

PORSCHE MECHANICAL TYPE

Porsche

911E (1969-73)

911S (1969-73)

911T (1972-73)

►NOTE - Pressure (pounds per square inch (psi) and Vacuum (inches of Mercury (in. Hg) are listed here in Atmospheres (atm). For conversion, 1 atmosphere of pressure equals 14.70 psi and 1 atmosphere of vacuum equals 29.92 in. Hg.

DESCRIPTION

Major components in this system are as follows: A six element, double row injection pump with compensating units; a roller cell fuel supply pump; micronic fuel filter with supplemental cold starting solenoid; and fuel injectors with lines.

Fuel is pumped by roller cell pump to micronic filter and on to fuel injection pump. Surplus fuel flows back to tank through overflow valve in filter top and a bypass in fuel supply pump. Return fuel circuit is provided to keep fuel injection pump cool and prevent formation of vapor locks.

Injection pump is driven by left engine camshaft through a toothed belt. Injection plungers are actuated through pump camshaft via roller tappets. Plungers force fuel to cylinders through six fuel injection lines of equal length; fuel is discharged into ports on intake stroke by means of injectors located in cylinder heads. Fuel is injected against opening intake valves at a pressure of 220-265 psi (15-18 atm). This is a timed indirect injection, or manifold injection system.

Fuel is metered by rotating injection plungers which resets a metering land in each. Plunger rotation is controlled by a control rack which is mechanically connected with plungers by means of toothed segments. As a result, the slanted metering land closes fuel inlet port at an earlier or later time.

Depending on throttle load and engine speed, engine needs varying amounts of fuel to attain correct air/fuel mixture ratio. This adjustment is made by a contoured cam mounted on pump camshaft together with centrifugal governor. Governor moves cam axially according to engine speed; throttle pedal rotates cam on its axis to adjust it to given throttle load. Riding on contoured cam is a sensor (roller) which transfers appropriate fuel volume requirements to control rack via a guide lever.

