

BMS-C1 Information

This is a work in progress, it is far from complete but sets out what is known about the single spark BMS. The name BMS comes from (BMW Motor Steuergerät [controller] Compact)

The BMS-C was the first of the programmable “learning” Engine ECU's utilised on BMW motorcycles. The BMS “adapts” the engine fuel mapping based on rpm, air temperature, exhaust gas, speed and throttle setting. It stores “optimum” adaption values for fuel mapping.

The heart of the BMS is a 5v 16mHz Motorola 68000 processor with 8k Bytes non volatile memory inbuilt and an external 4mb AMD Flash RAM memory module to store the program code.

The processor is powered from a 5v Voltage regulator, when the battery is connected the regulator enters sleep mode, when the ignition is turned on it powers up the processor, memory and logic components.

Inputs		Outputs	
Inductive Sensor	Water Temperature	Ignition Coil	Idle Actuator
Throttle Position Sensor	Starter Button	Fuel Injector	Coolant Fan
Air Temperature	Speed	Tacho	Tank Valve (US only)
Lambda Sensor		Lambda Sensor Heater	

BMS Firmware

The firmware for the BMS is split into two sections, the program code and the market specific data code

Program code is the boot program, error checking, DSPT (Digital Signal Processing Table) code, diagnostics routines and the on board code needed to flash the memory module.

The data code includes the fuel mapping, programming history, and adaption tables.

The BMS has labels showing the hardware and firmware versions fitted at the time of delivery. Dealers were required to fit a label whenever the firmware was updated. (US TSB 1300101) the TSB states :-

“Print a new identification label (YELLOW for update) and affix it to the BMS-COMPACT control unit. Please note that it is not permissible to deliver an updated motorcycle to a customer without the correct identification label affixed to the control unit.”

Regrettably this procedure has not been followed so the only way to determine which firmware is in the BMS is to check with Dealer Diagnostics or a GS911. This is important on the single spark GS as there are different firmware versions for RON 91 an 95 fuel grades as well as the two different fuel injectors which may be fitted.

BMSC Connections (US TSB 1300301 022) - Where BMS problems are suspected do this basic check
“Unplug BMS C control unit connector and check for signs of slight corrosion/oxidation”

BMSC Resets - Adaption tables/values are reset only via diagnostics, either the BMW Dealer System or G911

Idle Actuator Operation (US TSB 1300301 022)

“Idle air actuator operation is primarily based on engine temperature. Allowing the engine to warm up completely until the cooling fan activates allows the BMS C to build it’s reference values for air actuator operation. This warm up phase must be performed at idle without touching the throttle.”

BMSC1 Misconceptions

1/ Depowering the BMS resets the adaptations and other settings. **See US TSB 13 003 03 (051)**

When the ignition is turned off power is removed from the processor, memory and other 5v logic components. The only memory in the system is non volatile memory so there is no component in which data can be cleared.

2/ Turning on ignition and twisting the throttle 3 times resets the BMSC. **See US TSB 13 003 03 (051)**

“Turning the throttle-valve potentiometer does not have any influence on the engine’s operating characteristics. After a very short time, the BMS-C control unit recalibrates itself to recognize the new baseline position.”

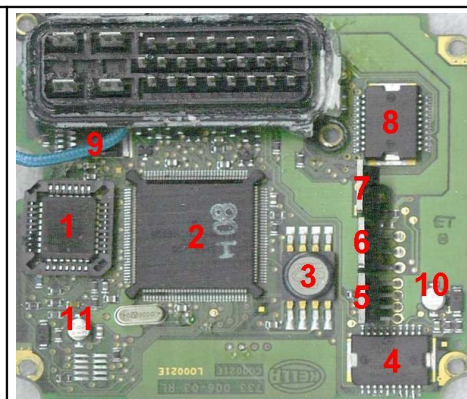
This procedure was one from the earlier Bosch ECU's which does not apply to the BMSC

BMS-C1 Component Information

Note - Some devices may have multiple manufacturers

Interface circuits needing documenting

Throttle Position Sensor
Coolant and Air Temp Sensors
Inductive Sensor



No	Mfr	Type	Notes	Pic
1	AMD	AM29F040B -120JE V 9938AVA L C 1993 AMD	EEPROM 4mb, 5v Non Volatile Memory Only guaranteed for 1x10 ⁶ Program/Erase cycles	
2	Motorola Now Freescale	MC68HC16Z2BM7016 2G11D QQAC9943	Processor, 5v, 16 bit, 16.78mHz, System Integration Module, 8/ 10-bit ADC Queued Serial Module, General-Purpose Timer 2048-byte SRAM, Masked ROM Module	
3	Motorola	MPXA4115A	Pressure Sensor Ambent Air Pressure measurement - 5v	
4	ST	L9935 199030019 Malaysia	Stepper Motor Driver Two-Phase for Idle Actuator	
5	ST	VND10B	O2 Sensor Heater & Fan Double Channel, High Side Smart Power Solid State Relay 14 amp max, with diagnostics	
6	ST	VN31	Fuel Pump ISO High Side Smart Power Solid State Relay 5v logic level input, 31 amp max	
7	Motorola	0N35CL	Ignition Coil Driver IGBT (Insulated Gate Bipolar Transistor) 5v logic input, 20 amp max	
8	ST	L9651 R990E0311 Early BMSC No IC No	Smart Quad Switch Fuel Injector Driver / Tank Valve Driver Coolant Lamp /	
9	Infineon	TLE 4267G	5v Voltage Regulator On/Off Logic, Short Circuit Proof	
10, 11		Electrolytic Capacitor	10uF 35v	
Rear	Philips	LM2901D	Quad Comparator	

