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TECHNICAL NOTE

Title: Using the Modbus Event Log in the Intellitrol2 No. 1805041

The Modbus manual gives an overview of the event log in Intellitrol2 with firmware v 1.36. Advanced user's of the Modbus Event Log, will benefit from this feature reference explaining the decoding of Event Log entries..

The Modbus Event Log will hold 1024 entries, which can be requested by entry number. The register 0x011B contains the entry number corresponding to the last event recorded (new event, or incremented repeat event) . To preserve space, repeated events are indicated by incrementing the Repeat Mask value. A repeated event is one that contains exactly the same type specific data (i.e. a reset is triggered repeatedly by power cycling). Overfills are recorded to the event log, only when enabled after each power up by setting the value of 0x0121 to 0x0000. All Modbus digits are in hexadecimal format

The response to the Modbus read log entry command (0x49) is a 38 Byte string. Bytes 1 to 14 are the same for all log entries. Bytes 15 to 36 are data specific to the event type. Bytes 37 and 38 are always the response check sum.

Table 1: Response Bytes:

Byte	Description
1	Device Address Echo
2	Function Code Echo (0x49h)
3	Log Entry Echo MSB
4	Log Entry Echo LSB
5	Remaining Data Byte Count MSB
6	Remaining Byte Count LSB
7	Event Type
8	Event Sub Type
9	Repeat Mask MSB
10	Repeat Mask LSB
11	Time Stamp MSB
12	Time Stamp 2nd MSB
13	Time Stamp 2nd LSB
14	Time Stamp LSB
15 to 36	Type Specific Data
37	Check Sum MSB
38	Check Sum LSB

Bytes 15 to 36 will be interpreted differently, depending on the event type (Byte 7). The responses are encoded as shown in table 2.

Table 2 Event Type Encoding

Event Type	Description	Sub Type	Type Specific Data
01	EEProm Initialization	Blocks Initialized Bit Mask 0x01 - All blocks 0x02 – Boot block 0x04 – Crash block 0x08 – System block 0x10 – Log block 0x20 – Key block 0x40 – TIM block	Bytes 15 & 16 – Hardware Version Bytes 17 & 18 – Kernel Version Bytes 19 & 20 – Shell Version Bytes 21 & 22 – System Hardware Jumpers Bytes 23 & 24 – Software Enable Configuration Bytes 25 -> 36 - Spare
02	Reset	Reset Cause Bit Mask 0x02 – Reset Instruction 0x04 – Brown Out Reset 0x20 – Watchdog Reset 0x40 – Power On Reset 0x80 – External Reset	Bytes 15 & 16 – Hardware Version Bytes 17 & 18 – Kernel Version Bytes 19 & 20 – Shell Version Bytes 21 & 22 – System Hardware Jumpers Bytes 23 & 24 – Software Enable Configuration Bytes 25 & 26 – Eeprom Status Bytes 27 -> 36 - Spare
03	Bypass	Bypass Level Bit Mask 0x01 – Overflow Bypass 0x02 – Ground Bypass 0x08 – VIP Bypass 0x80 – Deadman Bypass	Bytes 15 to 20 – Key Serial Number Bytes 21 to 26 – Truck Serial Number Bytes 27 -> 36 - Spare
04	Hardware Error	00 – CRC Error	Bytes 15 & 16 – Kernel Expected CRC Bytes 17 & 18 – Kernel Calculated CRC Bytes 19 & 20 – Shell Expected CRC Bytes 21 & 22 – Shell Calculated CRC Bytes 23 -> 36 – Spare
04	Hardware Error	01 – Relay Error	Byte 15 – Backup Relay State Byte 16 – Main Relay State Bytes 17 -> 36 - Spare
04	Hardware Error	02 – EEProm Error	Bytes 15 & 16 – EEprom Status Bytes 17 & 18 – Status-A Bytes 19 & 20 – Status-B Bytes 21 -> 36 - Spare

Table 2: Continued

Event Type	Description	Sub Type	Type Specific Data
05	Voltage Error	Error Type Bit Mask 0x01 – Raw 13V Fault 0x02 – Reference Voltage Fault 0x04 – Probe Bias Fault 0x08 – Noise Fault 0x10 – 10V Tolerance Fault 0x20 – 20V Tolerance Fault 0x40 – 5 Wire Optic Pulse Voltage Fault	Bytes 15 & 16 – Raw 13V Voltage Bytes 17 & 18 – Reference Voltage Bytes 19 & 20 – Probe Bias Voltage Bytes 21 & 22 – Channel 1 Voltage Bytes 23 & 24 – Channel 2 Voltage Bytes 25 & 26 – Channel 3 Voltage Bytes 27 & 28 – Channel 4 Voltage Bytes 29 & 30 – Channel 5 Voltage Bytes 31 & 32 – Channel 6 Voltage Bytes 33 & 34 – Channel 7 Voltage Bytes 35 & 36 – Channel 8 Voltage All voltages are in millivolts
06	Impact	00	Bytes 15 to 20 – Key Serial Number Bytes 21 to 26 – Truck Serial Number Bytes 27 -> 36 - Spare
07	Overfill / No Permit	00	Byte 15 – Probe Type Byte 16 – Probe 1 State Byte 17 – Probe 2 State Byte 18 – Probe 3 State Byte 19 – Probe 4 State Byte 20 – Probe 5 State Byte 21 – Probe 6 State Byte 22 – Probe 7 State Byte 23 – Probe 8 State Byte 24 – Probe 9 State Byte 25 – Probe 10 State Byte 26 – Probe 11 State Byte 27 – Probe 12 State Byte 28 – Probe 13 State Byte 29 – Probe 14 State Byte 30 – Probe 15 State Byte 31 – Probe 16 State Bytes 32 to 36 – Truck ID (Lower 5 bytes only)