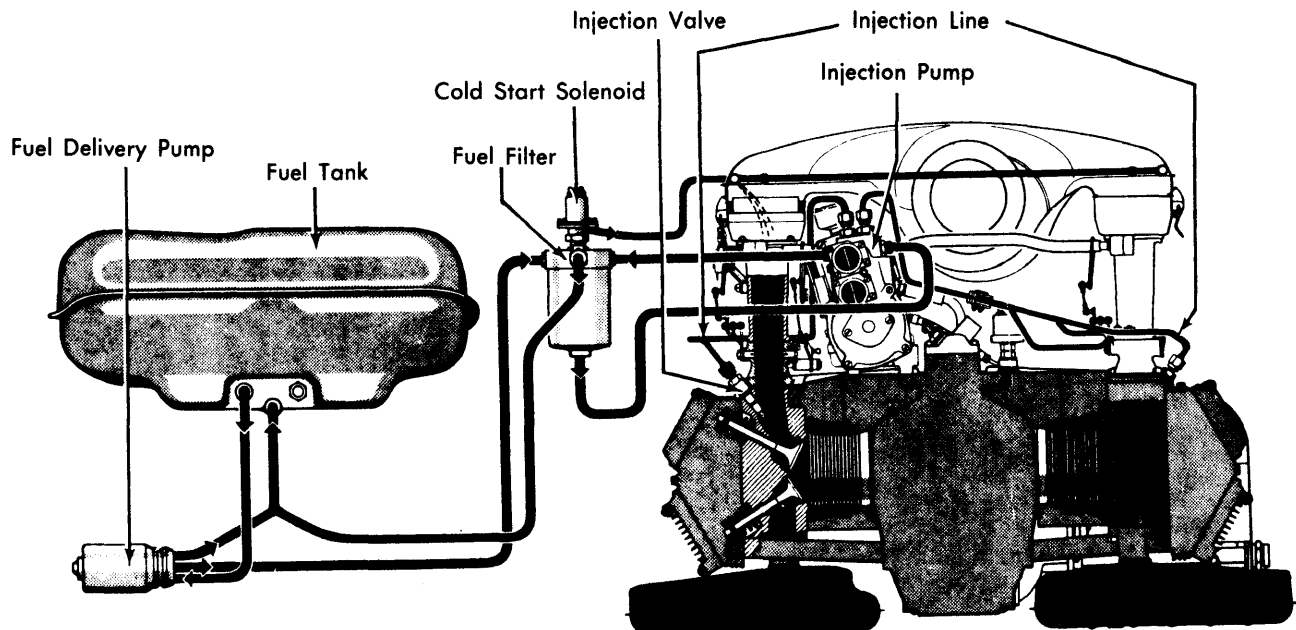
OPERATION

INJECTION PUMP

Pump housing contains six pump units. Each unit consists of a cylinder and a plunger. Each plunger is connected to a roller tappet which rides on cam lobe. Pump cylinders are fastened to pump housing and each cylinder is immersed in fuel which can enter cylinder compression chamber through an inlet port. Camshaft exerts a force upon roller tappet and causes it to move delivery plunger up. As a result, fuel contained in compression chambers is forced out through a check valve into pressure lines connected to injectors which spray fuel into intake ports. Maximum lift of delivery plungers is determined by camshaft design and remains constant. Injection quantity is regulated by turning delivery plungers, thus resetting a metering land in each. A toothed control rack, engaging its toothed counterpart in each delivery plunger, can slide back or forth and turn delivery plungers as required. As a result, slanted metering land closes fuel inlet port at an earlier or later time, causing greater or smaller amounts of fuel to be delivered on each stroke, depending on relative position of injection plunger.

CONTROL UNIT

To obtain required air/fuel mixture ratio, engine must be supplied with different quantities of fuel under varying engine speed and loads. This is accomplished by a contoured cam which is mounted on camshaft together with a centrifugal governor. Contoured cam can be moved axially

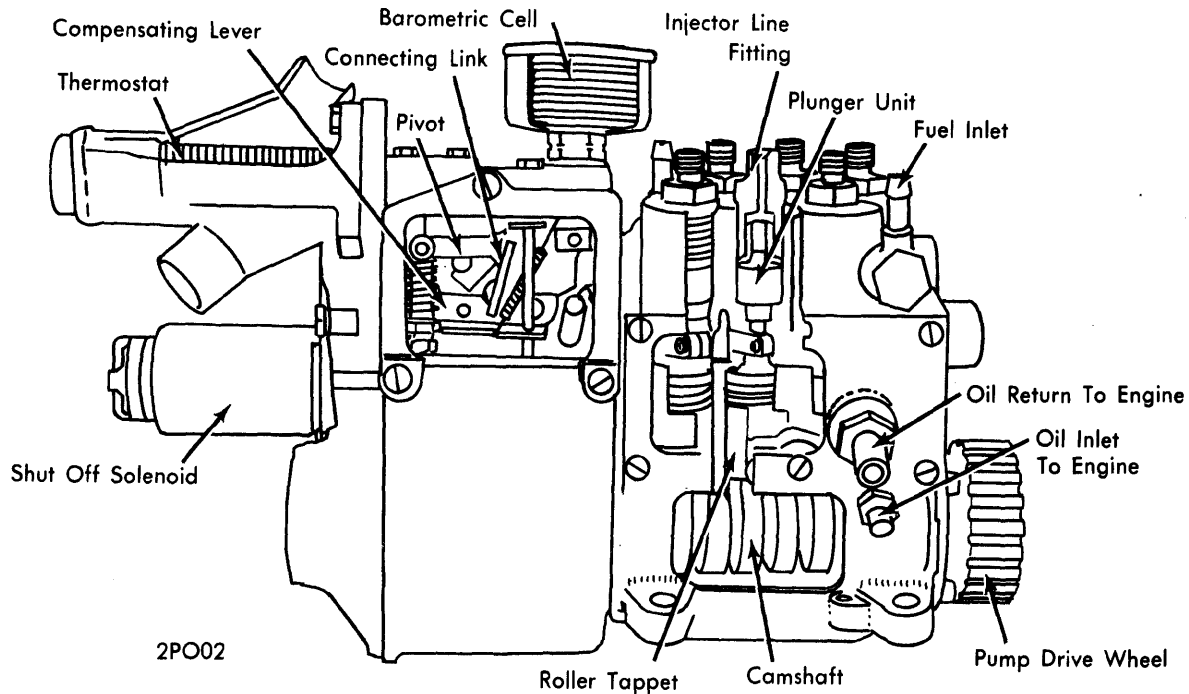


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FUEL INJECTION SYSTEM

Bosch Fuel Injection

PORSCHE MECHANICAL TYPE (Cont.)



INJECTION PUMP

by centrifugal governor and rotated on its axis by accelerator pedal in relation to given engine loads. Riding on contoured cam is a sensor (roller) which transfers appropriate fuel volume requirements to control rack via a guide lever.

