Audi Turbo Quattro Coupe Introductory Service Training Maintenance and Adjustments

This is one of two documents ca. 1982, which were used to train Audi mechanics on the internal workings of the then-new ur-quattro.

This document contains the detailed engine and drivetrain specs and troubleshooting information for the WX engine, which is completely from the Bentleys or any other source.

The companion document is “IST Information”, which is an introductory overview of the engine and drivetrain components with verbal descriptions of their functions

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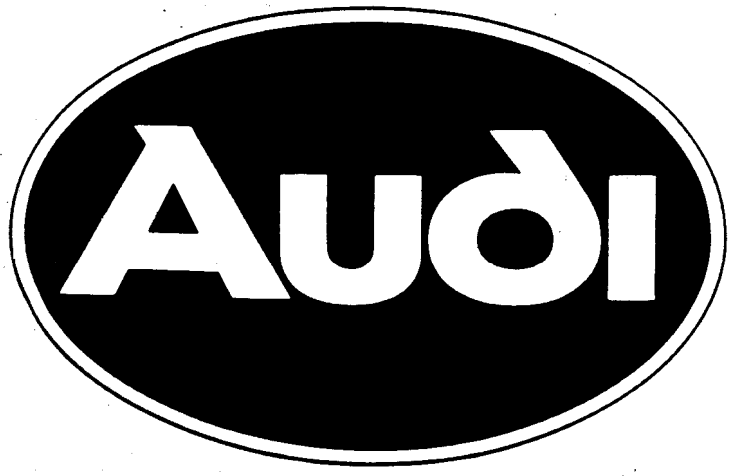

Introductory Service Training Information

Maintenance and Adjustments

quattro

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All information contained in this booklet is preliminary information which is subject to change.

Engine

Engine oil capacity

4.5 qts. (4.0 L) with oil filter change
4.0 qts. (3.5 L) without oil filter change

Oil pressure

With oil temperature 80° C (176° F) —
@ idle speed — 1 bar (14 psi) minimum
@ 5500 rpm — 5.3 bar (75 psi) minimum

Valve clearance

With coolant temperature above +35° C (95° F)
Intake .20-.30 mm (.008 - .012 in.)
Exhaust .40-.50 mm (0.16 - .020 in.)

Compression

Acceptable	7-9 bar (102-131 psi)
Minimum	5 bar (73 psi)
Max. between cyl.	2 bar (29 psi)

Tune up

Spark plugs

Bosch WR 5 DS
Beru RS 39
Champion N522 GY, N6 GY
Gap 0.7 ± 0.1 (.028 ± .044)

Ignition rotor/wires

Rotor resistance = 1000 ohms
Spark plug wire
resistance = 4000 to 6000 ohms
Coil wire resistance = 800 to 1200 ohms

Ignition timing

The ignition timing is not adjustable

Idle speed

All electrical accessories OFF engine at operating temp.
850 ± 60 rpm

CO %

Crankcase breather hose removed from valve cover and hose plugged.
Charcoal canister purge hose removed at the intake air duct and the intake air duct plugged.

	Check at:
"Duty cycle"	25 - 65%
CO%	0.3% to 1.2%

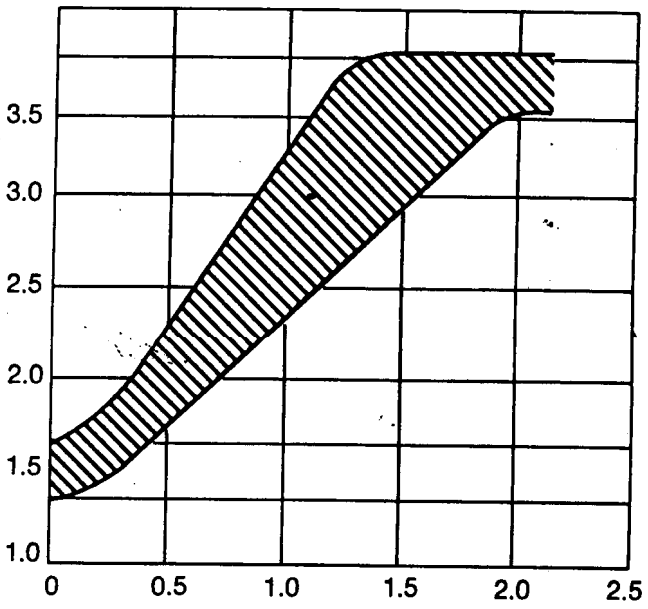
If duty cycle is outside of this range, adjust to 50%±6%

Oxygen sensor

Condition	Dwell spec	CO%
Closed loop - oxy sensor connected - engine warm	25% - 65% fluctuates	0.3% to 1.2%
Open loop - oxy sensor disconnected - engine warm	50% ± 6% steady	0.8 ± 0.4%
Full throttle enrichment Full throttle sw. tripped Idle sw disconnected	70-77%	—
Cranking enrichment - oxy sens disconnected/Temp sens disconnected/Crank engine	80%	—
Cold running enrichment - oxy sens disconnect/Temp sens disconnect/Run engine	65%	—

CIS Fuel injection
Control pressure

Cold: see control pressure curve opposite
Warm:
Hoses connected 3.4 - 3.8 bar
Hoses disconnected 380 mm Hg (15 in Hg) vacuum applied to lower chamber, upper chamber vented to atmosphere



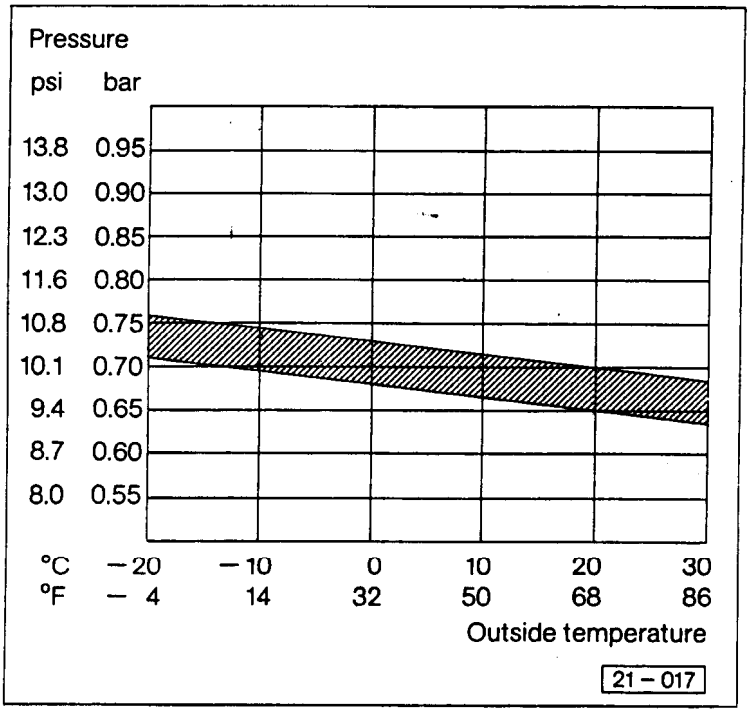
Control pressure curve

System pressure
5.2 - 6.0 bar

Residual pressure
2.6 bar after 10 minutes
2.4 bar after 20 minutes

Turbo-Charger

Boost pressure:
Accelerate using full throttle in second gear
Hold vehicle speed constant with foot brake at 5500 rpm
Maximum test time is 10 seconds
See chart for specifications.



Transmission

Front final drive/Gearbox oil specs
- SAE 80 or SAE W90
- GL4 (Mil-L-2105)
- Oil Level - top to filler hole
- Capacity 3.37 qts. (3.21L)

Rear final drive
- SAE 90
- GL5 (mil-L2105B)
- Oil level - top to filler hole
- Capacity - 2.32 qts. (2.21 L)

Steering

Steering play
- No play with engine running

Tie rods
- No play

Power steering
- Dextron® ATF
- ATF level - top to mark on reservoir
- Check level with engine OFF after pressing brake pedal 20 times

Brakes

Brake fluid level
- Fill to mark on reservoir

Front brakes

Disc	Diameter 280mm (11in) thickness 22mm (.87in) Wear limit 20mm (.79in)
Pads	Thickness without backing plate 14mm (.55in) Wear limit 2mm (.8in)

Rear brakes

Disc	Diameter 245mm (9.6in) thickness 10mm (.4in) Wear limit 8mm (.315in)
Pads	Thickness without backing plate 12mm (.47in) Wear limit 2mm (.8in)

Brake pressure regulator

Depress brake pedal until gauge on front axle reads:
Front 50 bar (725 psi)
Rear 34-39 bar (493-566 psi)

Increase brake pedal pressure until gauge on front axle reads:
Front 100 bar (1450 psi)
Rear 57-62 bar (827-899 psi)

Technical data

Wheel alignment

Front axle

Total toe (wheel not pressed)	0° +5 -10
Camber	-50′ ± 30′
Max. difference between left & right	30′
Caster (Not adjustable)	+1°30′ ± 40′
Corresponds to difference in camber when turned from 20° left lock to 20° right lock	+1° ± 25′
Max. difference between left & right	30′

Rear axle

Camber	-30′ ± 30′
Max. difference between left & right	30′
Total toe (at specified camber)	-10′ ± 10′
Max permissible deviation from vehicle center line	25′
Toe at each wheel at	-5′ ± 5′

NOTE: Wheel alignment should only be adjusted after coil springs have settled (600-1200mi)

Wheels/Tires

Tire size

Standard - 205/60 HR15
Winter - 185/65 HR15
Spare - T125/70 D15

Wheel size

6J X 15
4J x 15 (spare)

Wheel bolt torque

110 Nm (80ft lbs)

Tire pressures

Cold	Front	Rear
½ load	26 (1.8)	25 (1.7)
Full load	28 (1.9)	28 (1.9)
Spare	61 psi (4.2 bar)	

Torque data

Engine

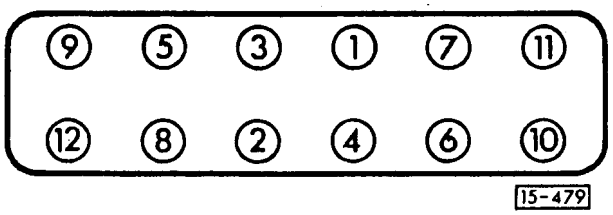
Cylinder head to block

Insert bolts 9 and 11 first to center head.

Torque cylinder head bolts in three step sequence (Engine cold):

1. 40 Nm/29 ft. lb.
2. 60 Nm/43 ft. lb.
3. 75 Nm/54 ft. lb.

(Plus ¼ turn more with breaker bar)



Caution: Do not retorque cylinder head bolts at 1000 mile maintenance nor at 1000 miles following repairs.

Engine to transmission ..... 55Nm/40ft.lb.
Valve cover to cylinder head . 30Nm/22ft.lb.
Spark plug to cylinder head . 30Nm/22ft.lb.
Coolant temperature sensor to cylinder head ..... 8Nm/6ft.lb.
Radiator fan thermo switch to radiator ..... 25Nm/18ft.lb.
Camshaft sprocket to camshaft ..... 80Nm/58ft.lb.
Water pump to engine block . 20Nm/14ft.lb.
Oil pan to engine block ..... 20Nm/14ft.lb.
Oil drain plug to oil pan ..... 40Nm/29ft.lb.
Oil pressure switch to engine block ..... 15Nm/11ft.lb.
Crankshaft damper bolt to crankshaft with special Tool 2079 ... 350Nm/253ft.lb.
Starter mounting bolt ..... 60Nm/43ft.lb.
Exhaust pipe to manifold .... 30Nm/22ft.lb.
Engine mounts ..... 45Nm/32ft.lb.

Transmission

Driveshaft to center and rear differential flanges ..... 45Nm/32ft.lb.
Inner CV joints to drive flanges ..... 80Nm/58ft.lb.

Front suspension

Slotted nut to suspension strut ..... 50Nm/36ft.lb.
Screw cap for shock absorber housing ..... 180Nm/130ft.lb.
Brake caliper mounting bolts ..... 115Nm/82ft.lb.
Wheel hub to drive shaft ... 280Nm/202ft.lb.
Ball joint clamp nut ..... 65Nm/47ft.lb.
Subframe to body ..... 70Nm/51ft.lb.
Brake disc guard plate ..... 30Nm/22ft.lb.

Rear suspension

Slotted nut to suspension strut ..... 45Nm/32ft.lb.
Screw cap for shock absorber housing ..... 180Nm/130ft.lb.
Brake caliper mounting bolts ..... 65 Nm/47ft.lb.
Front axle nut ..... 280Nm/203ft.lb.
Ball joint clamp nut ..... 65Nm/47ft.lb.
Subframe to body ..... 70Nm/51ft.lb.
Stabilizer bar ..... 25Nm/18ft.lb.
Brake disc guard plate ..... 30Nm/22ft.lb.
Tie rod to wheel bearing housing ..... 60Nm/43ft.lb.

Torque data

Brakes/Wheels

Wheel bolts	110Nm/80ft.lb.
Brake caliper to	
Front suspension strut	115Nm/83ft.lb.
Rear suspension strut	65Nm/47ft.lb.
Brake caliper guide bolts	35Nm/25ft.lb.
Brake disc guard plate	30Nm/22ft.lb.

Steering

Steering wheel to steering column	40Nm/29ft.lb.
Tie rod to suspension strut	30Nm/22ft.lb.
Tie rod adjusting nut	40Nm/29ft.lb.
Tie rod to steering rack	45Nm/32ft.lb.
Steering gear to body	
to wheel housing	20Nm/14ft.lb.
to bulk head	35Nm/25ft.lb.
Ignition switch housing	20Nm/14ft.lb.
Flange tube to steering gear	30Nm/22ft.lb.

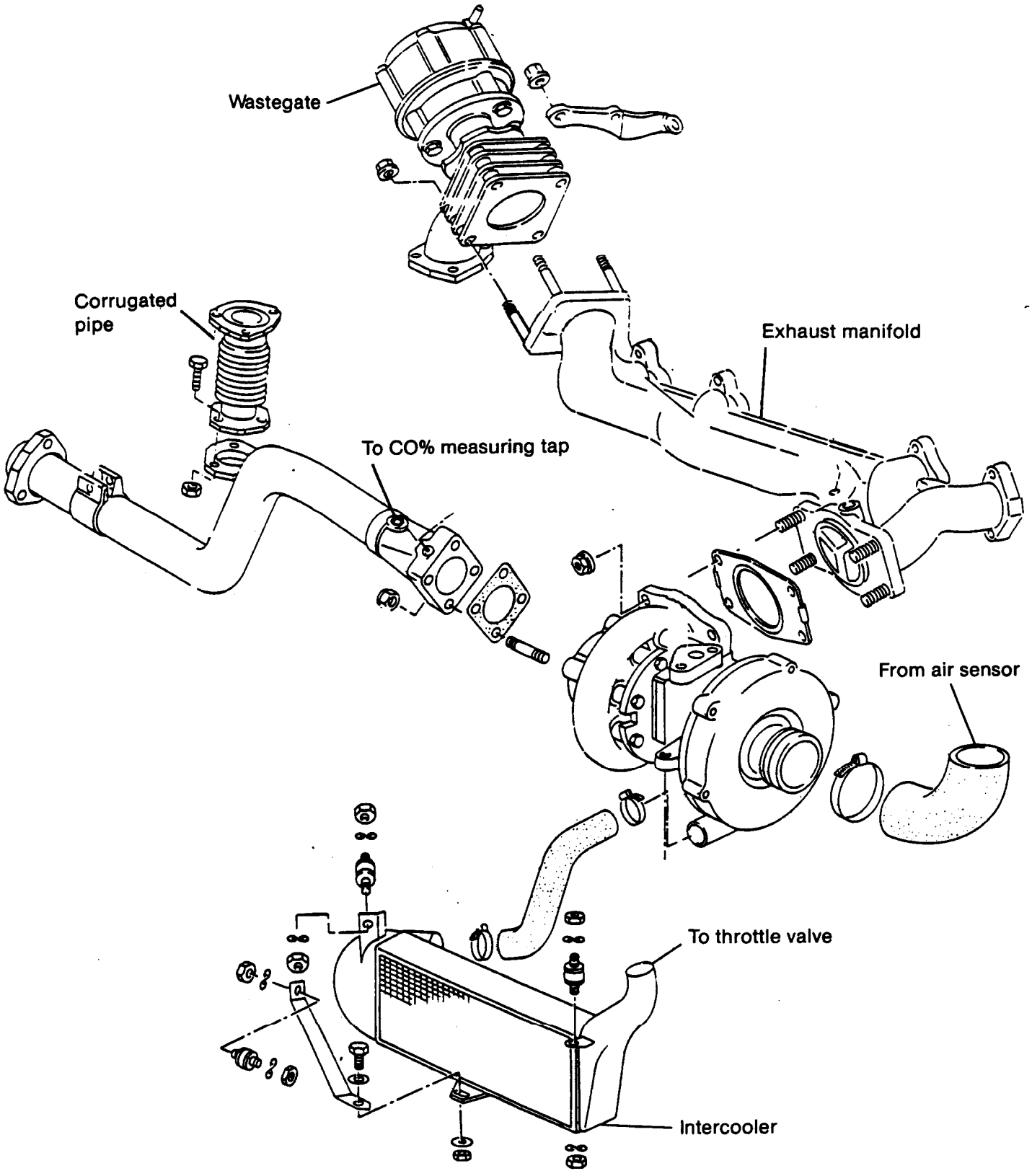
Electrical

Wiper arm to shaft	9Nm/6ft.lb.
Alternator bracket to engine block	45Nm/32ft.lb.
Alternator bracket to alternator	30Nm/22ft.lb.

