JBD BMS SERIAL INTERFACE AND REGISTER MAP

Glossary / abbreviations

Abbreviation	Meaning
U16	Unsigned 16 bit value
S16	Signed 16 bit value

Serial communication

Serial port communcation is 9600 baud, 8 data bits, no parity, 1 stop bit (9600 8N1).

Packet details

Packets to/from the BMS consist of:

Start Byte	Payload	Checksum	End Byte
0xDD	3 or more bytes	2 bytes, U16	0x77

Checksum

The checksum is simply sum of the payload byte values subtracted from 0x10000 (65536).

Payload to BMS

Command byte: Read: 0xA5, Write: 0x5A	Register Address Byte	Data length byte	Data bytes, n = data length byte

Payload from BMS

Register Address Byte	Command status: OK: 0x0, Error: 0x80	Data length byte	Data bytes, n = data length byte

Register Descriptions

Register 0x03 "Basic Info" (READ ONLY)

Byte offset	Data	Format	Unit	Field name(s)	Notes
0x0	Pack voltage	U16	10mV	pack_mv	
0x2	Pack amperes	S16	10mA	pack_ma	Negative values indicate discharge
0x4	Balance Capacity	U16	10mAH	cycle_cap	
0x6	Full Capacity	U16	10mAH	design_cap	
0x8	Discharge/Charge Cycles	U16	1 cycle	cycle_cnt	
0xA	Manufacture date	16 bit: bits 15:9=year - 2000 bits 8:5=month bits 4:0=Day	--	year, month, day	

0xC	Cell balance status	16 bit: bit 0: cell 1 balance active bit 1: cell 2 balance active ...etc...	--	bal_0, bal_1, ... etc ...	
0xE	Cell balance status	16 bit: bit 0: cell 17 balance active bit 1: cell 18 balance active ...etc...	--	bal_16, bal_17, <etc>	
0x10	Current errors	16 bit: bit 0: Cell overvolt bit 1: Cell undervolt bit 2: Pack overvolt bit 3: Pack undervolt bit 4: Charge overtemp bit 5: Charge undertemp bit 6: Discharge overtemp bit 7: Discharge undertemp bit 8: Charge overcurrent bit 9: Discharge overcurrent bit 10: Short Circuit bit 11: Frontend IC error bit 12: Charge or Discharge FET locked by config (See register 0xE1 "MOSFET control")	--	covp_err, cuvp_err, povp_err, puvp_err, chgot_err, chgut_err, dsgot_err, dsgut_err, chgoc_err, dsgoc_err, sc_err, afe_err, software_err	
0x11	Software Version	1 byte: 0x10 = 1.0 (BCD?)	--	version	
0x12	State of Charge	1 byte	percent	cap_pct	
0x13	FET status	1 byte	bit 0: charge FET bit 1: discharge FET bit set = FET is conducting	chg_fet_en, dsg_fet_en	
0x14	Pack cells	1 byte	1 cell	cell_cnt	
0x15	NTC count	1 byte	1 NTC	ntc_cnt	
0x16 .. 0x16 + ntc_cnt x 2	NTC Values	16 bits	0.1K	ntc0, ntc1, <etc>	

Register 0x04 "Cell voltages" (READ ONLY)

The number of values returned depends on the cell_cnt field from 0x3 "Basic Info".

Byte offset	Data	Format	Field name(s)
2 * cell number (starting at zero)	Cell voltage	16 bits, unsigned, unit: 1mV	cell0_mv, cell1_mv, <etc>

Register 0x05 "Device Name" (READ ONLY)

Byte offset	Data	Format	Field name(s)
0x0	Device name length	1 byte, length of following string	--
0x1 .. n	Device name	n bytes of device name	device_name

Passwords

Thanks to Steve Tecza at Overkill Solar for doing the legwork of figuring this out.

Devices with firmware 0x16 or higher have password capability.

If there is a password set, then the password should be sent to the register password *before* entering into factory mode by writing the password to the `use_password` register.

Note that in the stock JBD FW, you can always clear the password by using the `clear_password` register. This effectively makes passwords useless.

Register Address	Register Name	Data	Format	Unit	Field name(s)	Notes
0x06	use_password	bytes	[length byte (0x06)][6 byte password]	--	--	Write the current password to this register to enable access to entering "factory mode," below. This register is similar to a string register (e.g. "mfg_name") in that the first byte of the payload must be the length. Length must be 6.
0x07	set_password	bytes	[length byte (0x0c)][6 byte current password][6 byte new password]	--	--	This changes the password. A single 13-byte payload is provided. Byte 0 is the length (0x0c); next 6 bytes are the current password; final 6 bytes are the new password. This register is similar to a string register (e.g. "mfg_name") in that the first byte of the payload must be the length. Length is 12.
0x09	clear_password	J1B2D4	[length byte (0x6)] 'J1B2D4'	--	--	Write the ASCII value 'J1B2D4' to remove password protection. This register is similar to a string register (e.g. "mfg_name") in that the first byte of the payload must be the length. Length is 6.

EEPROM Register Descriptions

These registers are read/write configuration settings that are stored in EEPROM. They affect the operation of the BMS.

