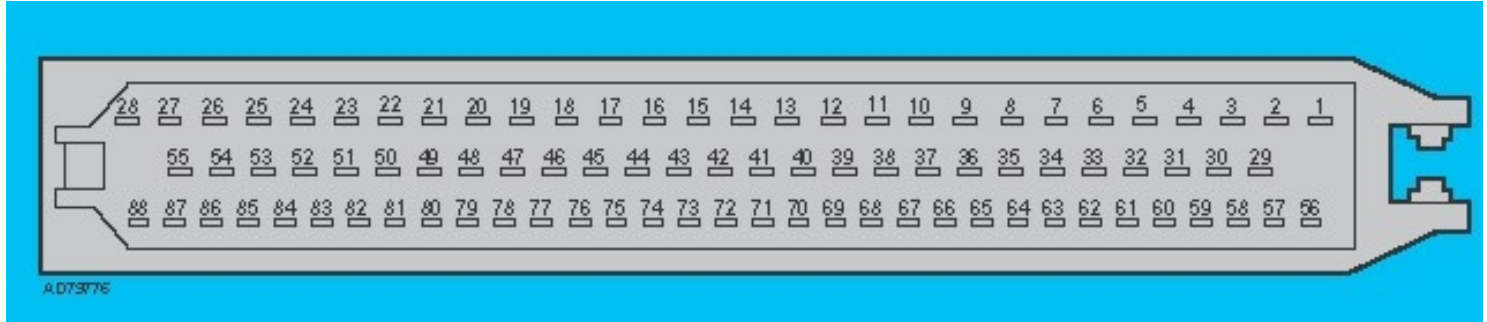
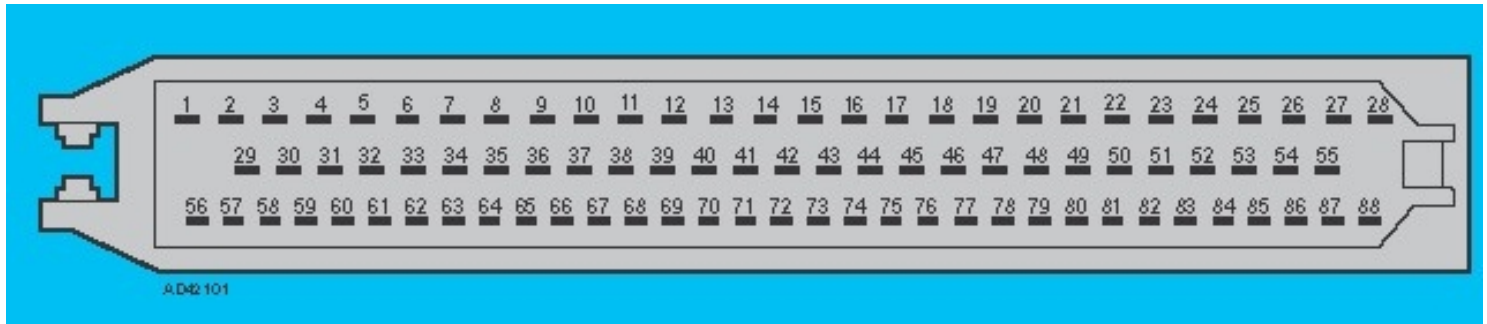


Telephone:
Fax:
VAT Registration No.:

Terminal side



Wire side



Component/circuit description	ECM pin	Signal	Condition	Typical value	Oscilloscope setting (Suggested settings - Voltage/time per division)	Wave form
ABS control module	82		Ignition ON	0 V		
ABS control module	83		Ignition ON	0 V		
ABS/traction control module - if fitted	47	⇒	Ignition ON	0 V		
ABS/traction control module	47	⇒	Engine idling	35 Hz		
ABS/traction control module	47	⇒	3000 rpm	146 Hz		
ABS/traction control module	62		Ignition ON	0 V		
ABS/traction control module	82			Connected pin - no test data available or random digital signal		
ABS/traction control module	83			Connected pin - no test data available or random digital signal		
AC compressor clutch relay	48	⇌	Ignition ON	11-14 V		
AC compressor clutch relay	48	⇌	Engine idling - AC compressor OFF	11-14 V		
AC compressor clutch relay	48	⇌	Engine idling - AC compressor ON	0-1 V		
AC control module - if fitted	64	←	Ignition ON	0 V		