Turbocharger

Exhaust manifold to cylinder head	25Nm/18ft.lb.
Wastegate to exhaust manifold	20Nm/14ft.lb.
Corrugated pipe between wastegate and front exhaust pipe	25Nm/18ft.lb.
Turbocharger to exhaust manifold	60 Nm/43ft.lb.
Front exhaust pipe to turbocharger	35Nm/25ft.lb.
Oil return line to Turbocharger and engine block	25Nm/18ft.lb.
Oil supply line to turbocharger	25Nm/18ft.lb.

Turbo Charger

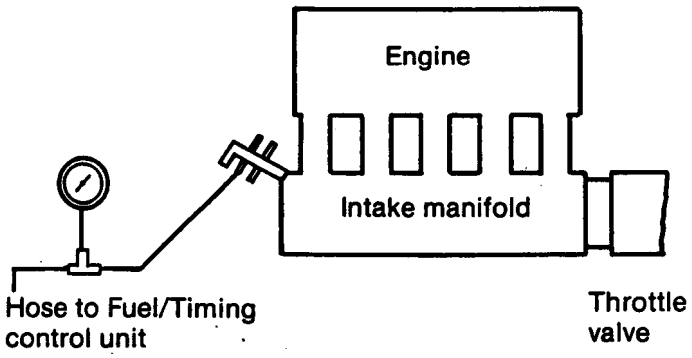


Turbocharger/Wastegate check

— Disconnect the vacuum hose which leads to the Fuel/Timing control unit at the intake manifold connector.

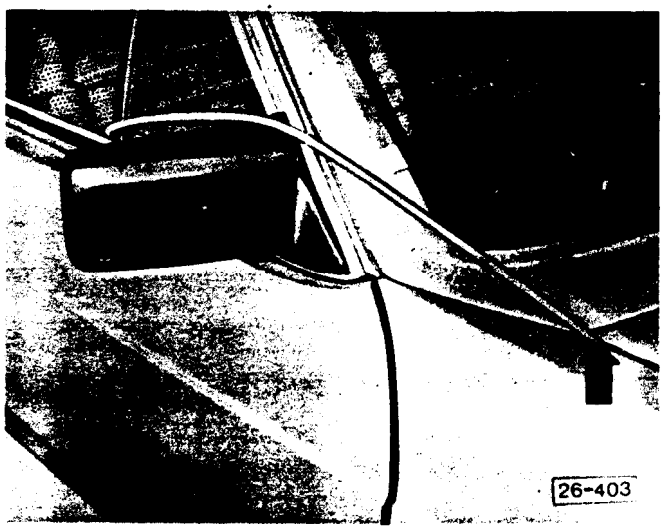
— Using a T-connector, install the VW 1397 pressure gauge between the disconnected vacuum hose and the intake manifold connector

— All hose connections must be secured with hose clamps to assure accurate gauge readings

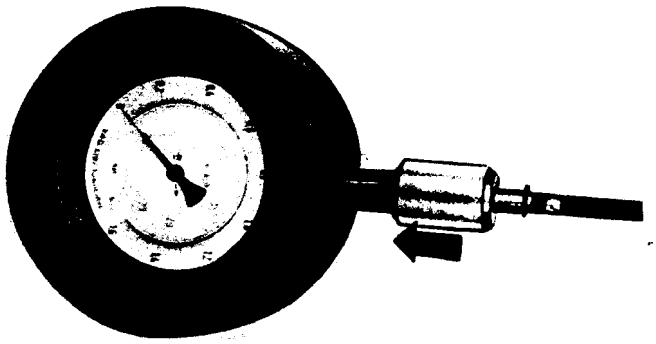


— Place the pressure gauge inside the car and carefully route the hose to avoid pinching or kinking the hose

— Run the engine until it reaches operating temperature



— Open the gauge valve by pushing it toward the gauge
— Accelerate, using full throttle in 2nd gear
— Hold the speed of the car constant with the foot brake when the engine reaches 5500 rpm
Do not allow test time to exceed 10 seconds
— Close the pressure gauge valve. Boost pressure must be in tolerance range shown in the graph
For example: at 20° C (68° F) boost equals 0.65 to 0.70 bar



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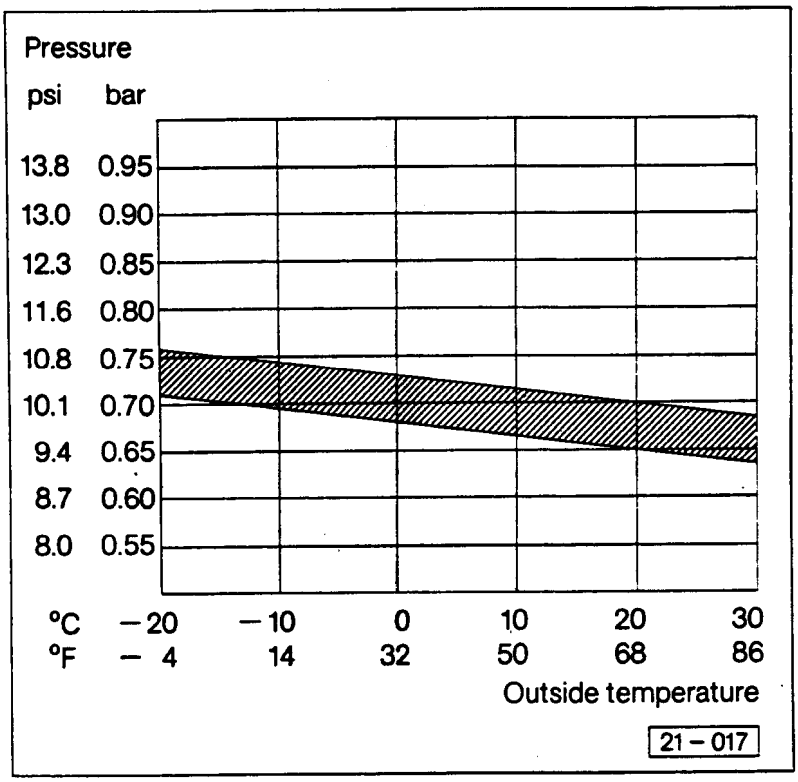


— If boost pressure is not OK check all hose connections and the intake manifold for leaks
— If boost pressure is still not OK replace wastegate and retest
— If boost pressure still not OK reinstall wastegate and replace turbocharger

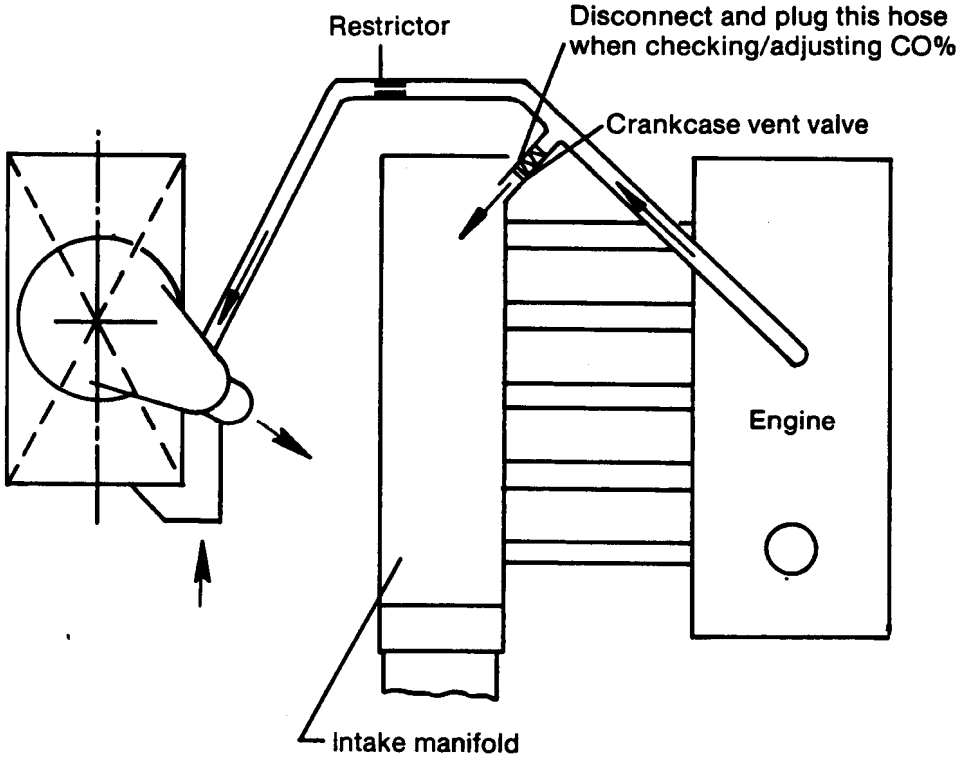
Crankcase ventilation system

The crankcase ventilation system on the Audi Quattro is a closed system. Therefore, crankcase emissions are not discharged into the atmosphere.
The crankcase ventilation system is controlled by the crankcase ventilation valve.
The crankcase ventilation system works like this:

At high manifold vacuum - Under conditions of high manifold vacuum (ie. at idle) the crankcase ventilation valve is almost closed. Therefore most of the crankcase emissions are routed from the valve via a restrictor to the air duct above the sensor plate.

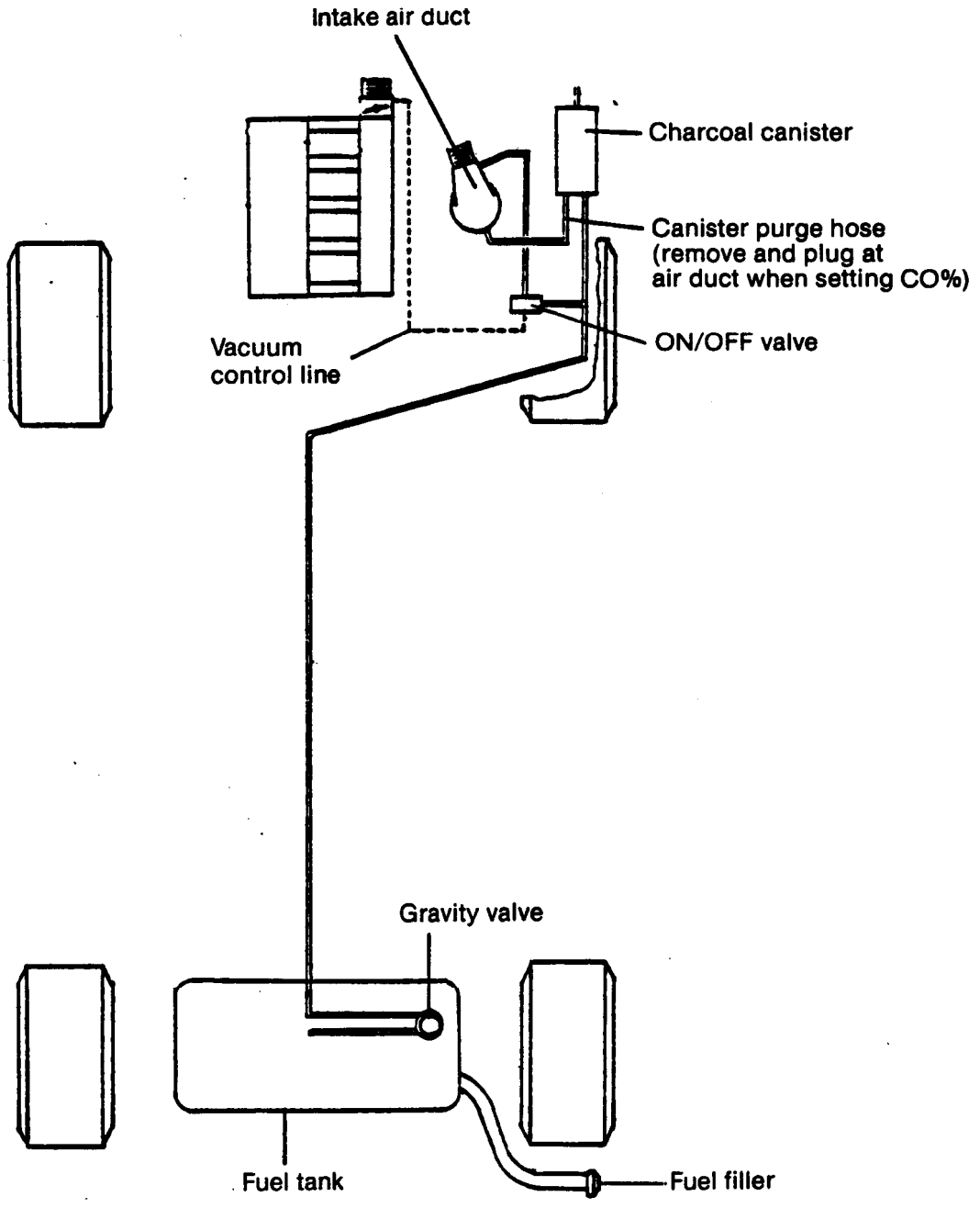
As manifold vacuum decreases - As manifold vacuum decreases, the crankcase ventilation valve opens under spring pressure and crankcase emissions are routed from the valve cover directly into the intake manifold.

At low manifold vacuum and at overpressure (boost) - Under conditions of boost pressure the crankcase ventilation valve closes completely and crankcase emissions are routed to the air duct above the sensor plate.
To set the CO%, disconnect the crankcase ventilation hose from the valve cover and plug hose.

