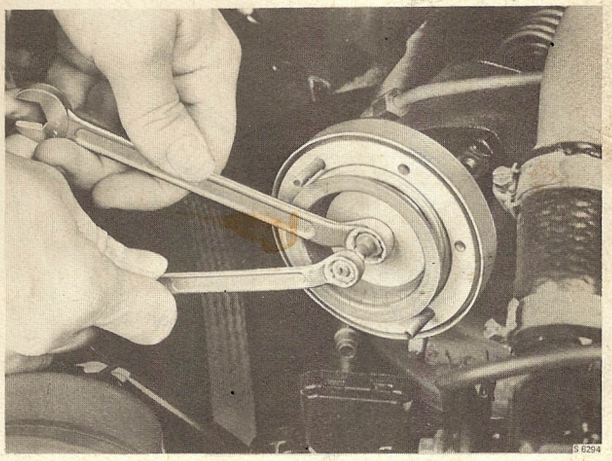
REMOVING THE DIAPHRAGM NUT WHEREUPON THE TWO NUTS ARE GRIPPED

8. Remove the two nuts, the diaphragm nut, the outer diaphragm washer, the diaphragm and the inner diaphragm washer.
9. Clean the diaphragm housing and all dismantled parts.
10. Check that the flat washer inside the inner diaphragm washer is in position.
11. Fit the diaphragm with the two diaphragm washers. Ensure that the inner ridge on the diaphragm engages the groove in the diaphragm washer.



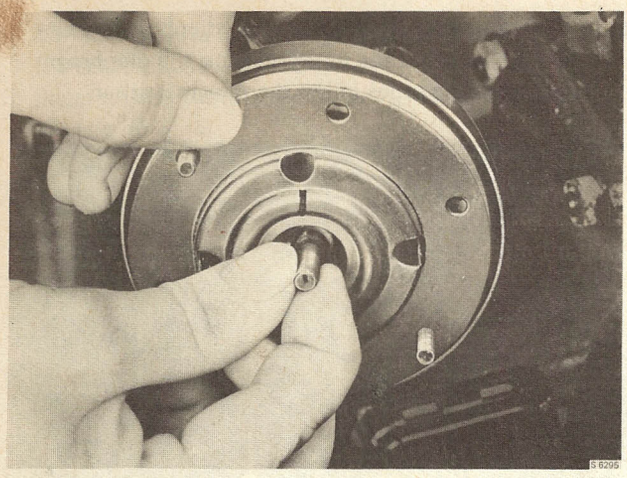
REMOVING THE DIAPHRAGM

12. Fit the diaphragm nut and the two other nuts, and tighten the diaphragm nut. Remove the other two nuts.

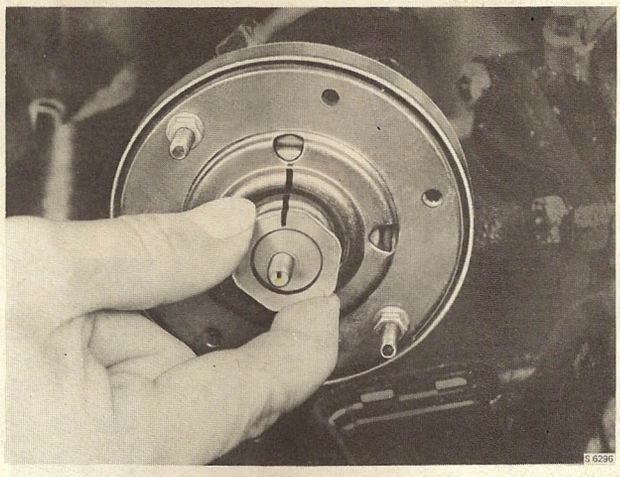


FITTING THE DIAPHRAGM NUT

13. Fit the inner spring seating and then align the valve with the previous markings.

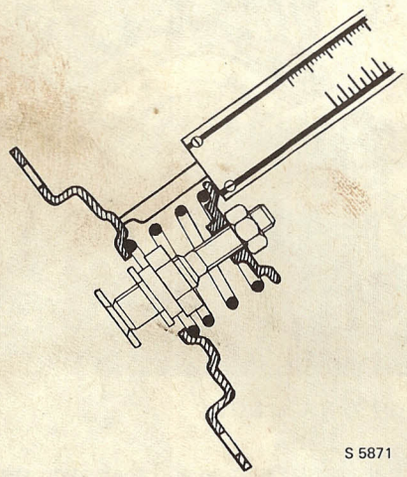


TURNING THE VALVE ACCORDING TO THE MARKS



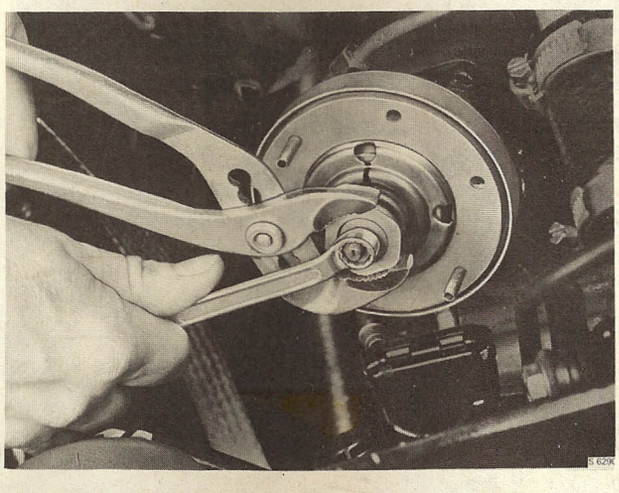
TURNING THE UPPER SPRING SEATING ACCORDING TO THE MARKS

14. Fit the spring and the outer spring seating.
15. Adjust the compressed length of the spring to the length measured on dismantling (the basic length given in the specifications is approximate). Replace and tighten the lock nut. Grip the outer spring seating by means of polygrip pliers.



S 5871

ADJUSTING THE COMPRESSED SPRING LENGTH



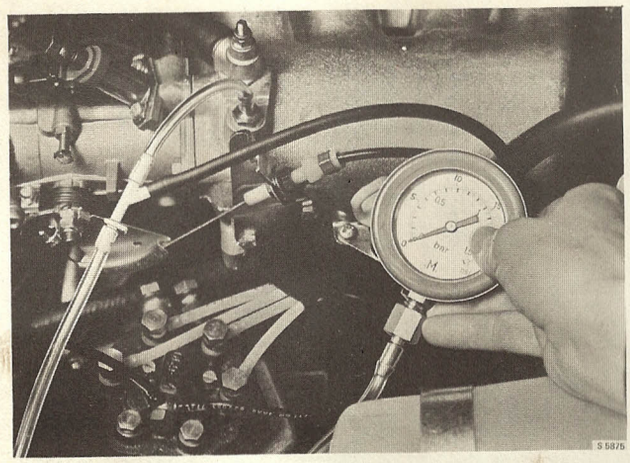
FITTING THE DIAPHRAGM NUT

16. Fit the gasket and diaphragm housing cover.
17. Fit the heat shield.
    Check the charging pressure and adjust as necessary, and then seal the charge pressure regulator.

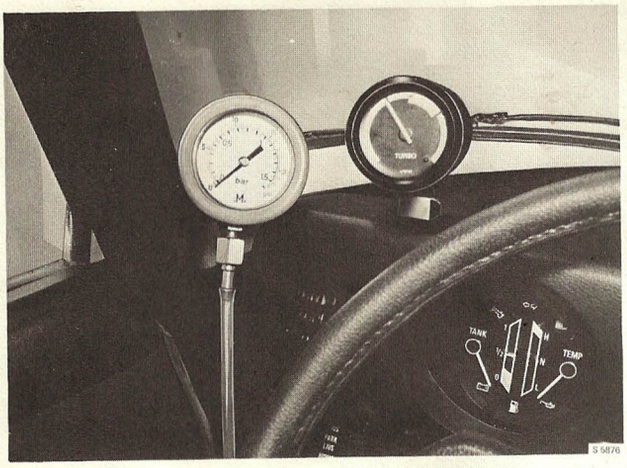
Measuring the charging pressure

The charging pressure is measured while the car is being test driven and is indicated by means of a special pressure gauge connected to the inlet manifold.

1. Connect pressure gauge 83 92 813 between the nipple on the inlet manifold and the line to the pressure switch. Run the hose into the passenger compartment and place the pressure gauge on the left-hand corner of the instrument panel.

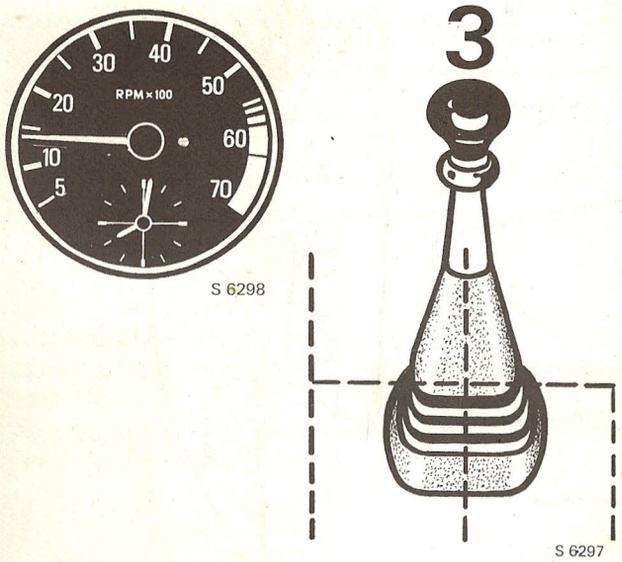


EQUIPMENT FOR MEASURING THE CHARGING PRESSURE



MEASURING THE CHARGING PRESSURE

2. Warm up the engine properly by driving the car on the road.
3. To start the test, drive the car in 3rd gear at an engine speed lower than 1 500 rev/min.

