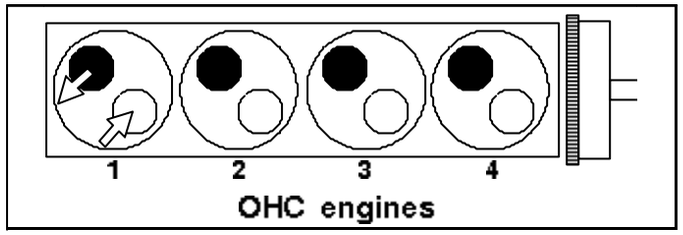
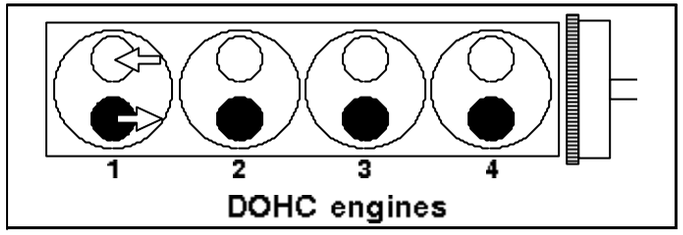
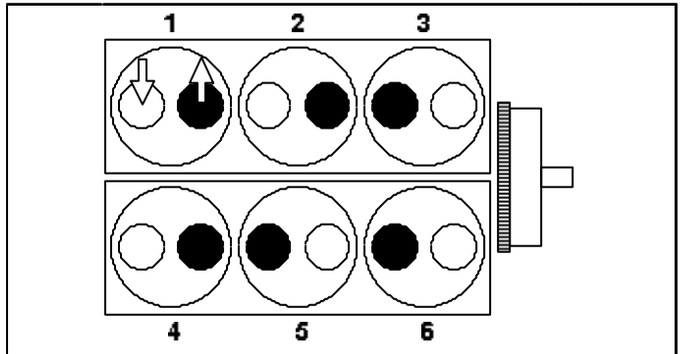
– 2.0, 2.8 and 2.9 engines



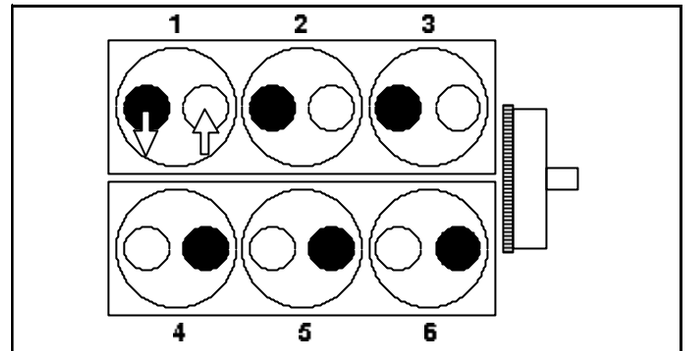
OHC engines



DOHC engines



2.8 and 2.9 V6 engines with two-pipe exhaust manifold



2.9 V6 engines with three-pipe exhaust manifold

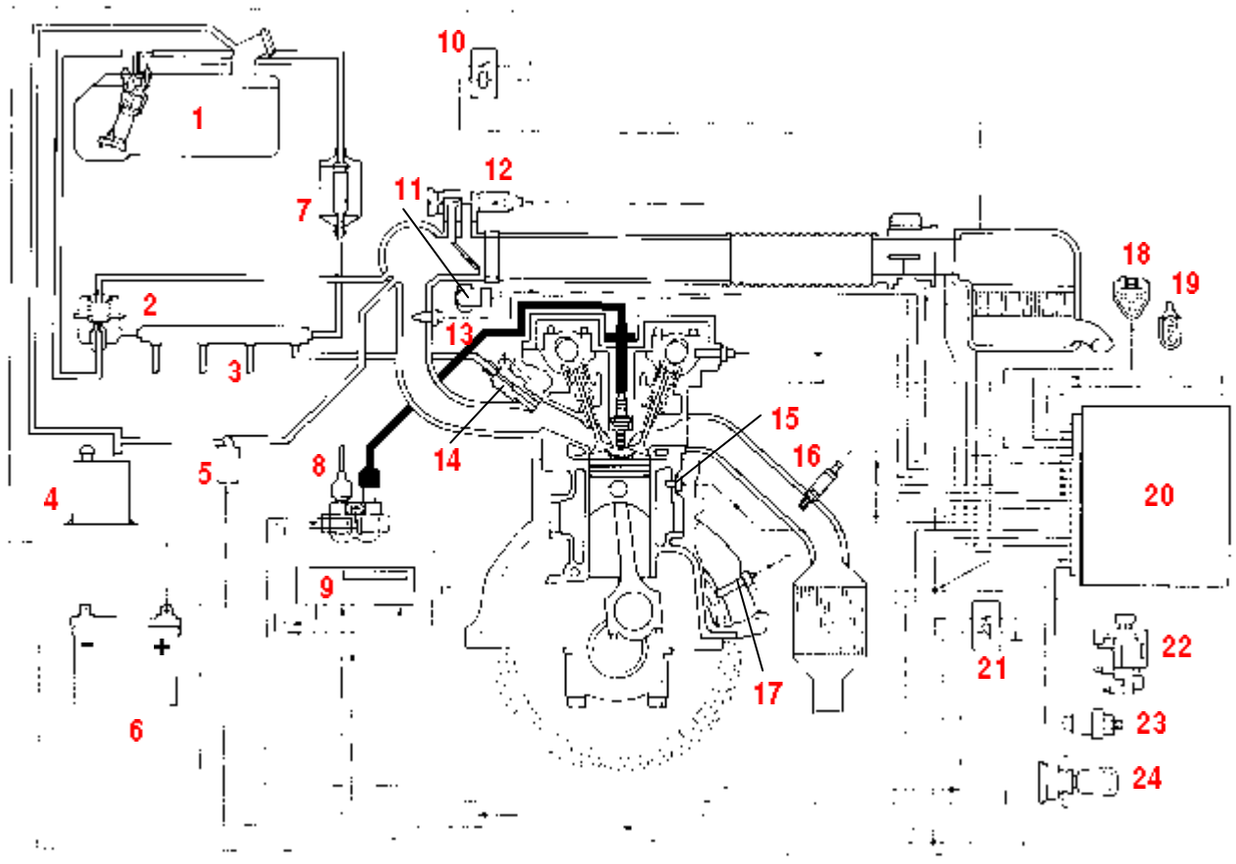
firing order	
4-cylinder engines	1 - 3 - 4 - 2
6-cylinder engines	1 - 4 - 2 - 5 - 3 - 6

This is a multipoint fuel and ignition system. A control unit controls both systems using several sensors and actuators.

technical specifications	
spark plugs, make and model	
2.0 OHC engine	Motorcraft BRF 32 C
2.0 DOHC engines	Motorcraft AGPR 22 CD
2.8 V6 engines	Motorcraft AGR 22 C
2.9 V6 engines without catalytic converter	Motorcraft AGPR 32 CD
2.9 V6 engines with catalytic converter	Motorcraft AGPR 32 C1

spark plug gap	
all engines except 2.9 V6 with catalytic converter	0,75 mm
2.9 V6 engines with catalytic converter	1,0 mm
dwell angle at cranking rpm	electronically controlled

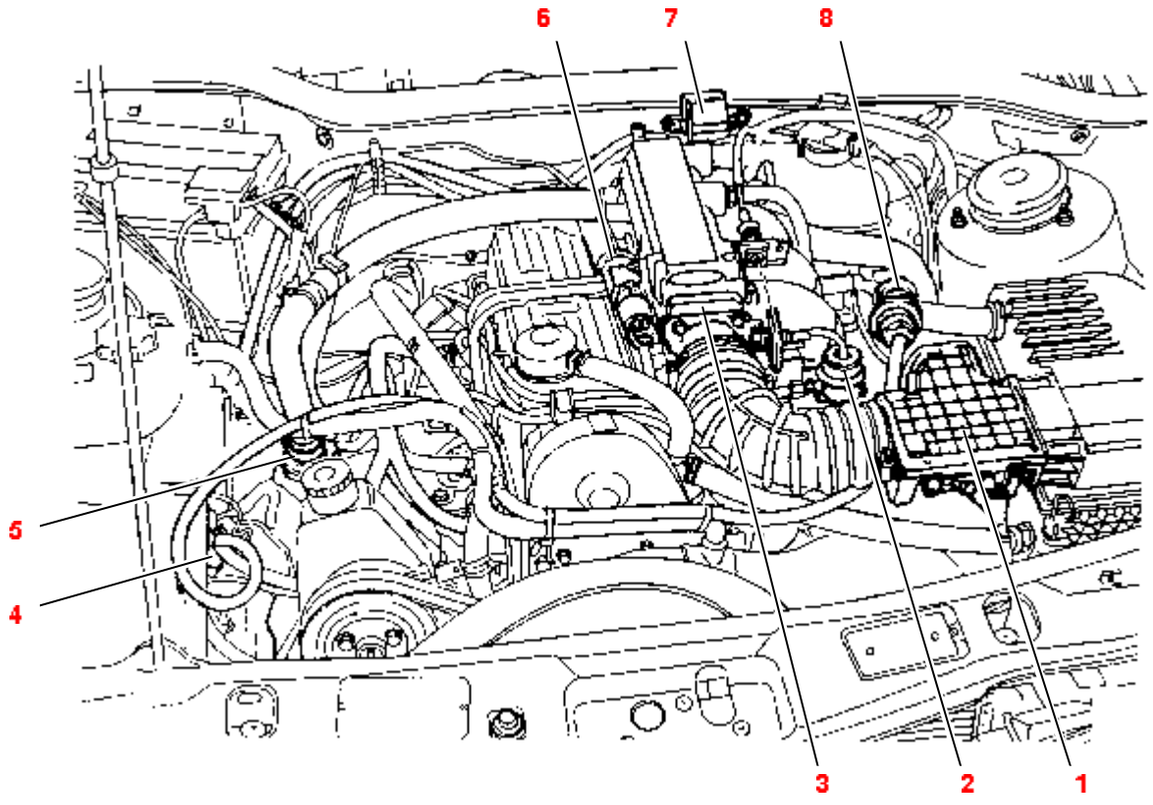
coil resistance, primary	0,72 - 0,88 Ω
coil resistance, secondary	4500 - 7000 Ω
resistance HT-leads	max. 30 kΩ
fuel pump pressure	min. 5 bar at 12V; no flow
injection pressure	2,5 bar