Unless otherwise noted, all registers are 16 bit big-endian. Signedness varies.

Register 0x00 "Enter factory Mode"

Write the byte sequence 0x56, 0x78 to enter "Factory Mode." In this mode, the other registers below can be accessed.

Register 0x01 "Exit factory Mode"

Write the byte sequence 0x0, 0x0 to exit "Factory Mode."

Write the byte sequence 0x28, 0x28 to exit "Factory Mode," update the values in the EEPROM, and reset the "Error Counts" (0xAA) register to zeroes.

Stored registers:

Register Address	Register Name	Data	Format	Unit	Field name(s)	Notes
0x10	design_cap	Pack capacity, as designed	U16	10 mAh	design_cap	
0x11	cycle_cap	Pack capacity, per cycle	U16	10 mAh	cycle_cap	
0x12	cap_100	Cell capacity estimate voltage, 100%	U16	1 mV	cap_100	
0x32	cap_80	Cell capacity estimate voltage, 80%	U16	1 mV	cap_80	
0x33	cap_60	Cell capacity estimate voltage, 60%	U16	1 mV	cap_60	
0x34	cap_40	Cell capacity estimate voltage, 40%	U16	1 mV	cap_40	
0x35	cap_20	Cell capacity estimate voltage, 20%	U16	1 mV	cap_20	
0x13	cap_0	Cell capacity estimate voltage, 0%	U16	1 mV	cap_0	
0x14	dsg_rate	Cell estimated self discharge rate	U16	0.1%	dsg_rate	
0x15	mfg_date	Manufacture date	16 bit: bits 15:9=year - 2000 bits 8:5=month bits 4:0=Day	--	year, month, day	
0x16	serial_num	Serial number	U16	--	serial_num	
0x17	cycle_cnt	Cycle count	U16	cycle	cycle_cnt	
0x18	chgot	Charge Overtemp threshold	U16	0.1K	chgot	
0x19	chgot_rel	Charge Overtemp release threshold	U16	0.1K	chgot_rel	Temp must fall below this value to release overtemp condtion
0x1A	chgut	Charge Undertemp threshold	U16	0.1K	chgut	
0x1B	chgut_rel	Charge Undertemp release threshold	U16	0.1K	chgut_rel	Temp must rise above this value to release overtemp condtion
0x3A	chg_t_delays	Charge over/undertemp release delay	2 bytes: byte 0: Charge under temp release delay byte 1: Charge over temp release	s	chgut_delay, chgot_delay	

			delay			
0x3B	dsg_t_delays	Discharge over/undertemp release delay	2 bytes: byte 0: Discharge under temp release delay byte 1: Discharge over temp release delay	s	dsgut_delay, dsgot_delay	
0x1C	dsgot	Discharge Overtemp threshold	U16	0.1K	dsgot	
0x1D	dsgot_rel	Discharge Overtemp release threshold	U16	0.1K	dsgot_rel	Temp must fall below this value to release overtemp condtion
0x1E	dsgut	Discharge Undertemp threshold	U16	0.1K	dsgut	
0x1F	dsgut_rel	Discharge Undertemp release threshold	U16	0.1K	dsgut_rel	Temp must rise above this value to release overtemp condtion
0x20	povp	Pack Overvoltage Protection threshold	U16	10 mV	povp	
0x21	povp_rel	Pack Overvoltage Protection Release threshold	U16	10 mV	povp_rel	Pack voltage must fall below this value to release overvoltage condition
0x22	puvp	Pack Undervoltage Protection threshold	U16	10 mV	puvp	
0x23	puvp_rel	Pack Undervoltage Protection Release threshold	U16	10 mV	puvp_rel	Pack voltage must rise above this value to release undervoltage condition
0x3C	pack_v_delays	Pack over/under voltage release delay	2 bytes: byte 0: Pack under volt release delay byte 1: Pack over volt release delay	s	puvp_delay, povp_delay	
0x24	covp	Cell Overvoltage Protection threshold	U16	1 mV	covp	

0x25	covp_rel	Cell Overvoltage Protection Release	U16	1 mV	covp_rel	Cell voltage must fall below this value to release overvoltage condition
0x26	cuvp	Cell Undervoltage Protection threshold	U16	1 mV	cuvp	
0x27	cuvp_rel	Cell Undervoltage Protection Release threshold	U16	1 mV	cuvp_rel	Cell voltage must rise above this value to release undervoltage condition
0x3D	cell_v_delays	Cell over/under voltage release delay	2 bytes: byte 0: Cell under volt release delay byte 1: Cell over volt release delay	s	cuvp_delay, covp_delay	
0x28	chgoc	Charge overcurrent threshold	S16	10 mA	chgoc	This number must be positive
0x3E	chgoc_delays	Charge overcurrent delays	2 unsigned bytes: byte 0: chgoc_delay byte 1: chgoc_release	s	chgoc_delay, chgoc_rel	
0x29	dsgoc	Discharge overcurrent threshold	S16	10 mA	dsgoc	This number must be negative
0x3f	chgoc_delays	Charge overcurrent delays	2 unsigned bytes: byte 0: dsgoc_delay byte 1: dsgoc_release	s	dsgoc_delay, dsgoc_rel	
0x2A	bal_start	Cell balance voltage	S16	1 mV	bal_start	
0x2B	bal_window	Balance window	U16	1mV	bal_window	
0x2C	shunt_res	Ampere measurement shunt resistor value	U16	0.1mΩ	shunt_res	
0x2D	func_config	Various functional config bits	U16: bit 0: switch bit 1: scrl bit 2: balance_en bit 3: chg_balance_en bit 4: led_en bit 5: led_num	--	switch, scrl, balance_en, chg_balance_en, led_en, led_num	switch: Assume this enables the sw connector on the board? scrl: ? balance_en: Enable cell balancing chg_balance_en: Enable balancing during charge (balance_en must also be on) led_en: Assume that this enables