Manufacturer: BMW
Engine code: 20 6S 2
Tuned for: R-Cat

Model: 5 Series (E34) 2,0 520i
Output: 110 (149) 5900
Year: 1991-96

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V6.410- **/Autodata**

AC control module	64	←	Engine idling - AC OFF	0 V		
AC control module	64	←	Engine idling - AC ON	11-14 V		
AC refrigerant pressure switch - if fitted	65	←	Ignition ON	11-14 V		
AC refrigerant pressure switch	65	←	Engine idling - AC ON - AC compressor OFF	11-14 V		
AC refrigerant pressure switch	65	←	Engine idling - AC ON - AC compressor ON	0-1 V		
AC relay - if fitted	64	←	Ignition ON	0 V		
AC relay	64	←	Engine idling - AC OFF	0 V		
AC relay	64	←	Engine idling - AC ON	11-14 V		
Alarm system control module	66	←		Connected pin - no test data available or random digital signal		
Battery	26	←	Ignition OFF	11-14 V		
<u>Camshaft position (CMP) actuator</u>	7	←	Ignition ON	11-14 V		
<u>Camshaft position (CMP) actuator</u>	7	←	Engine idling - full throttle briefly	0-1 V		
<u>Camshaft position (CMP) sensor</u>	17	←	Ignition ON	5 V		
<u>Camshaft position (CMP) sensor</u>	17	←	Engine idling		2 V/50 ms	 12
Crankshaft position (CKP) sensor	16	←	Ignition ON	0 V		
Crankshaft position (CKP) sensor	16	←	Engine idling		5 V/2 ms	 2
Crankshaft position (CKP) sensor	43	↔	Ignition ON	0 V		
Data link connector (DLC)	47	⇒	Ignition ON	0 V		
Data link connector (DLC)	47	⇒	Engine idling	35 Hz		
Data link connector (DLC)	47	⇒	3000 rpm	146 Hz		
Data link connector (DLC)	60		Ignition ON	0 V		
Data link connector (DLC)	87	←	Ignition ON	11-14 V		
Data link connector (DLC)	88	↔	Ignition ON	0 V		
Earth	6		Ignition ON	0 V		
Earth	15		Ignition ON	0 V		
Earth	28		Ignition ON	0 V		
Earth	34		Ignition ON	0 V		
Earth	55		Ignition ON	0 V		
<u>Engine control relay</u>	27	↔	Ignition OFF	11-14 V		
<u>Engine control relay</u>	27	↔	Ignition ON	0-1 V		
<u>Engine control relay</u>	27	↔	Engine cranking	0-1 V		
<u>Engine control relay</u>	54	←	Ignition ON	11-14 V		
<u>Engine control relay</u> - MT - some models	81	←	Ignition ON	11-14 V		
<u>Engine coolant temperature (ECT) sensor</u>	44	↔	Ignition ON	0 V		