1. fuel pump
2. fuel pressure regulator
3. fuel rail
4. charcoal canister
5. fuel vapour cut-off valve
6. battery
7. fuel filter
8. ignition coil
9. ignition module
10. fuel pump relay
11. throttle valve potentiometer
12. idle control valve
13. intake air temperature sensor
14. injector
15. coolant temperature sensor
16. oxygen sensor
17. engine speed/position sensor
18. diagnostic connector
19. service connector (octane adjust)
20. control unit
21. system control relay
22. air induction system electro/vacuum valve
23. power steering pressure switch
24. ignition switch

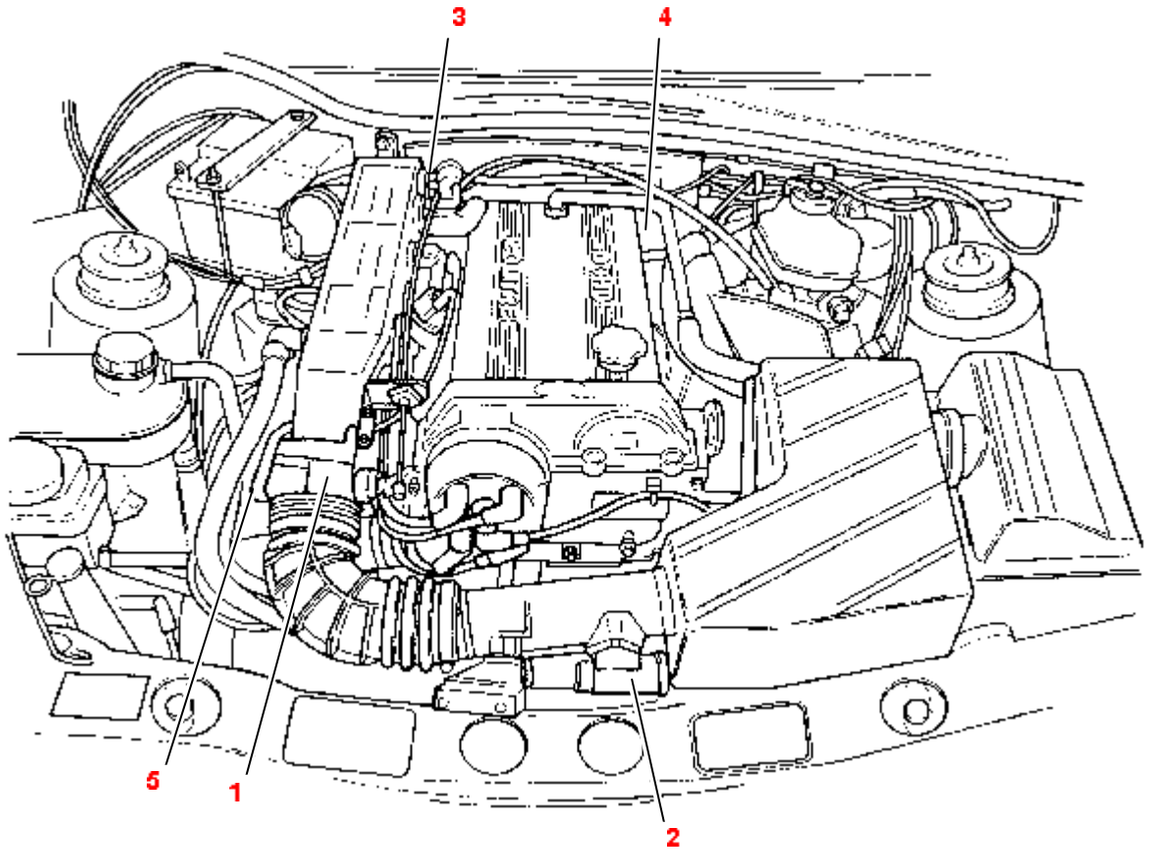
System fuse: fuse (1 Amp.) next to central fuse box. Fuel pump fuse: fuse 7 in central fuse box. Diagnostic connector: near left suspension strut tower.

working diagram



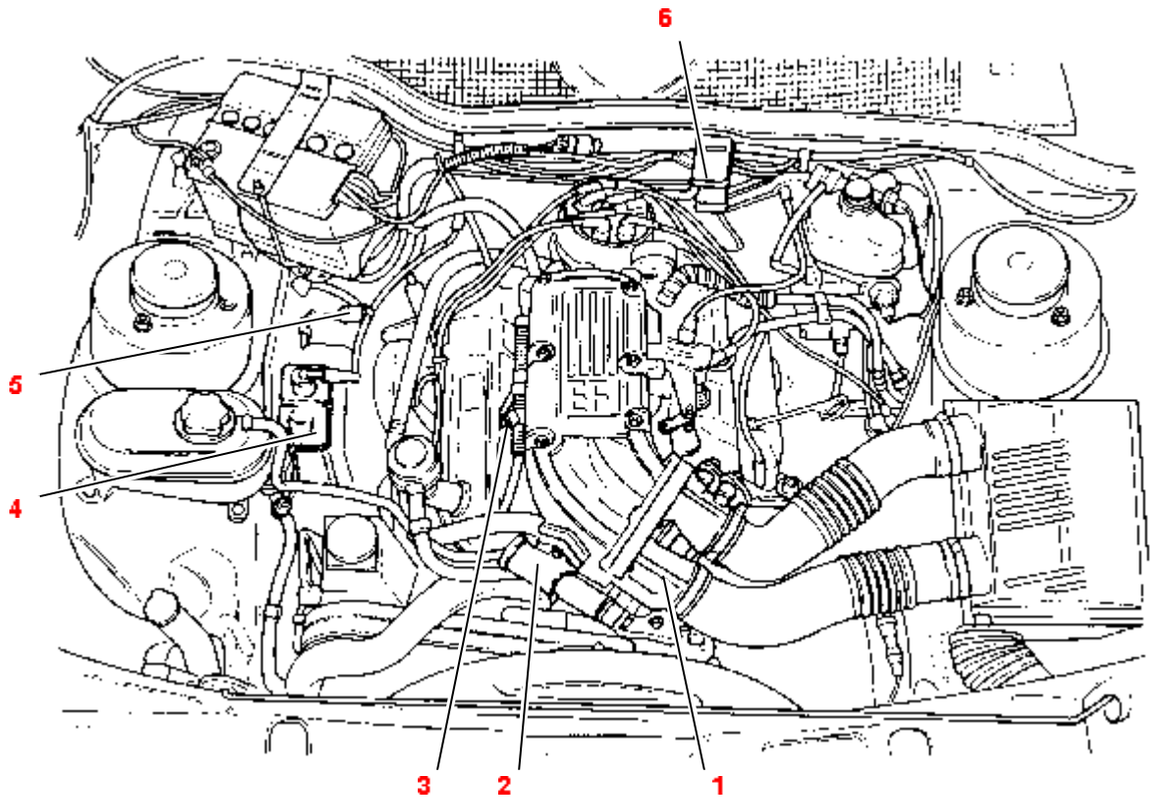
1. air flow meter
2. fuel pressure regulator
3. throttle body
4. air induction system electro/vacuum valve
5. air induction system check valve
6. idle speed control motor
7. MAP-sensor
8. air induction system vacuum/air valve

component location: OHC engines



1. throttle body
2. idle speed throttle valve servo motor
3. intake air temperature sensor
4. MAP-sensor
5. throttle valve potentiometer

component location: DOHC engines

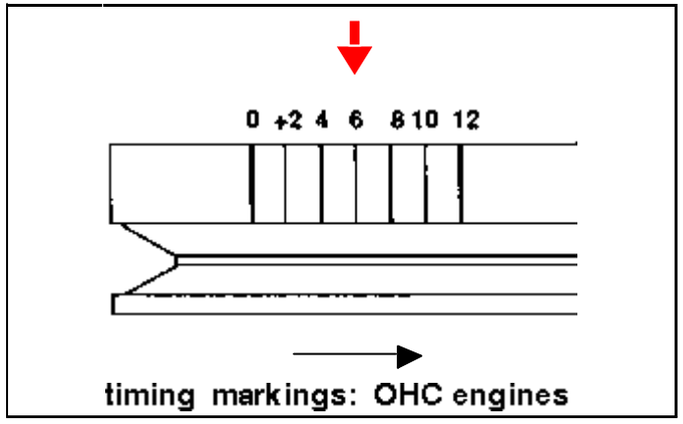


1. throttle body
2. idle speed throttle valve servo motor
3. intake air temperature sensor
4. charcoal canister
5. fuel vapour cut-off valve
6. MAP-sensor

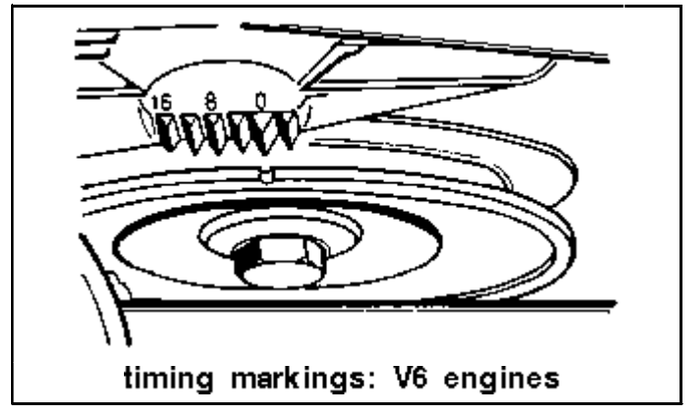
component location: V6 engines

Adjustments

Ignition timing



timing markings: OHC engines



timing markings: V6 engines

dynamic ignition timing	
vacuum hose disconnected and blanked off; idle speed	
OHC engines	
with catalytic converter	18° BTDC
with leaded petrol	12° BTDC
with unleaded petrol	8° BTDC
DOHC engines	no timing markings
V6 engines	
with catalytic converter	15° BTDC
with leaded petrol	12° BTDC
with unleaded petrol	8° BTDC

Check the ignition timing with a rev. counter and a timing light.

Disconnect service connector at ignition coil.

Carry out dynamic self test; see *Fault codes*.

Wait for code 60.

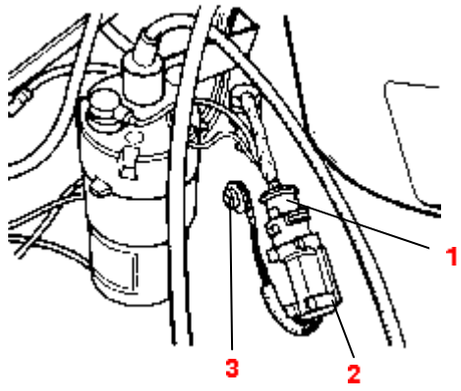
Adjust by turning the distributor.

Check base idle speed.