IC Operations Notes

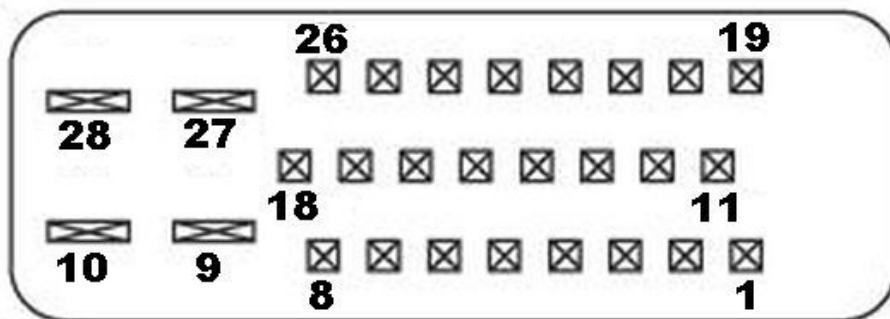
VND10B

Fan & O2
Heater

The diagnostics is a high or low signal on a single pin to indicate a fault on either of the outputs. A diode in the earth leg provides for short to earth errors. BMSC processor routines determine whether the fan or O2 heater is faulty. The only fault code is an "implausible signal" fault as seen by a GS911. It is possible a fault will appear on both components where only one has had a fault condition.

**BMSC - A9500
(Single Spark)
Connector Pin out**

**Connector Viewed
from top of ECU
(x) = Pin No**



Pin	Description	Signal	Color	Connection	Notes
1	T9010 - Coil & P9002 - Tacho	Z1	Sw	Pin2 IC7	
2	M9140 - Cooling Fan (via Fuse 3)	FAN	Ws/Ge	Pin7 IC5	
3	B9562 - Coolant Temp Sensor (4)	TFK-	Br/Rt	Earth	
4	B9562 - Coolant Temp Sensor (3)	TFKS	Br/Gn	?	Should go to A-D
5	M9576 - Throttle Valve Actuator (4)	D	Vi/Sw	?	
6	M9576 - Throttle Valve Actuator (1)	A	Vi/Gn	Pin2 IC4	
7	X9590 - Diagnostic Socket (1)	DIAG	Br/Sw	?	
8	B9545 - Inductive Sensor (2)	RPM-	Ge/Br	?	
9	X9402 - Common Ground	31	Br/Or	Earth	
10	B9690 - Lambda Sensor (1)	LSH+	Gr/Sw	Pin5 IC5	
11	M9576 - Throttle Valve Actuator (3)	C	Vi/Ws	Pin9 IC4	
12	S9084 - RHS Switch - Starter (3)	50	Sw/Ge	?	
13	M9576 - Throttle Valve Actuator (2)	B	Vi/Ge	Pin13 IC4	
14	B9550 - Air Temp Sensor (1)	TFL-	Br/Bl	Earth	
15	R9570 - Throttle Pos Pot (1)	DKP-	Ws/Rt	Earth	
16	B9690 - Lambda Sensor (3)	LSS-	Ge	Earth	
17	B9690 - Lambda Sensor (4)	LSS+	Sw	?	Should go to A-D
18	B9545 - Inductive Sensor (1)	RPM+	Ge/Rt	?	
19	H9190 - Coolant Lamp (10)	KT	Vi	Pin5 IC8	
20	Y9601 - Fuel Injector (2)	EV	Ge/Bl	Pin16 IC8	
21	P9210 - Speedo & Option Skt	TAA	Bl/Ge	?	
22	Y9572 - Tank Vent Valve	TEV	Gr/Rt	Pin14 IC8	
23	B9550 - Air Temp Sensor (1)	TFLS	Br/Ge	?	Should go to A-D
24	R9570 - Throttle Pos Pot (2)	DKPS	Ws/Sw	?	
25	X9431 - From F1 +12v 31	30F4	Rt/Ws	Pin1 IC9	
26	R9570 - Throttle Pos Pot (3)	DKP+	Ws/Gr	?	
27	M9100 - Fuel Pump (15)	EKP	Gn/Br	Pin5 IC6	
28	K9110 - Motronic Relay V+	15g	Gn/Bl	+12v Rail	
Color Code	Ws = White Sw = Black	Bl = Blue Br = Brown	Ge = Yellow Rt = Red	Gn = Green Or = Orange	Gr = Grey Vi = Violet Rs=Pink Tr=Clear

Notes

- 1/ Sensor inputs will go to A-D inputs of Processor (1.68k Ohms to ?)
- 2/ Pin28 +12v direct to IC5 Pin4, IC6 Pin3,
- 3/ Pin 25 unswitched +12v goes to IC9 5v regulator for Processor power only (used for sleep mode logic)
- 4/ +5v regulator output goes to Processor, Flash Memory, IC3 Pin2, IC4 Pin6,
- 5/ IC Earth connections, IC3 Pin3, IC7 Pin3, IC4 Pins 1, 10, 11, 20, IC8 Pins 1, 10, 11, 20,
- 6/ IC 8 Two early BMSC had markings of 30382 9944 DM790.1 45DL 03, later 2003 has IC ST L9651
- 7/ No power connections to IC 8, it seems to be individual devices custom packaged for the BMS ?