

# Instruments

## Speedometer

### General

The speedometer indicates the speed of the vehicle, the total mileage, and trip mileage. A flexible shaft from the left front wheel brings the drive to the speedometer. The dial of the instrument is driven by a magnetic system. The magnet rotates at the speed of the wheels and drives the needle of the dial. The magnet rotates inside an aluminum shell which is attached to the dial needle but does not contact the magnet.

The speedometer drive is a flexible woven wire shaft in a flexible steel housing which connects the left front wheel to the speedometer. The shaft is driven from the wheel hub through the hollow stub axle.

The rotation of the magnet induces eddy currents in the aluminum shell and advances the speedometer needle against a spring. With increasing speed, the torque becomes greater moving the needle proportionally farther around the speed scale. The spring on the dial shaft is matched to the magnetic drive characteristics. This enables the speedometer to show the speed by means of the magnetic coupling whose transmitted torque increases with speed. The needle advances around the speed scale until the magnetic torque and the spring torque are equal.

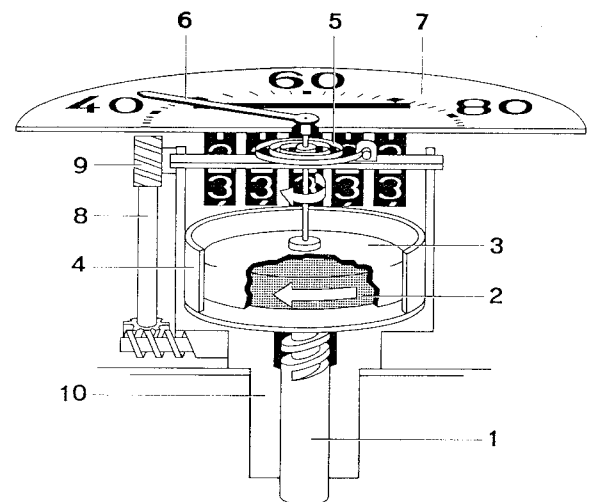


Fig. 70

- ① Input shaft
- ② Magnet
- ③ Aluminum shell
- ④ Magnetic shield
- ⑤ Spiral spring
- ⑥ Speedometer hand
- ⑦ Dial
- ⑧ Worm drive shaft
- ⑨ Worm gear with counter
- ⑩ Bearing block

The odometer is driven by a worm gear drive train and has five reels which record the total mileage. A four reel trip mileage odometer is located in the lower half of the speedometer face. The first reel on the right indicates tenths of miles giving a total capacity of up to one thousand miles for the four reels. The trip mileage may be turned to zero by means of a knob on the back of the speedometer.

## Removing and Installing Speedometer

### Removal

1. Remove instrument lights from the sockets.
2. Remove speedometer cable nut and pull cable from instrument.
3. Remove clamp screws from the back of the speedometer.
4. Remove the clamp bracket and remove the speedometer from the instrument panel.

### Note:

Turning the odometer back or other such operations are not permitted. When exchanging a speedometer for repair, the original mileage is to be left on the dials. When exchanging a speedometer at the factory, the correct mileage is to be given so that this may be registered on the dials of the new instrument.

Repairs and service covered by the guarantee are performed only by the manufacturers or their representatives.

### Installation

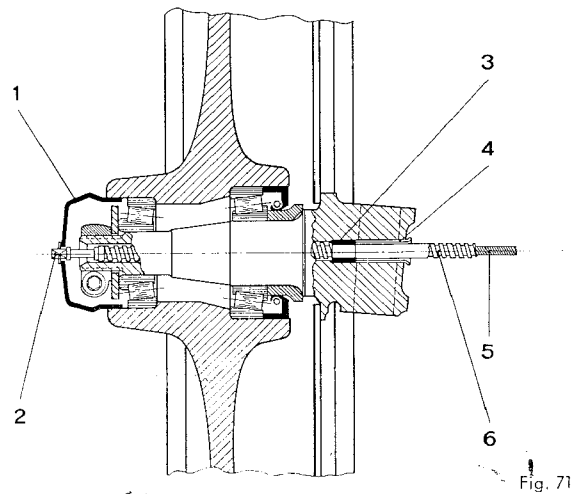
The installation is accomplished in the reverse order of removal observing the following points:

1. Inspect sockets of the instrument lamps for a tight fit.
2. Before tightening the clamp screws on the back of the speedometer, adjust the position of the instrument so that the numbers are vertical.

## Removing and Installing Speedometer Drive Shaft

### Removal

1. Disconnect drive shaft from the speedometer.
2. Remove left front hub cap.
3. Remove the cotter key from the end of the speedometer shaft on the bearing cap and remove the cap.
4. Remove the flexible shaft and housing by pulling it out of the back of the stub axle.
5. Remove speedometer shaft assembly from the car.



- ① Bearing cap with square hole.
- ② Drive extension with cotter key.
- ③ Rubber protector.
- ④ Steel shell.
- ⑤ Flexible shaft.
- ⑥ Flexible housing.

### Installation:

The installation is accomplished in the reverse order of removal observing the following points:

1. Do not kink or stretch the new shaft.
2. The flange of the shaft housing must mate flush with the speedometer.
3. The square end of the shaft must fit easily into the speedometer without force.
4. Install a new rubber collar where the shaft enters the stub axle.
5. Use a new cotter key for the drive shaft in the wheel bearing cap.

### Note:

Special care should be taken in placing the flexible shaft in a good position.