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 V6.410- **/Autodata**

<u>Engine coolant temperature (ECT) sensor</u>	78	←	Ignition ON - 10°C	4 V		
<u>Engine coolant temperature (ECT) sensor</u>	78	←	Ignition ON - 80°C	1 V		
<u>Evaporative emission (EVAP) canister purge valve</u>	36	↔	Ignition ON	0-1 V		
<u>Evaporative emission (EVAP) canister purge valve</u>	36	↔	Engine hot - valve operating		10 V/20 ms	 20
<u>Fuel pump relay</u>	1	↔	Ignition ON	11-14 V		
<u>Fuel pump relay</u>	1	↔	Engine idling	0-1 V		
Heated oxygen sensor (HO2S)	13	←	Engine idling - engine hot	0,1-1,0 V fluctuating	0,2 V/1 sec.	 21
Heated oxygen sensor (HO2S)	40	↔	Ignition ON	0 V		
<u>Idle air control (IAC) valve</u>	2	↔	Ignition ON	5 V		
<u>Idle air control (IAC) valve</u>	2	↔	Engine idling	70%	5 V/5 ms	 25
<u>Idle air control (IAC) valve</u>	29	↔	Ignition ON	5-7,5 V fluctuating		
<u>Idle air control (IAC) valve</u>	29	↔	Engine idling	26%	5 V/5 ms	 25
<u>Ignition coil</u> - cylinder 1	50	↔	Ignition ON	11-14 V		
<u>Ignition coil</u>	50	↔	Engine cranking	9 V		
<u>Ignition coil</u>	50	↔	Engine idling		5 V/2 ms	 33
<u>Ignition coil</u> - cylinder 2	51	↔	Ignition ON	11-14 V		
<u>Ignition coil</u>	51	↔	Engine cranking	9 V		
<u>Ignition coil</u>	51	↔	Engine idling		5 V/2 ms	 33
<u>Ignition coil</u> - cylinder 3	52	↔	Ignition ON	11-14 V		
<u>Ignition coil</u>	52	↔	Engine cranking	9 V		
<u>Ignition coil</u>	52	↔	Engine idling		5 V/2 ms	 33
<u>Ignition coil</u> - cylinder 4	23	↔	Ignition ON	11-14 V		
<u>Ignition coil</u>	23	↔	Engine cranking	9 V		
<u>Ignition coil</u>	23	↔	Engine idling		5 V/2 ms	 33
<u>Ignition coil</u> - cylinder 5	25	↔	Ignition ON	11-14 V		
<u>Ignition coil</u>	25	↔	Engine cranking	9 V		
<u>Ignition coil</u>	25	↔	Engine idling		5 V/2 ms	 33
<u>Ignition coil</u> - cylinder 6	24	↔	Ignition ON	11-14 V		
<u>Ignition coil</u>	24	↔	Engine cranking	9 V		
<u>Ignition coil</u>	24	↔	Engine idling		5 V/2 ms	 33
<u>Ignition coil</u> - shield wire	45	↔	Ignition ON	0 V		
Ignition switch	56	←	Ignition ON	11-14 V		

Manufacturer: BMW
Engine code: 20 6S 2
Tuned for: R-Cat

Model: 5 Series (E34) 2,0 520i
Output: 110 (149) 5900
Year: 1991-96

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Injector 1	33		Ignition ON	11-14 V		
Injector 1	33		Engine idling - engine hot	3,4 ms	10 V/2 ms	 35
Injector 2	32		Ignition ON	11-14 V		
Injector 2	32		Engine idling - engine hot	3,4 ms	10 V/2 ms	 35
Injector 3	31		Ignition ON	11-14 V		
Injector 3	31		Engine idling - engine hot	3,4 ms	10 V/2 ms	 35
Injector 4	5		Ignition ON	11-14 V		
Injector 4	5		Engine idling - engine hot	3,4 ms	10 V/2 ms	 35
Injector 5	3		Ignition ON	11-14 V		
Injector 5	3		Engine idling - engine hot	3,4 ms	10 V/2 ms	 35
Injector 6	4		Ignition ON	11-14 V		
Injector 6	4		Engine idling - engine hot	3,4 ms	10 V/2 ms	 35
Instrument panel	42		Ignition ON	11-14 V		
Instrument panel	46		Ignition ON	11-14 V		
Instrument panel	47		Ignition ON	0 V		
Instrument panel	47		Engine idling	35 Hz		
Instrument panel	47		3000 rpm	146 Hz		
Intake air temperature (IAT) sensor	44		Ignition ON	0 V		
Intake air temperature (IAT) sensor	77		Ignition ON - 10°C	4 V		
Knock sensor (KS) 1 - cylinders 1 & 2	70		Ignition ON	0,5 V		
Knock sensor (KS) 1	70		Engine idling - accelerate briefly		50 mV/1 ms	 38
Knock sensor (KS) 2 - cylinders 3 & 4	69		Ignition ON	0,5 V		
Knock sensor (KS) 2	69		Engine idling - accelerate briefly		50 mV/1 ms	 38
Knock sensor (KS) - shield wire	71		Ignition ON	0 V		
Mass air flow (MAF) sensor	14		Ignition ON	0 V		
Mass air flow (MAF) sensor	41		Ignition ON	1,0-2,0 V		
Mass air flow (MAF) sensor	41		Engine idling	0,75 V		
Mass air flow (MAF) sensor	41		3000 rpm	1,7 V		
Mass air flow (MAF) sensor	41		Engine idling - full throttle briefly	3,8 V		
Oxygen sensor heater relay	38		Ignition ON	11-14 V		
Oxygen sensor heater relay	38		Engine idling	11-14 V		

