

## Functional Wiring Diagram

### Color Coding

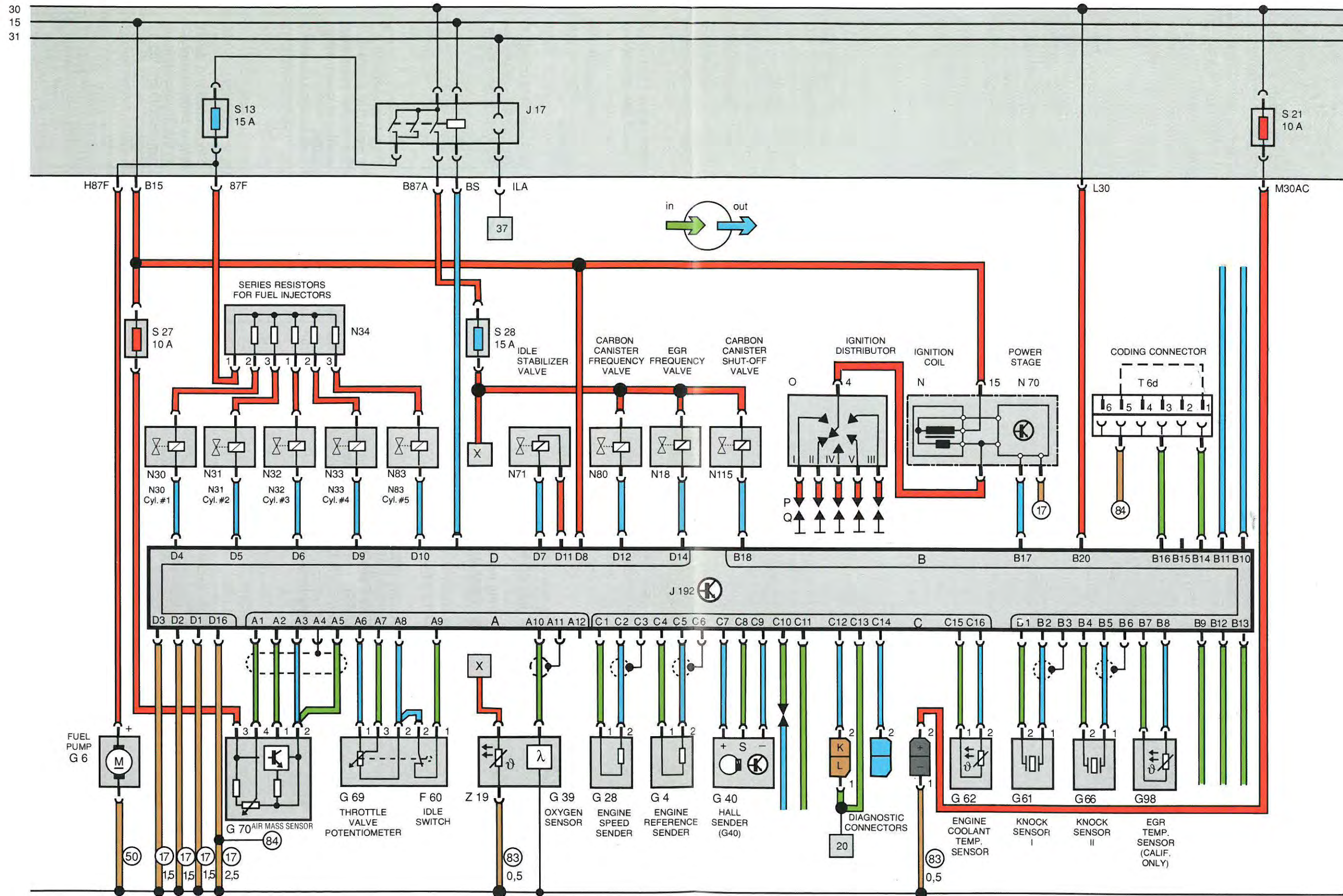
- Green = input signal
- Blue = output signal
- Red = positive
- Brown = ground