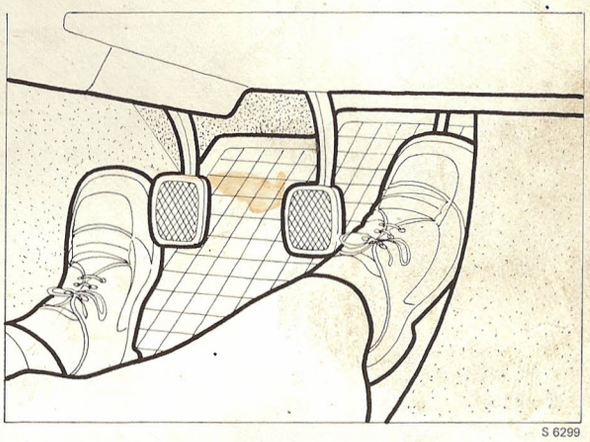


S 6298

S 6297

3RD GEAR, ENGINE SPEED LOWER THAN 1 500 REV/MIN

4. Accelerate at full throttle by pressing the accelerator down to the floor.

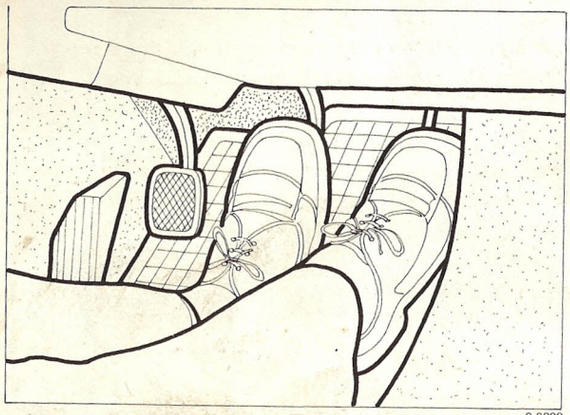


S 6299

DEPRESSING THE ACCELERATOR TO THE FLOOR

5. As the engine speed approaches 3 000 rev/min, apply the brakes (still keeping the accelerator pressed down)

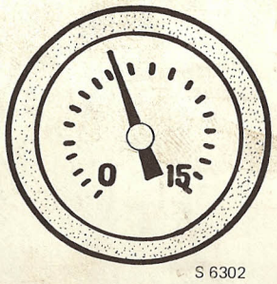
to put the car under full load at 3 000 rev/min and note the maximum pressure indicated by the pressure gauge.



S 6300

APPLYING THE BRAKES WITH THE ACCELERATOR DEPRESSED, ENGINE SPEED 3 000 REV/MIN

S 6301



S 6302

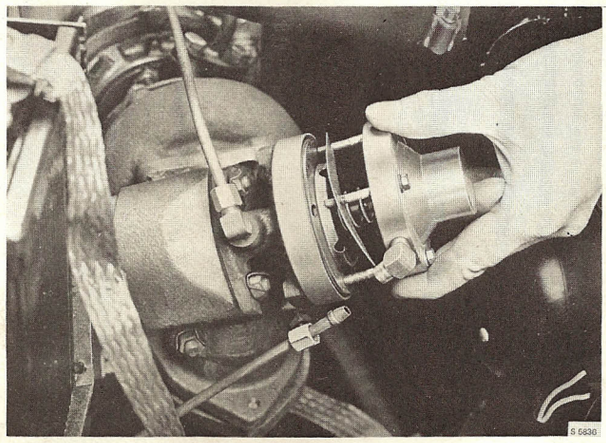
THE MAXIMUM PRESSURE IS INDICATED ON THE PRESSURE GAUGE

Adjusting the charging pressure

(After test driving)

If the reading on the pressure gauge during test driving deviates from the specified value, adjustment based on the readings recorded can be carried out as follows:

1. Remove the heat shield mounted in front of the charge pressure regulator.
2. Disconnect the exhaust line from the cover on the diaphragm housing cover.
3. Remove the diaphragm housing cover.

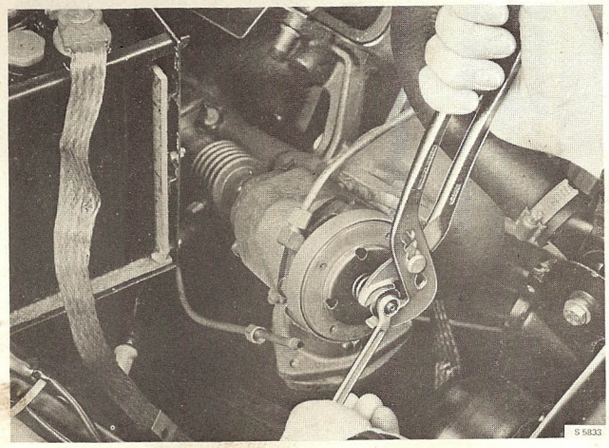


S 5830

REMOVING THE DIAPHRAGM HOUSING COVER

4. Undo the lock nut using a 10 mm ring spanner. Grip the spring seating by means of polygrip pliers.

> CAUTION
>
> Always grip the valve seat when removing the spindle nut to avoid damaging the diaphragm. Never attempt to turn the valve.

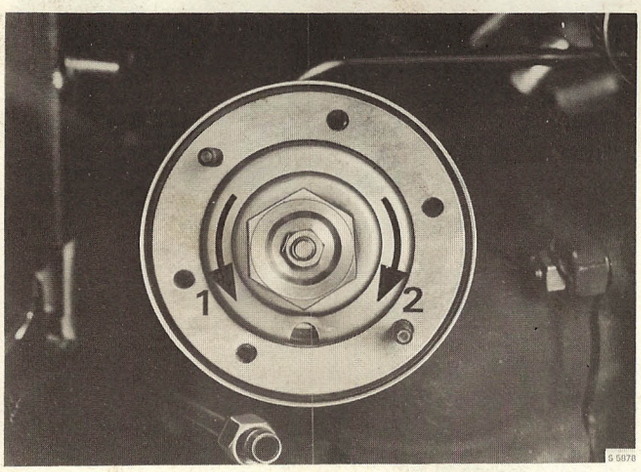


S 5833

LOOSENING THE LOCK NUT

5. Adjust the tension of the spring by rotating the spring seating clockwise (inwards) or counter-clockwise (outwards) in accordance with the following table. Ensure that the valve does not turn as the spring seating is rotated. Thereafter, retighten the lock nut.

Charging pressure	
Charging pressure reading from test driving (bar)	Screw the spring seating in or out the following number of turns
0.86	1 out
0.82	3/4 out
0.78	1/2 out
0.74	1/4 out
0.70	CORRECT VALUE
0.66	1/4 in
0.62	1/2 in
0.56	3/4 in
0.54	1 in

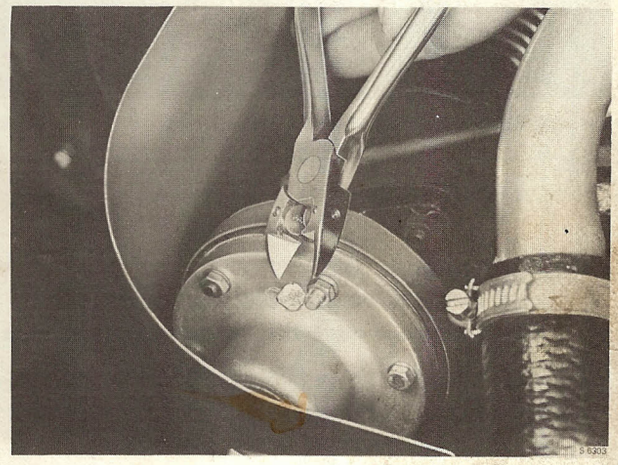


ADJUSTMENT
1. Counter-clockwise
2. Clockwise

6. Replace the cover and gasket, exhaust line and heat shield.
7. Test drive the car and check the charging pressure.
8. Seal the charge pressure regulator.

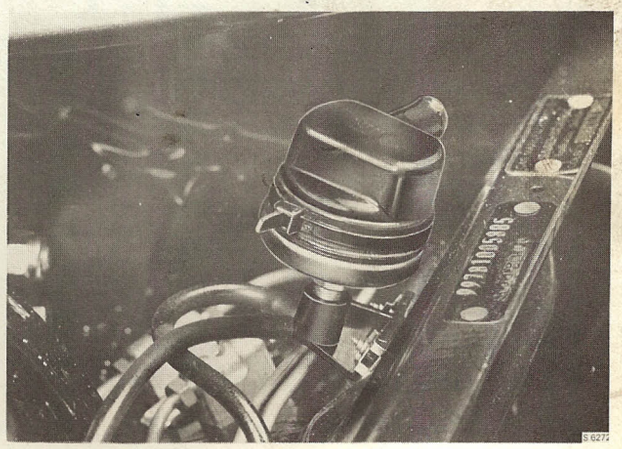
Cleaning the charge pressure regulator
(In conjunction with inspection)
1. Remove the heat shield.
2. Remove the exhaust line and the diaphragm housing cover.
3. Dry and clean the diaphragm housing using a brush.
4. Replace the cover, exhaust line and heat shield.

Sealing the charge pressure regulator
To avert unauthorised adjustment of the charging pressure, the charge pressure regulator must be sealed. Fit the seal to the long diaphragm bolt which has a hole for the purpose.
Authorized Saab workshops will be supplied with sealing pliers and special seals.



SEALING THE CHARGE PRESSURE REGULATOR

Pressure switch

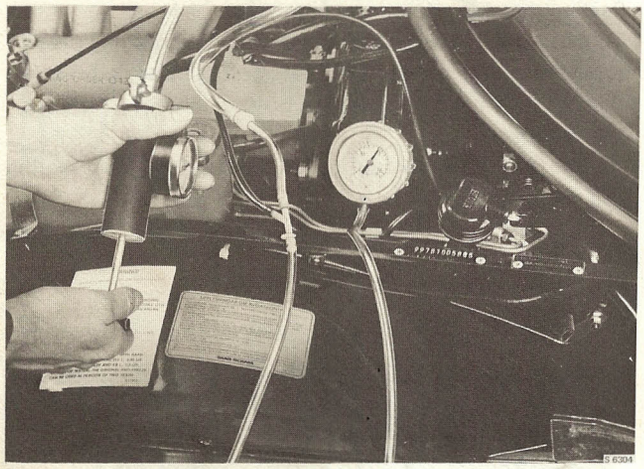


PRESSURE SWITCH

Checking
1. Start the engine and have it idle.
2. Disconnect the hose to the pressure switch at the inlet

manifold and connect gauge 83 92 813, together with a suitable pump (e.g. cooling system tester) to the pressure switch hose.

3. Increase the pressure by means of the pump and check the pressure at which the engine cuts out. Refer to the specifications in section 0.