BAROMETRIC CELL

Compensates for changes in air pressure. When aneroid mechanism expands, a pin transfers action to compensating mechanism by means of a lever. This movement corrects given position of control rack so that quantity of injected fuel is increased at high air pressures, and reduced when pressure drops, such as in changing weather or when driving in mountains. Barometric cell is a sensitive precision instrument and must be handled with care to prevent any damage. **NOTE** - It cannot be replaced without adjusting injection pump on a Bosch-Service test stand.

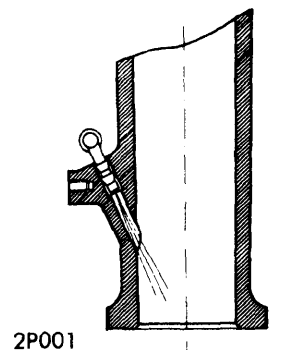
THERMOSTAT

Compensates for varying engine operating temperatures (quantities required during engine warm-up). Thermostat is mounted on control unit housing and responds to engine cooling air which comes from a heat exchanger and is ducted to thermostat through hoses. Thermostat consists of several heat expansion elements which cause a certain amount of mechanical movement. A connecting lever transfers this movement to a compensating mechanism which, in turn, corrects position of plunger control rack. When engine is cold, control rack is moved into "full load" position to enrich combustion mixture. Increasing engine temperature progressively reduces fuel enrichment. Thermostat does not influence control rack position after a temperature of 113°F (45°C) has been reached (127°F (53°C) for 1970 Models).

ENRICHMENT SOLENOID

Enriches combustion mixture in cold and hot starting (controlled by thermo-limit switch and time-limit relay). Enrichment solenoid has been incorporated in fuel pump and acts directly on plunger control rack, moving it beyond "full power" position with plunger aligning for starting-rate fuel delivery. Solenoid energizing circuit includes a time-limit relay and a thermo-limit switch. Time-limit relay closes solenoid circuit for two seconds during each starting procedure, without regard to air temperature in crankcase. A thermo-limit switch keeps energizing circuit closed over an appropriately longer period of time when temperature ranges between 50°F (10°C) and -14°F (-25°C). When air temperature in crankcase drops to between 14°F (-10°C) and -22°F (-30°C), and additional thermo-switch activates a supplemental cold-starting device.

NOTE - Supplementary starting equipment consists of small nozzles fitted into lower portion of intake stacks.

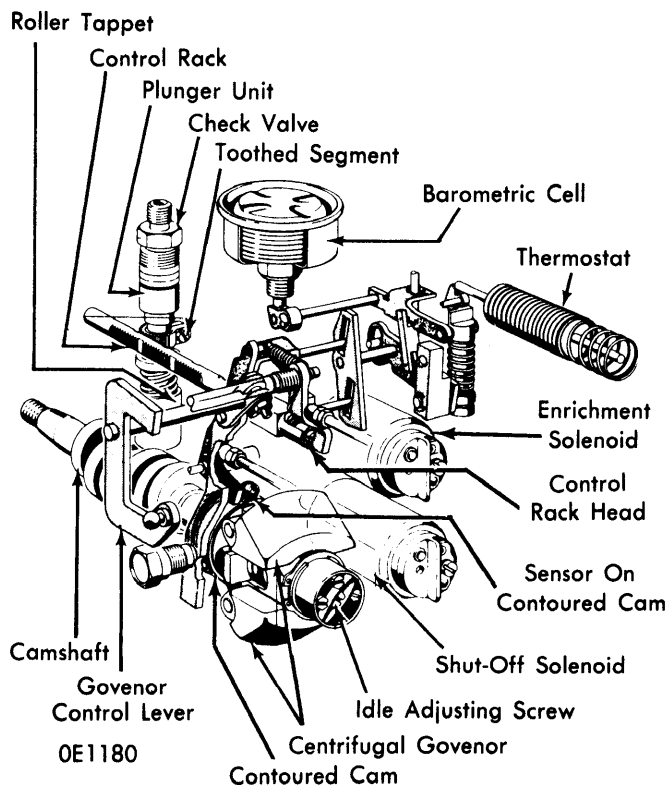


COLD START NOZZLE

PORSCHE MECHANICAL TYPE (Cont.)

