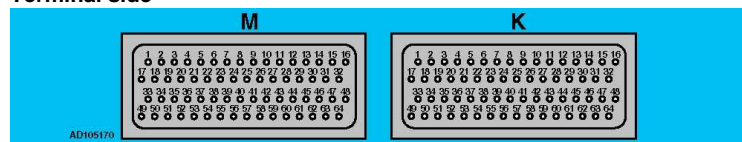
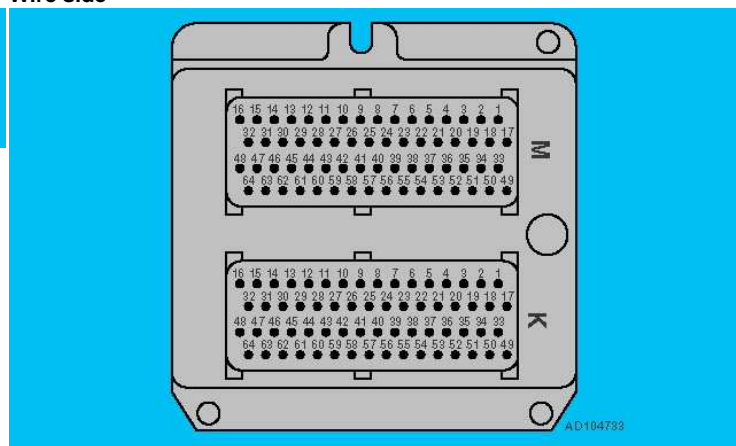




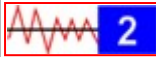
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













































































Wire side




































Component/circuit description	ECM pin	Signal	Condition	Typical value	Oscilloscope setting (Suggested settings - Voltage/time per division)	Wave form
ABS control module - VSS signal	K41	←	Ignition ON - vehicle pushed	0 V or 11-14 V fluctuating		
AC compressor clutch relay	K51	↔	Engine idling - AC OFF	11-14 V		
AC compressor clutch relay	K51	↔	Engine idling - AC ON - AC compressor OFF	11-14 V		
AC compressor clutch relay	K51	↔	Engine idling - AC ON - AC compressor ON	0-1 V		
AC refrigerant pressure sensor	K7	←		Connected pin - no test data available or random digital signal		
AC refrigerant pressure sensor	K23	⇒	Ignition ON	5 V		
AC refrigerant pressure sensor	K34	↔	Ignition ON	0 V		
AC/heater function control panel	K11	←		Connected pin - no test data available or random digital signal		
Accelerator pedal position (APP) sensor	K8	←	Ignition ON - accelerator pedal released	1 V		
Accelerator pedal position (APP) sensor	K8	←	Ignition ON - accelerator pedal depressed	4,3 V		
Accelerator pedal position (APP) sensor	K24	←	Ignition ON - accelerator pedal released	0,5 V		
Accelerator pedal position (APP) sensor	K24	←	Ignition ON - accelerator pedal depressed	2,1 V		
Accelerator pedal position (APP) sensor	K39	⇒	Ignition ON	5 V		
Accelerator pedal position (APP) sensor	K40	↔	Ignition ON	0 V		
Accelerator pedal position (APP) sensor	K55	⇒	Ignition ON	5 V		
Accelerator pedal position (APP) sensor	K56	↔	Ignition ON	0 V		
Battery	K32	←	Ignition OFF	11-14 V		
Brake pedal position (BPP) switch	K28	←	Ignition ON - brake pedal released	0 V		