						LEDs? led_num: Show battery level with the LEDs in 20% increments
0x2E	ntc_config	Enable / disable NTCs (thermistors)	U16: bit 0: NTC 1 bit 1: NTC 2 ... etc ...	--	ntc1, ntc2 ... ntc8	
0x2F	cell_cnt	Number of cells in the pack	U16	1 cell	cell_cnt	
0x30	fet_ctrl	???	U16	1S	fet_ctrl	
0x31	led_timer	???	U16	1S	led_timer	Assume it's the number of seconds the LEDs stay on when status changes?
0x36	covp_high	Secondary cell overvoltage protection	U16	1mV	covp_high	
0x37	cuvp_high	Secondary cell undervoltage protection	U16	1mV	cuvp_high	
0x38	sc_dsgoc2	Short circuit and secondary overcurrent settings	2 bytes: byte 0: bit 7: sc_dsgoc_x2 bits 4:3: sc_delay 0 = 70uS 1 = 100uS 2 = 200uS 3 = 400uS bits 2:0: sc 0 = 22mV 1 = 33mV 2 = 44mV 3 = 56mV 4 = 67mV 5 = 78mV 6 = 89mV 7 = 100mV byte 1: bits 7:4: dsgoc2_delay 0 = 8ms 1 = 20ms 2 = 40ms 3 = 80ms 4 = 160ms 5 = 320ms 6 = 640ms 7 = 1280ms bits 3:0: dsgoc2 0 = 8mV 1 = 11mV 2 = 14mV	--	sc, sc_delay, dsgoc2, dsgoc2_delay, sc_dsgoc_x2	sc: Assuming this is the voltage across that shunt that would indicate short-circuit sc_delay: Assuming this is how long that voltage would need to be present dsgoc2: Assuming this is the voltage across that shunt that would indicate secondary overcurrent dsgoc2_delay: Assuming this is how long that voltage would need to be present dsgoc2_x2: Boolean; if set, assume all the values here are doubled

			3 = 17mV 4 = 19mV 5 = 22mV 6 = 25mV 7 = 28mV 8 = 31mV 9 = 33mV A = 36mV B = 39mV C = 42mV D = 44mV E = 47mV F = 50mV			
0x39	cxvp_high_delay_sc_rel	Secondary cell under/over voltage release times, and short circuilt release time	2 bytes: byte 0: bits 7:6: cuvp_high_delay 0 = 1S 1 = 4S 2 = 8S 3 = 16S bits 5:4: covp_high_delay 0 = 1S 1 = 2S 2 = 4S 3 = 8S byte 1: Short Circuit release time, seconds	--	cuvp_high_delay, covp_high_delay, sc_rel	
0xA0	mfg_name	Manufacturer name	Variable length string: Byte 0: Length of string (n) Byte 1 ... n + 1: String	--	mfg_name	
0xA1	device_name	Device name	Variable length string: Byte 0: Length of string (n) Byte 1 ... n + 1: String	--	device_name	
0xA2	barcode	Barcode	Variable length string: Byte 0: Length of string (n) Byte 1 ... n + 1: String	--	barcode	
0xAA	error_cnts	Various error condition counts	11 U16	--	sc_err_cnt, chgoc_err_cnt, dsgoc_err_cnt, covp_err_cnt, cuvp_err_cnt, chgot_err_cnt, chgut_err_cnt, dsgot_err_cnt, dsgut_err_cnt, povp_err_cnt,	READ ONLY

					puvp_err_cnt	
0xB0 .. 0xCF		Cell voltage calibration registers (32)	U16	1mV		Write the actually measured value of each cell to set the calibration
0xD0 .. 0xD7		NTC calibration registers (8)	U16	0.1K		Write the actually measured temperature of each NTC to set the calibration
0xE1		MOSFET control	U16: bit 0: Set to disable charge FET bit 1: Set to disable discharge FET	--		
0xE2		Balance control	U16: 0x01: Open odd cells 0x02: Open even cells 0x03: Close all cells	--		To exit this mode: Enter, then exit factory mode.
0xAD		Idle Current Calibration	U16: Write 0x0 when no current is flowing	--		
0xAE		Charge Current Calibration	U16	10mA		Write the actual current. This value is positive.
0xAF		Discharge Current Calibration	U16	10mA		Write the actual current. This value is positive.
0xE0		Capacity remaining	U16	10mAH		