SHUT-OFF SOLENOID

Function of shut-off solenoid is to move plunger control rack to OFF position and close fuel delivery to engine when car is coasting in gear. Shut-off solenoid is controlled by a micro-switch and an RPM-transducer. Micro-switch is mounted on intake stack and is actuated by throttle valve linkage. RPM-transducer closes circuit when engine speed exceeds 1500 RPM. When throttle is closed, micro-switch closes circuit and current can flow from RPM-transducer through micro-switch to shut-off solenoid. This energizes solenoid and causes it to pull control rack to OFF position, stopping flow of fuel to engine. When engine speed drops below 1300 RPM, RPM-transducer interrupts flow of current, causing shut-off solenoid to return into its inactive position and release plunger control rack. As a result, fuel flow to engine is resumed, permitting engine to idle when vehicle is stopped. If engine speed is again increased, RPM-transducer becomes reactivated at 1500 RPM. However, solenoid circuit will be interrupted by micro-switch. RPM-transducer receives its control impulses from ignition coil.



CONTROL & COMPENSATING UNITS

FUEL PUMP

A roller-cell type fuel pump mounted by a bracket to support member under fuel tank. It has a delivery capacity of approximately 29 gal. per hour (110 ltr per hour) up to 33 gal. per hour (125 ltr per hour). This delivery capacity is several times the amount of actual fuel consumption and is necessary to keep fuel temperature in injection pump as low as possible. Excessive fuel flows back to tank via a return line. An overflow valve in fuel filter will establish a pressure of 11.8 ± 3.0 psi (0.8 ± 0.2 atm) in fuel system. When pressure increases above approximately 14 psi (1.0 atm), some of fuel is returned to fuel tank via bypass valve installed in fuel pump. Bypass valve operates independent of overflow valve.

LINKAGE

To obtain a constantly correct air/fuel ratio under all operating conditions, movements of accelerator pedal are transmitted to control lever of injection pump and to throttle valves by means of linkage. Pump control lever regulates quantity of fuel, throttle valves control quantity of intake air. Movements of pump control lever and those of throttle valves should always be in definite ratio to each other (correlation). Any change of air/fuel ratio results in irregular running of engine during acceleration, while shifting, etc. Correlation is important for proper operation of injection system.

MAINTENANCE

All Models - Perform the following every 10,000 miles:

- 1) Check engine compression.
- 2) Check rocker shafts for tightness.
- 3) Check valve clearance.
- 4) Check cam angle and ignition timing.
- 5) Check spark plug gap.
- 6) Check engine speed switch, micro-switch, and electro magnetic valves.
- 7) Check full power and idle stop positions of fuel injection linkage. Replace fuel filter cartridge. Clean oil strainer in pump lubrication circuit. Check adjustment of fuel injection pump with suitable exhaust gas analyzer.
- 8) Replace air cleaner element.
- 9) Check flame trap cartridge in crankcase breather.

TESTING

ENRICHMENT SOLENOID

- 1) Remove rubber cap on driving end of injection pump and insert a M 5x30 bolt into plunger control rack. Pull control rack in driving direction. When released, control rack should snap back to its original position. If control rack sticks, or does not return to its original position, replace injection pump.
- 2) Remove wires from enrichment solenoid. Connect a jumper wire to fuse box terminal 15. While observing bolt M 5x30, touch solenoid with jumper wire. Control rack should move in driving direction.
- 3) If rack does not move, even though rack is mechanically free, enrichment solenoid must be replaced. When replacing solenoid, adjust plunger to same length as old solenoid.
- 4) In Model Year 1971, fuel injected Porsche engines do not have an enrichment solenoid. There are no threads in control rack, therefore, a clean blunt tool must be used to push control rack rearward (opposed to driving direction). When released, control rack should automatically snap back to its starting position. If control rack sticks or does not release to its original position, replace injection pump. Reinstall rubber cap after check.

TIME-LIMIT RELAY

Connect test light to terminal on enrichment solenoid (other end to ground). Start engine. Test light should stay on for two seconds. If not, replace time-limit relay.

PORSCHÉ MECHANICAL TYPE (Cont.)

THERMO-LIMIT SWITCH

►NOTE - Test can only be made at temperatures between -14°F (-25°C) to 35°F (2°C).

Connect test light to terminal on enrichment solenoid. Start engine. Test light should go on for more than two seconds.

SHUT-OFF SOLENOID

1) Remove rubber cap on injection pump and insert an M 5x30 bolt into control rod. Start engine, run at 3000-4000 RPM, then decelerate. Control rod should move to rear i.e., opposite driving direction (zero delivery).