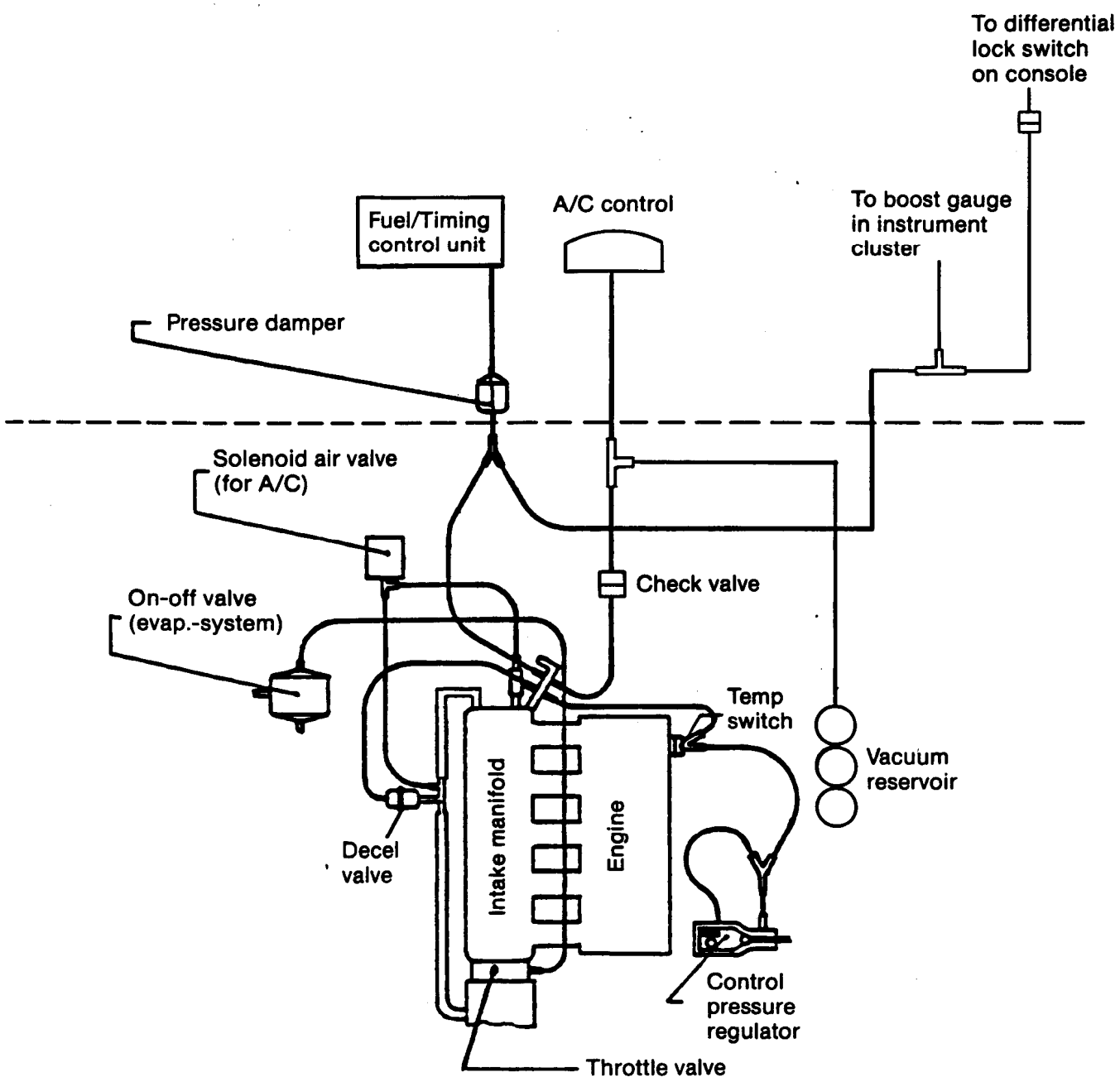


Evaporative emission control system

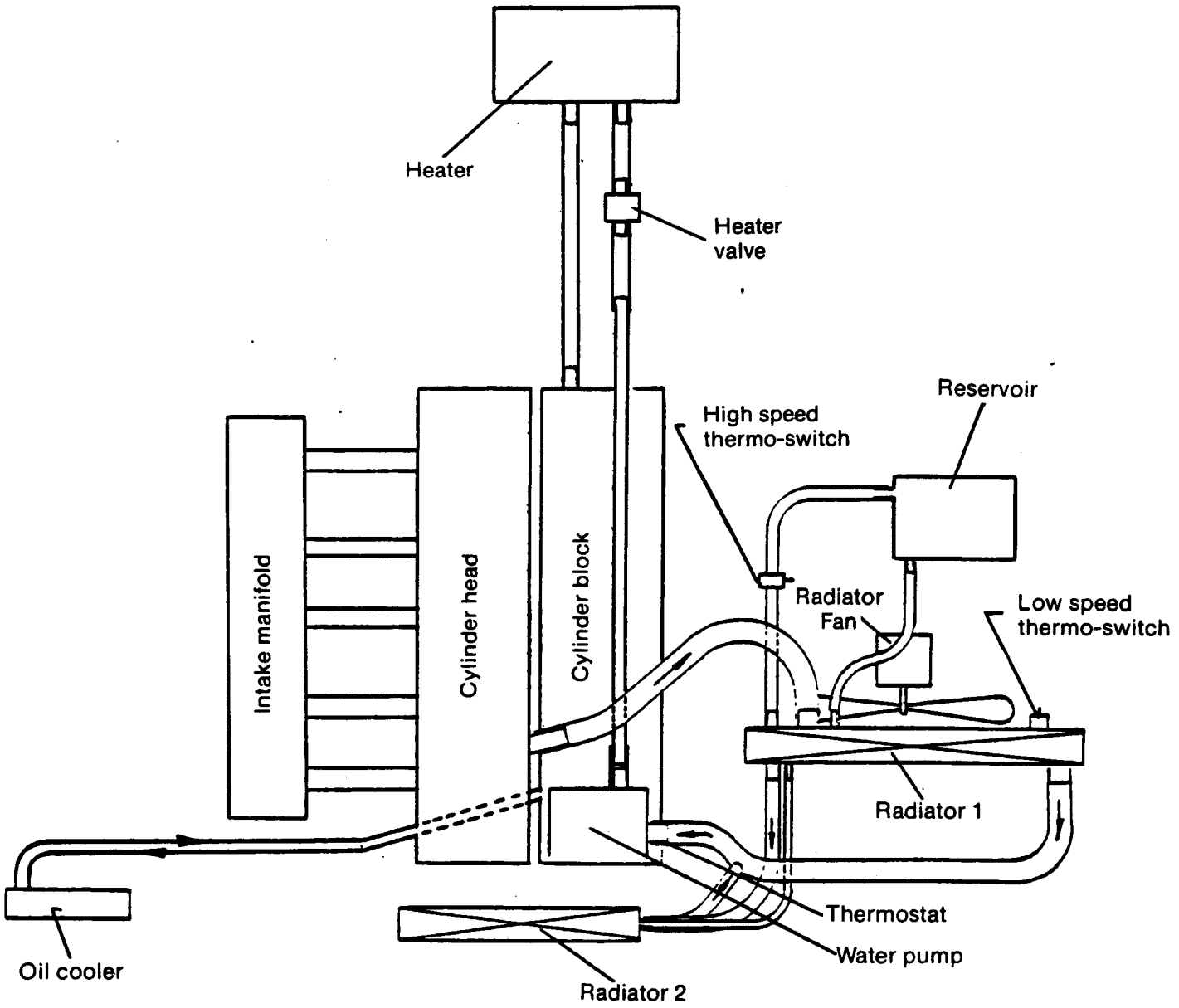
The evaporative emission control system on the Audi Quattro is a closed system. It is designed to prevent air pollution caused by evaporation losses from the fuel system. When the engine is idling, the fuel vapors are drawn from the charcoal canister into the intake air duct above the sensor plate. As soon as the throttle is opened, fuel vapors are drawn from the fuel tank into the intake air duct via a vacuum controlled ON/OFF valve.
Since these fuel vapors may have an effect on idle mixture, always remove the charcoal canister purge hose at the intake air duct before adjusting the CO%.

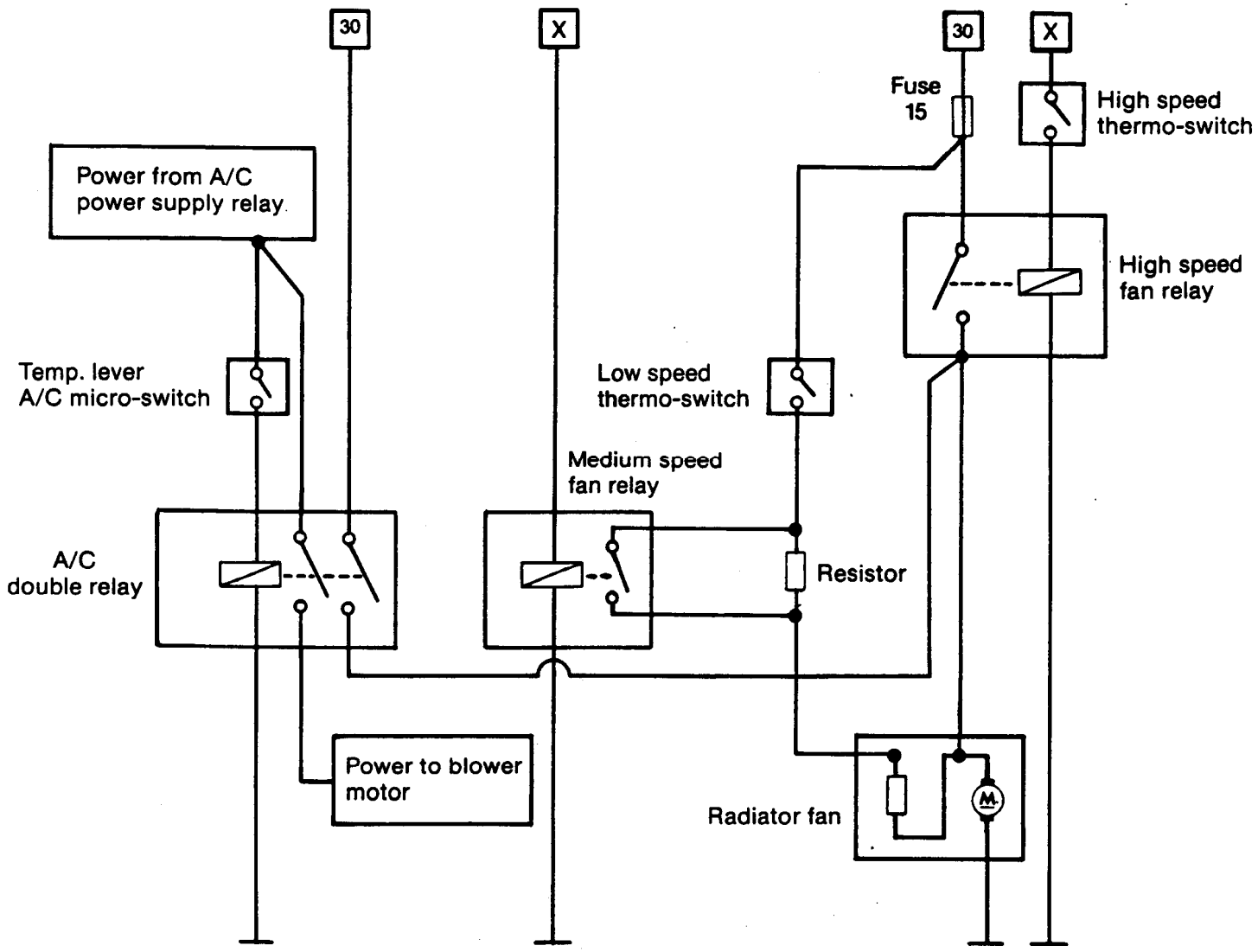


Vacuum hose diagram



Cooling System





Radiator Fan Operation

The radiator fan motor operates at three different speeds. It acts as the fan for both the radiator and the A/C condenser. The fan is activated by either coolant temperature or by the A/C double relay.

Low speed - The low speed radiator thermo-switch operates the fan at low speed (if the ignition is off) by providing voltage to the fan motor through one resistor on the body and one resistor built into the motor.

Medium speed - When the ignition is switched on, the medium speed fan relay will be energized. As soon as the low speed thermo-switch closes, voltage will be supplied to the radiator fan through the closed contacts of the medium speed relay. The resistor on the body will be bypassed and voltage will be supplied to the fan through the resistor which is built into the radiator fan.

High speed - When the high speed thermo-switch closes, the high speed fan relay will be energized and voltage will be supplied directly to the radiator fan.

The high speed of the radiator fan will also be activated whenever the air conditioning is on.

Basic adjustments

Test conditions

— Engine at operating temperature, min. oil temp. 80° C
— All electrical consumers switched off
— Disconnect purge line from carbon cannister to intake air duct
Plug connection at intake air duct
— Disconnect crankcase vent hose from valve cover. Plug vent hose.
— Run warm engine for a few minutes to allow oxs sensor to warm up.

Check idle speed -	850 ± 60 rpm
Check ignition timing -	6° ± 2° BTDC
Check duty cycle -	25% – 65% reading must fluctuate
Check CO -	0.3 to 1.2%

If timing incorrect
Ignition timing is not adjustable. If idle speed is close to 820 rpm the idle stabilizer will start to advance the timing. Set idle speed to 910 rpm and recheck timing. If timing is still incorrect check timing curves on page 19.

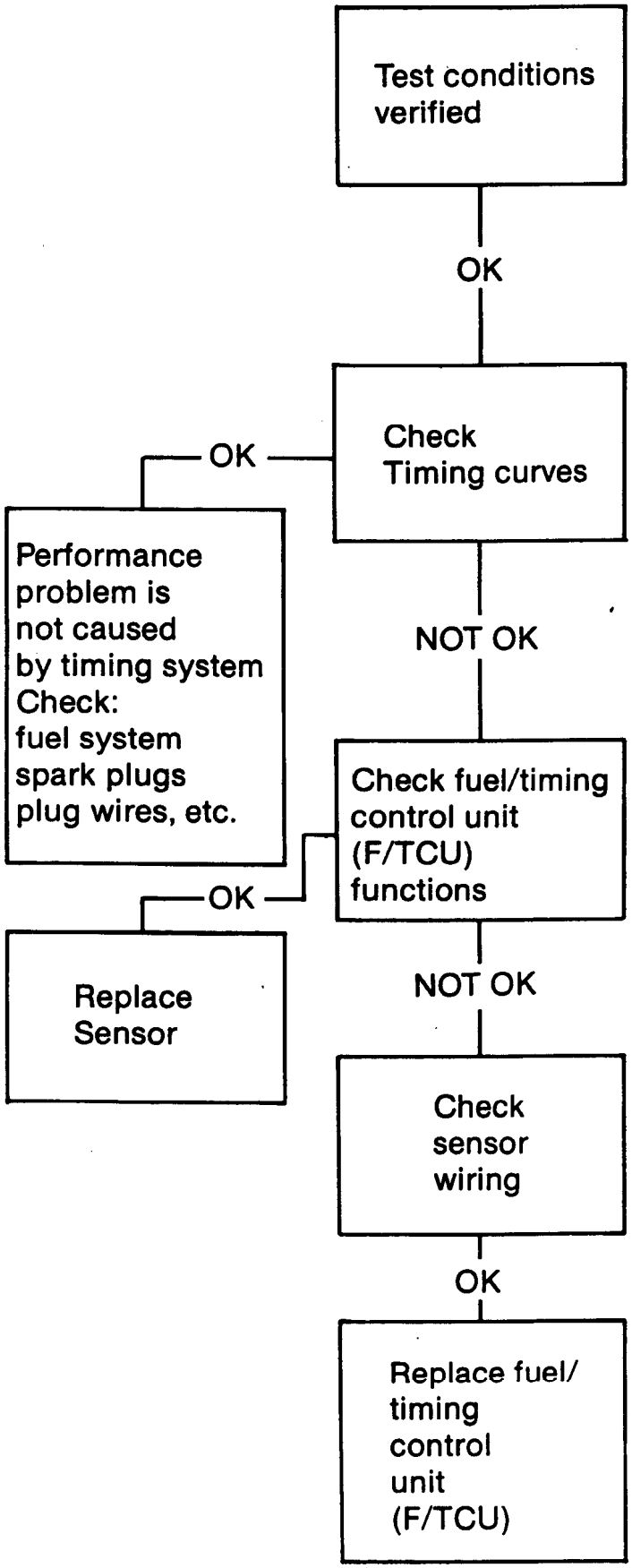
If duty cycle reading is incorrect Adjust "duty cycle" at mixture adjustment screw.

If CO is more than 1.2% with duty cycle at 50 ± 6% check for leaks in exhaust or intake system, CIS defect such as injector spray pattern.

If duty cycle cannot be adjusted or duty cycle reading does not fluctuate check the operation of the oxygen sensor system on page 24.

Briefly increase engine speed to 4500 rpm. If fuel pump shuts off check:
— Air temp sensor page 23
— Idle switch page 21
— Boost pressure page 9
— Frequency valve & wiring (check for open circuit).

Timing system testing
Performance problems



Before testing the system certain conditions must be satisfied. If everything is OK the timing control system could be the cause of the problem.

These tests will help to pinpoint the cause of the problem.
If these tests are out of specifications the problem is being caused by either the timing control unit or one of the sensors which provide information to the control unit.

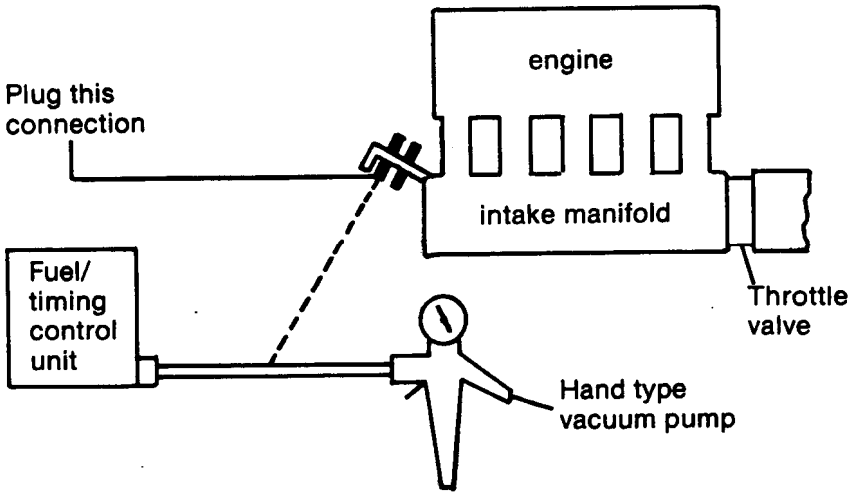
By disconnecting sensors and observing the changes in ignition timing you can isolate the cause of the problem. If the timing curve is incorrect and if the control unit function test is OK, the sensor is the cause of the problem.

If the control unit does not respond properly when the sensor is disconnected, the cause of the problem is either the wiring to the sensor or the fuel/timing control unit. (F/TCU)

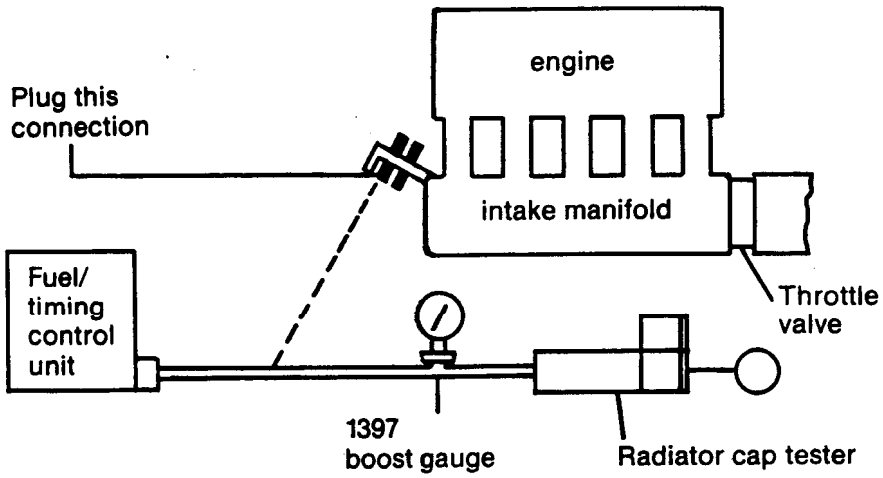
If the sensor wiring is OK, the fuel/timing control unit is the cause of the problem.