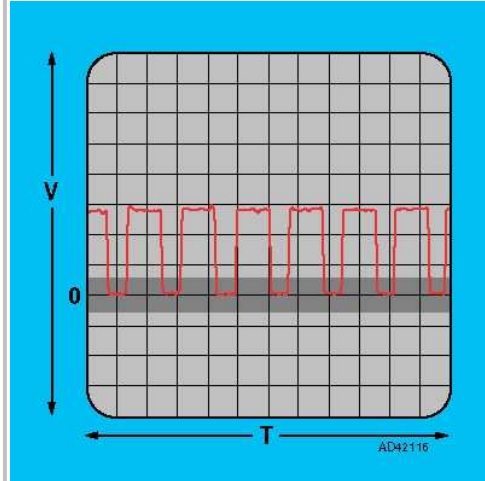
Brake pedal position (BPP) switch	K28	←	Ignition ON - brake pedal depressed	11-14 V		
Brake pedal position (BPP) switch	K42	←	Ignition ON - brake pedal released	11-14 V		
Brake pedal position (BPP) switch	K42	←	Ignition ON - brake pedal depressed	0 V		
Camshaft position (CMP) sensor	M1	↗	Ignition ON	0 V		
Camshaft position (CMP) sensor	M11	←	Ignition ON	0 or 5 V		
Camshaft position (CMP) sensor	M11	←	Engine idling		2 V/100 ms	
Camshaft position (CMP) sensor	M52	⇒	Ignition ON	5 V		
CAN data bus - high	K6	↔		Connected pin - no test data available or random digital signal		
CAN data bus - low	K38	↔		Connected pin - no test data available or random digital signal		
Clutch pedal position (CPP) switch - with cruise control	K10	←		Connected pin - no test data available or random digital signal		
Crankshaft position (CKP) sensor	M5	←	Engine idling	2,8 V ac	2 V/2 ms	Reversed 
Crankshaft position (CKP) sensor	M37	←	Engine idling	2,8 V ac	2 V/2 ms	
Crankshaft position (CKP) sensor - shield wire	M33	↗	Ignition ON	0 V		
Cruise control master switch	K27	←		Connected pin - no test data available or random digital signal		
Cruise control master switch	K43	←		Connected pin - no test data available or random digital signal		
Cruise control master switch	K59	←		Connected pin - no test data available or random digital signal		
Digital multifunction display	K20	⇒		Connected pin - no test data available or random digital signal		
Engine control (EC) relay	K31	←	Ignition OFF	0 V		
Engine control (EC) relay	K31	←	Ignition ON	11-14 V		
Engine control (EC) relay	K36	↔	Ignition OFF	11-14 V		
Engine control (EC) relay	K36	↔	Ignition ON	0-1 V		
Engine control (EC) relay	K47	←	Ignition OFF	0 V		
Engine control (EC) relay	K47	←	Ignition ON	11-14 V		
Engine control (EC) relay	M23	←	Ignition OFF	0 V		
Engine control (EC) relay	M23	←	Ignition ON	11-14 V		
Engine coolant blower motor control module - 2002 with AC	K2	⇒		Connected pin - no test data available or random digital signal		
Engine coolant blower motor control module - tachometer signal - 2002 with AC	K62	⇒	Engine idling	25 Hz		
Engine coolant blower motor control module	K62	⇒	3000 rpm	100 Hz		

Engine coolant blower motor relay 1	K30			Connected pin - no test data available or random digital signal		
Engine coolant blower motor relay 2	K29			Connected pin - no test data available or random digital signal		
Engine coolant blower motor relay 3 - AT with AC	K29			Connected pin - no test data available or random digital signal		
Engine coolant blower motor relay 3 - MT with AC	K46			Connected pin - no test data available or random digital signal		
Engine coolant blower motor relay 4 - AT with AC	K46			Connected pin - no test data available or random digital signal		
<u>Engine coolant temperature (ECT) sensor</u>	M1		Ignition ON	0 V		
<u>Engine coolant temperature (ECT) sensor</u>	M25		Ignition ON - engine cold	3,6 V		
<u>Engine coolant temperature (ECT) sensor</u>	M25		Engine idling - engine hot	0,8 V		
Engine malfunction indicator lamp (MIL)	K14		Ignition ON - MIL ON	0-1 V		
Engine malfunction indicator lamp (MIL)	K14		Ignition ON - MIL OFF	11-14 V		
<u>Evaporative emission (EVAP) canister purge valve</u>	M34		Ignition ON	11-14 V		
<u>Evaporative emission (EVAP) canister purge valve</u>	M34		Engine idling		5 V/2 ms	Intermittent  68
<u>Fuel pump (FP) relay</u>	K19		Ignition ON	0 V briefly then 11-14 V		
<u>Fuel pump (FP) relay</u>	K19		Engine idling	0-1 V		
<u>Heated oxygen sensor (HO2S) 1</u>	M8		Ignition ON	0 V		
<u>Heated oxygen sensor (HO2S) 1</u>	M19		Ignition ON	11-14 V		
<u>Heated oxygen sensor (HO2S) 1</u>	M19		Engine idling	0-1 V		
<u>Heated oxygen sensor (HO2S) 1</u>	M35		Ignition ON	11-14 V		
<u>Heated oxygen sensor (HO2S) 1</u>	M35		Engine idling	0-1 V		
<u>Heated oxygen sensor (HO2S) 1</u>	M57		Ignition ON	0,4 V		
<u>Heated oxygen sensor (HO2S) 1</u>	M57		Engine idling - engine hot	0,1-0,9 V fluctuating	0,2 V/1 sec.	 21
<u>Heated oxygen sensor (HO2S) 1</u> - shield wire	M33		Ignition ON	0 V		
<u>Heated oxygen sensor (HO2S) 2</u>	M18		Ignition ON	11-14 V		
<u>Heated oxygen sensor (HO2S) 2</u>	M18		Engine idling	0-1 V		
<u>Heated oxygen sensor (HO2S) 2</u>	M24		Ignition ON	0 V		
<u>Heated oxygen sensor (HO2S) 2</u>	M40		Ignition ON	0,4 V		
<u>Heated oxygen sensor (HO2S) 2</u>	M40		Engine idling	0,6 V		
<u>Heated oxygen sensor (HO2S) 2</u>	M51		Ignition ON	11-14 V		
<u>Heated oxygen sensor (HO2S) 2</u>	M51		Engine idling	0-1 V		
<u>Heated oxygen sensor (HO2S) 2</u> - shield wire	M33		Ignition ON	0 V		