2) If control rod does not move as specified, check RPM-transducer and micro-switch. If switches test good, replace shut-off solenoid.

RPM TRANSDUCER (SPEED SWITCH)

Connect test light to terminal 30b and ground. Start engine and accelerate. Test light should go on at approximately 1500 RPM. Decelerate. Test light should go out at approximately 1300 RPM. Replace RPM-transducer if necessary.

MICRO-SWITCH

Connect a hot wire to connection terminal of micro-switch. Connect a test lamp from ground to other terminal. Turn on ignition and actuate switch. When pushing micro-switch button, test light should go on. Test lamp should go out when button is released. Replace micro-switch if necessary.

FUEL PUMP

Pressure - Loosen hollow bolt on filter of injection pump return line. Attach pressure gauge with special tool (P 233b or equivalent), together with return line to fuel filter (long hollow bolt). Turn on ignition and observe pressure gauge reading. If pressure is below 11.8 ± 3.0 psi (0.8 ± 0.2 atm), filter must be replaced. If specified pressure is still not obtained, check overflow valve, as well as fuel pump electrical connections.

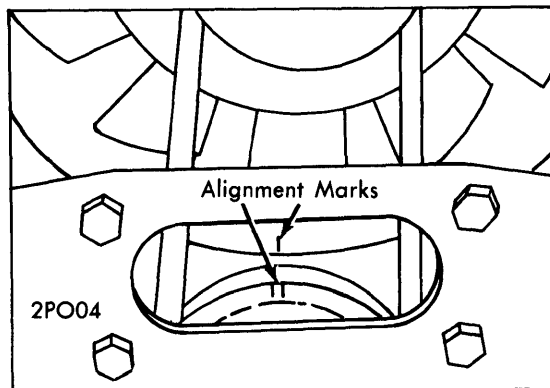
Volume - Loosen hollow bolt on filter of injection pump return line. Hold line into a suitable measuring container. Turn ignition on for 30 seconds; delivered quantity should be 1.90-2.11 pts. (0.9-1.0 ltr).

Current Draw - Connect voltmeter and ammeter to pump, and turn on ignition. Voltage should be 11 volts ± 1 volt, and current draw should be between 2.15 and 2.40 amperes.

ADJUSTMENT

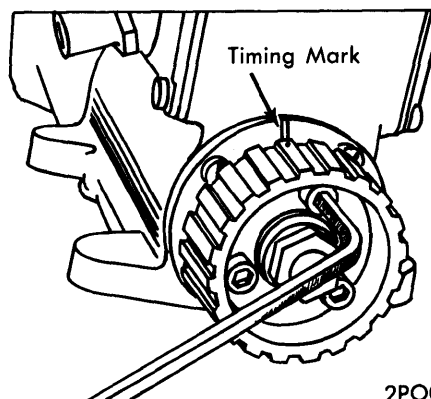
INJECTION PUMP END OF DELIVERY STROKE

1) Bring number 1 piston to TDC of compression stroke, then turn one complete revolution (360°), in direction of engine rotation. Continue turning slightly beyond TDC mark, approximately 40° , and align the "F-E" mark on crankshaft pulley with notch in blower housing.



CRANKSHAFT ALIGNMENT MARKS

2) Pump is then properly timed if marking on hub of belt pulley lines up with mark on pump bearing cover. Check mark alignment with mirror. If marks do not line up, pump must be loosened, toothed belt removed and camshaft pulley repositioned. By loosening the three socket head bolts, fine adjustments can be made.



PUMP SPROCKET ADJUSTMENT

LINKAGE ADJUSTMENT

1) Adjust injection pump control lever to $4.49 \pm .04$ " (114 ± 1 mm).

2) Adjust throttle valve push rods to $5.89 \pm .04$ " ($149.5 \pm .04$ mm).

3) Adjust pull rod which connects accelerator linkage bell crank with cross shaft to a length of 10.83" (275 mm).

►NOTE - Dimensions are from ball head center to ball head center. If permissible tolerance is insufficient, check that operating lever of cross shaft or throttle valve push rods are not bent.

LINKAGE CORRELATION ADJUSTMENT

1) To adjust and correlate linkage, use suitable tool (P228C) which consists of three protractors and three pointers. Attach pertinent pointer using left upper fastening screw of enrichment solenoid.

PORSCHE MECHANICAL TYPE (Cont.)

2) Attach protractors to left and rear throttle connecting rod valve levers. Then attach pointers to intake pipe studs.