Connecting test equipment

Checking vacuum curve



Checking timing with boost



Check timing curves

Timing at atmosphere pressure

— Remove timing control unit pressure hose from connection at intake manifold.
— Plug connection at manifold.

At 1500 rpm Timing should be 26° ± 4°
At 3500 rpm Timing should be 32.5° ± 4°

Timing at maximum vacuum

— Connect a hand type vacuum pump to the timing control unit pressure hose.
— Apply 20 inches of vacuum.

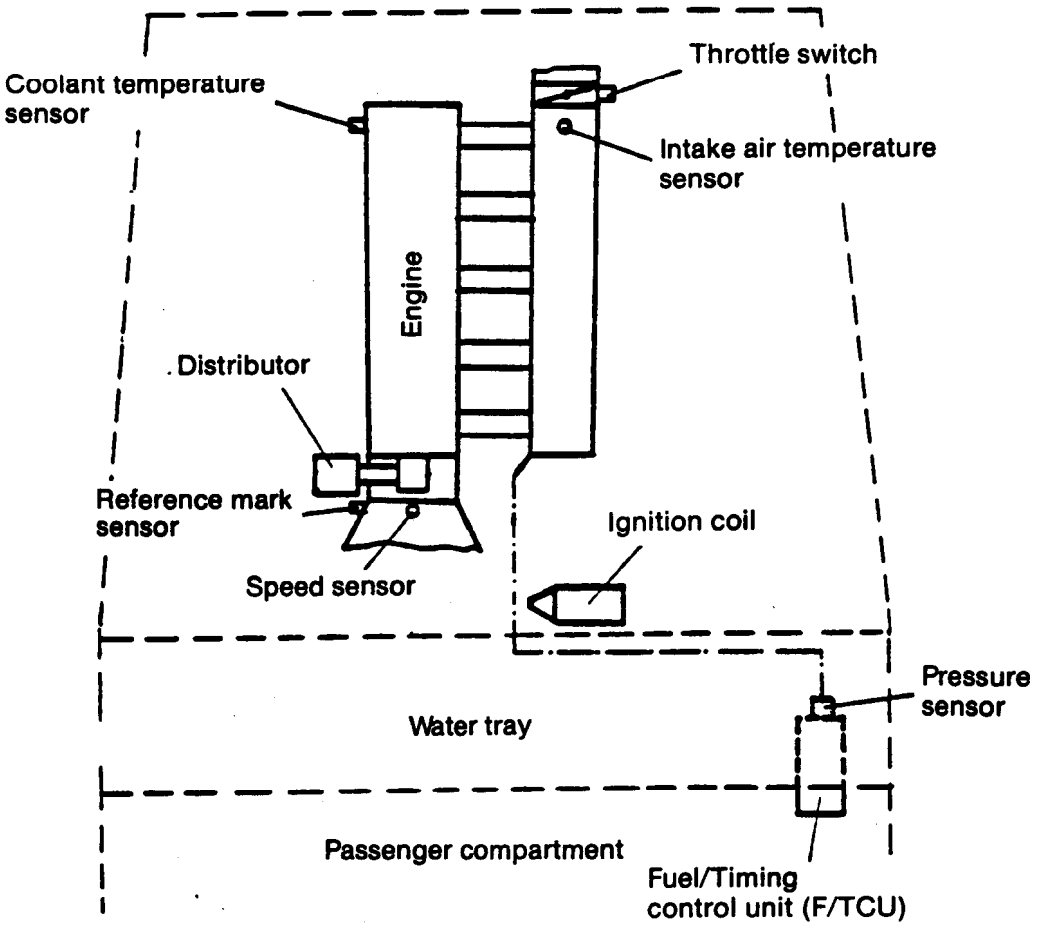
At 3500 rpm Timing should be 38° ± 4°

Timing with boost pressure

— Connect radiator cap tester and 1397 boost pressure gauge to timing control unit pressure hose.
— Increase engine speed to 4000 rpm and then apply 0.7 bar boost pressure.
(If 0.7 bar is applied before 4000 rpm the fuel pump may cut-out.)

At 4000 rpm Timing should be 14° ± 4°

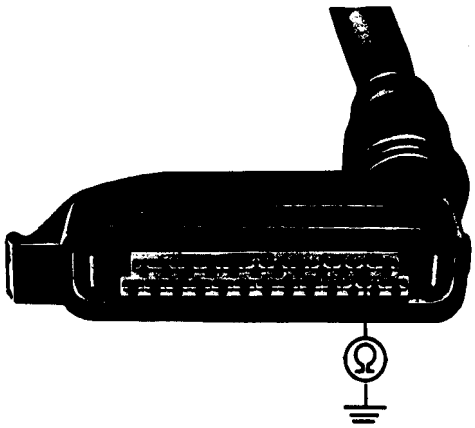
Component location

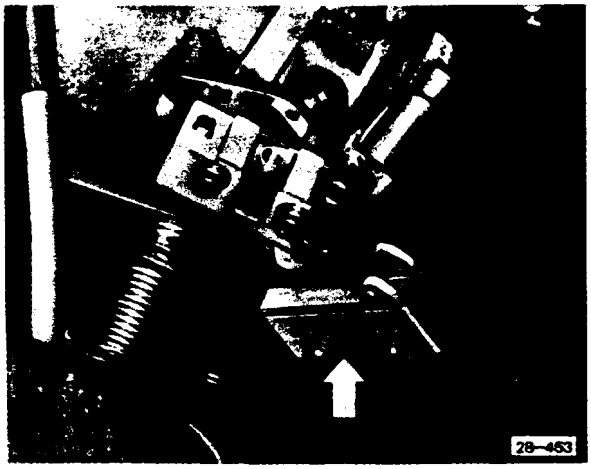


Check control unit and component functions

Idle switch
Remove wires from idle switch.
Connect ohmeter across idle switch terminals
with throttle closed ohmeter should read: 0 ohms
with throttle open more than 3° ± 1° ohmeter should read: ∞ ohms.

Component failure symptoms
A defective or misadjusted idle switch can cause the following conditions:
— If the idle switch is open or if the wires to the switch are open there will be no cold idle timing advance (below -3°C)
— If the idle switch is closed or shorted when the throttle is opened, the timing during the vacuum test will be incorrect and the fuel pump will shutoff at 4000 rpm during the boost test





Wiring check
Connect ohmeter to terminal 15 and ground
0 ohms throttle closed
∞ ohms throttle open more than 3° ± 1°

Switch adjustment
Idle switch should open (∞ ohms) when the throttle is opened more than 3° ± 1° (loosen screws to adjust switch.)

Check control unit and component functions

Coolant temperature sensor - Control unit check

— Pressure hose for fuel/timing control unit must be connected to intake manifold.

— Idle speed must be 850-910 rpm (that is, above idle stabilizer switch-in point).

— Disconnect coolant temperature sensor
Timing should retard to about 0°

— Ground coolant temperature sensor wire
Timing should advance to about 6° BTDC

If timing does not change when sensor is disconnected and/or when grounded, check wire for open circuit. If wire is OK - replace control unit.

Component failure symptoms
A defective coolant temperature sensor can cause no cold idle timing advance (below -3° C). The sensor can also cause warm idle timing to be incorrect.
If warm idle timing is incorrect and control unit checks out OK, replace coolant temperature sensor.

Air temperature sensor - Control unit check

— Connect radiator cap tester and boost pressure gauge to timing control unit pressure hose. Plug the connection at the intake manifold.
— Start the engine and apply 0.2 bar pressure
— Remove connector from air temperature sensor. (on some cars air temp sensor wires are soldered - connector will be near right shock tower).

Ignition timing should retard about 4° to 6°

Engine speed should be limited to about 4000 rpm

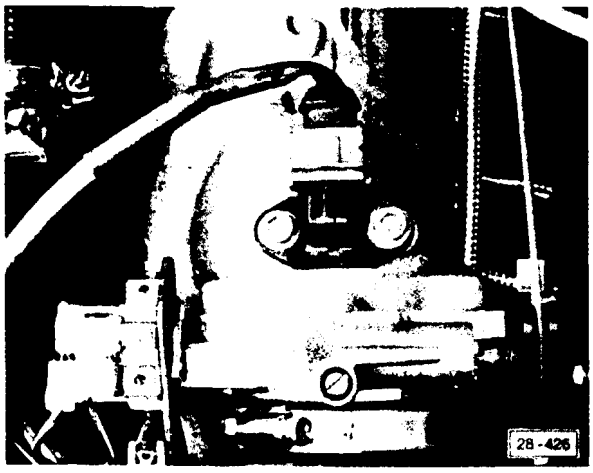
If timing does not retard - Check wires to air sensor for open circuit.

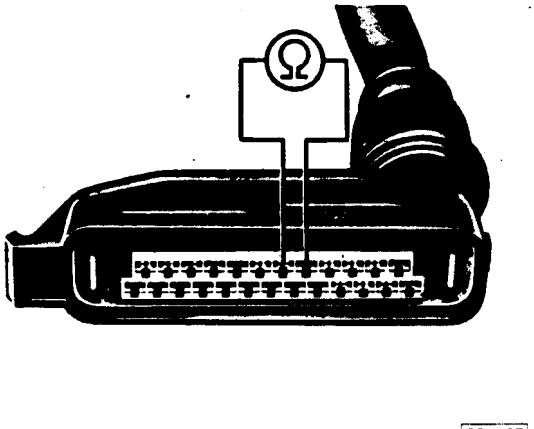
If wires to air sensor OK - Check air temperature sensor for open circuit.

If air temperature sensor OK - Replace control unit.

Component failure symptoms

A defective air temperature sensor will cause ignition timing during boost conditions to be incorrect and also the fuel pump will shut off at 4000 rpm.





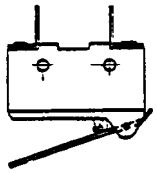
Air temperature sensor, wiring check

Reconnect air temp sensor.
Connect ohmeter between terminals 18 and 19 on multiplug.
Ohmeter should read approximately 13 to 33 ohms at room temperature.

Oxygen sensor system

If duty cycle cannot be adjusted or if duty cycle reading does not fluctuate check the operation of the oxygen sensor system:

Check open loop signal

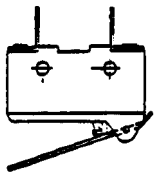


Trip full throttle switch (engine at idle so idle sw. is closed).
Duty cycle reading 50% ± 6% (steady)

No duty cycle reading → Check: Test plug connections

Duty cycle incorrect → Check F/TCU electrical circuit page 31

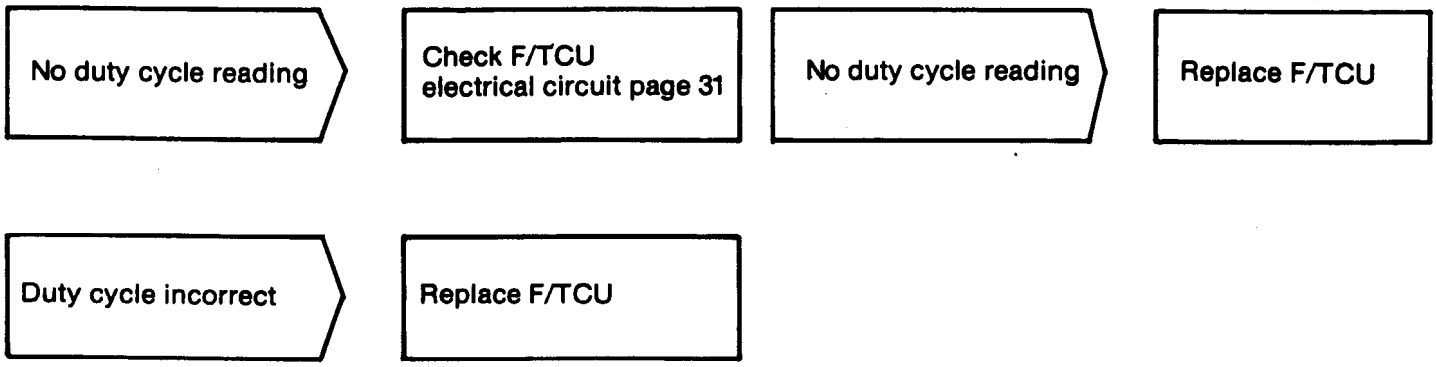
Check full throttle enrichment

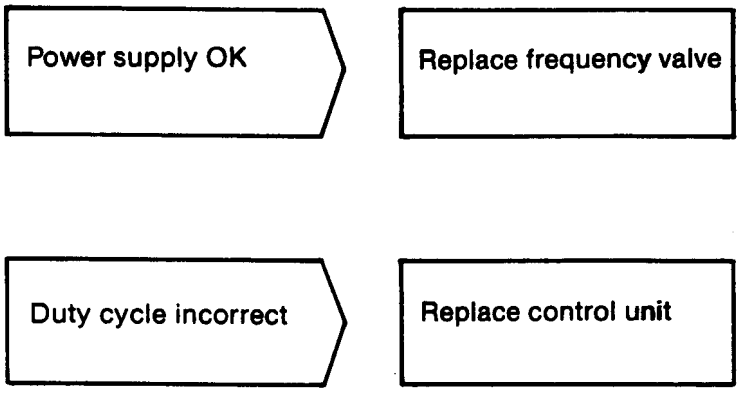


Remove wire from idle switch
Trip full throttle switch
CO% should increase
Duty cycle — 70 to 77%

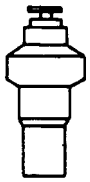
CO does not increase
Duty cycle OK → Check power to frequency valve

Duty cycle incorrect → Check F/TCU electrical circuit page 31


No duty cycle reading
Check F/TCU electrical circuit page 31
No duty cycle reading
Replace F/TCU
Duty cycle incorrect
Replace F/TCU


Power supply OK
Replace frequency valve
Duty cycle incorrect
Replace control unit

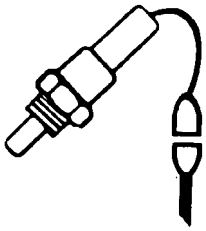
Check cranking enrichment



Disconnect oxygen sensor
Disconnect coolant temperature sensor
Ground coil wire
Crank engine
Duty cycle reads 80%

Duty cycle incorrect → Check F/TCU electrical circuit page 31

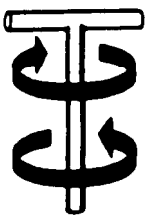
Check cold running enrichment



Start engine
Disconnect oxygen sensor
Disconnect coolant temperature sensor
Duty cycle goes to 95% for up to 30 secs. then duty cycle reads 65%

Duty cycle incorrect → Check F/TCU electrical circuit page 31

Check open loop CO



Disconnect oxygen sensor
Disconnect & plug crankcase vent hose
Disconnect evaporative emissions hose & plug intake air duct
Adjust CO to 0.8 ± 0.4%

CO adjusted to specifications
HC level OK

CO cannot be adjusted
HC level not OK → Repair fuel system or engine defect

Duty cycle incorrect → Replace F/TCU

Duty cycle incorrect → Replace F/TCU

If CO is OK with oxygen sensor disconnected yet duty cycle with oxygen sensor connected is incorrect or does not fluctuate -
Replace oxygen sensor

Timing system testing

Car does not start

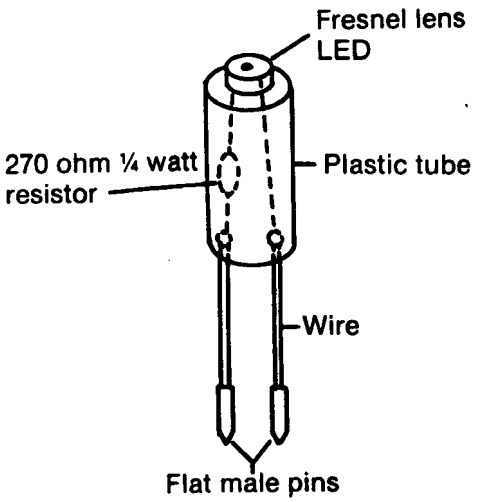
Possible causes

1) Fuel/Timing control unit (F/TCU) power supply and ground
2) Ignition control unit and coil
3) Speed sensor
4) Reference sensor
5) Hall sender in distributor
6) Fuel pump circuit
7) Fuel/Timing control unit (F/TCU)

Before proceeding with the following troubleshooting procedure, certain basic engine conditions must be checked. These are:

1 Distributor cap
2 Ignition rotor resistance
3 Camshaft timing at 0° TDC
4 Basic ignition timing at 0° TDC
5 Ignition wires and spark plugs