Ignition timing can be adjusted to petrol:

ignition timing adjustment			
Connect red and/or blue wire of service connector to earth; values in degrees: extra advance			
engine	*red*	*blue*	*both*
2.0 OHC	2°	4°	6°
2.0 DOHC	prevents knocking	with 91 RON	both
2.8 V6	3°	6°	don't connect both!
2.9 V6 without catalytic converter	4°	6°	don't connect both!
2.9 V6 with catalytic converter	4°	—	don't connect both!

ignition retard			
Wire from service connector to earth; see illustration			
wire colour	red	blue	red and blue
retard	2°	4°	6°

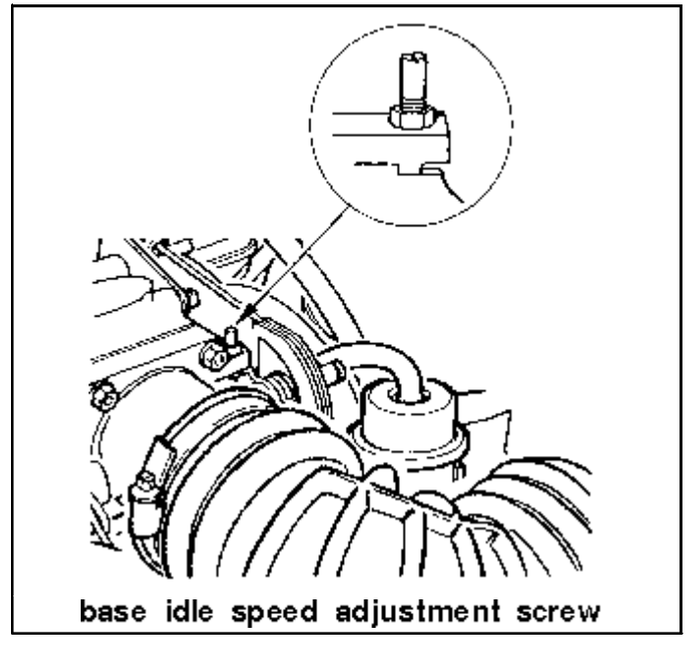


1. service connector
2. service wire; not always
3. earth connection

ignition adjustment

Idle speed

– 2.0 OHC engines



base idle speed adjustment screw

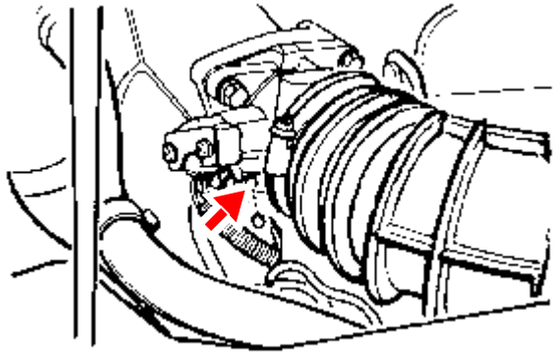
base idle speed	
with catalytic converter	900/min; zero load/full load switch disconnected
without catalytic converter	1050/min

Check within 10 minutes after code 60 of dynamic selftest; see also *Ignition timing*.

Adjust by turning the adjustment screw.

Idle speed control: by computer and non-adjustable.

– 2.0 DOHC engines



base idle speed adjustment screw

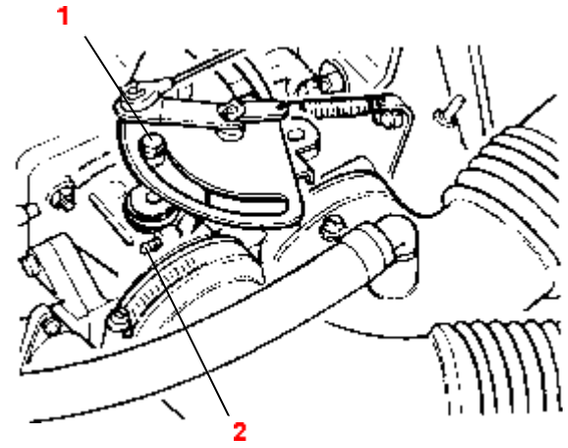
base idle speed	
with or without catalytic converter	875/min

Check within 10 minutes after code 60 of dynamic self test; see also *Ignition timing*.

Adjust by turning the adjustment screw.

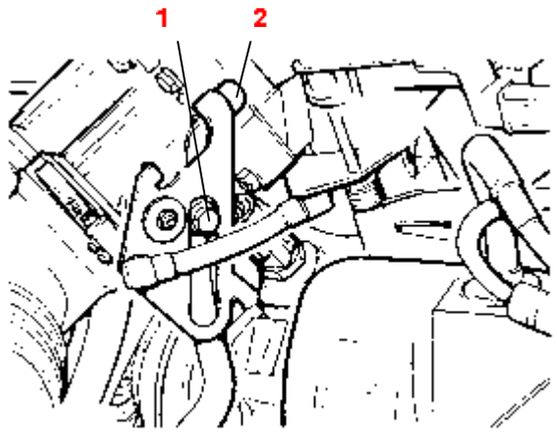
Idle speed control: by computer and non-adjustable.

– V6 engines



1. cam plate bolt
2. base idle speed adjustment screw

base idle speed adjustment screw: 2.8 engines



1. cam plate bolt
2. base idle speed adjustment screw

base idle speed adjustment screw: 2.9 engines

base idle speed	
2.8 engines	625/min
2.9 engines with catalytic converter	700/min
2.9 engines without catalytic converter and with manual gearbox	up to 06/1988: 775 - 825/min from 06/1988 onwards: 850 - 900/min
2.9 engines without catalytic converter and with automatic transmission	up to 12/1987: 800 - 875/min from 12/1987 onwards: 875 - 925/min

Disconnect idle speed control motor.

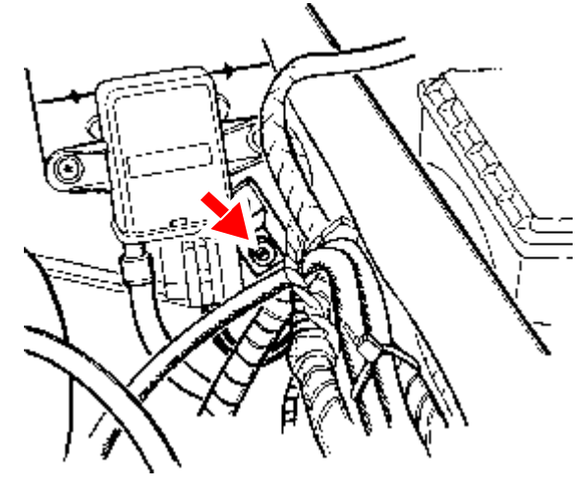
2.8 engines: remove throttle body cover.

Unscrew cam plate bolt.

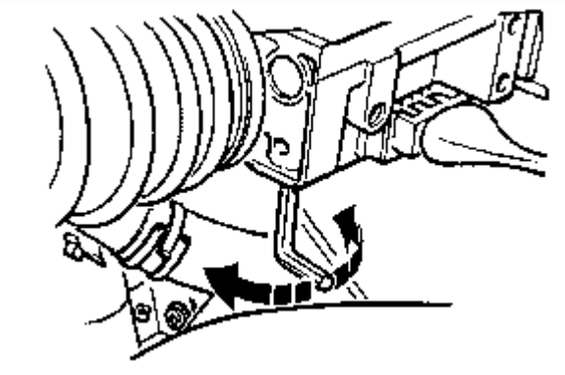
Adjust by turning abutment screw.

Idle speed control: by computer and non-adjustable.

CO-percentage



CO-potentiometer: DOHC engines



CO adjustment screw: other engines

CO-percentage	
all engines with catalytic converter	max. 0,5 %
DOHC engines without catalytic converter	1,25 ± 0,25 %
other engines without catalytic converter	0,8 ± 0,2 %

CO-adjustment possible: only version without catalytic converter.

Check the CO-percentage with engine at operating temperature.

Ignition and idle speed must be correctly set.

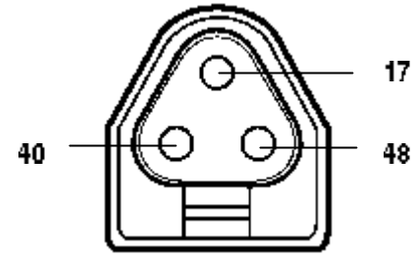
Adjustment: turn adjustment screw with Allen key.

Versions with exhaust gas recirculation: Disconnect suction pipe from EGR valve and blank off.

Fault finding

Fault codes

The control unit is fitted with a self-diagnostic system which can be read by means of blinking codes.



17 = STO (Self Test Output)
40 = earth
48 = STI (Self Test Input)

diagnostic connector

Location of diagnostic connector: in engine compartment and with a rubber cap (newer types: red colour).

Note: The fault code is a 2-digit number. It is read out by counting the number of flashes from an LED. Between the first and second digit the LED briefly stops blinking.

A zero in the fault code is not shown.
Every code is repeated once.

Ford has two different read-out methods:

- Versions up to model year 1987 without catalytic converter: limited fault codes list; only reading out of faults present.
- Other version: KAM (Keep Alive Memory) with extensive fault codes list: also reading out of intermittent faults.

– Versions without KAM

Start the engine.

Connect LED-tester between battery positive and STO.

Connect STI to earth on diagnostic connector.

fault codes list	
code	*fault finding*
11	no faults present
12	air flow meter
13	coolant temperature sensor
14	intake air temperature sensor
15	throttle valve potentiometer
22	air flow meter
23	ignore this code
31	control unit
32	control unit

Also possible: **wiggle-test**: checking of operation and wiring of following sensors:

- throttle valve potentiometer
- air flow meter
- coolant temperature sensor

Connect LED-tester as described earlier.

Switch on ignition.

Signal change: LED flashes once.

– Versions with KAM

3 possible tests:

Engine off test

Check if wires of service connector are grounded, see *Ignition timing*.

Switch off air-conditioning; if fitted.

Place gearbox in neutral or automatic transmission in P.

Apply parking brake.

Connect an LED-tester between battery positive and STO.

Connect STI to earth on diagnostic connector.

Switch on the ignition.

Rear wheel drive versions with A4LD automatic transmission from model year 1990 onwards:

When code 10 appears: depress brake and accelerator pedal fully within 10seconds; otherwise the control unit might give a fault code.

The fault codes present in the system appear.

Note: Fault codes are repeated once

Code 10 or 20 appears.

Control units with fault memory:

The fault codes in the fault memory of the control unit appear.

Code 10 or 20 appears.

All engines except V6-engines with catalytic converter:

Start of the wiggle-test: testing of wire connections. Wiggle multi connectors and wires. The result of the test appears as a fault code.