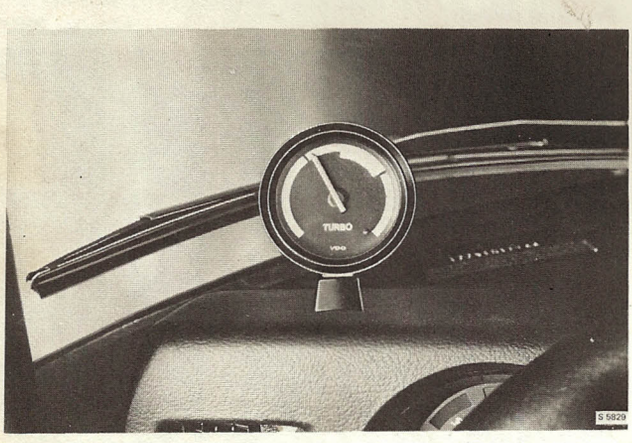


CHECKING THE PRESSURE SWITCH

Changing the pressure switch

To change the pressure switch, remove the rubber cover and cables and then unscrew the pressure switch from its mounting.

Turbo pressure gauge



TURBO PRESSURE GAUGE

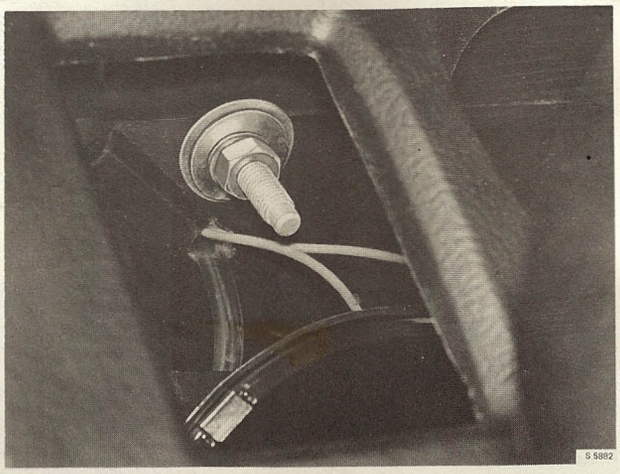
Checking

Check the turbo pressure gauge following the same procedure as that for checking of the pressure switch. At maximum charging pressure, the needle should be within the wide orange zone.

At the pressure switch actuating pressure, the needle should be in front of the limit between the orange and the red zones.

Removal and installation

1. Remove the three screws at the bottom of the safety padding on the instrument panel side of the car.
2. Pull the safety padding away to release the spring clips (see Service Manual, section 853).
3. Disconnect the hose at the joint below the padding and disconnect the electric cables. Undo the nut underneath the safety padding and remove the instrument.



TURBO PRESSURE GAUGE INSTALLATION

Refit in the reverse order.

To dismantle the instrument, e.g. to replace a bulb, etc., remove the screw at the front of the casing.

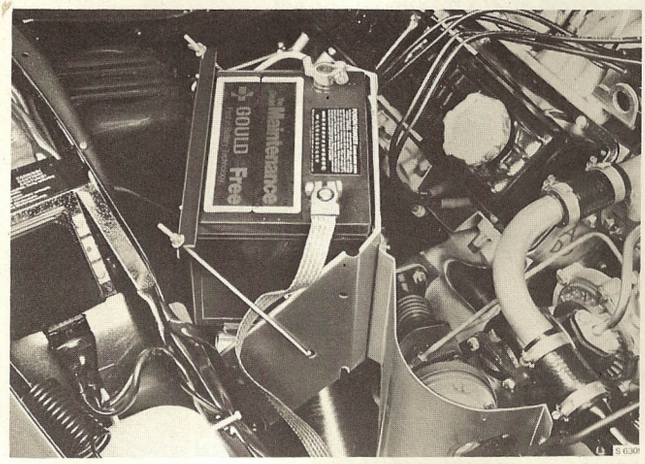
Fault diagnosis chart, Saab Turbo

FAULT	CAUSE	REMEDY
Noise or vibration from the turbo compressor	Poor lubrication of the turbo shaft bearing	Check the oil pressure and flow to the turbo. If the fault should persist after remedial action (permanent bearing damage) exchange the turbo compressor.
	Leakage in the induction or exhaust system	Tighten leaking connections and replace defective seals and gaskets
	Unbalanced turbo shaft owing to damage	Exchange the turbo compressor
Insufficient charging pressure	Leakage between the compressor and cylinder head or between the cylinder head and turbine	Tighten leaking connections and replace defective seals and gaskets
	Incorrect setting of charging pressure	Adjust the charge pressure regulator
	Valve in charge pressure regulator sticks in open position	Overhaul the charge pressure regulator
	Partially clogged exhaust system	Clean or replace exhaust system
	Clogged air cleaner	Change cartridge
	Binding turbo shaft	Exchange turbo compressor
Excessive charging pressure	Leakage at exhaust pressure line connections	Tighten; if necessary, replace nipples
	Clogged exhaust pressure line	Remove and clean
	Damaged diaphragm in charge pressure regulator	Replace diaphragm
	Valve in charge pressure regulator sticks in closed position	Overhaul the charge pressure regulator
	Ice formation in exhaust pressure line. (Excessive pressure occurs 1–2 min after cold start when ambient temperature below freezing)	Avoid heavy loading of engine immediately after cold starting
	Incorrect setting of charging pressure	Adjust charge pressure regulator

FAULT	CAUSE	REMEDY
Metallic noise from charge pressure regulator	Play in regulator valve	Overhaul the charge pressure regulator
	Spring insufficiently offset in charge pressure regulator	Adjust position of spring (replace as necessary)
Engine knocking (pinking)	Excessive charging pressure	Adjust charging pressure
	Unsuitable fuel (octane too low)	Change fuel
	Ignition setting too far advanced	Adjust timing
Oil leakage at turbo shaft seals (oil fumes in exhaust)	Poor return flow from turbo: – Clogged return line – Excessive crankcase pressure	Check return line Check crankcase ventilation
	Turbo unit seals damaged	Exchange turbo compressor

Battery

Turbo cars are equipped with a service-free battery. In common with conventional batteries, this battery contains highly corrosive electrolyte and also produces an explosive gas which is emitted into the atmosphere. The battery must therefore be handled with the same care as conventional batteries.



BATTERY

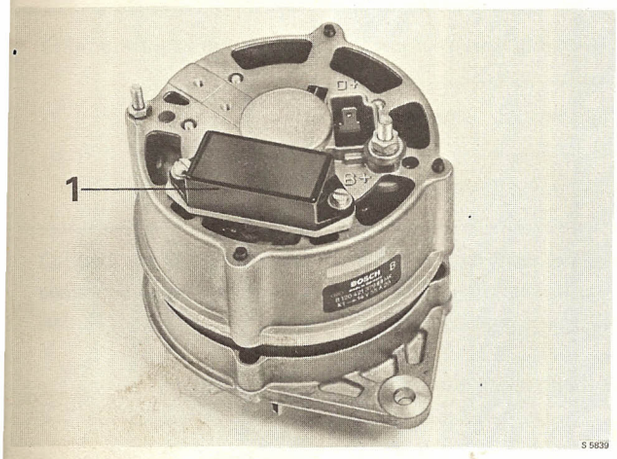
The battery is located in a specially removable shelf. Cooling air is supplied to the battery shelf by means of a hose running from a special duct in the right-hand side of the spoiler.

Starter motor

The starter motor cables are equipped with special insulation (silicone rubber) to protect them against high temperature.

ALTERNATOR

The alternator has a maximum charging capacity of 65 A and is equipped with charging regulator which forms an integral unit with the brush housing.



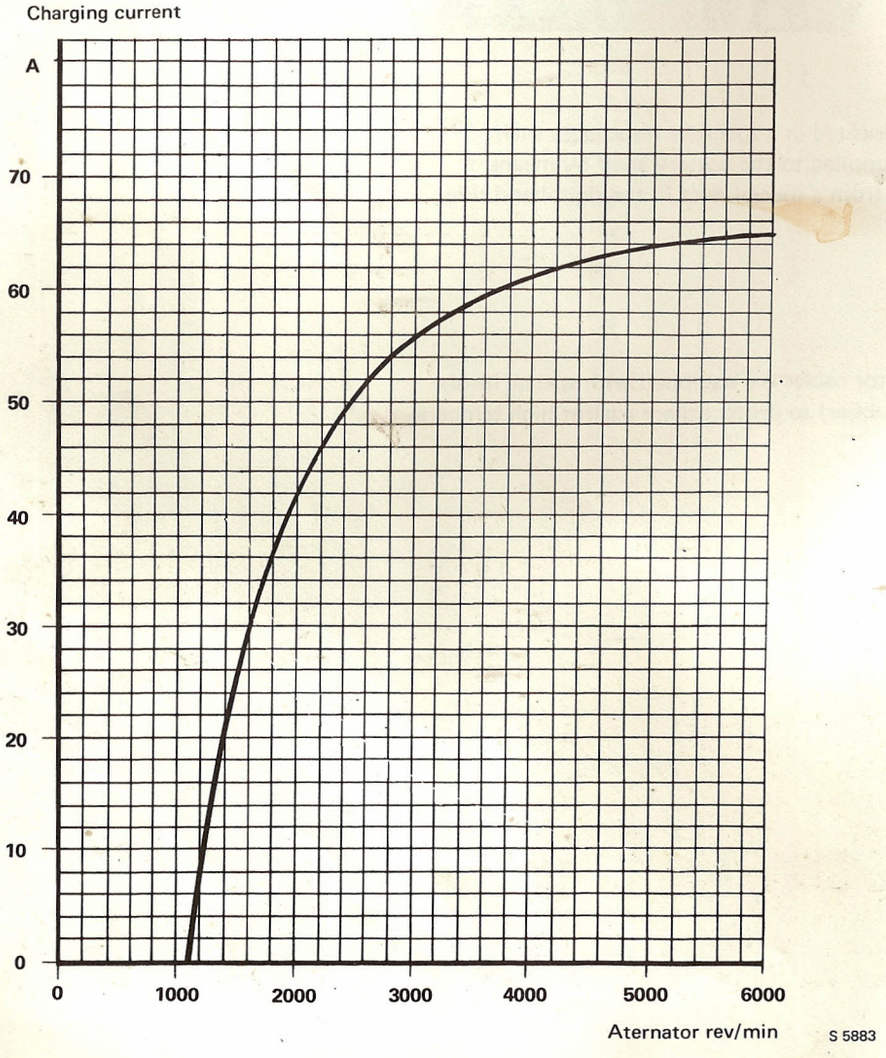
ALTERNATOR
1. Charging regulator

The alternator otherwise corresponds to earlier Bosch alternators of this type.
For dismantling, assembly and testing, refer to the service manual, M 69–74, section 321. The following altered test specifications apply:

A. Testing the rotor.
Resistance in rotor winding: 2.8 ohm ± 10 % (measured across slip rings).

B. Testing the stator.
Resistance in stator winding: 0.10 ohm ± 10 % (rectifiers disconnected).

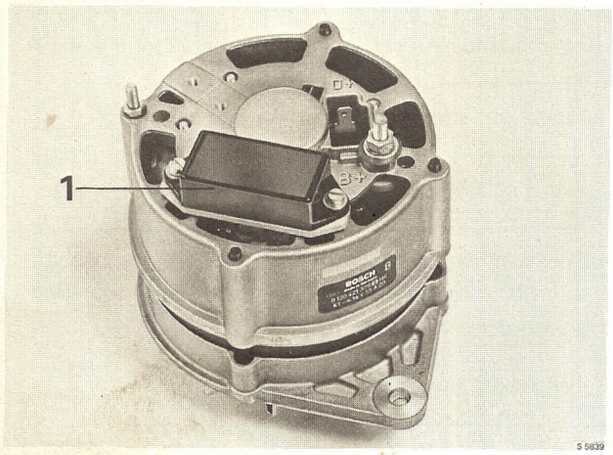
C. Testing at 2/3 maximum current.
At 2 100 rev/min the alternator should deliver 44 A.