Special LED tester

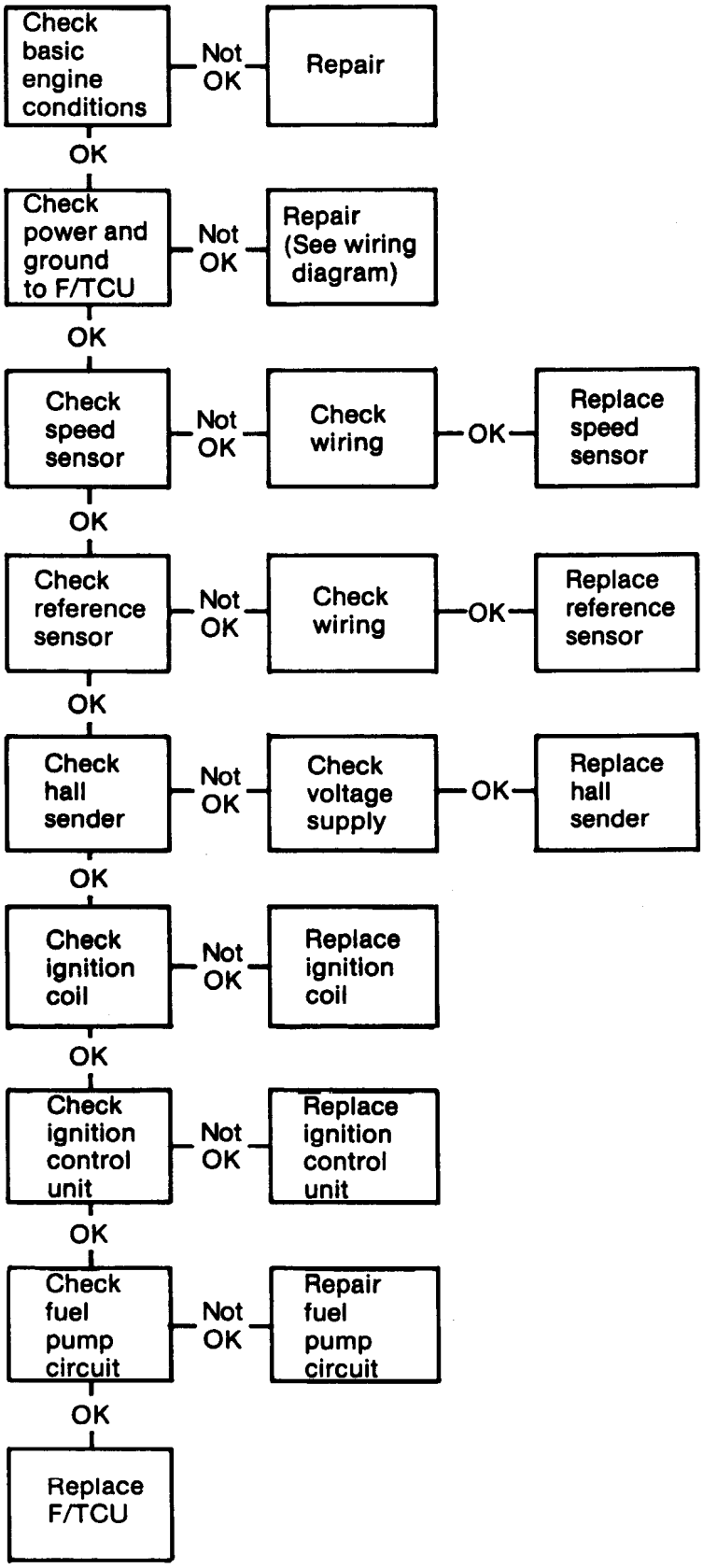


An LED is used to check the low voltage signal from the reference mark and speed sensors. One of these testers will be sent to every dealer. The tester, however can be made from locally available components which are available at Radio Shack or any other electronics store.

Since most of the circuits which are tested with the LED have low voltage it is normal for the LED to glow dimly. A fresnel lens LED works best, however other types of LED's may be used.

The 270 ohm ¼ watt resistor is used to protect the LED from damage when it is connected to circuits with high voltage (i.e. 12V)

All connections should be soldered and insulated with heat shrink tubing.



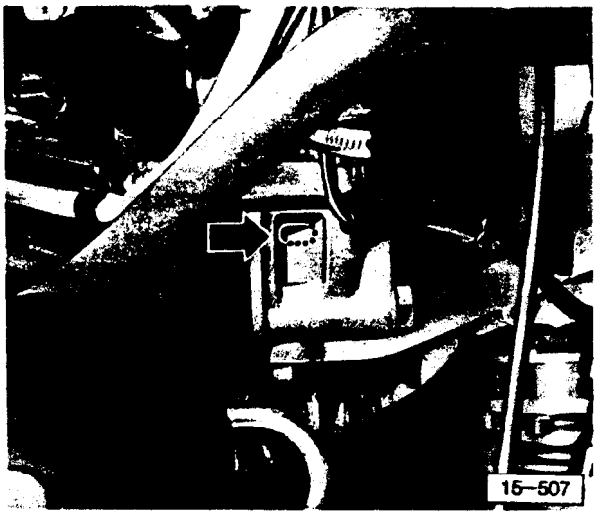
This chart is a summary of the troubleshooting sequence for a no start condition.

The chart should be used to develop an understanding of the troubleshooting logic and the troubleshooting sequence.

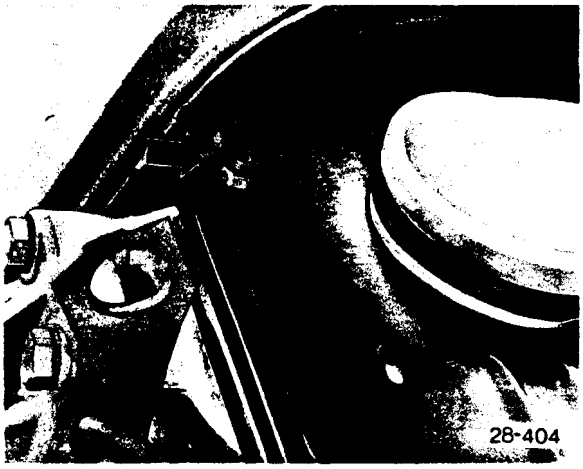
Detailed instructions are given on the following pages.

Basic ignition checks

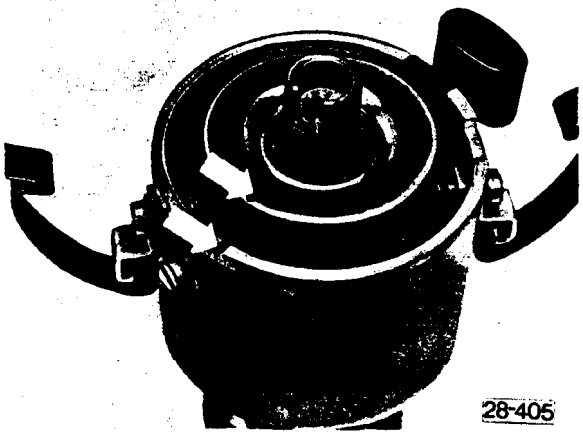
Checking crankshaft and basic timing



Set crankshaft to cylinder No. 1 top dead center



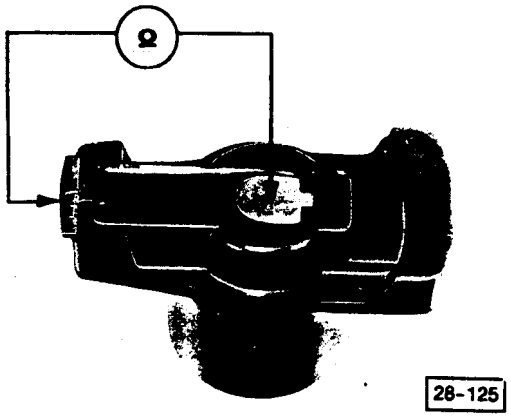
Mark on camgear should line up with valve cover



Marks on distributor should be lined up.

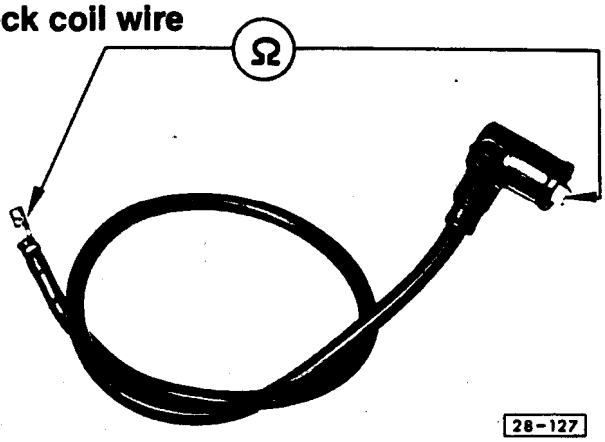
Ignition timing is not adjustable. Timing is controlled by the fuel/timing control unit (F/TCU).

Check rotor resistance



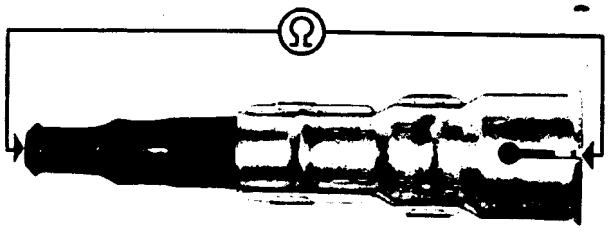
Rotor resistance should be about 1000 ohms.

Check coil wire



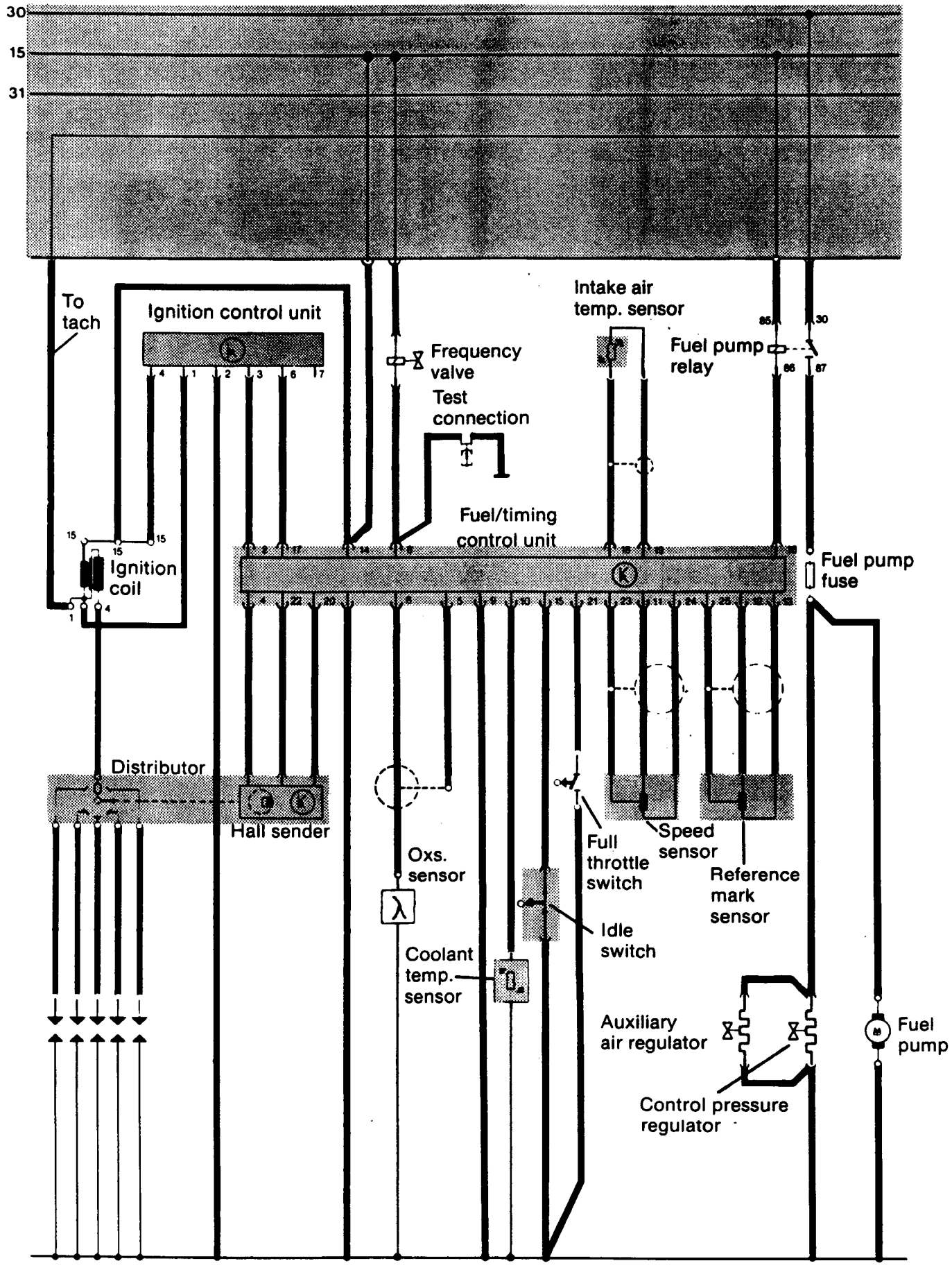
Coil wire resistance should be 800 to 1200 ohms.

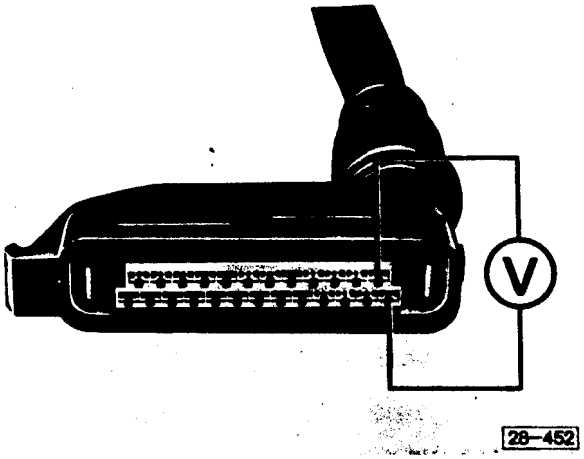
Check plug connectors



Connector resistance should be 4000 to 6000 ohms.

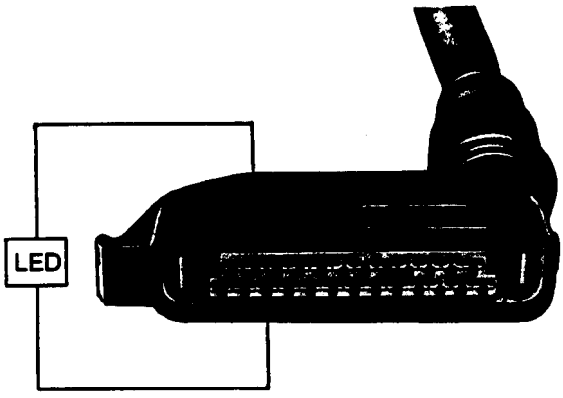
Current Flow Diagram
Fuel/Timing system





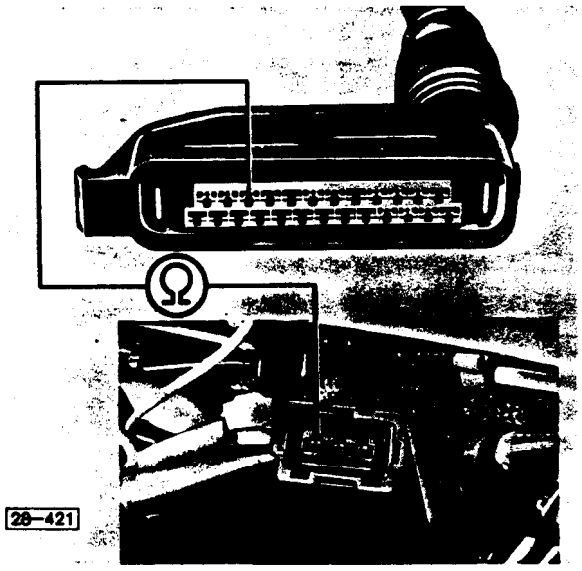
Check Fuel/Timing Control Unit (F/TCU)
Power and ground

— Connect a voltmeter across F/TCU multiplug terminals 14 and 1.
— Turn the ignition key on
Voltmeter should show 12 volts (battery voltage).
(If not, see wiring diagram page 31)



Check the speed sensor

— Remove the multiplug from the Fuel/Timing control unit (F/TCU).
— Connect the LED tester across terminals 11 and 24.
— Crank the engine
The LED should flicker if the speed sensor and wiring are OK.
(If LED does not flicker, check speed sensor wiring)

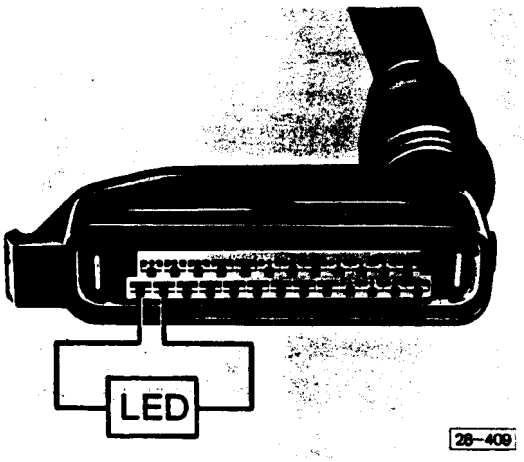


If necessary

Check speed sensor wiring

— Connect an ohmeter between multiplug terminals 11 and 23 — ∞ ohms
terminals 24 and 23 — ∞ ohms
— Disconnect the gray 3-pin connector for the speed sensor (The speed sensor is on top of the bellhousing).
— Connect an ohmeter between multiplug terminals 23 and the 3-pin plug.