Ignition off. Disconnect STI from earth.

Erase fault memory:

- All engines except V6 with catalytic converter: automatically after code 10 has appeared at the beginning of the wiggle-test.
- V6 engines with catalytic converter: repeat test with engine off up to reading out of codes from fault memory. If code 10 appears: disconnect STI from earth.

Continuous engine running test:

not possible for V6 engines with catalytic converter.

Check wiring of service connector for connection to earth; see *Ignition timing*.

Switch off air-conditioning; if fitted.

Place gearbox in neutral or automatic transmission in P.

Apply parking brake.

Start engine and idle.

Connect an LED-tester between battery positive and STO.

Connect STI to earth on diagnostic connector.

The fault codes present in the system appear.

Note: Fault codes are repeated once

Disconnect STI from earth. Switch off engine.

Dynamic engine running test

Check wiring of service connector for connection to earth; see *Ignition timing*.

Switch off air-conditioning; if fitted

Place gearbox in neutral or automatic transmission in P.

Apply parking brake.

Engine at operating temperature:

Connect an LED-tester between battery positive and STO.

Connect STI to earth on diagnostic connector.

Switch on the ignition.

Wait 3 seconds and start engine.

Code 30 (V6 with catalytic converter) or code 50 (other engines) appears.

If initial procedures were not carried out: control unit gives a fault code: disconnect STI from earth; switch off engine and repeat test

Engine speed rises and dynamic test procedure is started.

Code 10 appears.

Blip accelerator pedal: at least 4000/min.

Code 44 or 77 (V6 with catalytic converter) appears: engine speed insufficient. Disconnect STI from earth. Switch off engine. Repeat test procedure.

The fault codes present in the system appear.

Note: Fault codes are repeated once

After code 60 of code 11 (V6 with catalytic converter) has appeared: engine enters service set mode; See adjustment data of relevant engine type if this is applicable.

Versions with Power steering: Turn steering from lock to lock. Place steering in straight ahead position.

Duration of service set mode: 10 or 2 (V6 with catalytic converter) minutes. End of mode: code 70 appears.

V6 with catalytic converter:

Wire test. Wiggle multi connectors and wires. The result of the test appears as a fault code.

LED flashes during wire test: erase fault memory: carry out engine off test up to reading out of codes in fault memory. code 10 appears: disconnect STI from earth

Disconnect STI from earth. Remove LED-tester.

Idle engine for three minutes.

fault codes list	
code	*fault finding*
10	beginning of wiggle-test or blip accelerator pedal after this code during dynamic test
11	no fault present
12	air flow meter: signal out of limit
13	coolant temperature sensor: signal out of limit; possible during dynamic test, engine has not reached operating temperature
14	intake air temperature sensor: signal out of limit
15	throttle valve potentiometer: signal out of limit
17	MAP-sensor: signal out of limit
18	battery voltage below 8,7 V
19	KAM (Keep Alive Memory) faulty
20	separator code: separates continuous (before code 20) from intermittent (from code 20 onwards) faults
21	ignition signal irregular
22	air flow meter: voltage too high
23	coolant temperature sensor: voltage too high
24	intake air temperature sensor: voltage too high
25	throttle valve potentiometer: voltage too high
27	MAP-sensor: voltage too high
28	oxygen sensor: voltage constantly high (rich mixture)
30	marker code: correct control unit fitted; No further actions
31	fault in memory, ROM, RAM or KAM
32	air flow meter: voltage too low
33	coolant temperature sensor: voltage too low
34	intake air temperature sensor: voltage too low

35	throttle valve potentiometer: voltage too low
37	MAP-sensor: voltage too low
38	oxygen sensor: voltage constantly too low (lean mixture)
42	MAP-sensor: constant frequency
43	throttle valve potentiometer: constant signal during dynamic test (blip accelerator pedal)
44	throttle not opened during test
45	vehicle speed sensor (VSS): no signal
46	idle control valve (ISC): no change in engine speed during dynamic test
47	idle control valve (ISC): engine speed too low
48	idle switch: not closed during idling
49	no pressure change in pressure transducer
50	European control unit fitted
51	airco on
52	automatic transmission in position D
53	octane adjust lead 1 grounded; connection disconnected during test
54	octane adjust lead 2 grounded; connection disconnected during test
55	idle adjust lead grounded; connection disconnected during test
56	knock sensor: no signal
57	throttle plate moved during test
60	service set mode: idle speed and ignition control; control unit puts these in a fixed position to enable adjustment. Duration of service set mode: 10 minutes
65	brake light switch faulty; apply brake pedal during code read out, after code 10
66	kickdown switch faulty; apply brake pedal during code read out, after code 10
67	fuel rail temperature switch faulty
70	service set mode: end of service set mode
73	charcoal canister solenoid: open circuit in coil
74	automatic transmission shift solenoid third/ fourth gear faulty
75	automatic transmission lock up solenoid faulty
76	brake pedal depressed
77	kick-down activated

Components signal simulation

Lambda signal simulation

See: General - Electronic Control Systems, under Oxygen sensors.

Test measurements

Note: **connector** = connector from the relevant sensor/switch/ valve unless otherwise indicated

Note: **pin** = connectors of the ECU multiplug, unless otherwise indicated.

Note: In case test values are out of limit see the *Follow-on checks*. See: General - Electronic Control Systems, under the relevant Sensors/Actuators.

MAP-sensor		
only for 2.0 OHC, DOHC and 2.9 V6 engines with catalytic converter		
location: near RH suspension strut or on firewall		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
brown/black; V+	26	4,8 - 5,2 V
brown; V-	46	
connection	*to pin*	*test value*
brown/yellow; V+	45	4,0 - 5,0 V
earth; V-		
sensor signal; connector connected; ignition on; engine off		
connection	*to pin*	*test value*
brown/yellow; V+	45	2,4 - 2,6 V; at approx. 160 Hz
earth; V-		
sensor signal; 600 - 700 mbar on vacuum connection or idle engine		
connection	*to pin*	*test value*
brown/yellow; V+	45	2,4 - 2,6 V; at approx. 100 Hz
earth; V-		

throttle valve potentiometer		
location: on the throttle body		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
brown/black; V+	26	4,8 - 5,2 V
brown; V-	46	
sensor signal; connector connected; ignition on; throttle valve closed		
connection	*to pin*	*test value*
brown/green; V+	47	0,3 - 0,7 V
earth; V-		
open throttle valve slowly until max.; voltage must rise gradually		
connection	*to pin*	*test value*
brown/green; V+	47	4,1 - 4,5 V
earth; V-		

coolant temperature sensor		
location: in inlet manifold		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
brown/green; V+	7	4,4 - 4,8 V
brown; V-	46	

sensor signal; connector connected; ignition on; engine cold: approx. 20 °C		
connection	*to pin*	*test value*
brown/green; V+	7	2,7 - 3,5 V
earth; V-		
bring engine to operating temperature approx. 90 °C		
connection	*to pin*	*test value*
brown/green; V+	7	0,3 - 0,8 V
earth; V-		
resistance; connector disconnected; ignition off		
connection	*test value*	
testing on the sensor	+20 °C: 33 - 40 kΩ	
	+90 °C: 2 - 3 kΩ	

air flow meter		
not DOHC and 2.9 V6 engines with catalytic converter		
V6 engines have two air flow meters.		
location: near air filter, LH		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
brown/black; V+	26	4,8 - 5,2 V
brown; V-	46	

sensor signal; connector connected; ignition on; engine off		
connection	*to pin*	*test value*
brown/orange; V+	27	0,1 - 0,5 V
earth; V-		
Note: V6 engines: repeat measurement on pin 43		
sensor signal; gradually open air flow meter fully		
connection	*to pin*	*test value*
brown/orange; V+	27	rises gradually to: 4,4 - 4,8 V
earth; V-		
Note: V6 engines: repeat measurement on pin 43		
sensor signal; idle engine		
connection	*to pin*	*test value*
brown/orange; V+	27	0,6 - 2,0 V
earth; V-		
Note: V6 engines: repeat measurement on pin 43		

Hall-sensor		
only 2.0 OHC engines		
location: in distributor		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
black; V+	ignition	10 - 13 V
blue/black; V-	16	
connection	*to pin*	*test value*
blue/yellow; V+	56 (PIP)	10 - 13 V
earth; V-		

sensor signal; connector connected; start engine		
connection	*to pin*	*test value*
blue/yellow; V+	56 (PIP)	4,0 - 9,0 V
earth; V-		

engine speed/position sensor (DOHC engines)		
location: near bell housing		
sensor signal; connector disconnected, start engine, tester on AC		
connection	*to pin*	*test value*
blue/yellow; V+	5	min. 1,0 V
blue/green; V-	6	
resistance; connector disconnected		
connection	*test value*	
blue/yellow	5	270 - 330 Ω
blue/green	6	

intake air temperature sensor		
location: in air flow meter (if applicable) or in inlet manifold		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
brown/yellow; V+	25	4,8 - 5,2 V
brown; V-	46	

sensor signal; connector connected; ignition on; engine cold; approx. 20 °C		
connection	*to pin*	*test value*
brown/yellow; V+	25	2,8 - 3,6 V
earth; V-		
resistance; connector disconnected; ignition off		
connection	*test value*	
testing on the sensor	at: 0 °C: approx. 95 kΩ at: 20 °C: approx. 37 kΩ at: 50 °C: approx. 11 kΩ at: 80 °C: approx. 4 kΩ at: 100 °C: approx. 2 kΩ	

oxygen sensor		
location: exhaust manifold; connector near starter motor		
sensor signal; connector connected; engine temperature approx. 90 °C and at 2000/min; use a lambda signal tester		
connection	*to pin*	*test value*
black +	29	0,1 - 0,8 V; changing between rich and weak
grey	49	
2nd oxygen sensor 2.9i engines with catalytic converter:		
connection	*to pin*	*test value*
blue /; V+	56	0,1 - 0,8 V; changing between rich and weak
grey; V-	49	
feed signal heating element; connector connected, ignition on		
connection	*to pin*	*test value*
black/red; V+	system control relay	10 - 13 V
brown; V-	earth	
resistance; connector disconnected; ignition on; engine warm		
connection		*test value*
testing on the sensor (heating element)		6 - 10 Ω

injector		
location: in inlet manifold		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
black; V+	system control relay	10 - 13 V
earth; V-		
control signal; connector disconnected; start engine; use LED-tester		
connection	*to pin*	*test value*
battery positive		the LED must flash
brown (2 groups)	58 59	
resistance; connector disconnected; ignition on		
connection		*test value*
injector resistance		13 - 19 Ω

ignition module		
location: OHC engine: near ignition coil; other engines: on distributor		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
black; V+	ignition	10 - 13 V
blue/black; V-	16	

connection	*to pin*	*test value*
green; V+	ignition coil	10 - 13 V
earth; V-		
control signal; connector disconnected; start engine		
connection	*to pin*	*test value*
blue/red; V+	36 (SPOUT)	4,0 - 9,0 V
earth; V-		

idle control valve		
location: near throttle body		
feed signal; connector disconnected; ignition on		
connection	*to pin*	*test value*
black; V+	system control relay	10 - 13 V
earth; V-		
control signal; connector connected; engine idling and at operating temperature; approx. 90 °C		
connection	*to pin*	*test value*
brown/yellow; V+	21	8,0 - 10,0 V
earth; V-		