AMPERAGE OUTPUT DIAGRAM
14 V constant voltage

ALTERNATOR

The alternator has a maximum charging capacity of 65 A and is equipped with charging regulator which forms an integral unit with the brush housing.



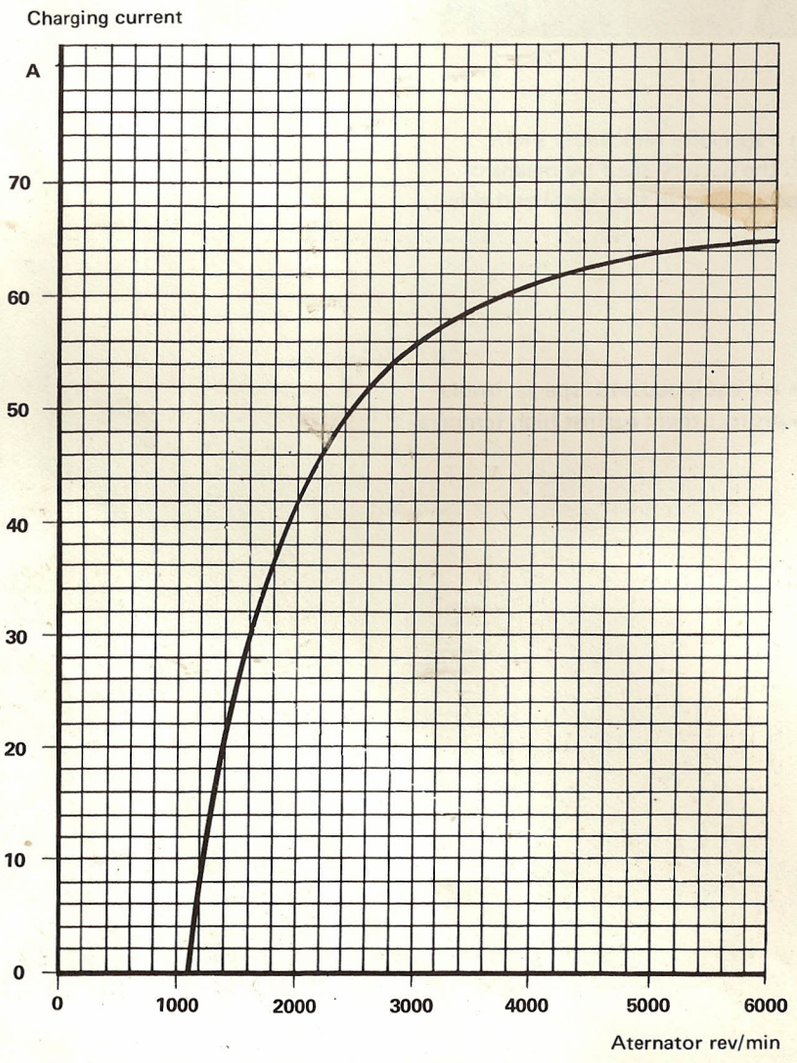
ALTERNATOR
1. Charging regulator

The alternator otherwise corresponds to earlier Bosch alternators of this type.
For dismantling, assembly and testing, refer to the service manual, M 69—74, section 321. The following altered test specifications apply:

A. Testing the rotor.
Resistance in rotor winding: 2.8 ohm ± 10 % (measured across slip rings).

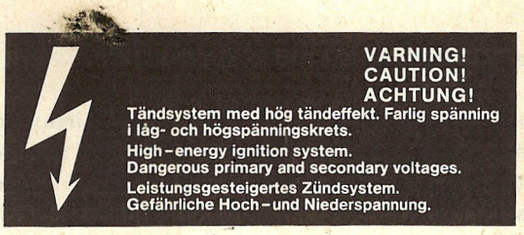
B. Testing the stator.
Resistance in stator winding: 0.10 ohm ± 10 % (rectifiers disconnected).

C. Testing at 2/3 maximum current.
At 2 100 rev/min the alternator should deliver 44 A.



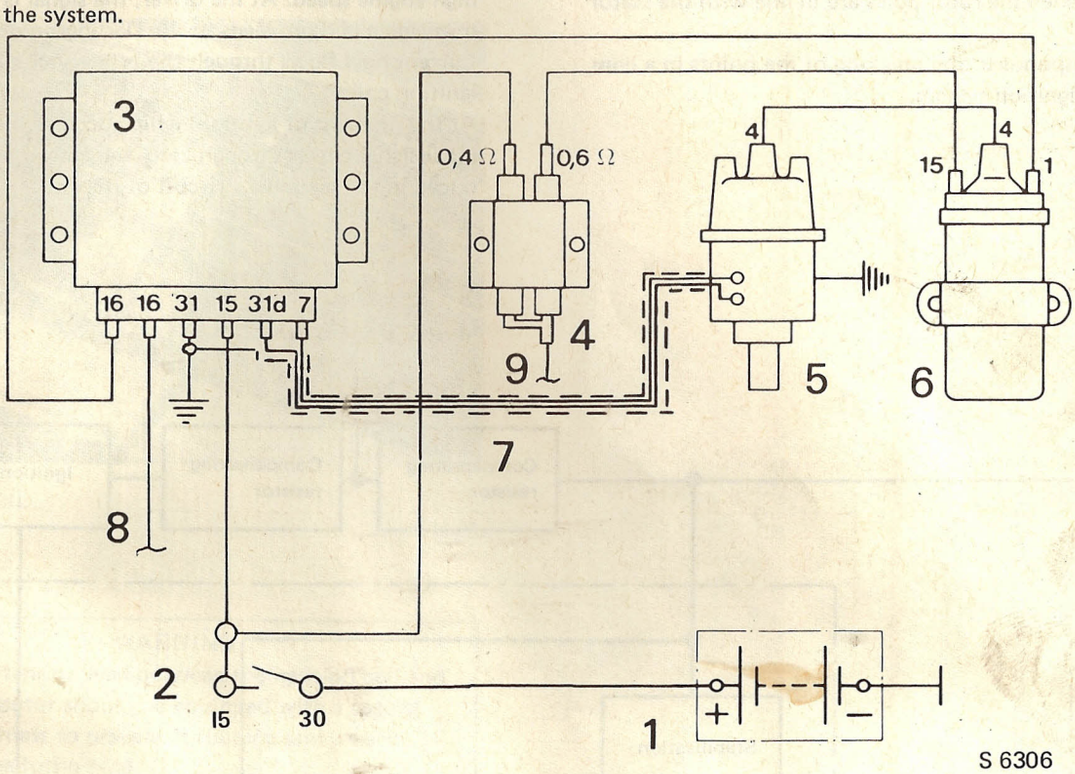
AMPERAGE OUTPUT DIAGRAM
14 V constant voltage

BREAKERLESS IGNITION SYSTEM



S 6245

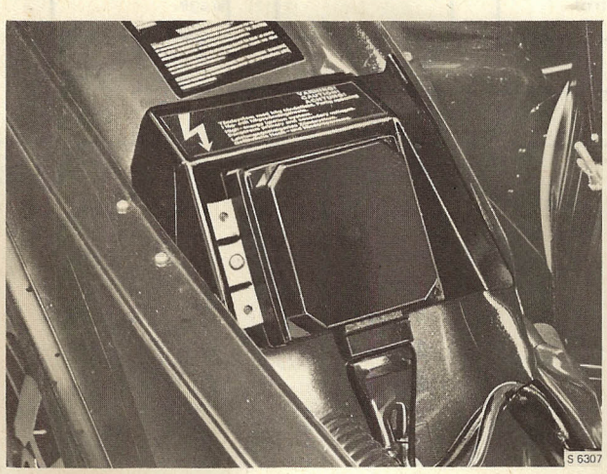
This system differs from conventional ignition systems as follows.
The breaker points in the distributor have been replaced by a transmission unit comprising an impulse transmitter, an induction coil and a rotor disc. The impulse transmitter is connected to an electronic control unit in which the signal from the distributor is converted and amplified.
The electronic control unit is connected to the ignition coil which is a high-voltage coil that has been specially adapted to the system.