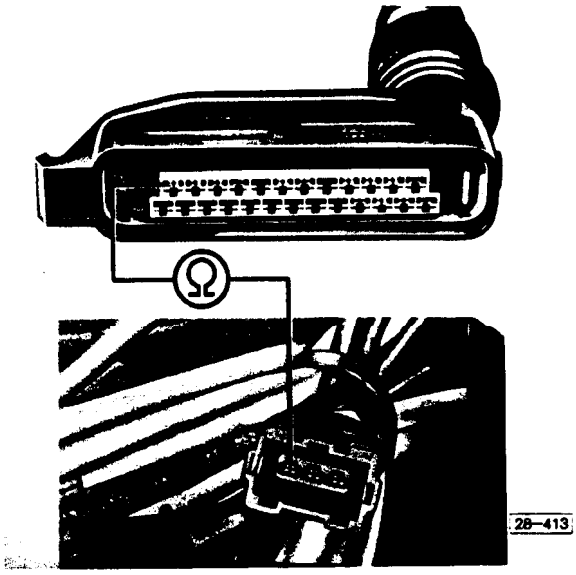
Ohmeter should read 0 ohms
(If the LED did not flicker and if the wiring is OK replace the speed sensor)



Check reference mark sensor signal

— Remove multiplug from F/TCU
— Connect LED tester across multiplug terminals 12 and 13.
— Crank the engine

The LED should flicker.
(If the LED does not flicker, check the reference sensor wiring)



If necessary

Check reference sensor wiring

— Connect an ohmeter between multiplug terminals 12 and 25 — ∞ ohms
terminals 13 and 25 — ∞ ohms
— Disconnect the black 3-pin connector for the reference sensor (the reference sensor is on the driver's side of the engine block).
— Connect an ohmeter between F/TCU multiplug terminals 25 and the 3-pin connector.

Ohmeter should read 0 ohms.
(If the LED did not flicker and if the wiring is OK replace the reference sensor)

Check signal from Hall sender

— Pull back boot on (F/TCU) multiplug.
— Reconnect multiplug to control unit.
— Connect LED tester positive lead to F/TCU terminal 22.
— Connect negative lead to F/TCU terminal 4.
— Crank engine

LED should flicker if Hall sender is OK.
(If LED does not flicker check Hall sender voltage supply)

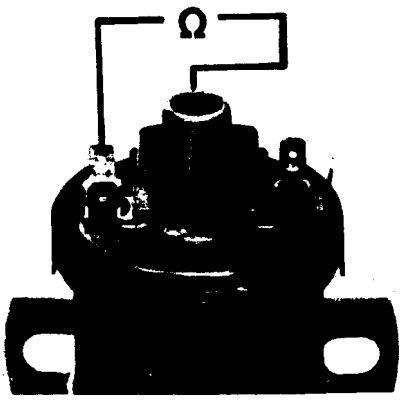
If necessary

Check voltage supply to Hall sender

— Remove the 3-pin connector from the distributor
— Connect a voltmeter across the outer terminals of the connector
— Turn the ignition on (multi-point connector must be connected to the F/TCU)

The voltmeter should read 10 volts minimum
(If voltage is OK and if there is no signal from the Hall sender — replace the Hall sender)

(If voltage is not OK, check wiring to Hall sender — if wiring is OK, replace F/TCU)

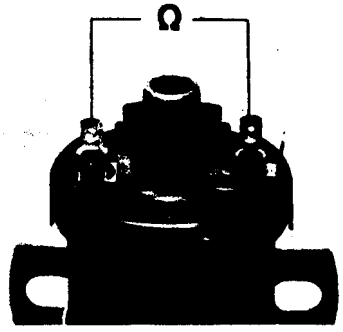


Check ignition coil

Measure secondary resistance.

— Disconnect all wires from coil terminals
— Connect an ohmeter between terminals 1 and 4

Ohmeter should read
6300 to 9200 ohms

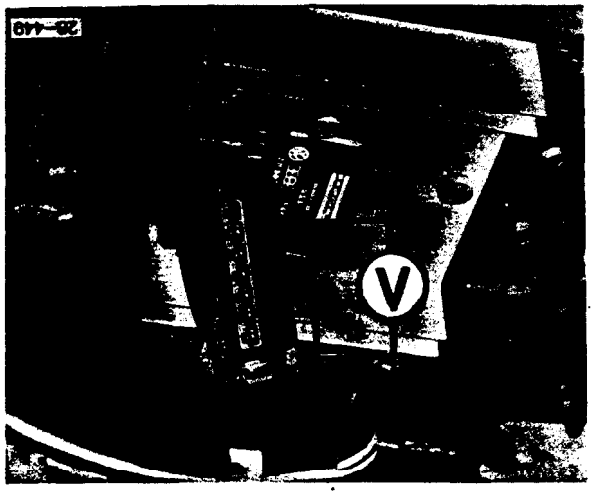


Check ignition coil

Measure primary resistance

— Connect ohmeter between terminals 1 and 15.

Ohmeter should read
0.61 to 0.83 ohms
(If resistance readings are incorrect or any insulation fluid has leaked from ignition coil - replace ignition coil.)

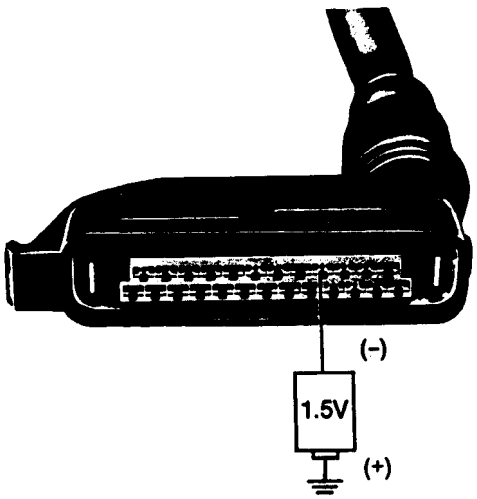


Check power and ground for the ignition control unit

— Remove the connector from the ignition control unit

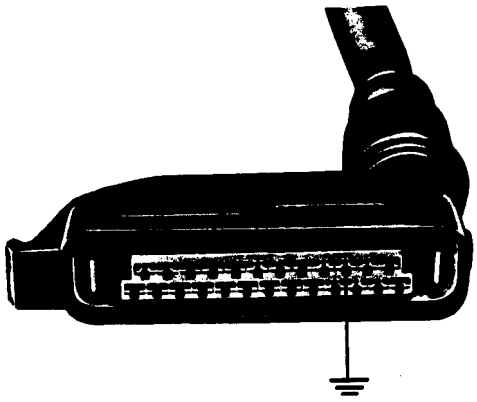
— Connect a voltmeter between terminals 2 and 4

With key on voltmeter should read battery voltage
(If power and ground are OK — check ignition control unit.)



Check ignition control unit

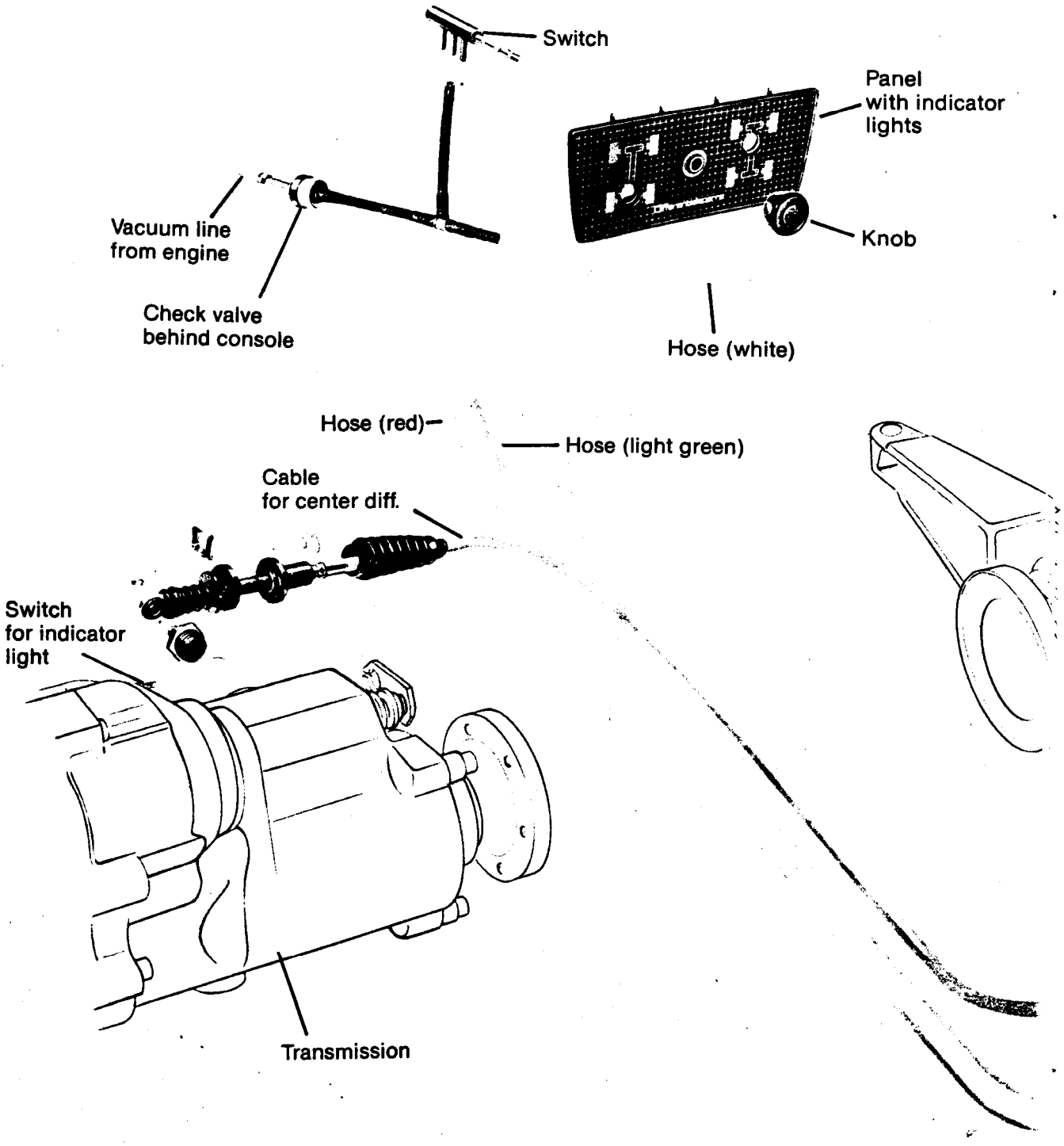
— Connect test light between coil terminal 1 and ground
— Place coil wire about 5mm from ground
— Turn ignition on
— Connect the ground (-) side of a 1.5 volt battery to terminal 17 of the control unit multiplug
— Touch the positive (+) terminal of the battery to ground
The test light should dim and the coil should spark
(If not - replace ignition control unit.)

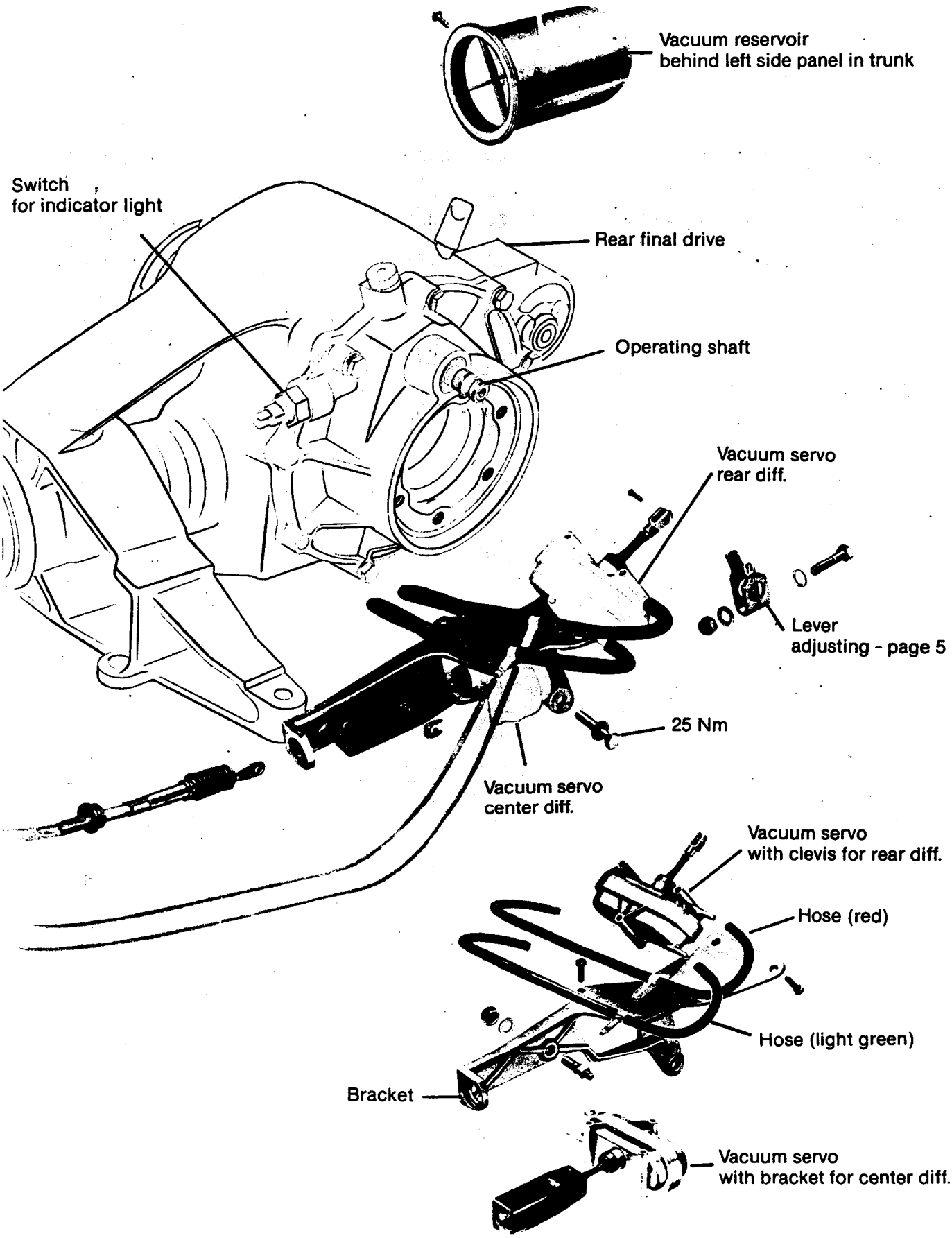


Check fuel pump circuit

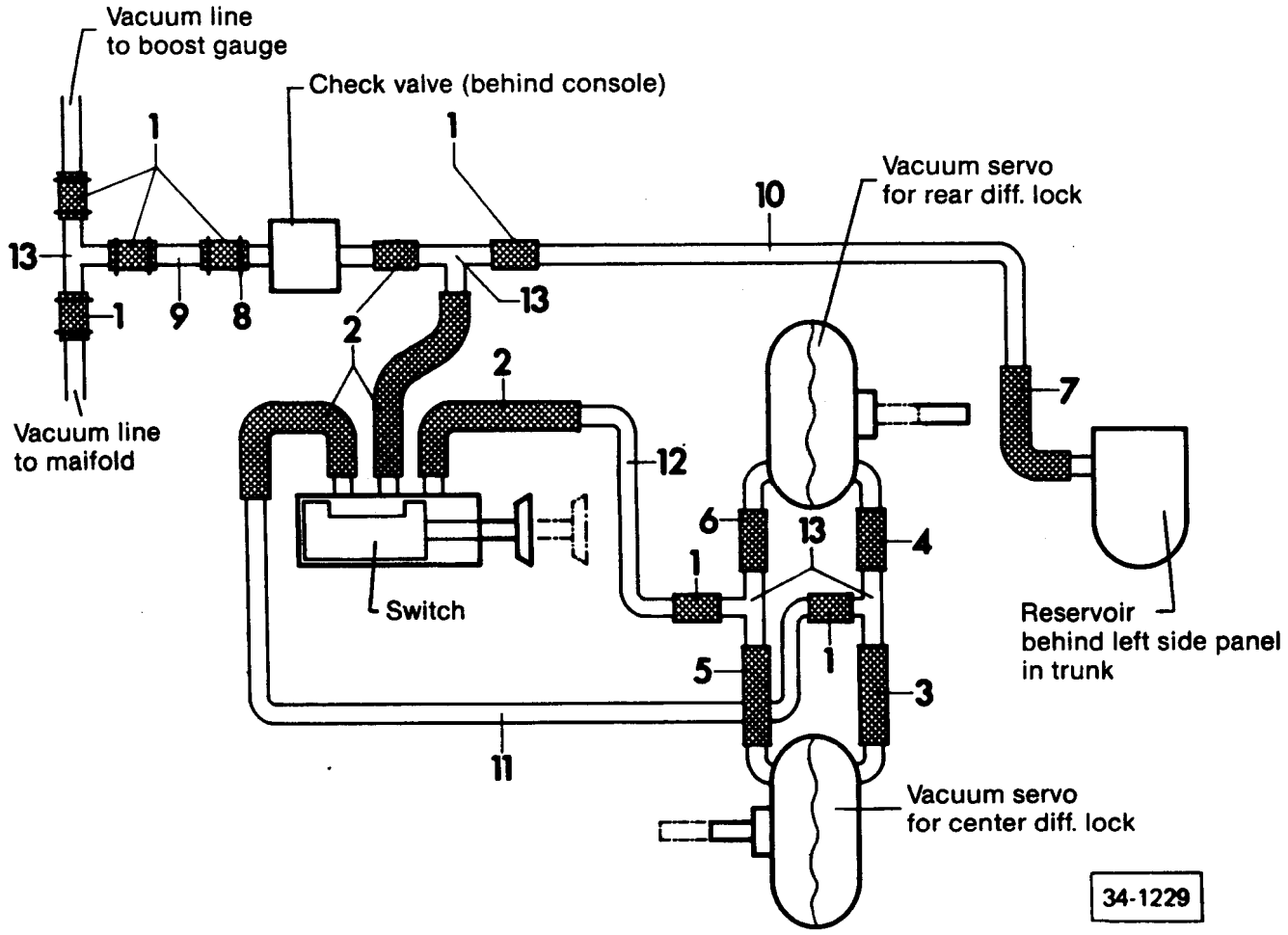
— Connect a jumper wire from terminal 16 to ground.
— Turn ignition on.
Fuel pump should run.
(If fuel pump runs but does not run during cranking with control unit connected, replace ignition control unit)

Differential locking system




Vacuum reservoir
behind left side panel in trunk
Switch
for indicator light
Rear final drive
Operating shaft
Vacuum servo
rear diff.
Lever
adjusting - page 5
25 Nm
Vacuum servo
center diff.
Vacuum servo
with clevis for rear diff.
Hose (red)
Hose (light green)
Bracket
Vacuum servo
with bracket for center diff.