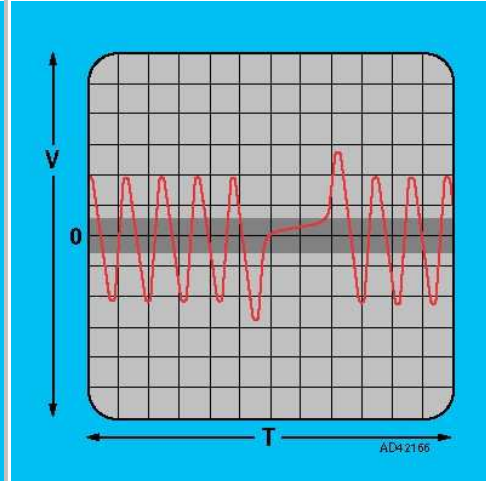
Ignition coil	M15		Ignition ON	11-14 V		
Ignition coil	M15		Engine idling		5 V/1 ms	 33
Ignition coil	M16		Ignition ON	11-14 V		
Ignition coil	M16		Engine idling		5 V/1 ms	 33
Ignition coil	M31		Ignition ON	11-14 V		
Ignition coil	M31		Engine idling		5 V/1 ms	 33
Ignition coil	M32		Ignition ON	11-14 V		
Ignition coil	M32		Engine idling		5 V/1 ms	 33
Ignition coil	M47		Ignition ON	11-14 V		
Ignition coil	M47		Engine idling		5 V/1 ms	 33
Ignition coil	M48		Ignition ON	11-14 V		
Ignition coil	M48		Engine idling		5 V/1 ms	 33
Ignition coil	M63		Ignition ON	11-14 V		
Ignition coil	M63		Engine idling		5 V/1 ms	 33
Ignition coil	M64		Ignition ON	11-14 V		
Ignition coil	M64		Engine idling		5 V/1 ms	 33
Ignition switch	K64		Ignition OFF	0 V		
Ignition switch	K64		Ignition ON	11-14 V		
Immobilizer control module	K5			Connected pin - no test data available or random digital signal		
Injector 1	M29		Ignition ON	11-14 V briefly then 0 V		
Injector 1	M29		Engine idling	3,2 ms	10 V/2 ms	 35
Injector 2	M61		Ignition ON	11-14 V briefly then 0 V		
Injector 2	M61		Engine idling	3,2 ms	10 V/2 ms	 35
Injector 3	M44		Ignition ON	11-14 V briefly then 0 V		
Injector 3	M44		Engine idling	3,2 ms	10 V/2 ms	 35
Injector 4	M12		Ignition ON	11-14 V briefly then 0 V		
Injector 4	M12		Engine idling	3,2 ms	10 V/2 ms	 35
Instrumentation control module	K2			Connected pin - no test data available or random digital signal		
Instrumentation control module - fuel level signal	K57			Connected pin - no test data available or random digital signal		
Instrumentation control module - tachometer signal	K62		Engine idling	25 Hz		
Instrumentation control module	K62		3000 rpm	100 Hz		
Intake air temperature (IAT) sensor	M41		Ignition ON - air temp. 20°C	1,9 V		