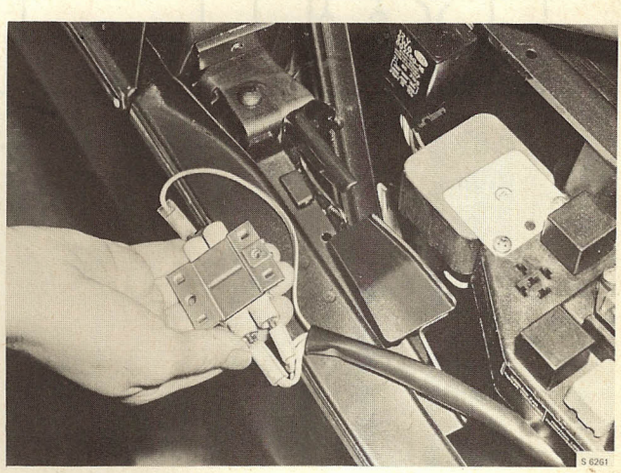
S 6306

BREAKERLESS IGNITION SYSTEM

1. Battery
2. Ignition switch
3. Electronic control unit
4. Compensating resistor
5. Distributor
6. Ignition coil
7. Screened cable
8. To fuel pump relay, tachometer and TSI socket
9. To relay terminal 87a (connected at start)


S 6307

ELECTRONIC CONTROL UNIT


S 6261

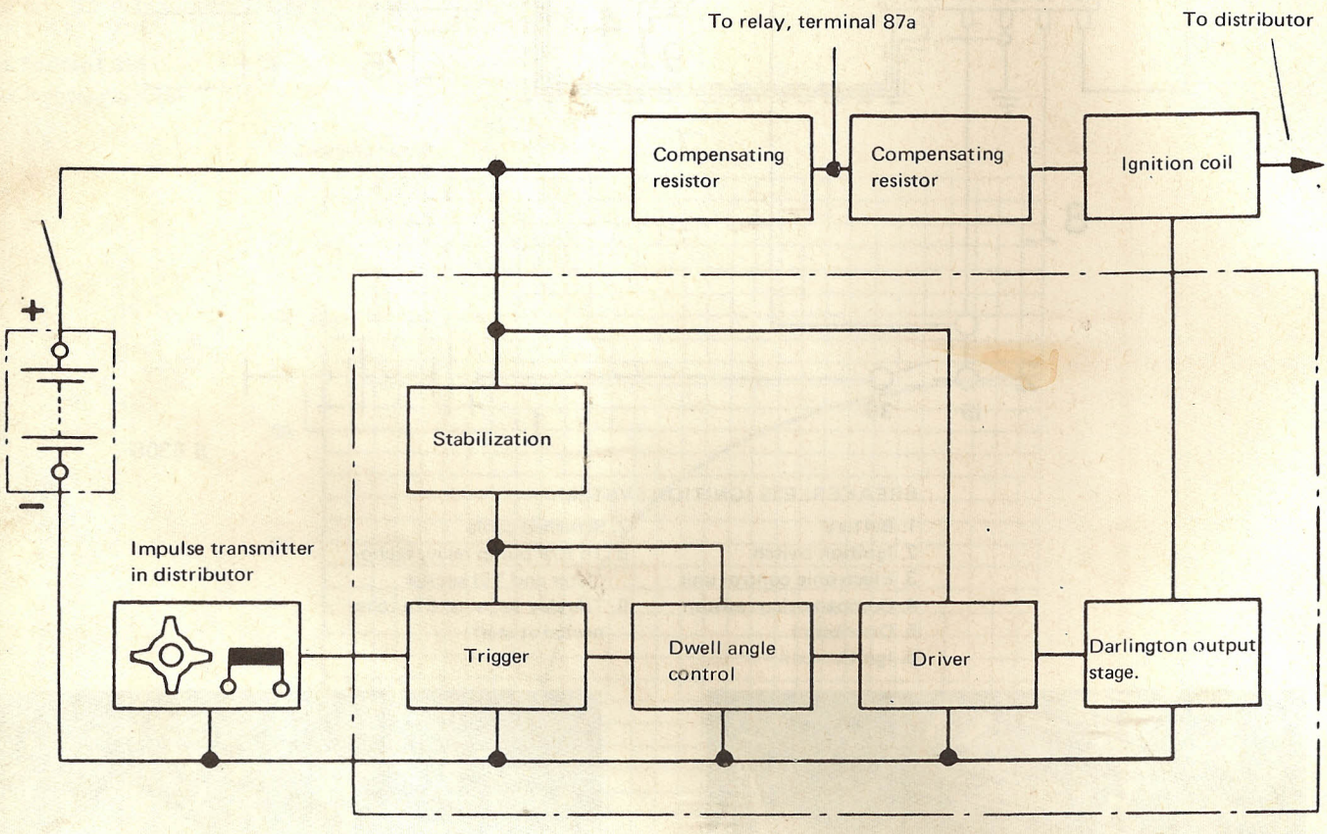
COMPENSATING RESISTOR

Operating principle

A sinusoidal control voltage is present in the induction coil, which alternates rapidly between positive and negative polarity. This alternation in polarity is utilized to transmit pulses. The pulse transmitted is governed by the engine speed and varies between 0.3 V and 100 V. The signal is then converted and amplified in the electronic control unit. When the sinusoidal voltage passes through zero, the ignition voltage is induced in the secondary circuit of the coil (when the rotor poles are in line with the stator poles).
This corresponds to the breaking of the points in a conventional ignition system.

Block diagram to illustrate operating principle

In the input stage, which is designed in the form of a Schmitt trigger, the sinusoidal signal from the distributor is amplified and converted to a rectangular pulse. The regulation of the dwell angle adapts the time of the current flow through the output transistor and the ignition coil to the engine speed. In contrast to the constant dwell angle in a conventional ignition system, the electronic system increases the dwell angle with increasing engine speed, thereby providing a high ignition voltage even at high engine speed. At the driver, the signal is amplified once again and proceeds to the Darlington output stage. Current now flows through the primary circuit of the ignition coil.
At the moment of ignition, which occurs when the sinusoidal signal passes through zero, the ignition voltage is induced in the secondary circuit of the coil.

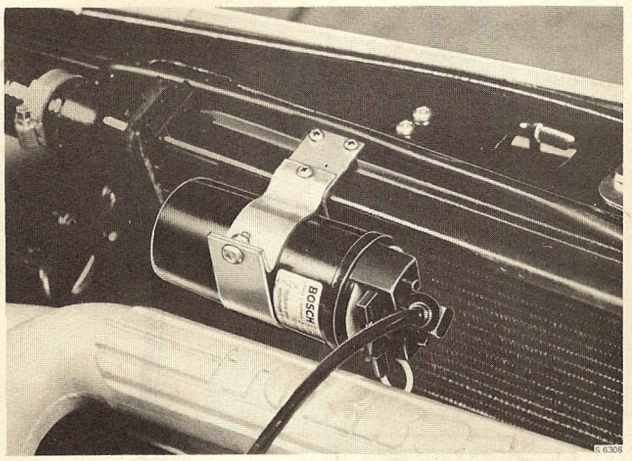


S 5902

BLOCK DIAGRAM

IGNITION COIL AND COMPENSATING RESISTOR

The ignition coil has been specially designed for this ignition system and provides a voltage about 30 % higher than the coil in a conventional system.
The compensating resistor is designed to limit the primary current at low engine speeds.
The compensating resistor is mounted on the right-hand wheel housing, underneath the electronic control unit bracket.

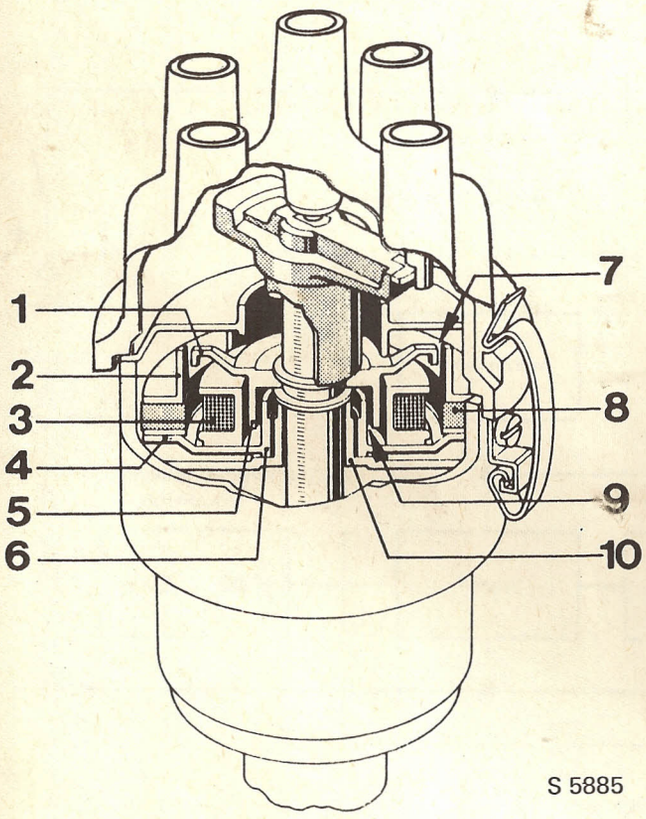


IGNITION COIL

WARNING
The high tension lead between the ignition coil and the distributor should be equipped with a special safety harness to prevent it rubbing and wearing against the turbo pipe.

DISTRIBUTOR

The size and shape of the distributor are the same as those of a conventional one. The distributor also has centrifugal and vacuum control of the ignition timing.
The electrical transmission unit is similar to a generator. The rotor reverses the direction of the magnetic field built up by the permanent magnet. The change in the magnetic field is governed by the clearance between the rotor and the stator. Since the rotor has the same number of poles as the stator, a mean value of the gap between the poles on the rotor and those on the stator is achieved, which guarantees correct timing even if there is a certain amount of play in the moving parts of the distributor. Thus, the ignition timing is not affected by mechanical wear since the circuit is broken electronically.



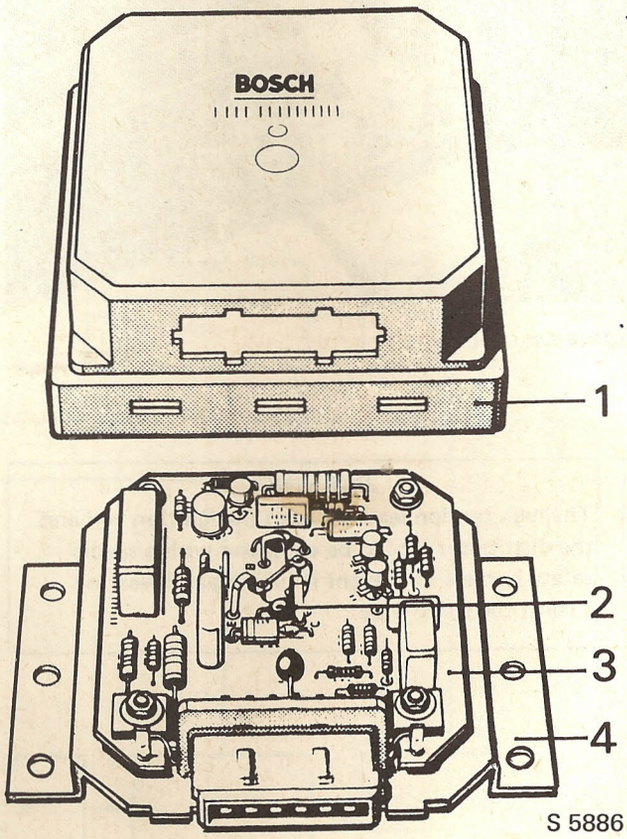
S 5885

DISTRIBUTOR

1. Rotor
2. Stator
3. Induction coil
4. Stator plate
5. Rotor sleeve
6. Stator sleeve
7. Outer gap
8. Magnet
9. Inner gap
10. Retaining plate and sleeve

Electronic control unit

The control unit is the electronic part of the ignition system in which the pulse from the distributor is converted and amplified. Control and regulation of the dwell angle are automatic.
The control unit comprises a circuit board on which an integrated circuit, transistors, condensors, diodes and resistors are mounted.
The electronic control unit is mounted on the right-hand wheel housing.