Table 2: continued

Event Type	Description	Sub Type	Type Specific Data
09	Reset Log Data	00	Byte 15 – Software Enable Configuration Bytes 16 & 17 – Status-A Bytes 18 & 19 – Status-B Bytes 20 & 21 – Am I Broke Status Bytes 22 & 23 – Am I Suffering Status Bytes 24 & 25 – Reference Voltage Byte 26 – Ground Byte 27 – Main State Byte 28 – Truck State Byte 29 – Acquire State Byte 30 – Probe Try State Byte 31 – 5 Wire State Byte 32 – 2 Wire State Byte 33 – Backup Relay State Byte 34 – Main Relay State Bytes 35 & 36 - Spare

The status and state registers provide information about the system configuration and condition of the equipment which can be read via Modbus. The register data is encoded according to bit definitions in Tables 3 and 4.

Table 3: Bit Defines for Type Specific Status Bytes

	System Hardware Jumpers	Software Enable Configuration	Relay States	Status-A	Status-B	Am I Broke	Am I Suffering	Ground
Bit 0	NA	NA	Relay Closed	Fault Non-permissive	NA	Raw 13V Fault	NA	Ground Fault
Bit 1	Enable Truck Here	Enable Truck Here	Relay Should Be Closed	Truck Present	EEprom Fault	Reference Voltage Fault	NA	Resistive Ground Fault
Bit 2	Enable VIP	Enable VIP	NA	Truck Talking	ADC TO Fault	Probe Bias Voltage Fault	NA	Diode Ground Fault
Bit 3	Enable Ground	Enable Ground	NA	Truck Valid	CRC Shell Fault	Noise Voltage Fault	NA	Ground Initialization Trial
Bit 4	Enable Add Bypass Key	Enable Add Bypass Key	Relay Not Sure	Bypassed	Clock Fault	10V Tolerance Fault	NA	Ground No Test
Bit 5	Enable Erase Bypass Keys	Enable Erase Bypass Keys	Relay Broken, Wanted closed but not closed	System Idle, No truck	CPU Fault	20V Tolerance Fault	NA	Ground Shorted
Bit 6	Enable Deadman	Enable Deadman	Relay Shorted, Closed but not wanted closed	Permissive	Invalid Truck	5 Wire Pulse Voltage Fault	NA	Ground Hard Fault
Bit 7	Enable Vapor Flow	Enable Vapor Flow	NA	Non-permissive / Bypassable	CRC Kernel Fault	Memory Fault	NA	Ground No Trial
Bit 8	8 Compartments, Otherwise 6	8 Compartments, Otherwise 6	NA	Debug	Voltage Fault	Backup Message CRC Fault	NA	NA
Bit 9	European 8 Volt limit	European 8 Volt limit	NA	NA	NA	Backup Hardware Fault	NA	NA
Bit 10	100 Ohm ground Resistance	100 Ohm Ground Resistance	NA	NA	TIM Data Fault	Backup Relay Fault	NA	NA
Bit 11	NA	NA	NA	NA	NA	Backup Jumper Change	NA	NA
Bit 12	NA	NA	NA	Deadman Closed	Ground Fault	Jumper Change	Hard Wire Fault	NA
Bit 13	NA	NA	NA	Good Diode Ground	Special Mode	Cable Short Fault	NA	NA
Bit 14	NA	NA	NA	Good Resistive Ground	TAS Shutdown	ADC Fault	NA	NA
Bit 15	Debug	Debug	NA	Intellicheck	Ground Fault	TPU vs. ADC Fault	NA	NA

Table 4: Bit Defines for Type Specific State Bytes

	Main state	Truck state	Acquire state	Probe Try state	5 Wire state	2 Wire state	Probe Type	Probe State
0	Idle	Unknown Probes	Idle	Not Testing	No Test In Progress	No Test In Progress	No type	Unknown
1	Acquire	Thermal Probes	5 Wire Optic Probes	Testing for 5 Wire Optic Probes	Pulse Emitted	Checking For Short	5 wire optical	Wet
2	Active	2 Wire Optic Probes	2 Wire Optic Probes	Testing for 2 Wire Optic Probes	Echo Received	Short Test Failed	2 wire optical	Dry
3	Gone	5 Wire Optic Probes	Thermal Probes	Testing for Thermal Probes	Diagnostic	Pulsing 2 Wire Optic Probes	Thermal	Cold
4	Finished	Departed	Gone					Hot
5		Gone						Open
6								
7								
8								
9								
10								Fault
11								Ground
12								Short