Hose layout



Hoses 3.5 x 2

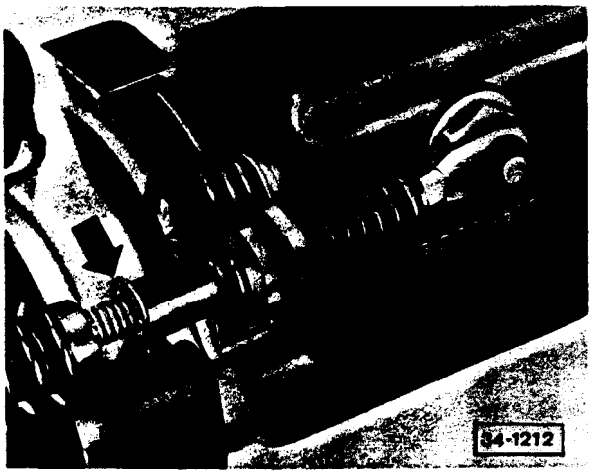
No.	Length (mm)	Color	Qty.	Part No.
1	45	black	7	
2	100	black	4	N 20 353.5*
3	245	red	1	
4	125	red	1	
5	245	light green	1	
6	120	light green	1	
7	565	black	1	
8	Hose clip		8	311 133 343 A

Pipes 4 x 1

No.	Length (mm)	Color	Qty.	Part No.
9	490	white	1	
10	2500	white	1	N 20 139.1*
11	3300	red	1	
12	3300	light green	1	
13	T piece		4	133 201 943 B

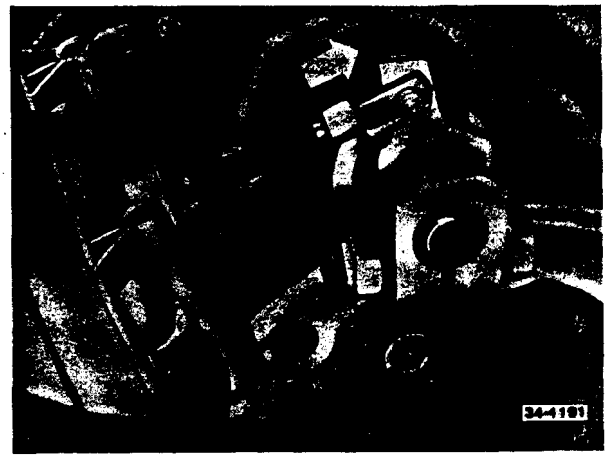
*As service parts only black hose or white tubing is supplied. When installing, cut hose or tubing and mark with a strip of adhesive tape of appropriate color.

Adjusting center differential lock
Disengage lock (plastic bracket on servo must be pulled in)
Check that cable is located correctly at all mounting points



— Pull outer cable to rear and install clip in front free groove in outer cable (arrow)

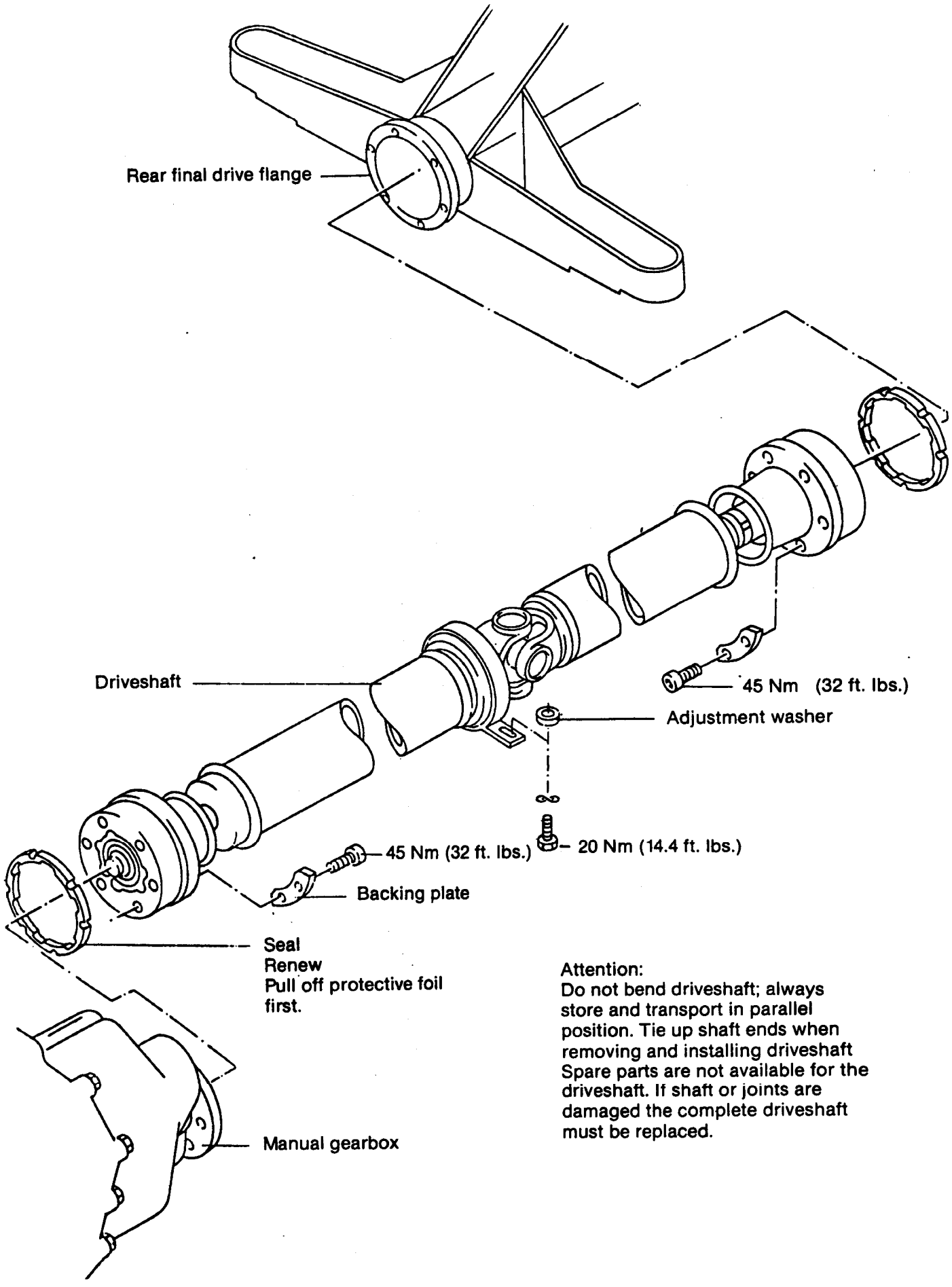
Adjusting rear differential lock
Disengage lock (clevis on servo must be pressed out)
Loosen clamping bolt for lever on operating shaft



— Turn shaft clockwise to stop and pull servo clevis out.
— In this position, tighten the lever clamping bolt.

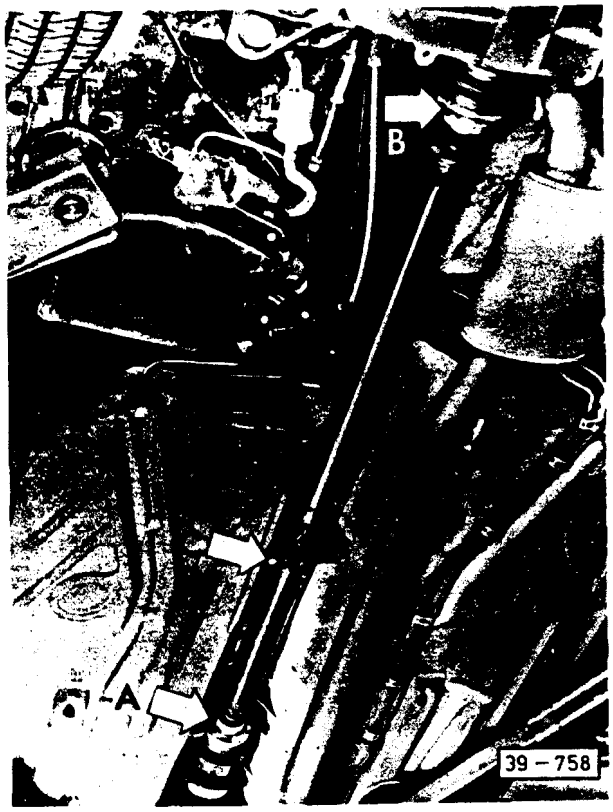
Note:
- Lock can only be engaged when there is sufficient vacuum. If necessary, run engine and check lock operation.
- When switch is pulled and gear teeth are aligned with one another, the lock cannot engage. If this happens the indicator light will not come on. To engage locks with engine off, turn driveshaft or one rear wheel.

Removing and installing driveshaft



Attention:
Do not bend driveshaft; always store and transport in parallel position. Tie up shaft ends when removing and installing driveshaft Spare parts are not available for the driveshaft. If shaft or joints are damaged the complete driveshaft must be replaced.

Removing and installing driveshaft



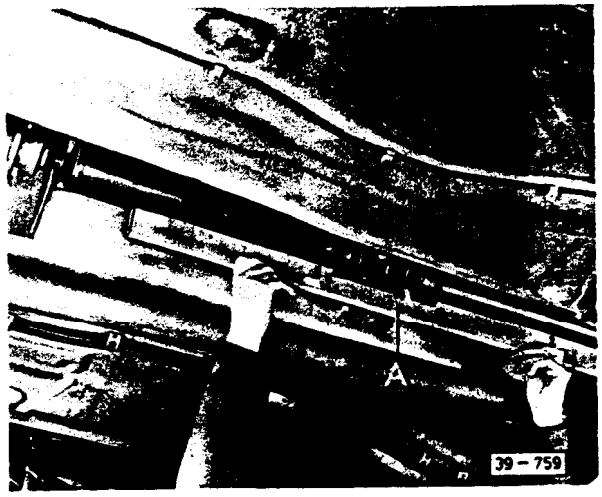
— Detach driveshaft from transmission (arrow A). Tie driveshaft to support it.
— Detach driveshaft from rear final drive (arrow B). If necessary, engage differential lock and block wheel. Tie driveshaft to support it.
— Detach center bearing from body (arrow) and take off driveshaft.

Tightening torques:
Driveshaft to trans. . . . . 45 Nm (32ft.lbs.)
Driveshaft to final drive . . . 45 Nm (32ft.lbs.)
Center bearing to body . 20 Nm (14.4ft.lbs.)

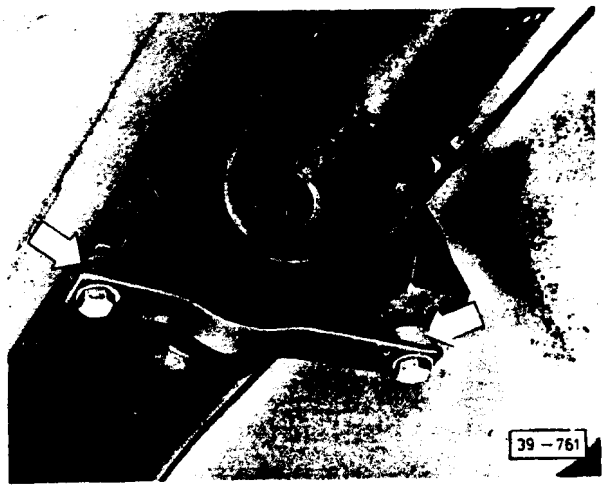
Adjust driveshaft after installation.

Adjusting driveshaft

Both driveshaft halves must be parallel to one another. The adjustment operations must be very carefully carried out because a badly adjusted driveshaft can cause vibration and noise.



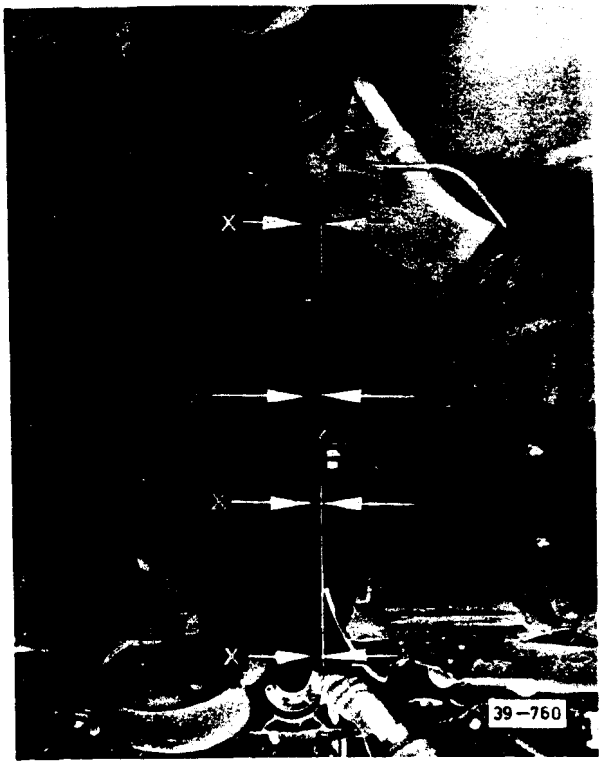
— Check the driveshaft with a locally manufactured gauge (A). Manufacture gauge (A) from suitable material approx. 120 cm in length ensuring that the edge is perfectly straight.
Cut a recess in the gauge — 1.5 cm deep and 20 cm long — in the area of the center bearing.



— Adjust the height of the driveshaft at the center bearing by inserting adjustment washers so that the complete shaft forms a straight line.