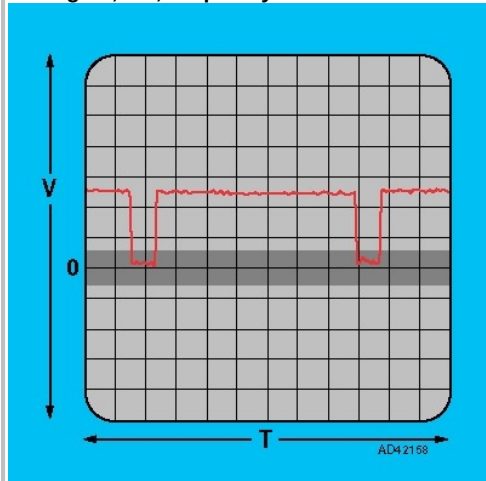
Manufacturer: BMW
Engine code: 20 6S 2
Tuned for: R-Cat

Model: 5 Series (E34) 2,0 520i
Output: 110 (149) 5900
Year: 1991-96

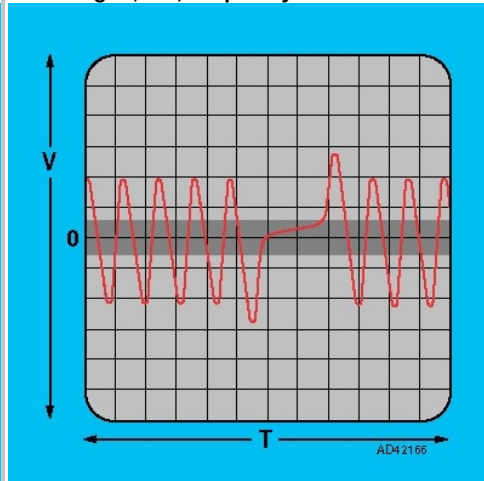
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Spare cable	8	⇒		Connected pin - no test data available or random digital signal		
<u>Throttle position (TP) sensor</u>	44	⚡	Ignition ON	0 V		
<u>Throttle position (TP) sensor</u>	59	⇒	Ignition ON	5 V		
<u>Throttle position (TP) sensor</u>	73	←	Ignition ON - throttle closed	0-1 V		
<u>Throttle position (TP) sensor</u>	73	←	Ignition ON - throttle fully open	4,5 V		
Traction control module	57	←		Connected pin - no test data available or random digital signal		
Transmission control module (TCM) - AT	57	←		Connected pin - no test data available or random digital signal		
Transmission control module (TCM)	11	⇒		Connected pin - no test data available or random digital signal		
Transmission control module (TCM)	47	⇒	Ignition ON	0 V		
Transmission control module (TCM)	47	⇒	Engine idling	35 Hz		
Transmission control module (TCM)	47	⇒	3000 rpm	146 Hz		
Transmission shift position switch - AT	81	←		Connected pin - no test data available or random digital signal		
Trip computer	66	←		Connected pin - no test data available or random digital signal		