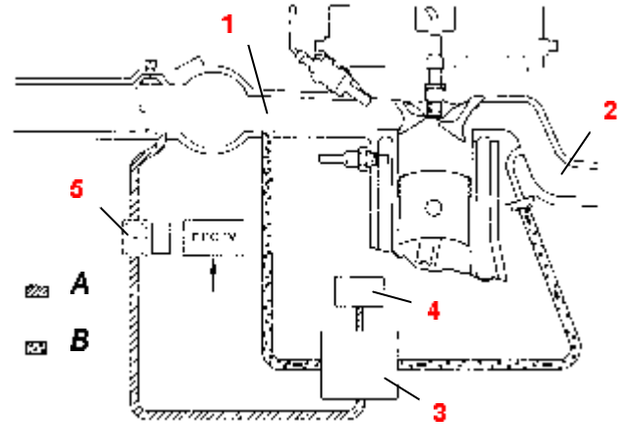
control signal; connector connected; engine idling and at operating temperature; approx. 90 °C; switch on rear screen heater		
connection	*to pin*	*test value*
brown/yellow; V+	21	voltage drops
earth; V-		
resistance; connector disconnected; ignition off		
connection	*test value*	
winding resistance	8- 12 Ω	
switch on lights, rear screen heater etc.		
connection	*to pin*	*test value*
brown/yellow; V+	21	voltage drops
earth; V-		
resistance; connector disconnected; ignition on		
connection	*test value*	
winding resistance idle speed control motor	8 - 12 Ω	

system control relay		
location: under dashboard, LH, or near control unit		
feed signal; relay disconnected; ignition on		
connection	*to pin*	*test value*
30 (on relay holder); 87 for 2.0 OHC with TFI-module on distributor; V+	battery	10 - 13 V
85 (on relay holder); V-	earth	
control signal; relay disconnected; ignition on		
connection	*to pin*	*test value*
86 (on relay holder); V+	ignition	10 - 13 V
earth; V-		
feed signal; relay connected; ignition on		
connection	*to pin*	*test value*
87 (on relay holder; 30 for 2.0 OHC with TFI-module on distributor); V+	37, 57	10 - 13 V
earth; V-		

fuel pump relay		
location: in central fuse box or near control unit		
feed signal; relay disconnected; ignition on		
connection	*to pin*	*test value*
30; V+ 86; V+	battery system control relay	10 - 13 V
earth; V-		
control signal; relay disconnected; start engine, connect LED-tester		
connection	*to pin*	*test value*
battery positive; LED+		LED lights
85; LED-	22	
feed signal; relay connected; start engine		
connection	*to pin*	*test value*
87 (on relay holder); V+	pump	8 - 13 V
earth; V-		
fuel pump test; relay disconnected		
connection	*to pin*	*test value*
connect 87 to 30	pump	pump running; pump pressure: 2,7 - 3,3 bar

fuel vapour cut-off valve		
location: on distributor		
feed signal; idle engine		
connection	*to pin*	*test value*
black; V+	37	0 - 0,1 V
brown/white; V-	DOHC and V6: 31 OHC: 35	
feed signal; accelerator pedal halfway depressed		
connection	*to pin*	*test value*
black; V+	37	3 - 14 V
brown/white; V-	DOHC and V6: 31 OHC: 35	
resistance; ignition off; measure on connector of control unit		
connection	*to pin*	*test value*
brown/wit; V+	DOHC and V6: 31 OHC: 35	50 - 120 Ω
black; V-	37	

Exhaust gas recirculation system (EGR)



A = vacuum
B = exhaust gas
1. inlet manifold
2. exhaust manifold
3. EGR vacuum valve
4. pressure transducer
5. vacuum regulator

working diagram: exhaust gas recirculation

Check the EGR-valve operation:

Remove the EGR-valve vacuum hose.

Connect a vacuum pump to the hose.

Start the engine.

Apply vacuum.

With a valve operating properly:

- the engine will run irregularly
- the vacuum may not drop

Check the pressure transducer control:

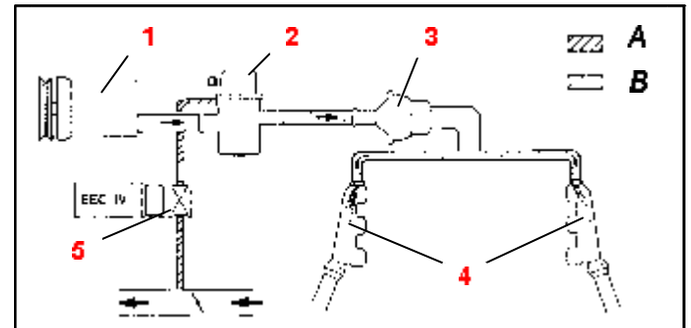
Disconnect the pressure transducer vacuum hose.

Connect a vacuum pump to the hose.

Start the engine; accelerate.

The vacuum rises.

Air injection system



A = vacuum
B = air

1. air pump
2. air valve
3. check valve
4. exhaust manifolds
5. solenoid valve

working diagram: air injection system

The air injection system is briefly fitted to the 2.9 engines with manual gearbox.

Check the pump pressure.

Check the air valve:

Remove the air valve.

Apply vacuum.

Blow on the valve; it should not be blocked.

Lower the vacuum; air must come through the valve.

Check the check valve:

Disconnect the inlet manifold side hose.

Start the engine: no exhaust gas must come through the valve.

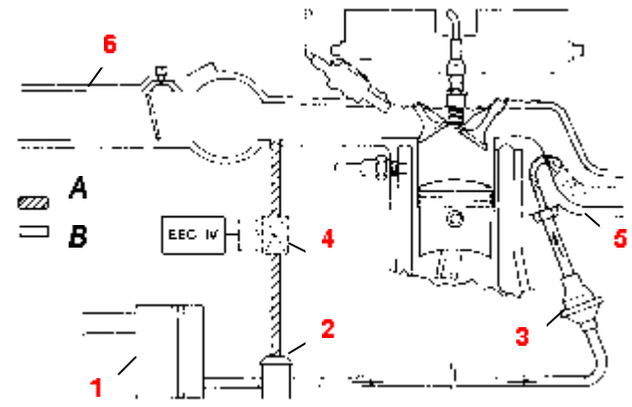
Check electronic vacuum regulator:

Carry out the self test with engine off; see *Fault codes*.

Depress the accelerator pedal fully, until all codes are shown.

Check that the voltage on the connector is 12 Volt.

Air induction system



A = vacuum
B = exhaust gas
1. air filter
2. control valve
3. check valve
4. solenoid valve
5. exhaust manifold
6. inlet manifold

working diagram: air induction system

Check the air induction system operation:

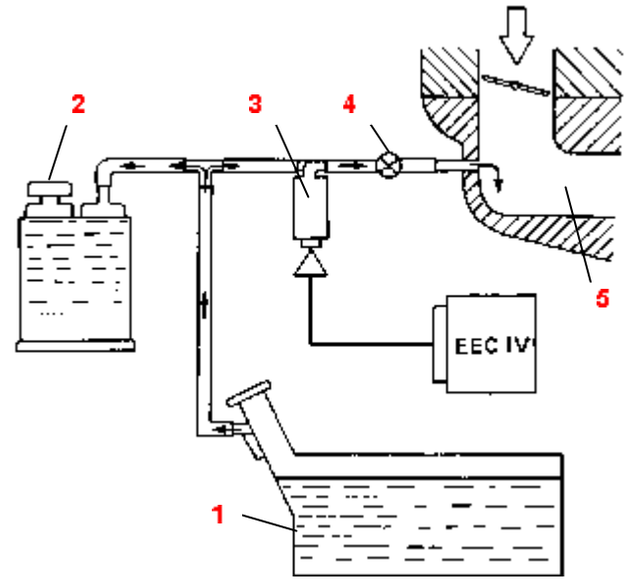
Engine at operating temperature.

Remove the appropriate air filter hose.

At idle speed, check that the hose induces air.

Accelerate; the system should no longer induce air.