### Components

- F 60 = Idle switch
- G 4 = Engine reference sender
- G 6 = Fuel pump
- G 28 = Engine speed sender
- G 39 = Oxygen sensor heater
- G 40 = Hall sender
- G 61 = Knock sensor I
- G 62 = Engine coolant temperature sensor
- G 66 = Knock sensor II
- G 70 = Air mass sensor
- G 98 = EGR temperature sensor (California)
- J 17 = Fuel pump relay
- J 192 = MPI control unit
- N = Ignition coil
- N 18 = EGR frequency valve (California)
- N 30 = Injector, cylinder #1
- N 31 = Injector, cylinder #2
- N 32 = Injector, cylinder #3
- N 33 = Injector, cylinder #4
- N 34 = Series resistors
- N 70 = Power stage (ignition coil)
- N 80 = Carbon canister frequency valve
- N 83 = Injector, cylinder #5
- N 115 = Carbon canister shut-off valve
- O = Ignition distributor
- P = Spark plug connector
- Q = Spark plugs
- S 13 = Fuse, fuel pump and fuel injectors
- S 21 = Fuse, diagnostic connector
- S 27 = Fuse, engine control I
- S 28 = Fuse, engine control II
- T 6d = Coding connector
- Z 19 = Oxygen sensor heater
- 17 = ground connection, intake manifold
- 50 = ground connection, luggage compartment
- 83 = ground connection, right front wiring harness
- 84 = engine ground connection, right front wiring



# Wiring Diagram



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58



**Note:** When working with a V.A.G. 1598 test box it must be taken into account that pin connections of connectors A through D on adapter cables 1598/11 or 1598/12 **are not always identical** with connections of sockets on the test box. Consequently the **box** number specifies the socket of the test box corresponding with a pertinent pin number.

Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
A1 Box 41	in	CO potentiometer G 74 in air mass sensor G 70 Pin 4	Voltage signal from CO potentiometer. Adjustment of idling injection rate according to engine and ambient conditions.	None (engine runs without correction of mixture).	00521/2242 Recognizes breaks or shorts to positive	Adjustment of CO is not possible; poor transition from idling range
A2 Box 42	in	Air mass sensor G 70 Pin 1	Voltage signal proportional to air mass flow in intake manifold, designates engine load. Load information is a major input variable in MPI for all map value calculations depending on load and speed.	None (signals from the throttle valve potentiometer are used for calculation of the injection time and firing point)	00520/2242 Recognizes breaks and shorts to positive or ground	Disturbed operation in transition to acceleration; engine stops after starting or overrunning phase
A3 Box 43	out (ground)	Air mass sensor G 70 Pin 2	Earth for air mass sensor and CO potentiometer.	(see A1, A2 and A5)	00520, 00521/2242 Recognizes breaks and shorts to positive or ground	Single operation disturbances become stronger due to missing input signals (CO and load)
A4 Box 44	Screening of air mass sensor cable	--	Screening for protection against interfering pulses.	--	--	--

Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
A5 Box 45	in	Air mass sensor G 70 Pin 2 (parallel to cable A3)	Voltage signal for recognition of voltage drop in earth cable of air mass meter	Replacement value of 0.1 V is assumed in case of a recognized fault	Recognizes breaks on Pin A3 as voltage above 1 V on Pin A5. Recognizes shorts to positive	Not to be expected
A6 Box 46	out	Throttle valve potentiometer G 69 Pin 1	Power supply voltage for throttle valve potentiometer	--	00518/2212 (see A7)	(see A7)
A7 Box 47	in	Throttle valve potentiometer G 69 Pin 3	Voltage signal, corresponding with throttle valve position, is used for: - recognition of throttle valve position, e.g. full load - releasing acceleration enrichment; how fast the throttle valve opens is evaluated (also refer to Pin C 10) - replacement signal in case of air mass meter failure	None (all functions controlled by the throttle valve potentiometer are no longer operated)	00518/2212 Recognizes breaks or shorts. Checks plausibility of signal by comparing it with idling switch signal and signal from air mass meter while driving.	Poor acceleration and power output
A8 Box 48	out (ground)	Throttle valve potentiometer G 69, Pin 2 Idling switch F 60, Pin 2	Ground for G 69 and F 60	(see A7 and A9)	(see A7 and A9)	--



Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
A9 Box 49	in	Idling switch F 60 Pin 1	Signal for idling stabilisation control, overrun cut-off, overrun air mass control and overrun ignition timing.	--	00516/2121 Checks plausibility of signal	Deviations from nominal idling speed, erratic idling, hesitation in overrun.
A10 Box 50	in	Oxygen sensor G 39	Voltage signal from oxygen sensor. Basic injection period is corrected on basis of this signal to keep the mixture at lambda = 1.	--	00525/2342 Recognizes a fault if the practical signal voltage range is not reached. Recognizes a fault in case of short to positive (sensor heating). Recognizes a fault in case of break or short to ground.	Not noticeable as disturbance in driving. Possibly sulphur odor from warm engine, as with an unregulated catalyst.
A11 Box 51	Screening	Oxygen sensor G 39 (sensor housing)	Screening for protection against interfering voltage.	--	--	--
A12	Not used	--	--	--	--	--
B1 Box 21	in	Knock sensor I G 61 Pin 2	Voltage signal from G 61 for recognition of knocking combustion in cylinders 1 and 2.	Ignition timing of cylinders 1 and 2 is retarded by the maximum of approx. 16°.	00524/2142 Recognizes a break if no signals are put in with the coolant temperature above 40° C.	Power loss, poor acceleration, misfiring.

Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
B2 Box 22	out (ground)	Knock sensor I G 61 Pin 1	Sensor ground of G 61.	(see B1)	(see B1)	(see B1)
B3 Box 23	Screening	Knock sensor I G 61	Screening for protection against interfering voltage.	--	--	--
B4 Box 24	in	Knock sensor II G 66 Pin 2	Voltage signal from G 66 for recognition of knocking combustion in cylinders 3, 4 and 5.	Ignition timing of cylinders 3, 4 and 5 retarded by maximum of approx. 16°.	00540/2144 Recognizes breaks if there are no signals with a coolant temperature above 40° C.	Power loss, poor acceleration, misfiring
B5 Box 25	out (ground)	Knock sensor II G 66 Pin 1	Sensor ground of G 66.	(see B4)	(see B4)	(see B4)
B6 Box 26	Screening	Knock sensor II G 66	Screening for protection against interfering voltage.	--	--	--
B7 Box 27	in	Exhaust gas recirculation temperature sensor G 98 Only California	Signal corresponding with exhaust gas temperature in EGR valve. Signal is used for diagnosis of exhaust gas recirculation; it has no influence on the control of exhaust gas recirculation.	--	00560/2411 Recognizes shorts to ground in sensor circuit and a continuously opened or closed EGR valve.	--



Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
B8 Box 28	out (ground)	Exhaust gas recirculation temperature sensor G 98 Only California	Ground for G 98	--	(see B7)	--
B9 Box 29	in	Road speed sender G 68	Road speed signal corresponding with road speed of car - for overrun air volume control - adaptation of idling stabilisation control works only on stopped car - air conditioner compressor cut-off works only in 1st gear (see Pin C10).	--	00218/1231 Recognizes when a signal is missing. Road speed can be read with Function 09, channel 15 (see self diagnosis).	Engine stops after overrun phase when declutching.
B10 Box 30	out	Tachometer, Pin 27 on Digimat control unit	Speed signal for activation of various electronic systems.	--	--	Specific faults of signal receiving systems.
B11 Box 31	out	On-board computer Pin 10	Consumption signal to on-board computer with information about instantaneous fuel consumption.	--	--	No display of instantaneous fuel consumption. Average consumption value drops continuously.
B12 Box 32	in	Digimat control unit Pin 20	Signal for recognition of selector lever position in cars with automatic transmission.	--	Signal can be checked with Function 08, display box 7 (see self diagnosis).	Stronger tendency of car creeping and possibly vibration in passenger compartment cell.

Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
B13 Box 33	in	Digimat control unit Pin 28	Signal from Digimat control unit informs MPI control unit J 192 about shift point.	--	Signal can be checked with Function 08, display box 7 (see self diagnosis).	Harder shifts
B14 Box 34	in	Coding plug	Code for manual or automatic transmission version. B14 open = manual transmission B14 to earth = autom. transm.	--	Recognition with V.A.G. 1551, Function 01 Code 11 1 = Manual transm. 0 = Autom. transm.	--
B15	Not used	--	--	--	--	--
B16 Box 36	in	Coding plug	Code for California version. For releasing system functions of exhaust gas recirculation including self diagnosis (CARB)	--	Recognition with V.A.G. 1551, Function 01 Code 11 1 = Without EGR 0 = With EGR	--
B17 Box 37	out	Final output stage N 70 of ignition coil Pin 2	Ignition signal for all cylinders for activation of final output stage N 70.	--	--	No starting, engine stopped
B18 Box 38	out	Solenoid valve 2 for activated charcoal filter N 115 (cut-off valve)	Ground control of N 115 (closed when without current).	--	01241/4331 Recognizes breaks and shorts to positive or ground.	Possibly overfilled activated charcoal filter canister (fuel odor).
B19	--	--	--	--	--	--



Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
B20 Box 40	Power supply	Fuse/relay plate Pin L	Permanent positive (terminal 30). Power supply of fault memory.	--	--	--
C1 Box 1	in	Engine speed sender G 28 Pin 1	Sender senses 135 teeth of flywheel's starter gear ring. Control unit recognizes engine speed and calculates crankshaft angle.	--	00513/2111 Recognizes when a signal is missing with engine running and for engine starting	Misfiring, engine cannot be started
C2 Box 2	out (ground)	Engine speed sender G 28 Pin 2	Sender ground for G 28.	--	--	--
C3 Box 3	Screening	Engine speed sender G 28	Screening for protection against interfering voltage.	--	--	--
C4 Box 4	in	Firing point sender G 4 Pin 1	Senses steel pin pressed in on back of the flywheel (60° before TDC of cylinder no. 1).	--	00514/2111 Recognizes when a signal is missing 5 seconds after engine has been started.	Engine cannot be started
C5 Box 5	out	Firing point sender G 4 Pin 2	Sender ground for G 4.	--	(see C4)	(see C4)

Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
C6 Box 6	Screening	Firing point sender G 4	Screening for protection against interfering voltage.	--	(see C4)	(see C4)
C7 Box 7	out (power supply)	Hall sender G 40 Pin +	Power supply for hall sender.	(see C8)	(see C8)	(see C8)
C8 Box 8	in	Hall sender G 40 Pin S	Hall sender signal. For recognition of ignition TDC for cylinder no. 1 to release first firing and injection after engine has been started.	--	00515/2113 Recognizes breaks or continuous signal voltage, even while attempting to start the engine.	Engine cannot be started
C9 Box 9	out (ground)	Hall sender G 40 Pin -	Ground for hall sender.	(see C8)	(see C8)	(see C8)
C10 Box 10	in + out (bidirectional)	Switch unit for solenoid coupling J 153 Pin 87A	<u>in:</u> Voltage is supplied to Pin C10 140 ms before switching on solenoid coupling for AC compressor. ISC compensates for the increased engine load. <u>out:</u> Air conditioner compressor is switched off via this pin when accelerating in 1st gear (recognized on engine speed and road speed).	--	Fast checking is possible with Function 08, display box 7 (see self diagnosis).	--



Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
C11 Box 11	in	Manual air conditioning: air conditioner switch E 30, Pin 1. Digital air conditioning: operating and indicating unit for air conditioner E 87	Engine speed boosted for operation of air conditioner. Manual air conditioning: Voltage signal is supplied to Pin C11 with air conditioner "ON"; idling speed is boosted. Digital air conditioning: Voltage signal is supplied to Pin C11 for maximum cooling or heating performance of air conditioner; idling speed is boosted.	--	Fast checking is possible with Function 08, display box 7 (see self diagnosis).	--
C12 Box 12	in / out (bidirectional)	Diagnosis socket (brown)	K-wire Output of rapid data transfer to V.A.G. 1551.	Output of flash code via fault lamp or diode test lamp.	Display on V.A.G. 1551: "control unit does not answer".	--
C13 Box 13	in	Diagnosis socket (brown)	L-wire Activation of rapid data transfer and flash code output.	--	--	--
C14 Box 14	out	Warning lamp K 66 for electronic ignition and diagnosis socket (blue)	Activation of warning lamp K 66 to warn driver of disturbance in MPI (only for California)	--	--	--

Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
C15 Box 15	in	Coolant temperature sender G 62 Pin 1	Information about the coolant temperature is a factor of correction for many system functions, which in addition are started depending on the temperature.	20° C is assumed for starting the engine when this signal is missing; 10° C are added for each minute of engine operation until 85° C is reached.	00522/2312 Recognizes breaks and shorts to positive or ground.	Starting problems and poor driving behavior at low temperature in the warming-up phase.
C16 Box 16	out	Coolant temperature sender G 62 Pin 2	Sender ground for G 62.	(see C15)	(see C15)	(see C15)
D1 Box 1	in	Intake manifold ground point (17) Power ground point	Ground for injectors, switched through the final output stages. Control unit connected internally with D2.	Pin D2 and D3	--	Possibly misfiring at high load and speed, since the high flow of current cannot be taken care of in one ground cable.
D2 Box 2	in	Intake manifold ground point (17) Power ground point	(see D1)	Pin D1 and D3	--	(see D1)
D3 Box 3	in	Intake manifold ground point (17) Power ground point	Ground for final output stages of control elements, except for injectors.	Pin D1 and D2	--	(see D1)



Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
D4 Box 4	out	Injector, cylinder 1 N 30	Ground control for injector N 30.	--	01249/4411 Recognizes breaks and shorts to positive in component.	Erratic engine running, maximum power output is not reached.
D5 Box 5	out	Injector, cylinder 2 N 31	Ground control for injector N 31.	--	01250/4412 (see D4)	(see D4)
D6 Box 6	out	Injector, cylinder 3 N 32	Ground control for injector N 32.	--	01251/4413 (see D4)	(see D4)
D7 Box 7	out	Idling stabilisation control valve N 71	Ground control for N 71; regulates idling speed and controls starting air volume and overrun air volume.	Final output stages are switched off by Pin D7 and D11 when a fault is recognized (N 71 in emergency running cross section opening size).	01257/4431 Recognizes breaks and shorts to positive or ground.	Deviation from idling speed, "surging" with cold engine.
D8 Box 8	in	Fuse/relay plate Pin B15	Power supply of control unit (terminal 15).	--	--	No engine running.
D9 Box 9	out	Injector, cylinder 4 N 33	Ground control for injector N 33.	--	01252/4414 (see D4)	(see D4)
D10 Box 10	out	Injector, cylinder 5 N 83	Ground control for injector N 83.	--	01253/4421 (see D4)	(see D4)

Pin No.	Type of Signal	Component / Connection Pin	Function	Replacement Function	Self Diagnosis	Effects
D11 Box 11	out	Idling stabilisation control valve N 71	Positive control for N 71.	(see D7)	(see D7)	(see D7)
D12 Box 12	out	Solenoid valve 1 for activated charcoal filter N 80 (frequency valve)	Ground control for N 80. Controls delivery of fuel vapors into intake manifold with engine running.	Valve N 80 remains open when circuit is interrupted.	01247/4343 Recognizes breaks and shorts to positive or ground.	Possibly idling problems
D13	--	--	--	--	--	--
D14 Box 14	out	Frequency valve for exhaust gas recirculation N 18 Only California	Ground control for N 18.	None (exhaust gas recirculation remains closed when circuit is interrupted).	01265/4312 Recognizes breaks and shorts to positive or ground.	--
D15 Box 15	out	Fuse/relay plate Pin BS	Ground control of fuel pump relay J 17 (Pin T on J 17).	--	--	Engine cannot be started, engine off
D16 Box 16	in	Intake manifold ground point (17) Electronic ground	Ground for electronics, sensors and screenings.	--	--	Possibly misfiring with high load of ground cables