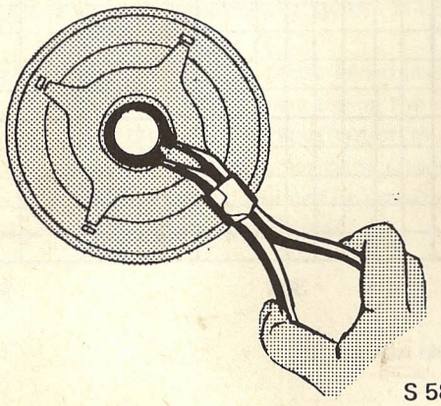
S 5886

ELECTRONIC CONTROL UNIT

1. Plastic cover
2. Power transistor
3. Printed circuit board
4. Base plate

Changing the induction coil

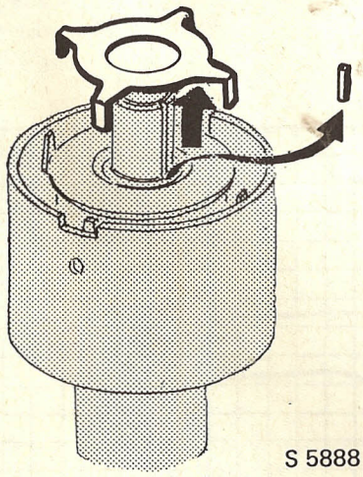
1. Remove the distributor.
2. Remove the distributor cap, rotor arm and condensate trap.
3. Remove the cable contact retainer and withdraw the contact.
4. Remove the vacuum control unit, the clip retainers and the three screws in the impulse transmitter plate.
5. Remove the rotor circlip.



S 5887

REMOVING THE ROTOR CIRCLIP

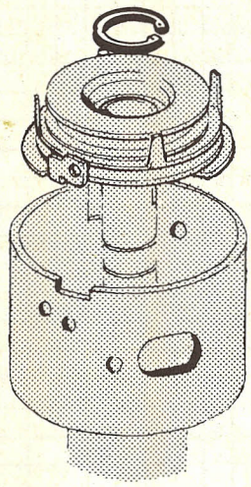
6. Lift the rotor and save the pin and the shim.



S 5888

REMOVING THE ROTOR

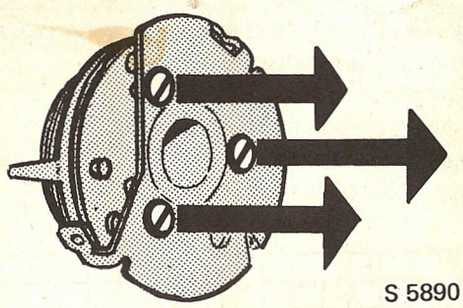
7. Remove the circlip on the impulse transmitter and lift the latter.



S 5889

REMOVE THE IMPULSE TRANSMITTER

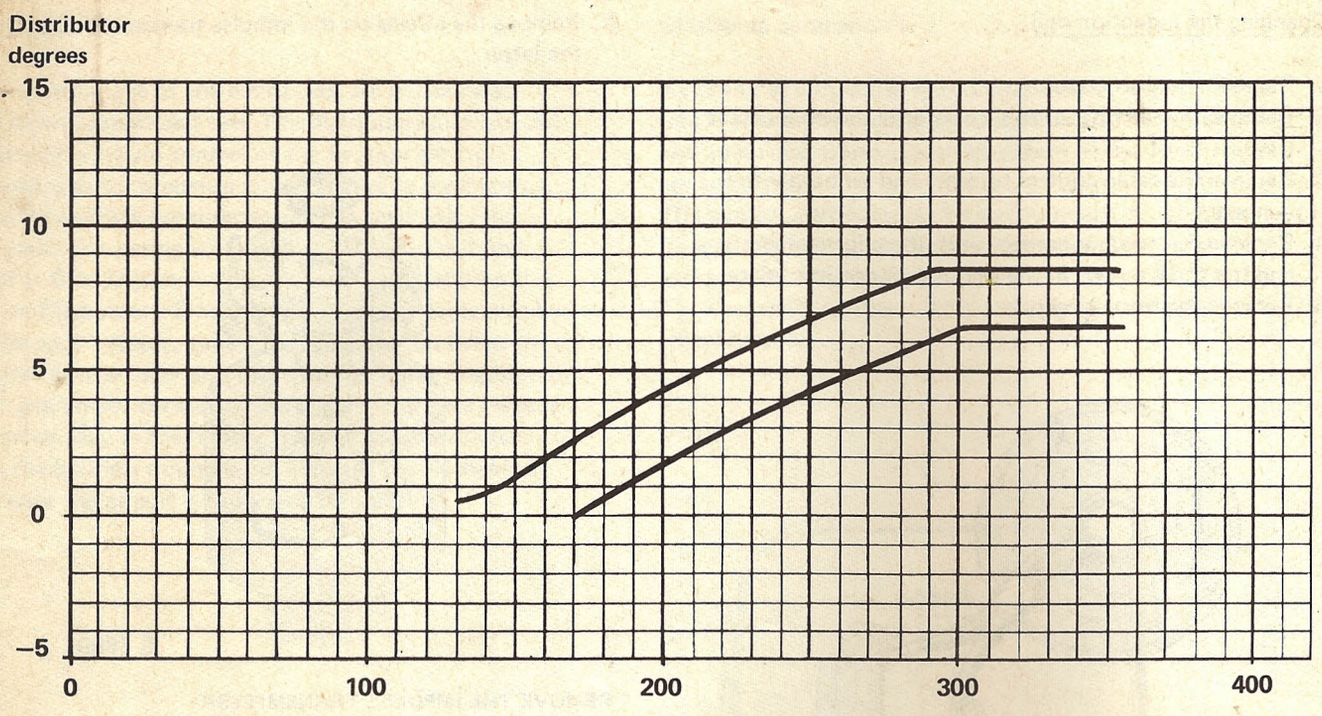
8. Remove the three screws securing the induction coil to the plate.



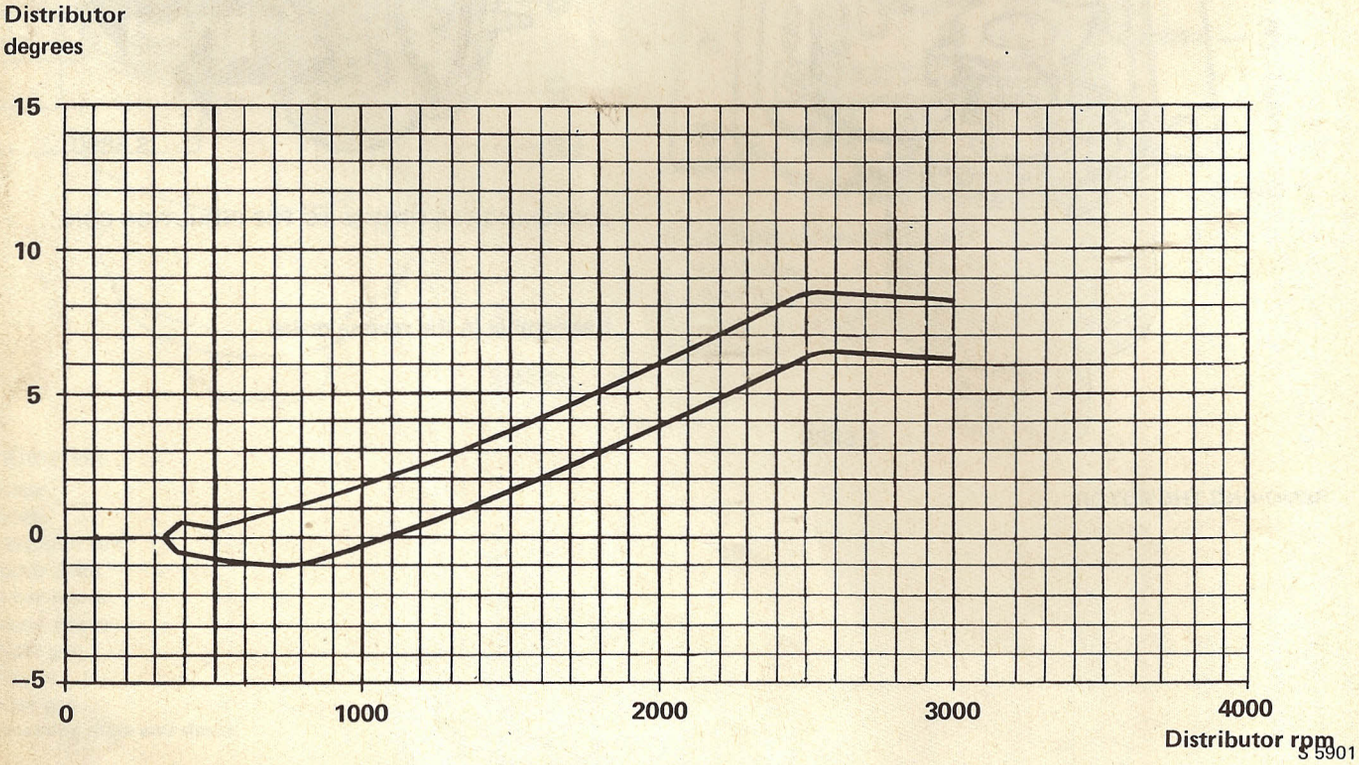
S 5890

LOOSENING THE SCREWS TO THE INDUCTION COIL

Reassemble in the reverse order.



IGNITION ADVANCE GRAPHS, VACUUM ADVANCE



IGNITION ADVANCE GRAPHS, CENTRIFUGAL ADVANCE

Some considerations of vital importance to work on the electronic ignition system

1. When the engine is running, dangerously high voltage which may prove fatal may be present in the primary circuit of the coil and in all cables connected to terminal 1. This is because the spark energy in the system is considerably higher than in conventional ignition systems.
2. When the ignition is switched on, full primary current will flow through the primary circuit of the coil. Consequently, always disconnect terminal 15 on the ignition coil before commencing work with the ignition on.
3. In conjunction with work on the screened impulse cable between the impulse transmitter in the distributor and the control unit, strict attention must be given to polarity. Should the polarity be reversed, a stable basic ignition setting will not be possible and timing and dwell will also be affected.