Evaporative emission control system

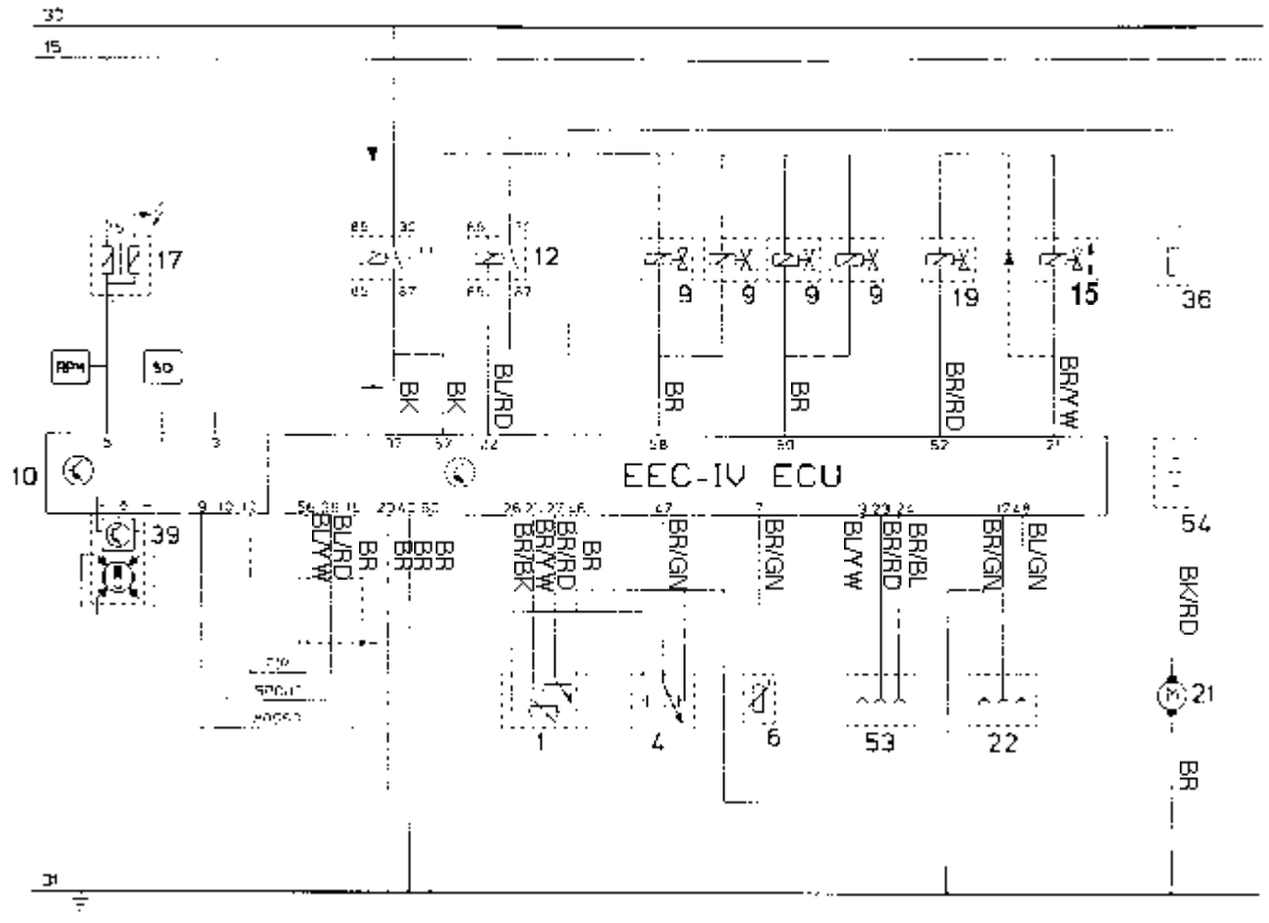


A = vacuum

B = air

1. fuel tank
2. charcoal canister
3. solenoid valve
4. restrictor
5. inlet manifold

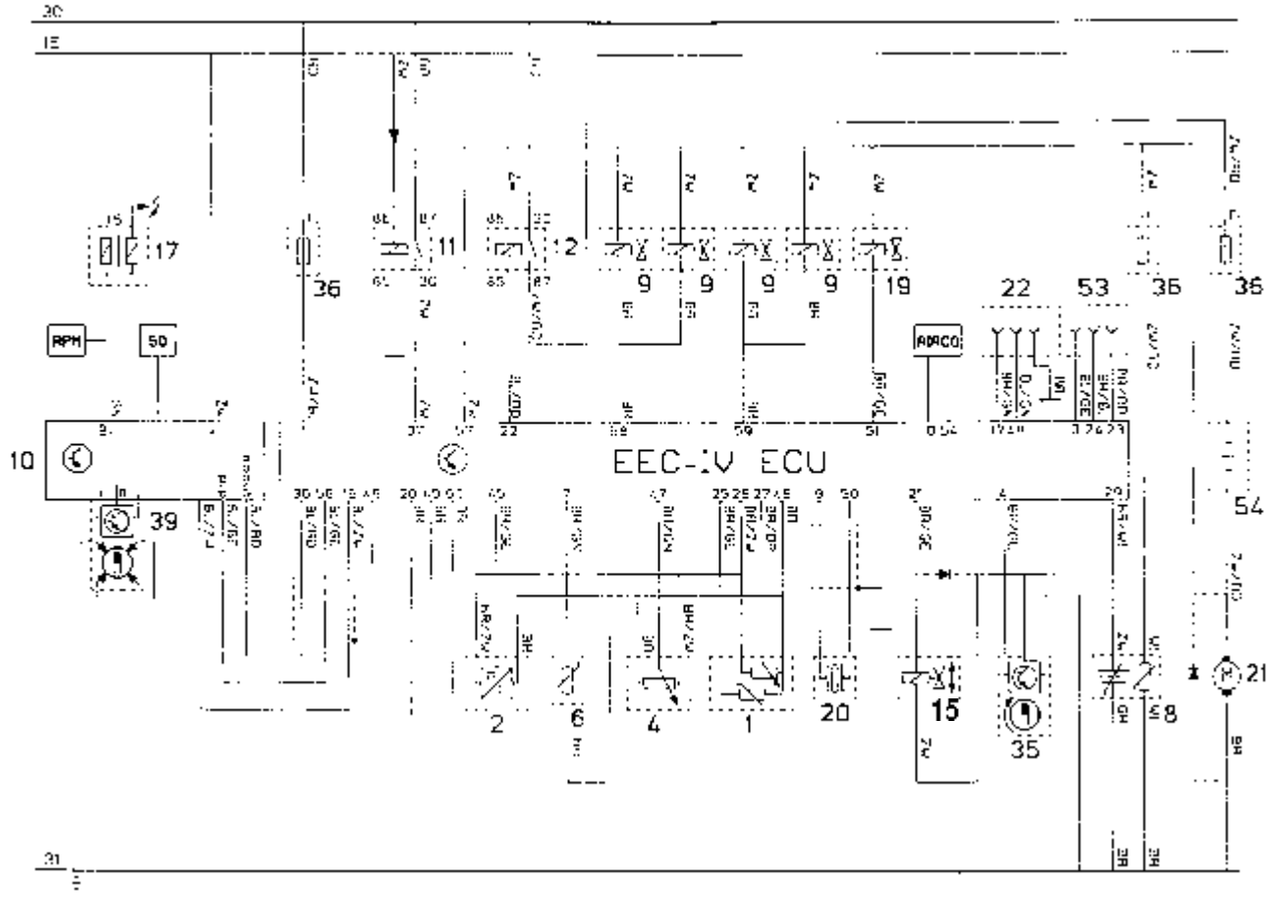
working diagram: evaporative emission control system



1. air flow meter
4. throttle valve potentiometer
6. coolant temperature sensor
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
15. idle control valve
17. ignition coil
19. fuel vapour cut-off valve
21. fuel pump
22. diagnostic connector
36. fuse
39. distributor with Hall-sensor
50. starter motor signal
53. ignition timing and/or engine speed correction
54. safety switch

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. RPM = rpm-signal.

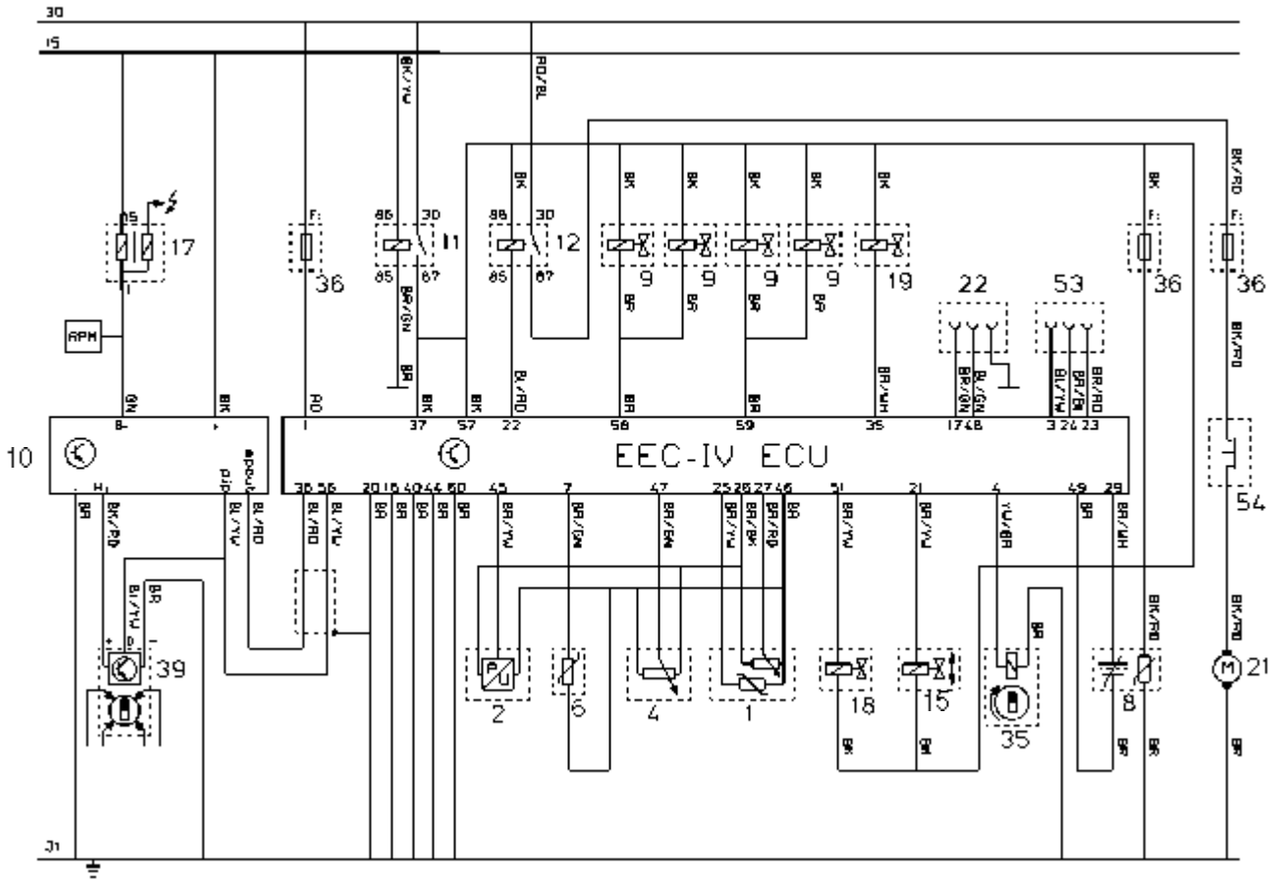
wiring diagram: 2.0 OHC engines without KAM and KAT



1. air flow meter
2. MAP-sensor
4. throttle valve potentiometer
6. coolant temperature sensor
8. oxygen sensor (with or without heating)
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
15. idle control valve
17. ignition coil
19. fuel vapour cut-off valve
20. knock sensor
21. fuel pump
22. diagnostic connector
35. vehicle speed sensor
36. fuse
39. distributor with Hall-sensor
53. ignition timing and/or engine speed correction
54. safety switch

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. RPM = rpm-signal.

