Satiator Serial Command Set

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The Cycle Satiator (Satiator) serial command firmware supports a small list of requests and actions, sent using a Grin Tech USB to Serial cable (3.3V TTL serial) to the Satiator. The serial connection uses:

- 38400 baud
- 8 bits
- 1 stop bit
- no parity bit
- no flow control

All commands received correctly and acted upon will be acknowledged with a response. The basic command format is a Sync byte (0x55) followed by a command byte, followed by any necessary data to send (0x00 if empty), followed by an additive checksum of all of the previous bytes except the Sync byte (sum of all previous bytes except checksum, and checksum is zero).

Command Name	Request Format	Acknowledge Format	Requirements For Use	Effects
Terminate Charge	0x55 0x01 0x00 0xFF	0x55 0x01 0x00 0xFF	Charging or waiting to connect battery	Stops charge and enters profile selection screen
Read Charge Status	0x55 0x02 0x00 0xFE	0x55 0x02 [STATUS] [CHECKSUM]	None	None
Select Profile	0x55 0x03 [PROFILE NUMBER] [CHECKSUM]	0x55 0x03 [CHEM] [MAX VH] [MAX VL] [MAX IH] [MAX IL] [CHECKSUM]	At Profile Selection Screen	Selects profile and waits for battery connection
Force Charge	0x55 0x04 0x00 0xFC	0x55 0x04 0x00 0xFC	Waiting to connect battery or short circuit error	Force starts charge
Read Voltage, Current, Charger Temperature	0x55 0x05 0x00 0xFB	0x55 0x05 [V3] [V2] [V1] [V0] [I3] [I2] [I1] [I0] [T3] [T2] [T1] [T0] [CHECKSUM]	At any time	None

Table 1 - Commands recognized, their format and responses expected

To translate values read from the Voltage/Current/Temperature instruction, interpret:

Voltage (in volts) = ([V3] * 2^24 + [V2] * 2^16 + [V1] * 2^8 + [V0])/100.0

For example, 0x00000ed0 = 3792 = 37.92V

Current (in amperes) = ([I3] * 2^24 + [I2] * 2^16 + [I1] * 2^8 + [I0])/10000.0

For example, 0x00009c31 = 39985 = 3.9985A

Charger temperature (in celsius) = ([T3] * 2^24 + [T2] * 2^16 + [T1] * 2^8 + [T0] - 2731)/10.0

For example, 0x00000bcc = 3020 = 302.0K = 28.9C

Commands must not be issued faster than once every 10ms, and issuing commands more often than 10Hz can lead to the charger losing track of milliseconds in its timings, so command polling at only 1Hz or so is recommended. Commands currently have screen/mode requirements to be accepted, forcing a workflow of Terminate Charge -> Select Profile [-> Force Charge] -> Terminate Charge, with Read Charge Status instructions at any point to keep track of the current charge.

In Table 1, Read Charge Status can return the following codes:

- 2 - No battery connected
- 4 - Error, Short circuit
- 6 - Charging disabled/terminated
- 7 - Charge complete
- 9 - Forcing charge
- 10 - Low current precharge (slowstart)
- 11 - Bulk charging
- 12 - Topup charging (Nickel)
- 13 - Disconnect check running
- 14 - Error, voltage too low
- 15 - Error, voltage too high
- 18 - Error, Power fault
- 19 - Error, thermistor needed but missing
- 20 - Error, Reverse voltage

In Table 1, the Select Profile command’s Profile Number is the number corresponding to number displayed next to each active profile, and profile numbers that are not shown are not used or acknowledged. Active profiles start numbering from 1. The acknowledge response contains information about the selected profile, and are formatted as:

[CHEM]: Profile chemistry:

- 0 - Lithium-based
- 1 - Nickel-based
- 2 - Lead-based

[MAX V H] [MAX V L] - 16-bit number corresponding to max voltage used in profile, high byte first then low byte, 10mV/LSB. For example, 42.00V would be written as 4200, or 0x10 0x68.

MAX I H] [MAX I L] - 16-bit number corresponding to max current used in profile, high byte first then low byte, 1mA/LSB. For example, 8.000A would be written as 8000, or 0x1F 0x40.

For example, to select active profile 1, which is a lithium profile with 42.00V and 2.000A max voltage and current, one might send:

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0x55 0x03 0x01 0xfc
```

And the response would be:

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0x55 0x03 0x00 0x10 0x68 0x07 0xd0 0xae
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