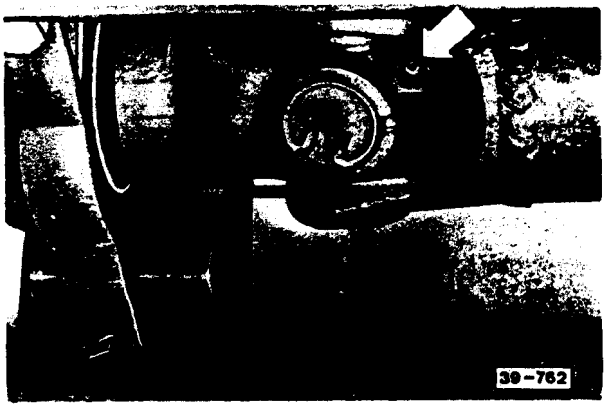
The following adjustment washers are available:

Part No.	Thickness (mm)
857 521 143	2
857 521 143 A	4
857 521 143 B	6
857 521 143 C	8
857 521 143 D	10



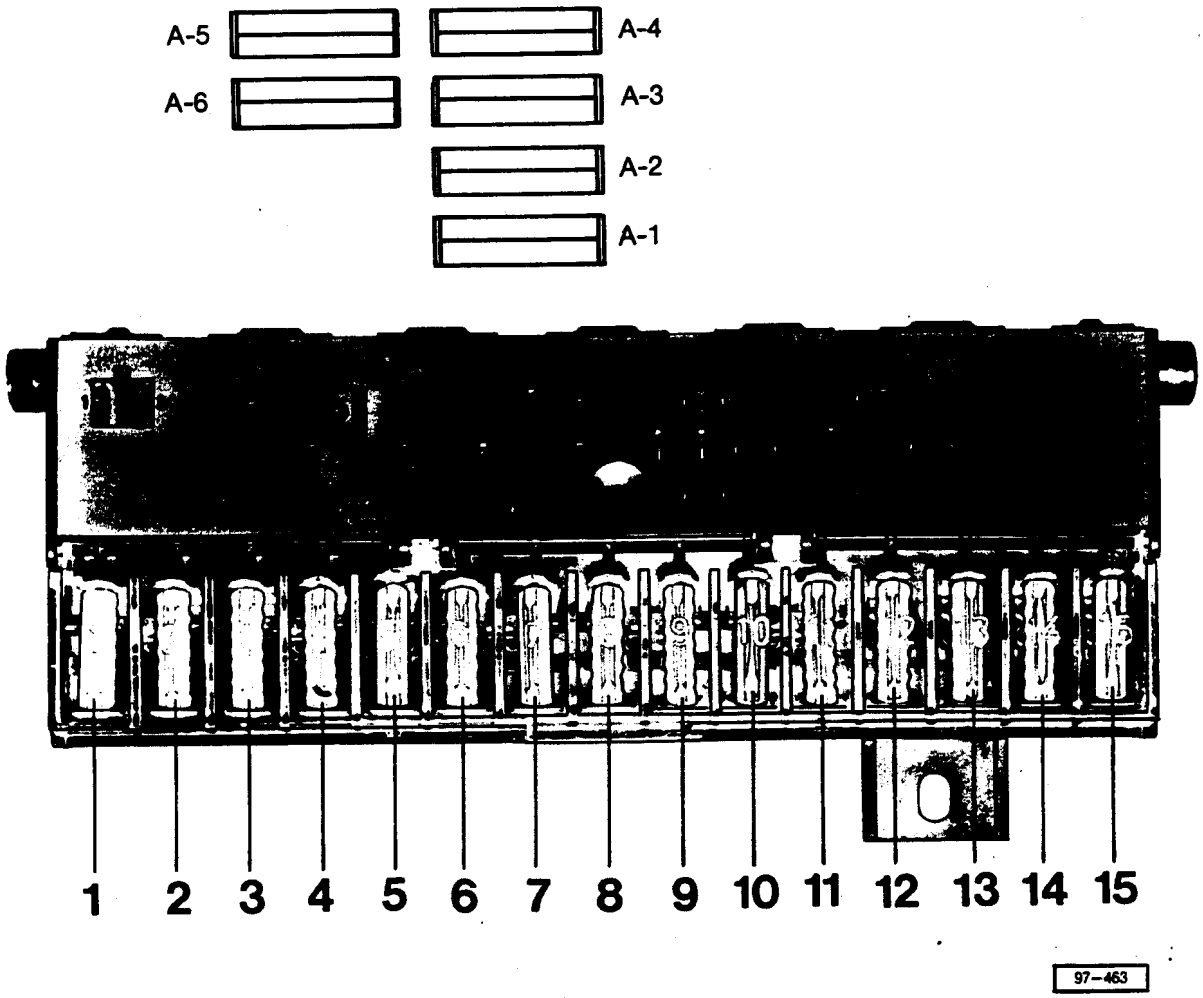
— Align the driveshaft laterally by moving the center bearing.
— To do this stretch a piece of string between the front and rear joint outside diameters and move the center bearing until the distances marked with an x are equal.
— Ensure that the string does not rest against the center bearing.

Lubricating driveshaft



— The driveshaft must be lubricated with lithium-based multi purpose grease every 15,000 miles.

Fuse location — Audi Quattro
(Auxiliary fuse locations may vary slightly)



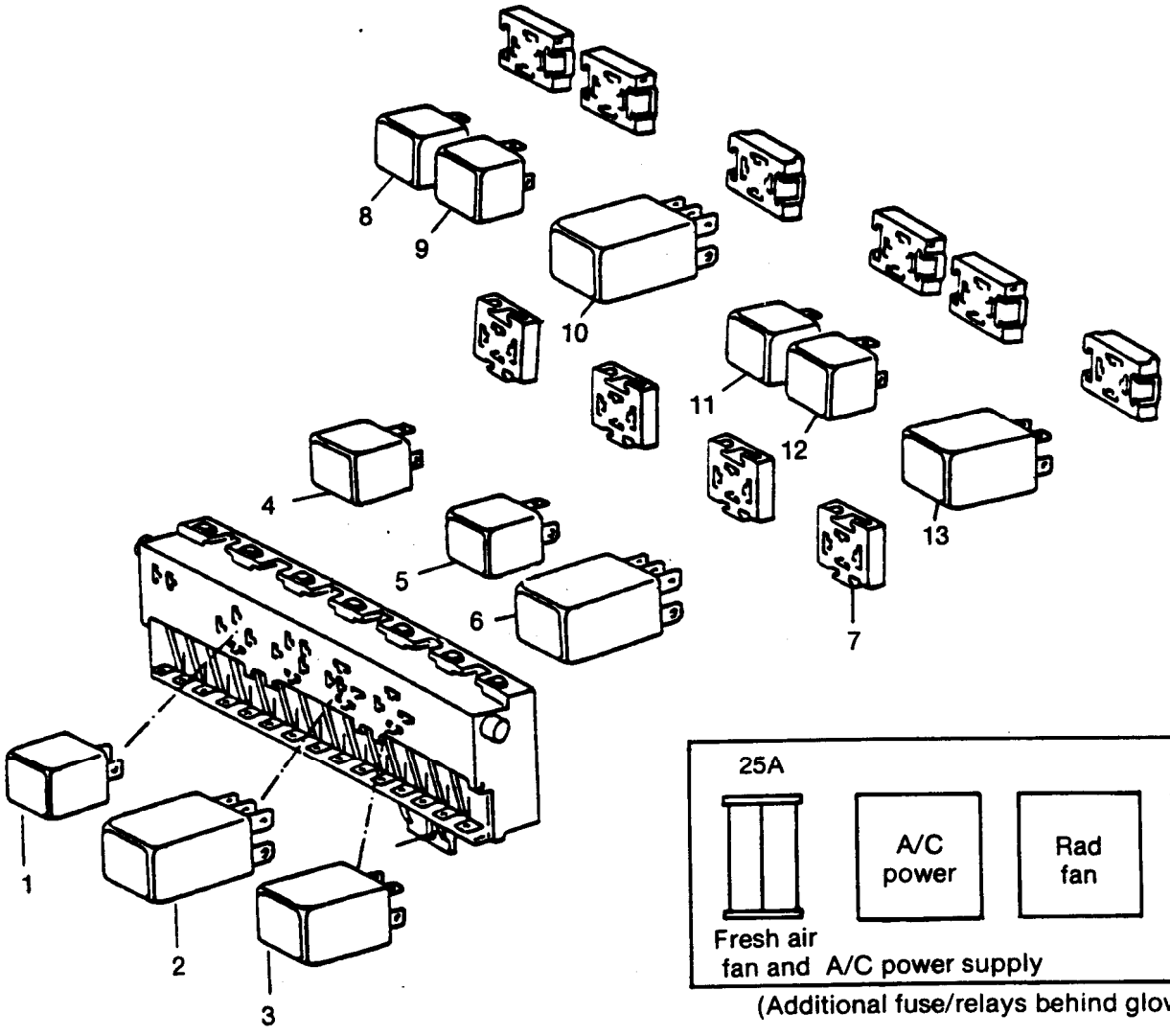
1. Low beam, left - 8A
2. Low beam, right - 8A
3. High beam, left - 8A
4. High beam, right - 8A
5. Rear window defroster - 16A
6. Stop lights and emergency flasher - 8A
7. Cigarette lighter/clock/interior light/vanity mirror/trunk light/radio and antenna - 8A
8. Turn signals/indicator lights - 8A
9. Back lights/cruise control - 8A
10. Indicator lights for differential locks and glove box light - 25A
11. Front wiper - 8A
12. License plate light - 8A
13. Tail light/park light, right - 8A
14. Tail light/park light, left - 8A
15. Radiator fan (low, med. high)/injector cooling fan - 25A

A-1 Power mirrors (adjustment & heating) - 8A
A-2 Power windows - 25A
A-3 Fuel pump - 16A
A-4 Rear wiper and washer - 8A
A-5 Horns - 16A
A-6 Central locking system - 8A

Relay location — Audi Quattro

(Relay locations may vary slightly)

1. Load reduction (x)
2. Wipers
3. Flashers
4. Power windows/power mirrors
5. Horns
6. Safety belt warning buzzer
7. Jumper wire (or dynamic oil pressure relay)
8. Radiator fan (high speed)
9. Injector cooling fan
10. Hot start pulse
11. Fuel pump
12. Radiator fan (medium speed)
13. Rear wiper

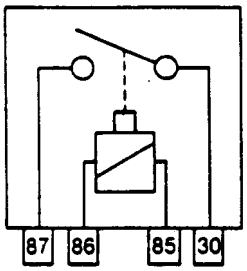


(Additional fuse/relays behind glove box)

Relay Identification — Audi Quattro

Part numbers are for reference only. Always check latest parts listings for correct numbers.

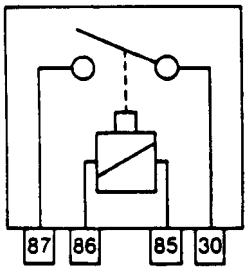
Fuel pump



431 951 253A (25 amp)

30 Red from battery (Terminal 30)
87 Green/yellow to fuel pump from auxiliary fuse 16A
85 Green/brown to T/FCU terminal #16
86 Black from ignition switch (Terminal 15)

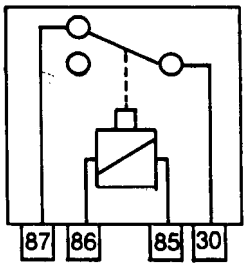
A/C power relay



431 951 253 (25 amp)

30 Red from terminal 30 through 25A auxiliary fuse
87 Black/red to fresh air fan switch Black/red to terminal 87 radiator fan relay.
85 Blue/red from load reduction relay (Terminal X)
86 Brown to ground

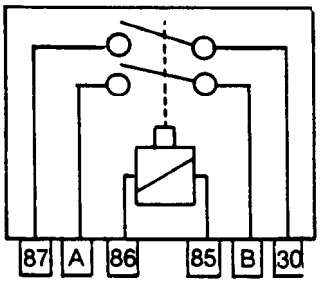
Compressor clutch relay



431 951 253F (20 amp)

30 Green from A/C thermostat
87a Green to A/C clutch
85 Blue/yellow to alternator indicator light (Terminal 61)
86 Blue/red from load reduction relay (Terminal X)

Condenser fan relay

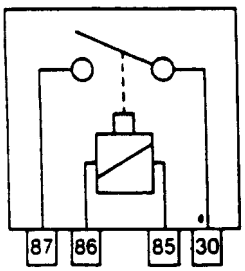


171 951 143A (2x25 amp)

30 Black/yellow to fresh air fan switch (Low speed)
87 Black/red terminal 87 on A/C power relay
A Red/black to radiator fan (high speed)
B Red from fuse #15 (Terminal 30)
85 Blue from A/C micro-switch
86 Brown to ground

Relay Identification — Audi Quattro

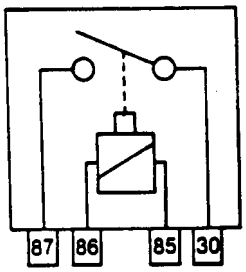
Radiator fan high speed



431 951 253B (40 amp)

30 Red/blue from fuse # 15 (Terminal 30)
87 Red/black to fan motor (High speed)
85 Brown to ground
86 Red/green from high speed fan switch on expansion tank

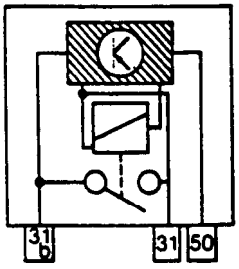
Injector cooling fan



431 951 252A (25 amp)

30 Red from fuse # 15 (Terminal 30)
87 Red/brown to injector cooling fan
85 Brown/blue to thermo-switch on manifold
86 Red from fuse #15 (Terminal 30)

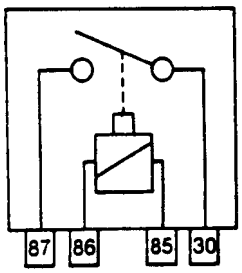
Hot-start pulse relay



813 906 064

31 Brown to ground
31b Green/white to cold start valve
50 Red/black from terminal 50 on ignition switch

Radiator fan medium speed

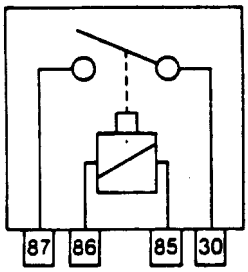


431 951 253H (40 amp)

30 Black/green from radiator thermo-switch
87 Brown white to radiator fan through resistor (Medium speed)
85 Brown to ground
86 Blue/red load reduction relay (Terminal X)

Relay Identification - Audi Quattro

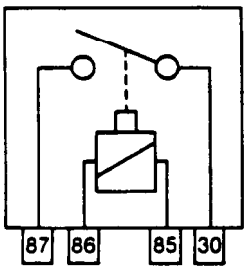
Heated power mirrors and power windows



431 951 253A (25A)

30 Red from battery (Terminal 30)
87 Black/red to fuses for windows and mirrors
85 Blue/red from load reduction relay (Terminal X)
86 Brown to ground

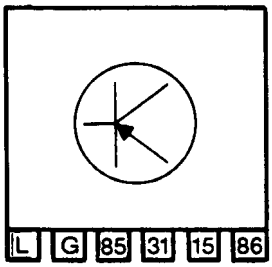
Horns



431 951 253D (30A)

30 Red/black from terminal 30 through fuse for horns
87 Black/yellow to horns
85 Brown/black from switch on horn ring
86 Black/yellow from terminal X

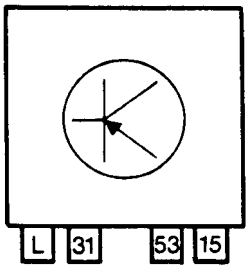
Seat belt warning buzzer



857 919 439

L Gray to safety belt/brake warning light
G Brown/green from seat belt buckle (Driver's side)
85 Brown/red to "S" terminal on ignition switch
86 Brown/white to seat belt buckle and door jam switch (Drivers side)
15 Black from terminal 15
31 Brown to ground

Rear wiper



171 955 529

L Brown to ground
31 Green/blue from wiper switch and also to rear washer pump
53 Black to rear wiper motor
15 Red/blue from terminal 30 through rear wiper fuse

Maintenance Item	After the first 1,000 mi.	At 7,500 mi.	Every 15,000 mi.	Additionally Every 30,000 mi.
Engine Oil/ Filters	- Check/add if necessary - Check for engine leaks	- Change oil (and every 7500 mi. thereafter) - Replace engine oil filter - Replace turbo-charger oil filter	- Replace engine oil filter (and every 15,000 mi. thereafter) - Replace turbo-charger oil filter (and every 15,000 mi. thereafter) - Check for engine leaks	
Valves	- Adjust clearance - Replace cover gaskets		- Adjust clearance - Replace cover gaskets	
Compression			- Check compression	
Spark Plugs				- Replace
Idle Speed	- Check/adjust if necessary		- Check/adjust if necessary	
Air Filter			- Clean (CA only)	- Replace
Oxygen Sensor				- Replace - Reset mileage counter
Fuel Filters				- Replace filter before fuel pump
Turbo-Charger	- Check turbo-charger for damage		- Check turbo-charger for damage	
Cooling System	- Check coolant level - Add if necessary - Check hoses for tightness	- Check coolant level - Add if necessary - Check hoses for tightness	- Check coolant level - Add if necessary - Check hoses for tightness	
V-Belts			- Check tension and condition - adjust or replace as necessary	
Exhaust	- Check for damage		- Check for damage	

Maintenance Item	After the first 1,000 mi.	At 7,500 mi.	Every 15,000 mi.	Additionally Every 30,000 mi.
Steering/ Suspension	- Check steering efficiency during road test - Torque CV joint bolts front and rear		- Check steering efficiency during road tests - Check power steering fluid level - Check ball joints and tie rods - Check steering and axle shaft boots	
Driveshaft			- Lubricate U-Joint	
Transmission			- Check oil level	
Brakes	- Check visually for damage and leaks - Check brake and parking brake efficiency during road test		- Check fluid level add if necessary - Check visually for damage and leaks - Check brake and parking brake efficiency during road test - Check thickness of brake pads - Check brake pressure regulator pressure	- Replace brake fluid (or every two years) - Check brake warning system
Wheels/ Tires			- Check for wear and damage	
Headlights			- Adjust	

Pre-delivery inspection

Engine oil - check/add if necessary

Idle speed - check/adjust if necesary

Cooling system - check antifreeze concentration/add if necessary

Battery - check electrolyte level

Wheels/tires - check tire pressure & spare
- check wheel bolt torque

Steering/
Suspension - check visually: lockplates, cotter pins, tie rods

Transmission - check oil level

Brakes - check fluid level/add if necessary
- check visually - lines, hoses
- check brake warning system
- check brake, parking brake efficiency during road test

Windshield wipers - check operation
- fill washers

Doorlocks - check operation

Seats - check operation and adjustment

Safety belts - check locking mechanism and ignition lock

Headlights -
(low/high beams) - check operation

Parking lights - check operation

Check operation of:

Brake lights

Turn signals

Emergency flashers

Tail lights

Side marker lights

License plate lights

Back up lights

Horn

Indicator lights
(Brake, alternator, oil pressure)

Water drain holes below front doors

Heating and air conditioning

Power windows

Central locking system

Rear/Side window defogger

Side mirrors

Cruise control

Vanity mirror light

Interior light