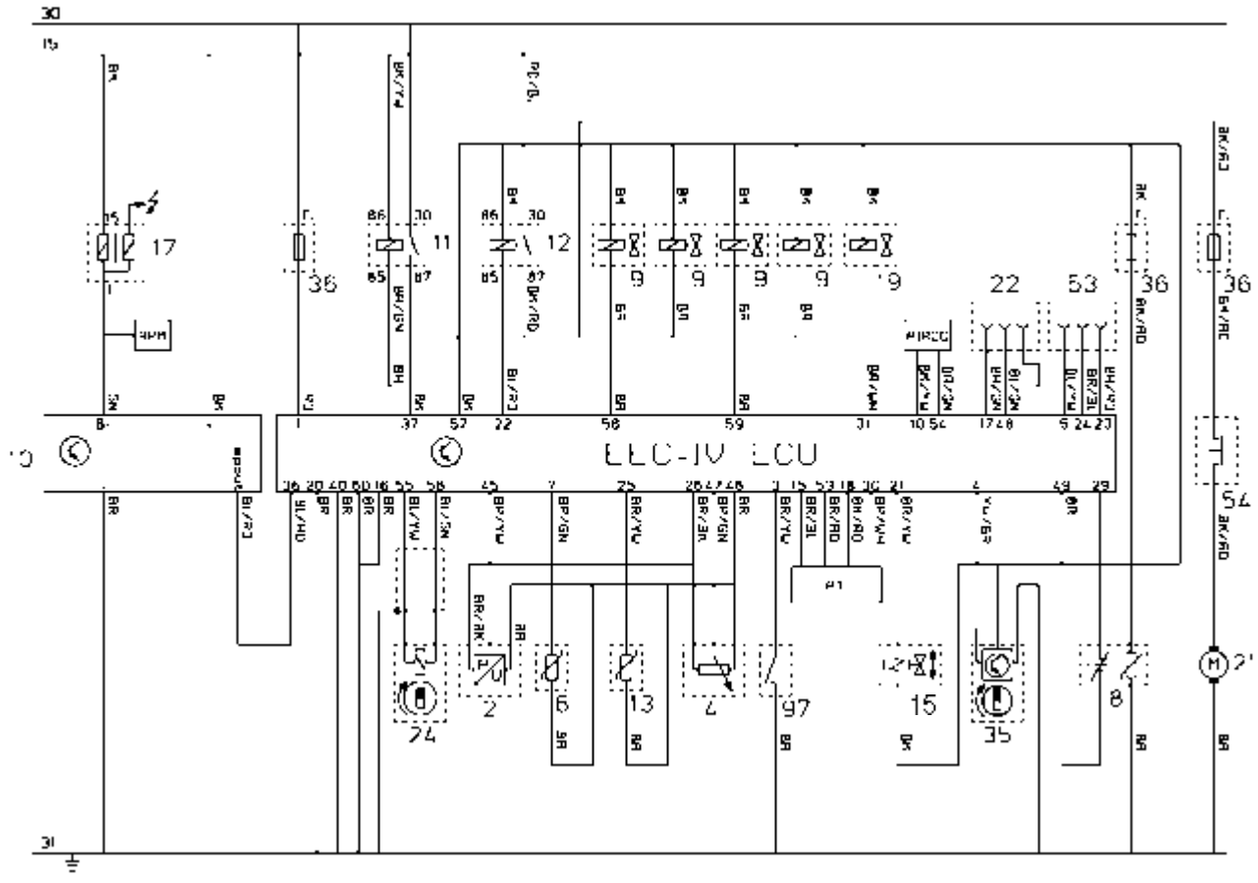
wiring diagram: 2.0 OHC engines with KAM and CAT; TFI module fitted to distributor



1. air flow meter
2. MAP-sensor
4. throttle valve potentiometer
6. coolant temperature sensor
8. oxygen sensor (with or without heating)
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
15. idle control valve
17. ignition coil
18. ignition timing control electro/vacuum valve
21. fuel pump
22. diagnostic connector
35. vehicle speed sensor
36. fuse
39. distributor with Hall-sensor
53. ignition timing and/or engine speed correction
54. safety switch

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. RPM = rpm-signal.

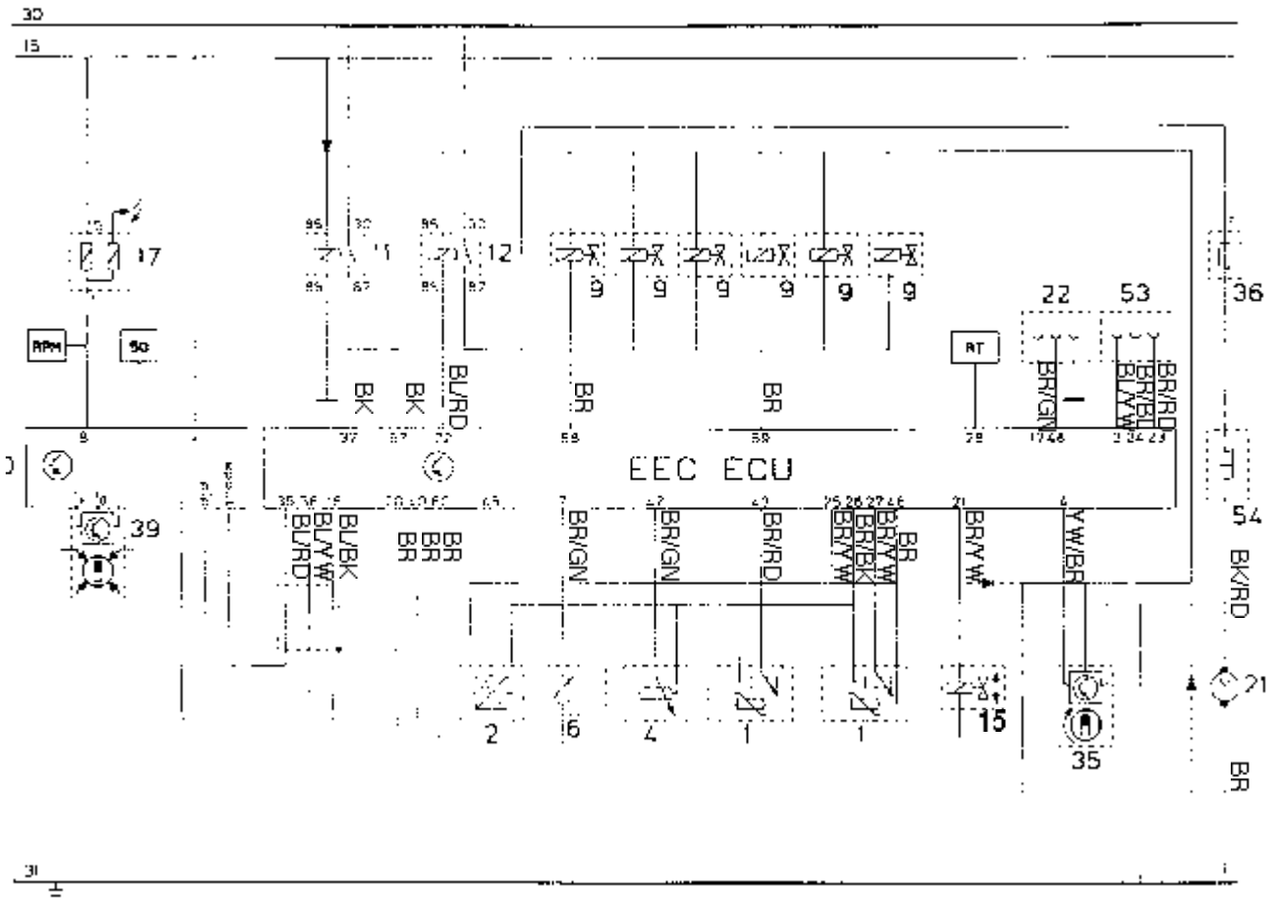
wiring diagram: 2.0 OHC engines with KAM and CAT; independent TFI module



2. MAP-sensor
4. throttle valve potentiometer
6. coolant temperature sensor
8. oxygen sensor (with or without heating)
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
13. intake air temperature sensor
15. idle control valve
17. ignition coil
21. fuel pump
22. diagnostic connector
24. engine speed/position sensor (inductive)
35. vehicle speed sensor
36. fuse
53. ignition timing and/or engine speed correction
54. safety switch
97. fuel temperature sensor

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. AT = automatic transmission. RPM = rpm-signal.

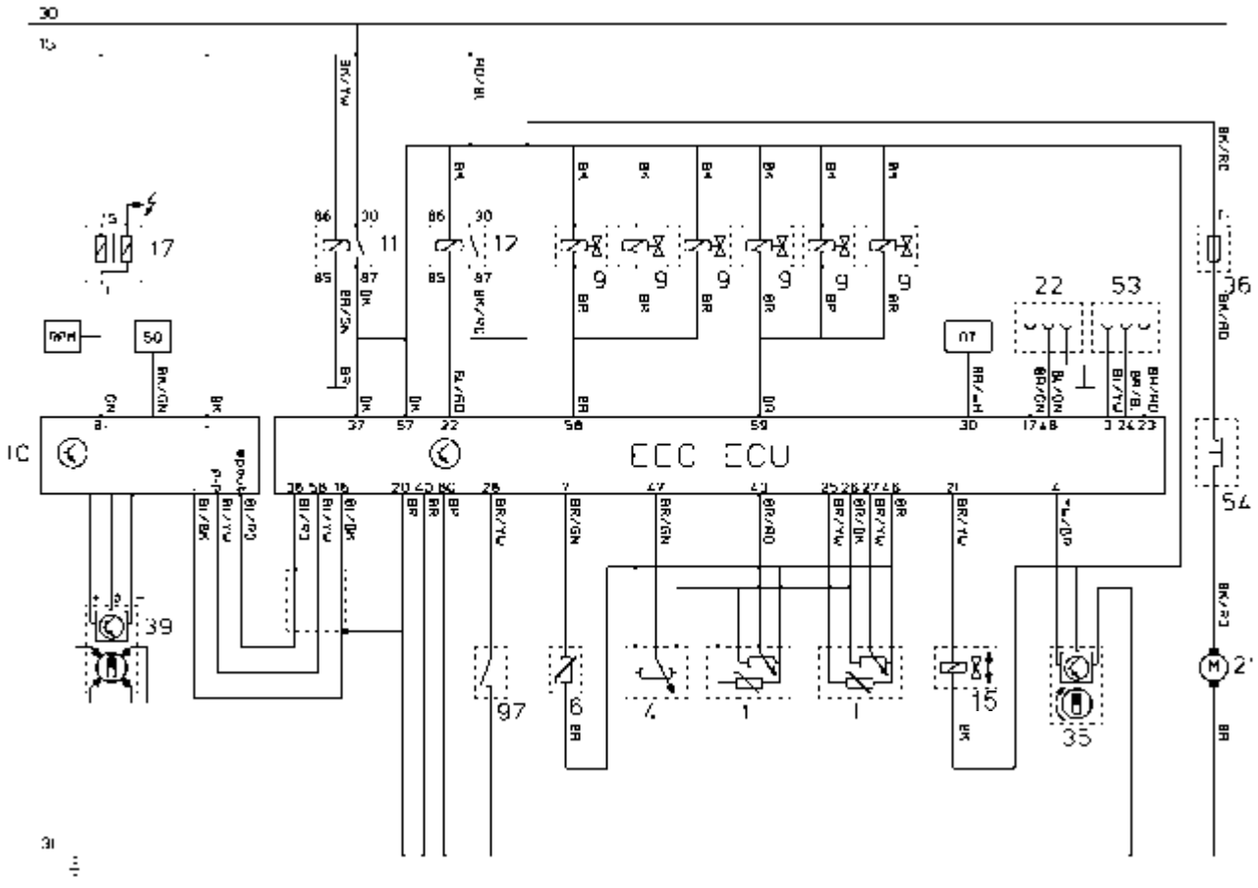
wiring diagram: 2.0 DOHC engines



1. air flow meter
2. MAP-sensor
4. throttle valve potentiometer
6. coolant temperature sensor
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
15. idle control valve
17. ignition coil
21. fuel pump
22. diagnostic connector
35. vehicle speed sensor
36. fuse
39. distributor with Hall-sensor
50. starter motor signal
53. correction ignition timing and/or engine speed
54. safety switch

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. AT = automatic transmission. RPM = rpm-signal.