Intake manifold air control solenoid	M2		Ignition ON	11-14 V		
Intake manifold air control solenoid	M2		Engine idling	11-14 V		
Intake manifold air control solenoid	M2		Engine idling - full throttle briefly	0 V briefly		
Knock sensor (KS)	M17		Engine idling - accelerate briefly		50 mV/1 ms	 58
Knock sensor (KS)	M49		Ignition ON	0 V		
Knock sensor (KS) - shield wire	M33		Ignition ON	0 V		
Mass air flow (MAF) sensor	M27		Ignition ON	0 V		
Mass air flow (MAF) sensor	M43		Ignition ON	0 V		
Mass air flow (MAF) sensor	M43		Engine idling	0,8 V		
Mass air flow (MAF) sensor	M43		Engine idling - accelerate briefly	4 V		
Power steering pump	K35			Connected pin - no test data available or random digital signal		
Service indicator	K13		Ignition ON - service indicator ON	0-1 V		
Service indicator	K13		Ignition ON - service indicator OFF	11-14 V		
Throttle motor	M13		Ignition ON	11-14 V briefly then 0 V		
Throttle motor	M13		Engine idling		2 V/2 ms	 64
Throttle motor	M30		Ignition ON	11-14 V briefly then 0 V		
Throttle motor	M30		Engine idling		2 V/50 ms	 91
Throttle motor	M45		Ignition ON	11-14 V briefly then 0 V		
Throttle motor	M45		Engine idling		2 V/2 ms	 64
Throttle motor	M62		Ignition ON	11-14 V briefly then 0 V		
Throttle motor	M62		Engine idling		2 V/50 ms	 91
Throttle motor position sensor	M3		Ignition ON	5 V		
Throttle motor position sensor	M10		Ignition ON	0,7 V		
Throttle motor position sensor	M10		Engine idling	0,5 V		
Throttle motor position sensor	M20		Ignition ON	5 V		
Throttle motor position sensor	M26		Ignition ON	4,2 V		
Throttle motor position sensor	M26		Engine idling	4,5 V		
Throttle motor position sensor	M42		Ignition ON	0 V		
Throttle motor position sensor	M58		Ignition ON	0 V		
Vehicle speed sensor (VSS) signal amplifier - without ABS	K41		Ignition ON - vehicle pushed	0 V or 11-14 V fluctuating		