3) Set pointers to 0°. Actuate linkage manually, compare readings with values shown in accompanying table and adjust if necessary.

Protractor At Pump	Protractor At Throttle Valve	Maximum Deviation
0°	0°	
5°	3°	
10°	6°	
15°	9.5°	(All 0.5°)
20°	13.0°	
30°	21.0°	
40°	30.0°	
50°	40.5°	
60°	52.0°	(All ±1°)
70°	65.0°	
79°-82°	80°-85°	Full Throttle Position

HAND THROTTLE

After adjusting linkage correlation, check hand throttle adjustment. With engine warm and hand throttle lever fully pulled, an engine speed of 4,000 RPM should be obtained.

ACCELERATOR PEDAL

Set accelerator pedal to full throttle position with pump lever on pump approximately .04" (1 mm) away from its full load stop. Make necessary adjustments on accelerator pedal stop screw.

MICRO-SWITCH

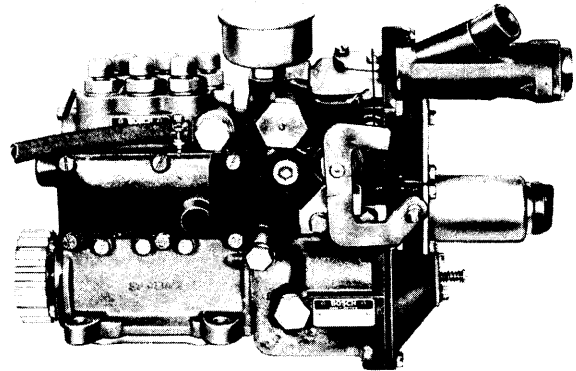
Release lock nut and loosen adjusting screw to extent that micro-switch circuit is not operable in idling position. From this position, turn adjusting screw down until micro-switch circuit is barely operable (audible clicking sound). Turn adjusting screw in 1/2 to 3/4 of a turn and tighten lock nut.

INJECTION PUMP

1) With engine at operating temperature, connect suitable exhaust gas analyzer according to manufacturers instructions. Attach tele-thermometer for intake air temperature (special tool P 237 or equivalent). Attach protractor with pointer to left throttle valve lever, and set pointer to 0°. Adjust hand throttle to 7°, while actuating accelerator pedal several times to relieve tensions on linkage.

2) Operate vehicle on road or a roller test stand to determine exhaust gas data in partial load range at a throttle valve position of 7° and 2500 RPM in second gear. If exhaust gas readings are not as specified, shift performance field on control rack head of injection pump.

Performance Field Adjustment - 1) Remove Allen head screw on inlet to control rack head. Remove 8 mm bolt (transmission lever support) on left rear housing of injection pump to gain access to adjustment screw inside pump. Adjustment of performance field is made with special screw driver (P229b or equivalent). Turn adjusting screw on control rack head with screw driver. Clockwise for "leaner", counterclockwise for "richer" adjustment.



2P006

INJECTION PUMP

2) Depending on deviation from specified CO value, adjusting screw should be shifted from 1 to 2 notches, then check exhaust gas values again during a driving test or on roller test stand. **NOTE** - Tighten access bolt before starting engine (on 2 litre engines only).

► **CAUTION** - Turning adjusting screw on control rack head will change adjusted quantity of fuel and affect CO values in all ranges of performance field. Idle speed adjustment must be checked after each correction.

IDLE SPEED ADJUSTMENT

1) With engine at operating temperature and tachometer attached, adjust idle speed air screws on throttle valve housings to obtain specified idle speed RPM. Turning in lowers idle, turning out increases idle. Then check air flow for individual cylinders at 3000 RPM, using suitable synchronizer (P 235 or equivalent).

2) Connect suitable exhaust gas analyzer and check CO content. If CO quantity is not within specifications, readjust idle speed injection quantity on pump.

3) Before attempting this adjustment, STOP ENGINE. Use a special tool (P 230b or equivalent) to push spring-loaded idle speed adjusting knob down until it locks. For a leaner mixture, turn adjusting screw counterclockwise; for a richer mixture, turn clockwise. Do not adjust by more than one notch at a time. Maximum of three notches may be adjusted toward either right or left of basic position.

4) Readjust idle speed air screws to obtain specified idle RPM. Measure again with suitable synchronizer for uniform vacuum in intake pipes.