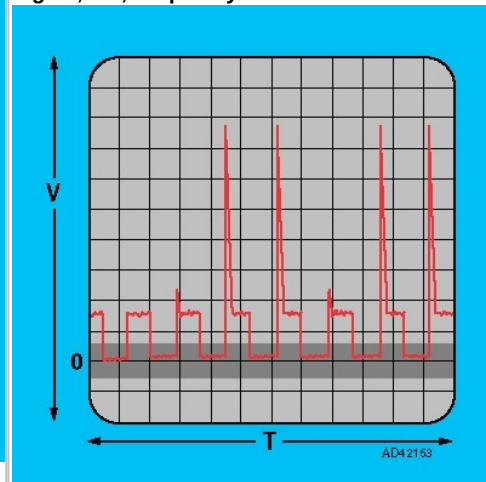
12. Digital, DC, frequency modulated



2. Analogue, AC, frequency modulated



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

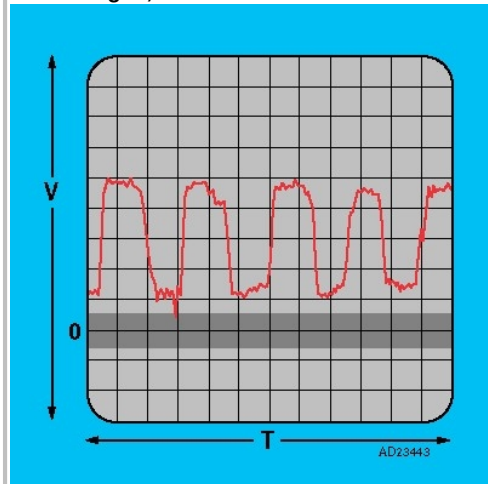


Manufacturer: BMW
Engine code: 20 6S 2
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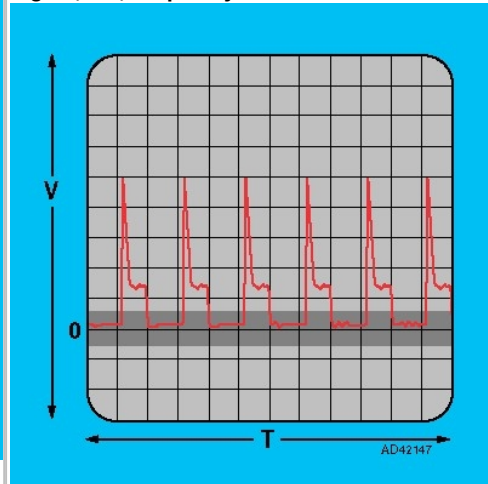
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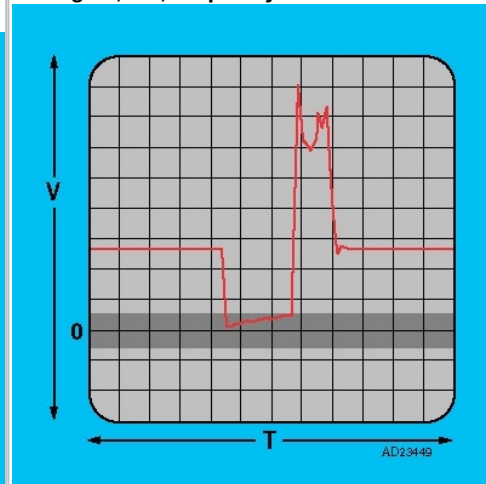
21. Analogue, DC



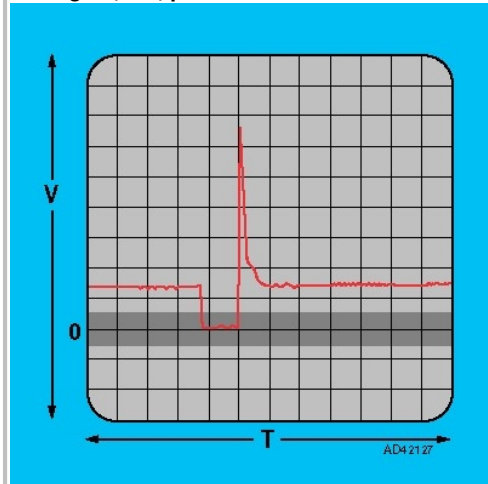
23. Digital, DC, pulse width modulated or digital, DC, frequency modulated



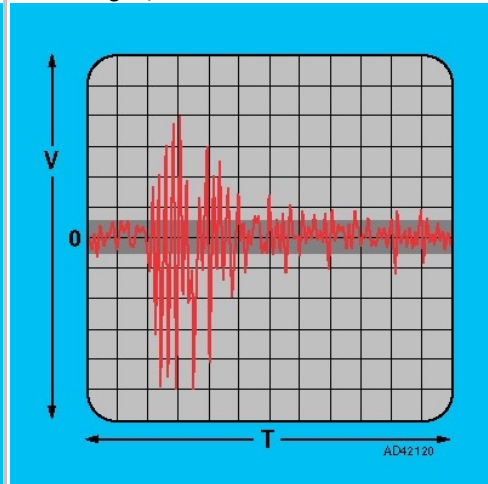
33. Digital, DC, frequency modulated



35. Digital, DC, pulse width modulated



38. Analogue, AC



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