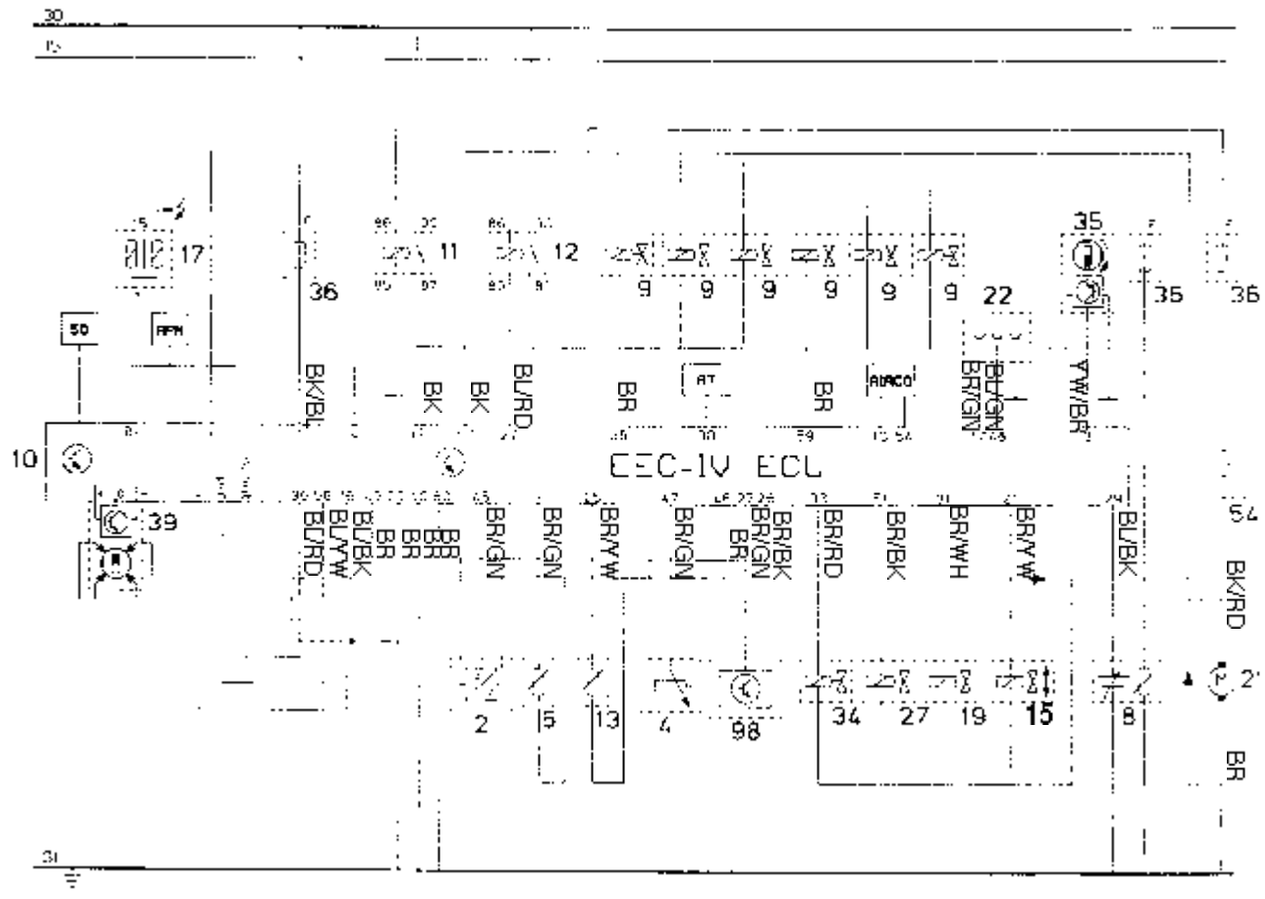
wiring diagram: 2.8 V6 engines



1. air flow meter
4. throttle valve potentiometer
6. coolant temperature sensor
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
15. idle control valve
17. ignition coil
21. fuel pump
22. diagnostic connector
35. vehicle speed sensor
36. fuse
39. distributor with Hall-sensor
50. starter motor signal
53. ignition timing and/or engine speed correction
54. safety switch
97. fuel temperature sensor

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. AT = automatic transmission. RPM = rpm-signal.

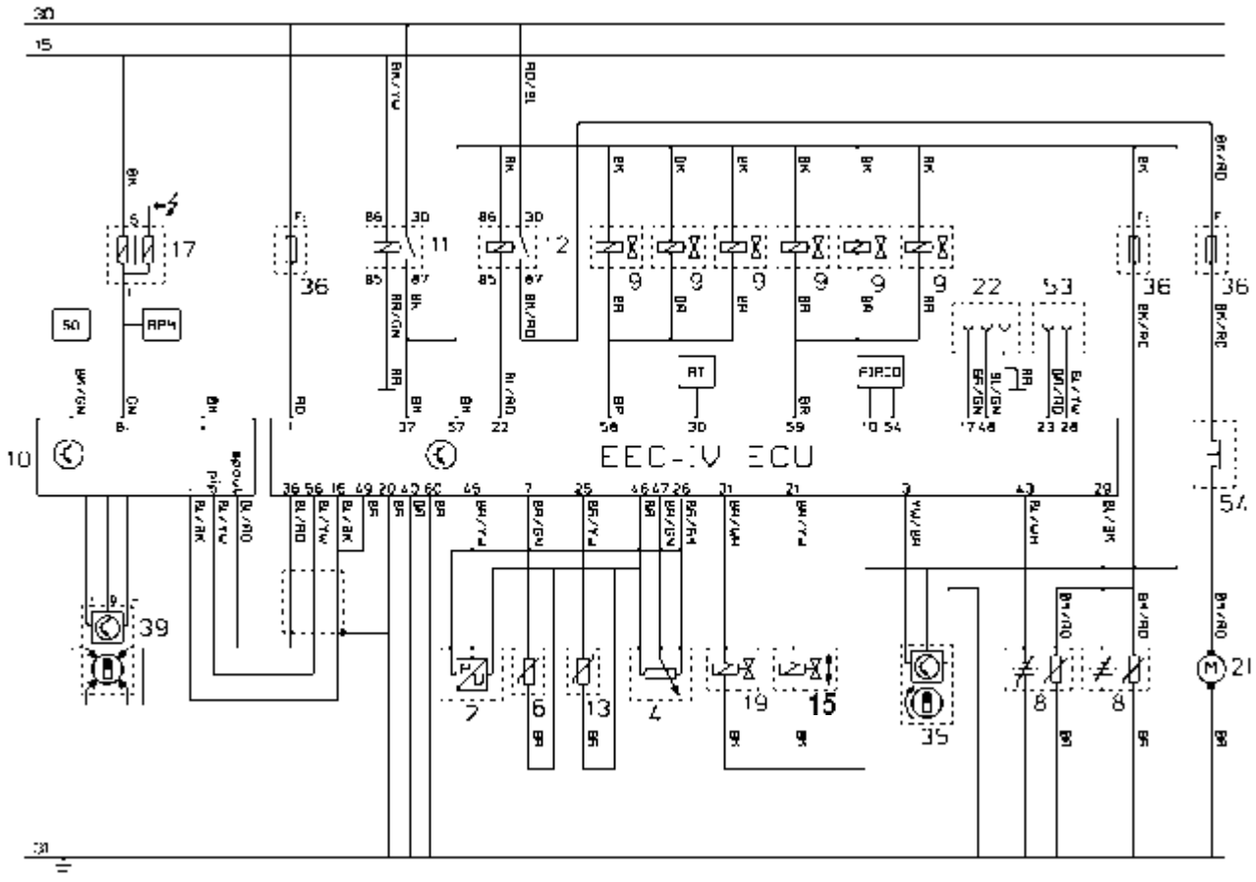
wiring diagram: 2.9 V6 engines; without catalytic converter



2. MAP-sensor
4. throttle valve potentiometer
6. coolant temperature sensor
8. oxygen sensor (with or without heating)
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
13. intake air temperature sensor
15. idle control valve
17. ignition coil
19. fuel vapour cut-off valve
21. fuel pump
22. diagnostic connector
27. air induction system electro/vacuum valve
34. electro/vacuum valve EGR
35. vehicle speed sensor
36. fuse
39. distributor with Hall-sensor
50. starter motor signal
54. safety switch
98. cruise control switch

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. AT = automatic transmission. RPM = rpm-signal.

wiring diagram: 2.9 V6 engines; with KAM and CAT and 1 oxygen sensor



2. MAP-sensor
4. throttle valve potentiometer
6. coolant temperature sensor
8. oxygen sensor (with or without heating)
9. injector(s)
10. ignition module
11. system control relay
12. fuel pump relay
13. intake air temperature sensor
15. idle control valve
17. ignition coil
19. fuel vapour cut-off valve
21. fuel pump
22. diagnostic connector
35. vehicle speed sensor
36. fuse
39. distributor with Hall-sensor
50. starter motor signal
53. ignition timing and/or engine speed correction
54. safety switch

BK = black; BL = blue; BR = brown; GN = green; D = dark; GR = grey; IV = ivory; L = light; OR = orange; hp = pink; PU = purple; RD = red; WH = white; YW = yellow. AT = automatic transmission. RPM = rpm-signal.

wiring diagram: 2.9 V6 engines; with KAM and CAT and 2 oxygen sensors