► **CAUTION** - Adjustments in partial load and idle range should be done as quickly as possible, so that intake passages do not heat up. Prior to continuing exhaust gas measurements (road or roller test stand), drive vehicle for a short period or run at higher speed (approximately 3000 RPM), so that intake passages will cool down.

THROTTLE VALVE AIR FLOW RATE

When throttle valves are actuated, each intake pipe should have same vacuum, so that each cylinder draws same quantity of air. With engine at operating temperature, adjust engine speed with hand throttle to 3000 RPM. Position suitable synchronizer in sequence on individual intake pipes and record reading. Add these values and divide by number of cylinders (6). Then set each cylinder to this mean value by turning air correction screws.

Bosch Fuel Injection

PORSCHE MECHANICAL TYPE (Cont.)

INJECTION PUMP BELT

Slightly loosen pump retaining nuts. Push pump sideways, using special tool (P 234b or equivalent), until toothed belt is properly tensioned. With firm thumb pressure at center, belt deflection should be .236-.315" (6-8 mm). Retighten pump retaining nuts.

SPECIFICATIONS

Engine

Idle Speed	900±50 RPM
Cam Angle	38°±3°
Ignition Timing	30° BTDC @ 6000 RPM
Spark Plug Gap024" (0.55 mm)
Compression	128-156 psi (9-11 kg/sq. cm)
Cylinder Leakage (maximum per cylinder)	10%
Valve Clearance	Intake (cold)004" (0.10 mm)
	Exhaust (cold)..... .004" (0.10 mm)

Fuel Pump

Pressure	11.8±3.0 psi (0.8±0.2 atm)
Volume (in 30 seconds)	1.90-2.11 pts (0.9-1.0 ltr)
Voltage (minimum)	11±1 Volts
Current Draw	2.15-2.40 Amps.

Linkage

Injection Pump	
Control Lever Length	① 4.49±.04" (114.0±1 mm)
Throttle Valve	
Push Rod (2) Length	① 5.89±.04" (149.5±1 mm)
Cross Shaft to Accelerator	
Bellcrank Pull Rod Length	① 10.83" (275 mm)
Injection Pump Lever	
Full Load Stop Clearance04" (1.0 mm)
Hand Throttle Setting	
Maximum Engine Speed	4,000 RPM

① - Dimensions are from ball head to ball head center.

Injection Pump

End of Delivery Stroke	Approximately 400° ATDC With "F-E" mark on camshaft pulley aligned at notch in blower housing.
Injection Pump Timing	Mark on hub of belt pulley to align with mark on pump bearing cover.
Drive Belt Deflection236-.315" (6-8 mm) with firm thumb pressure at center.

REMOVAL & INSTALLATION

INJECTION PUMP

Removal - 1) Disconnect battery. Remove air cleaner. Set engine to end of delivery stroke by bringing No. 1 piston to TDC of compression stroke and then turning one complete revolution (360°) in direction of engine rotation. Continue slightly (about 40°) beyond TDC mark and align the "F-E" mark on crankshaft pulley with notch on blower housing.

2) Disconnect wires from micro-switch. Remove wires from enrichment and shut-off solenoids (gray wire for enrichment solenoid; gray-red wire for shut-off solenoid). Loosen warm air supply hose to thermostat.

3) Disconnect injector lines at pump. Disconnect fuel inlet line on right side of pump and return line on left side of pump. Detach oil inlet and return lines. (When disconnecting inlet (lower) line, hold fitting with wrench.) Loosen clamp on return line and pull line from connection.

4) Remove linkage between guide shaft and governor. Remove pump retaining nuts on pump base using special tool (P 120b or equivalent). Push toothed belt off pump drive wheel. Secure belt (use rubber band) so that it does not fall off driving wheel at engine camshaft. Remove pump from mounting bracket and lift out. **NOTE - DO NOT lift pump by barometric cell to prevent damage to unit.**

Replacement - 1) Before replacing injection pump, place pump on side and fill through oil return connection (top hole) with approximately 10 oz (300 cc) oil (same as used in engine). Align mark on hub of belt pulley with mark on injection pump bearing cover. Recheck "F-E" position of engine again (mark on crankshaft pulley with notch on blower housing).

2) Install pump and tighten nuts slightly. Push toothed belt on drive pinion, being sure that delivery end is not misaligned. If teeth on drive wheel do not mesh with those of belt, remove pump and reset drive wheel by loosening the three Allen head bolts. Slightly tighten pump retaining nuts. Push pump sideways, using special tool (P 234b or equivalent), until toothed belt tension is as specified. Reinstall parts previously removed.