The shaft must operate smoothly without noise or vibrations and must therefore be positioned so that it has no bends with a radius of less than 150 mm (6 in.). When the wheels are aligned straight ahead, the flexible shaft should lie in a smooth curve from the wheel to the entrance in the chassis. The flexible shaft must not become kinked or stretched in any wheel position. If the housing becomes damaged and binds the shaft, a pulsation will occur and make the speedometer needle oscillate. Sharp bends hinder the motion of the shaft and cause the shaft to break prematurely. The rubber seal at the entrance to the axle prevents the entry of water which could cause bearing damage or, in winter, freeze the shaft solid in the housing. This seal must therefore be carefully installed so that a proper seat is obtained.

Oil or water resistant grease are to be used to lubricate the speedometer drive.

## Removing and Installing Tachometer Drive Shaft

44 LI

### General

Since the construction and operation of the tachometer drive shaft is, in principle, identical to the speedometer drive shaft, the same care and installation cautions apply as in section 43 LI.

### Removal

1. Remove foot pedal floor board.
2. Disconnect the flexible shaft from the tachometer.
3. Remove the flexible shaft from the oil pump at the engine.
4. Remove clamps at the instrument panel and engine compartment.
5. Remove hose clamps in the floor tunnel.
6. Remove the flexible shaft from the car.

### Installation

The installation is accomplished in the reverse order of removal observing the following points:

1. Install a new rubber boot at the rear panel.
2. Waterproof the flexible shaft and rubber boot with sealing compound.
3. Inspect the rubber strap above the rear axle and replace if necessary.
4. Properly connect clamps and fasteners.

## Removing and Installing Combination Instrument

### General

The combination instrument, located on the left side of the instrument cluster, contains the oil thermometer, fuel gauge, oil pressure indicator light, and generator warning light. The oil thermometer and pressure units are remote controlled by electric sending units on the engine.

### Removal

1. Disconnect cables.
2. Remove clamp nuts.
3. Pull out instrument lights.
4. Remove complete instrument.

### Installation

The installation is accomplished in the reverse order of removal observing particularly the correct cable connections.

## Removing and Installing Fuel Gauge

### Removal

1. Open front hood.
2. Disconnect green sending cable from fuel gauge.
3. Remove five mounting screws from fuel gauge.
4. Carefully remove fuel gauge sending unit and float.

### Installation

The installation is accomplished in the reverse order of removal observing the following points:

1. Install a new cork gasket.
2. Tighten the mounting screws uniformly to the same torque.

## Removing and Installing Oil Pressure Switch

### General

The oil pressure switch is located on top of the crankcase in the main oil flow to the oil cooler. When the engine is not running a contact attached to a diaphragm is held in the closed position by a spring. When the ignition is turned on, current flows from terminal 15 of the ignition switch through the oil

pressure warning lamp and the oil pressure switch to ground. Therefore, when there is no oil pressure the green warning lamp lights.

When the engine is running, the oil pressure in the main oil line presses against the diaphragm and opens the contacts, whereby the green warning lamp goes out.

### Removal

1. Disconnect cable from oil pressure switch.
2. Remove oil pressure switch using tool P19 a or a 24 mm open end wrench.

### Installation

The pressure seal at the pressure switch is obtained by the use of a tapered thread. For this reason it is important to tighten the switch no more than is necessary for a tight seal since the thread will otherwise become damaged.

After installing the switch, test its operation by running the engine and observing the green warning lamp.

### Note

The oil pressure switch used in 356 B cars, in contrast to previous models, cannot be adjusted and must be replaced with a new unit in the event of improper function or failure. The operating range of the switch is from 0.3 to 0.6 kg/cm<sup>2</sup> (4.3 to 8.5 psi).

## Oil Pressure Warning Light

If the green warning light goes on while the engine is operating, the main oil supply line and bearings are receiving insufficient pressure and are therefore not being properly lubricated. During winter driving the warning light may go on only while the engine is idling or possibly not at all. In contrast, in the summer when the engine is quite warm the light may go on

while changing gears due to the low viscosity of the warm oil.

Present day engine oils are relatively light in viscosity which, besides aiding in engine starting, assures a good oil flow at lower oil pressures. The increased flow gives better lubrication and cooling to the friction surfaces.

## Windshield Washer System

### General

The fluid for the washer system is held in a plastic bag next to the fuel tank. A rubber hose system feeds the water to a rubber ball foot pump and from the pump to the two jets. By depressing or flattening the rubber ball pump water is sprayed on the windshield through a jet located near each windshield wiper arm. As the foot pressure is released, the ball ex-

pands and by way of valves refills itself from the reservoir. When dismantling the washer system note the correct position of the "T" pipe sections so that they may be correctly installed.

For winter driving it is advisable to fill the fluid reservoir with one part alcohol to three parts water to keep the system from freezing.

# Radio

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## General

The car radio operates under relatively unfavorable conditions with its small antenna signal and correspondingly large static and noise reception from the auto electrical system. The ignition, generator, and windshield wiper motor as well as the surrounding vehicles are a constant source of interference. For this reason it is of great importance that the electrical system is thoroughly noise suppressed especially in the case of FM reception. Loose ground connections (varying resistance) are a common cause of static noises. When installing a radio it is advisable to test the ground connections with an ohmmeter. The choice of suppressor items is generally prescribed by the radio manufacturer and can be found in the radio accessory lists.

In the event that the radio receives interference from other sources than those which are normally suppressed, the entire system should first be tested for ground connections. If this does not locate the cause of the interference an auto electric shop which is specially equipped for such work should be consulted.

## Note

The maximum capacity for the suppressor condenser at generator terminals D + and regulator terminal D + is  $0.45 \mu\text{F}$ . A greater capacity will burn the regulator contacts.