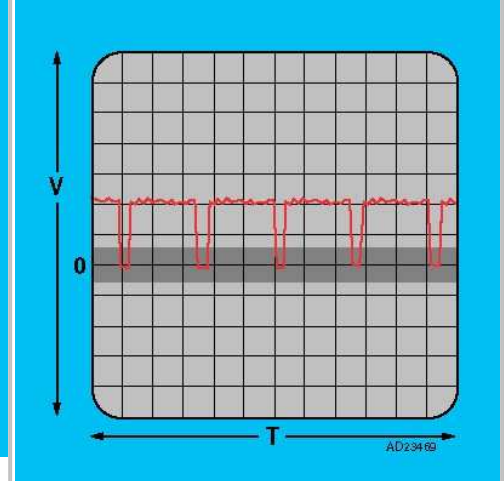
4. Digital, DC, frequency modulated



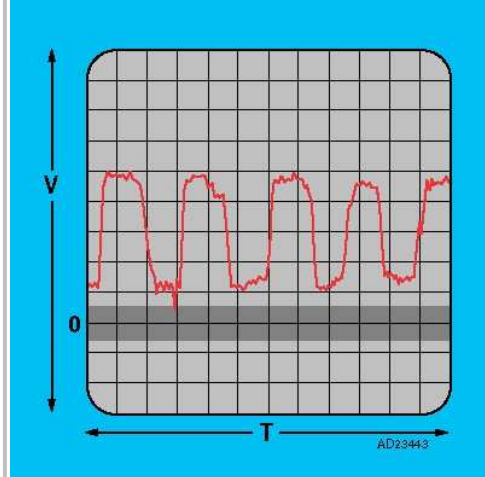
2. Analogue, AC, frequency modulated



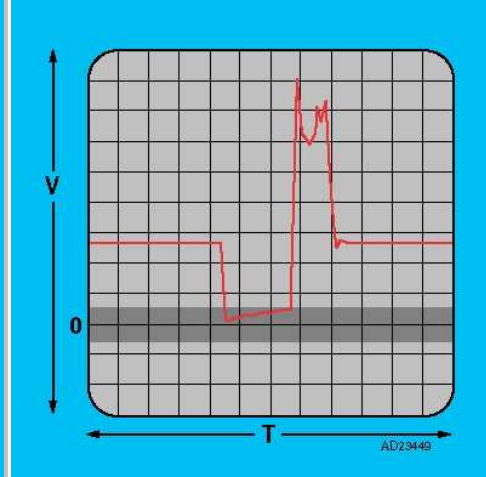
68. Digital, DC, pulse width modulated or digital, DC, frequency modulated



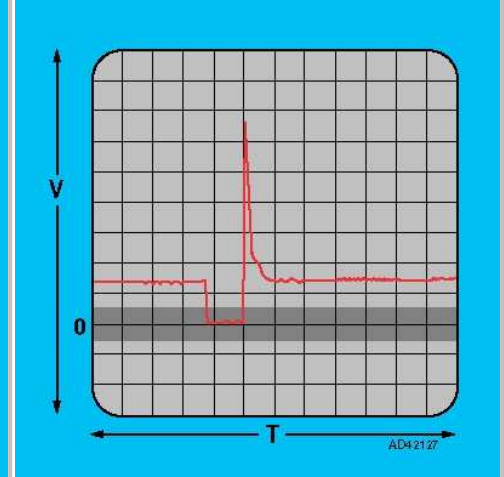
21. Analogue, DC



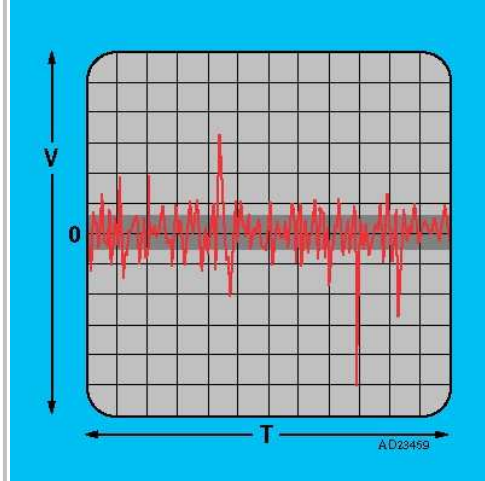
33. Digital, DC, frequency modulated



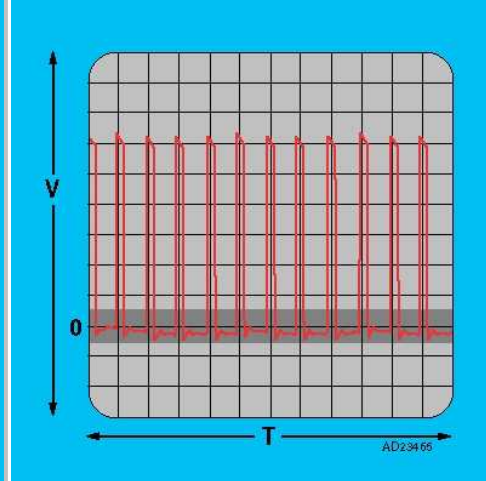
35. Digital, DC, pulse width modulated



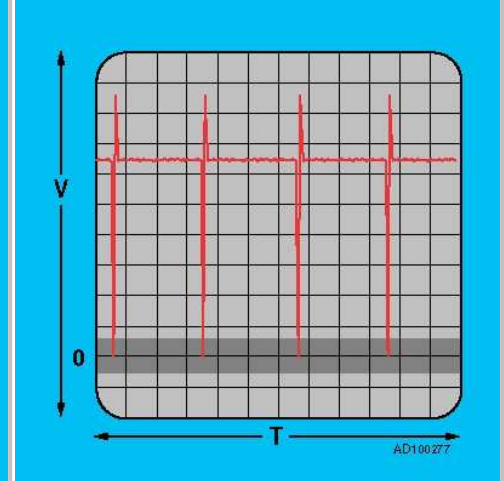
58. Analogue, AC



64. Digital, DC, frequency modulated



91. Digital, DC, frequency modulated



↔	input/output signal
←	input signal
→	output signal
↔	ECM switched earth
↔	ECM earth circuit