INJECTION PUMP BELT

Set engine and injection pump to end of delivery stroke (F-E mark). Remove left heat exchanger. Remove left front engine cover. Loosen pump retaining nuts. Move pump to left within range of oblong holes using special tool (P 120b or equivalent). Remove belt from drive sprocket. Install new toothed belt. Push pump sideways, using special tool (P 234b or equivalent), and adjust belt to specifications. Install cover plate and heat exchanger (use new gasket).

Additional Steps for Replacing Belt of Sportomatic Model - Remove pressure and suction lines on oil pump. Remove oil pump mounting bolts and remove oil pump. When installing, use new gasket. Mount cylindrical pin of oil pump shaft between clamping sleeves of camshaft. Use new gaskets for heat exchanger and tighten fastening nuts alternately and uniformly.

TROUBLE SHOOTING

HARD STARTING - ENGINE COLD

Improper Starting Procedure - Pull hand throttle valve up to stop at all outside temperatures. Do not use accelerator pedal when starting vehicle. When engine starts, run for a short period in preset hand throttle position. Then step on accelerator pedal until engine is running at approximately 4500 RPM. Release accelerator pedal and push hand throttle lever back until engine runs at approximately 1200-1400 RPM. If engine speed increases as temperature increases, set hand throttle back accordingly until it rests against bottom stop. If engine does not start after 10-15 seconds, wait for ten seconds and start again.

Enrichment Solenoid Does Not Activate - Check electrical connections and voltage. Replace solenoid if necessary.

PORSCHE MECHANICAL TYPE (Cont.)

Starting Relay Defective – Replace.

Time Limit Relay Defective – Replace.

Thermo-Limit Switch Defective – Replace.

HARD STARTING – ENGINE HOT

Improper Starting Procedure – Before starting a hot engine, ignition should be turned on for approximately five seconds so that any vapor that may have formed in system will be flushed out. Depress accelerator fully while starting.

Enrichment Solenoid Does Not Activate – Check connections and voltage on solenoid.

Starting Relay Defective – Replace.

Control Rod Remains in Starting Position – Check to see that control rack is released after approximately two seconds. Check relay, enrichment solenoid and time limit relay; replace if necessary.

Time Control Switch Defective – Replace.

ROUGH ENGINE IDLE

Idle Air Control Incorrectly Adjusted – Adjust idle air control screws at 3000 RPM using suitable synchronizer (P 235 or equivalent).

Timing Incorrect – Reset to specifications.

Restricted Warm Air Flow to Thermostat – Eliminate restrictions in lines or replace lines. *NOTE* – Engine may also appear excessively oily.

Thermostat on Injection Pump Defective – Replace thermostat. *NOTE* – Engine may also appear excessively oily.

Injection Valves Defective – Check injection jet and replace valve if necessary.

Cylinder Compression Varies – Check compression or pressure loss and make required correction.

Cold Weather Starting Device Does Not Shut Off – Check out device and replace if necessary.

ENGINE WILL NOT START

Fuel Pump Inoperative – Check power supply. Replace pump if necessary.

Fuel Pump Running But Insufficient Or No Fuel – Check hose connections (suction-pressure-bypass), check voltage and current draw on electrical connections. Check fuel filter and replace if necessary.

Starting Relay Defective – Replace.

Thermo-time Switch Defective – Replace.

Control Rack Stuck – Replace Injection Pump.

Time Limit Relay Switch Defective – Replace.

ENGINE WILL NOT START AT TEMPERATURE BELOW 14°F (–10°C)

Cold Starting Device Not Operating – Check electrical connections. Check voltage on electrical connections.

ENGINE MISFIRES

Ignition Malfunction – Check ignition system.

Fuel Filter Contaminated – Replace filter element.

Injection Valves Defective – Check injection valves and replace if necessary.

Insufficient Fuel – Check fuel pump volume. Check hose connections and electrical connections on pump. Replace pump if necessary.

WARM ENGINE HESITATION & BACKFIRING

Injection Pump Adjustment Incorrect – Check adjustment with suitable exhaust gas analyzer and adjust if necessary.

Improper Linkage Correlation – Check coordination and linkage correlation; adjust if necessary.

BACKFIRING UNDER OVERRUNNING CONDITIONS

Throttle Valves Not Synchronized – Synchronize throttle valves using suitable synchronizer (P 235 or equivalent).

Micro-switch Out of Adjustment – Adjust micro-switch, and replace if necessary.