Fault-tracing in the electronic ignition system

The recommended steps must be performed one at a time and in the stated order. If on inspection components are found to be defective, these must be renewed before any further fault-tracing is carried out. If a fault is known to occur, for example, under certain temperature conditions, always attempt as far as possible to trace faults under similar conditions. Thus, if trouble with starting the car is experienced during cold weather, fault-tracing should be carried out on a thoroughly cold car. Such procedure is necessary because defective electronic components may operate perfectly under normal temperature conditions before breaking down completely. Bad connections can also be affected by temperature.

Fault-tracing equipment

Ignition setting instrument (preferably with a 90° dwell angle scale); volt-ohmmeter with scales for 15 V d.c. and 5 V a.c., minimum sensitivity of 10 000 ohm/V, 0—5 ohm midscale, 0—5 kohm midscale.

1. Engine completely dead, fires without starting or is difficult to start

CHECK	READING	CONDITION OF THE SYSTEM; PROBABLE FAULT	CHECK AND REMEDY AS NECESSARY
1. Turn the engine over on the starter and check the length of the spark between the high tension lead from the coil and ground	More than 12 mm	Starter circuit and starter relay probably working	Check 0.4 compensating resistor by means of ohmmeter. Check the ignition setting. Check for flashover in coil isolator, distributor cap, rotor, ignition leads and plugs. Check the fuel system. Check that current flows from the starter relay circuit to the connection on the compensating resistor. When the starter is running, the voltage between the common connection and the + on the battery should be 0. If not, check relay and wiring. Proceed to step 2.
	Less than 12 mm or no spark		
2. Switch on the ignition. Before proceeding, check that the battery charge is at least 11 V.	Less than 11 V		Charge the battery; readings taken with insufficient battery voltage will give faulty values.
	More than 11 V		Proceed to step 3.

CHECK	READING	CONDITION OF THE SYSTEM; PROBABLE FAULT	CHECK AND REMEDY AS NECESSARY
3. Measure the voltage between terminal 15 on the coil and ground	0 V	Break in compensating resistor or leakage from terminal 15 on ignition switch	Check compensating resistor by means of ohmmeter. Check that voltage from the ignition switch is present at the single terminal on the 0.4 ohm resistor. If not, check ignition switch and wiring.
	Less than 6 V	Short-circuit in primary winding of coil	Check resistance of primary winding (0,95–1,4 ohm)
	6–8 V	Primary coil winding and compensating resistor sound	Proceed to step 4.
	8–12 V	Bad ground connection	Check using ohmmeter that contact pin 31 on the control unit connector has good ground connection
	12 V	Break in primary coil winding	Check using ohmmeter (0,95–1,4 ohm)
		Control unit not conducting	Check for battery voltage at contact pin 15, using voltmeter
4. Measure the voltage between terminal 1 on coil and ground	0 V	Short-circuit in control unit	Exchange control unit
	0.5–2 V	Power transistor in control unit sound	Proceed to step 5
	12 V	Control unit not conducting	Change control unit. Check for faulty insulation on cables to terminal 16 on the control unit.

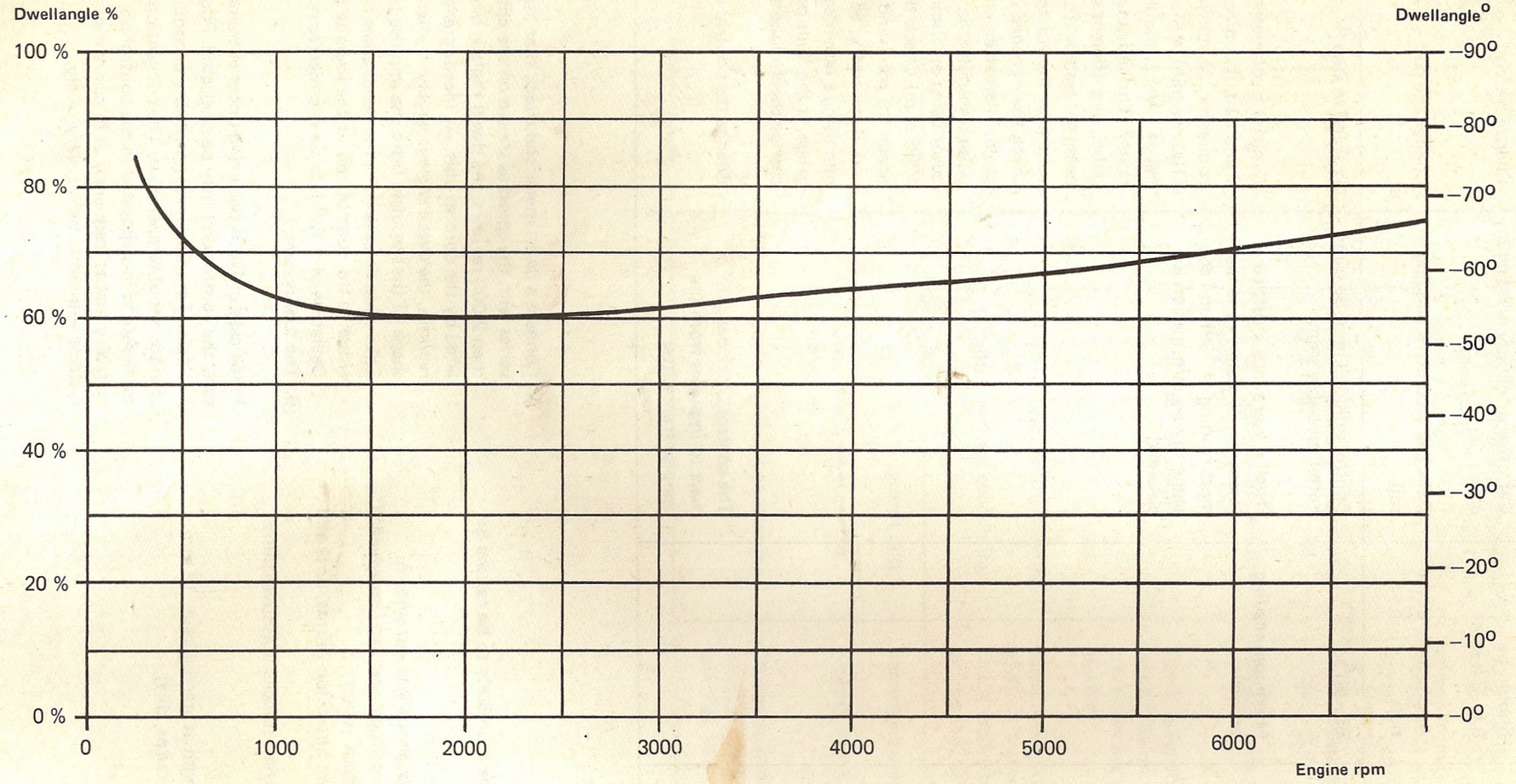
CHECK	READING	CONDITION OF THE SYSTEM; PROBABLE FAULT	CHECK AND REMEDY AS NECESSARY
5. Measure resistance in the secondary coil winding	Should be 5,5–8 k ohm	Defective secondary winding in coil	Change the coil
	Appreciable deviation	Defective secondary winding in coil	Change the coil
6. Connect a dwell meter	65–90°	Control unit and impulse transmitter probably sound	Proceed to step 6
Check dwell angle	Maximum reading on scale	Dwell meter range insufficient (many dwell meters have maximum reading of 70°) and consequently no information is obtained	Connect a voltmeter across pins 7 and 31d of control unit cable connector. At starting speed (100 rev/min), a minimum reading of 1 V a.c. should be obtained. This indicates that impulses of sufficient strength are being generated. If there is no voltage or the voltage is too low, check the screened impulse cable. Thereafter, check the impulse transmitter in the distributor using on ohmmeter (895–1285 ohm). Check the air gap between the rotor and the stator and, if necessary, adjust to 0.25 mm using a non-magnetic feeler gauge. If the fault persists, change the impulse transmitter.
		The control unit does not react to impulses from the impulse transmitter	Change the control unit

2. Poor running

Poor running of the engine is unlikely to be caused by faulty electronics.
Check the following items first:

1. Good connections throughout ignition system.
2. Ignition setting and centrifugal and vacuum advance.
3. General condition of spark plugs.
4. Rotor: check operation, insulation (burns, dirt) and contacts.
5. Distributor cap: insulation (cracks, flashover burns, dirt) and contacts.
6. Ignition leads.
7. Ignition coil: spark length at starting revs 12 mm minimum; insulation (burns, dirt).
8. Connect a dwell meter and check that the dwell angle varies with the speed as shown on the chart. At less than 2 000 rev/min, the dwell angle is largely regulated by the control unit. At speeds greater than 2 000 rev/min, the dwell angle is largely regulated by the shape of the impulses from the impulse transmitter. Thus wide deviations in the dwell angle can be traced either to the control unit or the impulse transmitter. Deviation of ± 10° is to be regarded as normal.
9. The fuel system.

In the case of faults occurring under extremes of temperature, the control unit may be suspected. Poor soldering and defective components probably become most evident at extremes of temperature. The conventional ignition condensor is incorporated in the control unit and may be faulty just as frequently as in conventional ignition systems – in other words, very rarely.

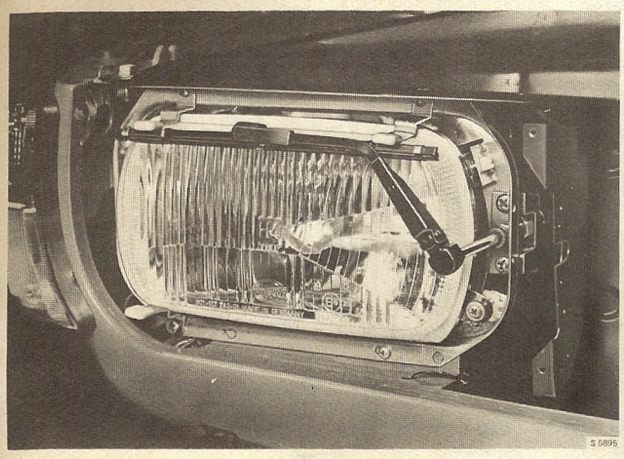


S 6309

DWELL ANGLE, ENGINE SPEED

HEADLAMP WIPERS

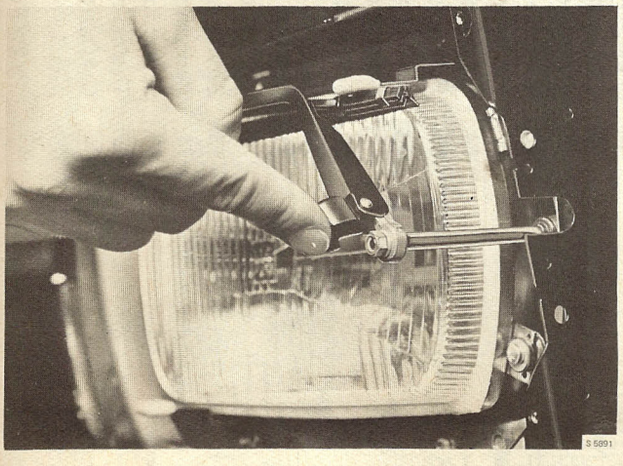
Saab Turbo cars are equipped with a new type of headlamp wiper, with individual motors for each wiper.



HEADLAMP WIPER ASSEMBLY

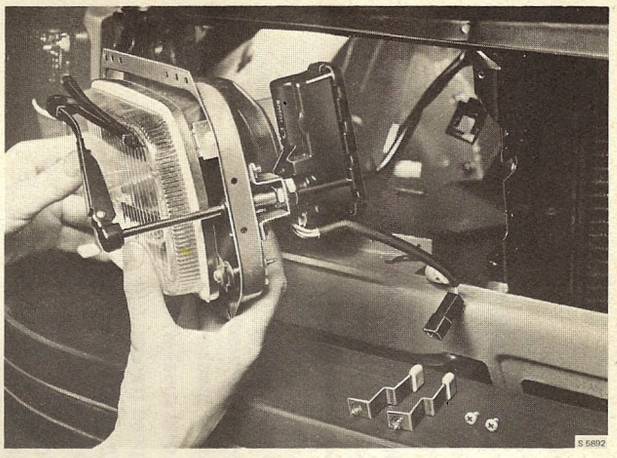
Removal and installation of wiper motor

1. Lift the cover on the wiper arm and then remove the retaining nut and wiper arm.



LIFTING THE COVER ON THE WIPER ARM

2. Remove the grille.
3. Disconnect the wiring to the headlamp bulb and wiper motor.
4. Remove the headlamp assembly complete with mounting frame and wiper motor. The two top retaining screws also serve as retaining screws for the wiper blade stop.



REMOVING THE HEADLAMP ASSEMBLY WITH WIPER MOTOR

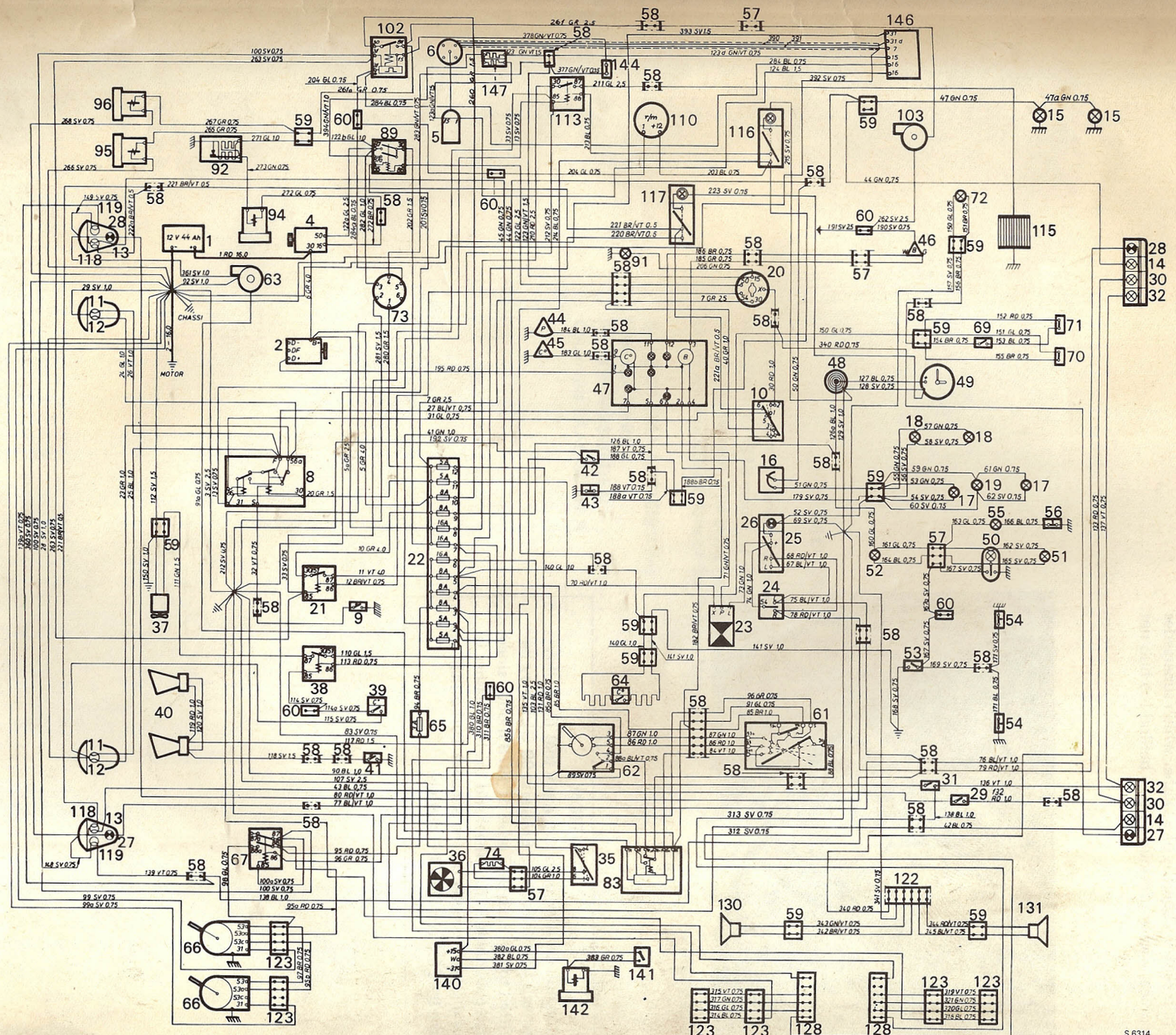
5. Unbolt the wiper motor from the mounting frame.

WIPER MOTOR

Install in the reverse order.

WIRING DIAGRAM

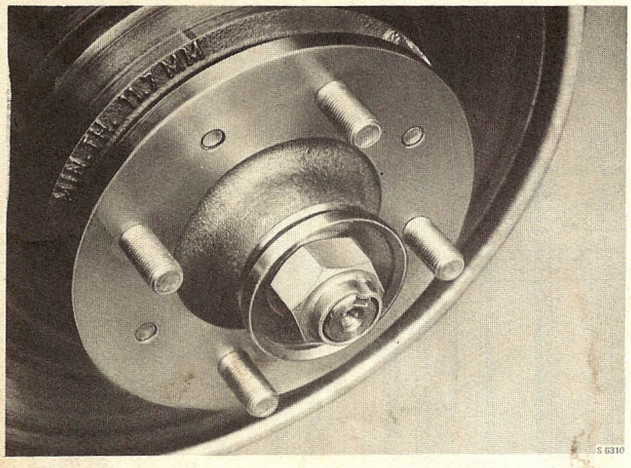
1. Battery
2. Alternator
4. Starter motor
5. Ignition coil
6. Ignition distributor
8. Lighting relay
9. Headlight dimmer/flasher switch
10. Light switch
11. High beam
12. Dimmed beam
13. Front parking light
14. Tail light
15. Number plate light
16. Resistance switch, instrument panel illumination
17. Switch light
18. Instrument panel light
19. Glove compartment and heater control light
20. Ignition
21. Ignition relay
22. Fuse box
23. Flasher unit
24. Direction indicator switch, headlight flasher and dimmer
25. Hazard warning signal switch
26. Hazard warning signal repeater
27. Direction indicator lights, L
28. Direction indicator lights, R
29. Stop light contact
30. Stop lights
31. Back-up light contact
32. Back-up lights
35. Ventilator fan switch
36. Ventilator fan motor
37. Radiator fan motor
38. Radiator fan relay
39. Radiator fan thermostat contact
40. Horn
41. Horn contact
42. Brake warning contact
43. Handbrake contact
44. Oil warning contact
45. Fuel level transmitter
47. Combination instrument: fuel gauge, fuel warning light, temperature gauge, oil warning light, ignition light, brake warning light, high beam indicator light, direction indicator repeater
48. Cigarette lighter
49. Clock
50. Dome light, door pillar
51. Dome light, rear view mirror
52. Ignition switch light
53. Interior lighting switch
54. Door contact, interior lighting
55. Trunk light
56. Trunk light contact
57. 3-pin connector
58. 12-pin connector
59. 2-pin connector
60. 1-pin connector
61. Wiper and washer system switch
62. Windshield wiper
63. Washer motor
64. Seat heating element with thermostat
65. Fuse holder
66. Headlight washer motor
67. Headlight wiper motor relay
69. Seat contact, R
70. Seat belt contact, L
71. Seat belt contact, R
72. Warning light, seat belts
73. Service outlet, ignition setting
74. Resistance, low speed, fan
89. Socket for start inhibitor relay
92. Thermo-time switch
94. Cold start valve
95. Auxiliary air valve
96. Warm-up regulator
102. Pump relay
103. Fuel pump
110. Tachometer
113. Relay, electrically heated rear window
115. Electrically heated rear window
116. Switch, electrically heated rear window
117. Corner lamp switch
118. Cornering light
119. Side back-up light
122. 8-pole connector
123. 4-pole connector
130. Loud speaker, L
131. Loud speaker, R
140. Speed transmitter
141. Throttle valve switch
142. Magnet valve
144. Pressure switch
145. Electronic unit
147. Compensating resistance



WIRING DIAGRAM

Wheels

Saab Turbo cars are fitted with 5 1/2-inch light-alloy wheels with hub centring.
The hub centring consists of a washer which supersedes the conical washer previously fitted behind the hub nut.



HUB CENTERING

> CAUTION
> The hub centring does not imply that light-alloy wheels for the Saab 99 EMS and 99 GLE may be fitted to the Saab 99 Turbo of 1978 model, since the guide hole in the wheel and the hub washer is of a larger diameter on the Saab 99 Turbo than on the 99 EMS and 99 GLE models.

Ordering number 3108

Printed in Sweden Götab, Kumla 1977 23308