

Serial Communication Protocol used in SYNKRO devices as of June 6, 2010

Serial communication from user to SYNKRO device is provided to allow users to display and adjust device settings. Serial communication can also be used in conjunction with a vehicle display to indicate real-time stats.

User connects via USB. Device is primarily a USB / VCP bridge (p/n: CP2102, vender: Silicon Labs). The VCP Baud rate is **115200** (or 57600 if built prior to June 2009). The VCP settings are **8** bit, **no** parity, **1** stop bit, **no** flow control. Non USB direct serial is an alternative for RS232 or TTL level connections.

At this time a single master multi node addressing scheme is in place. This was done to allow development toward applications with multiple SYNKRO devices such as controllers, chargers, displays or battery management systems. The scheme in place only allows for 127 nodes and 127 parameters per node. This **ASCII** serial communication scheme resembles a MODBUS protocol.

To provide a minimum level of serial communication integrity, start and stop characters and a check sum value are used. Hex values are used for data to differentiate from start and stop values.

ASCII characters representing Hex values are 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F (upper case only). Hex values must include leading zeroes if needed to fit size requirement (byte, word, etc.)

To request a parameter value from the SYNKRO device, send the following:

```
Start character ':'
Hex value (NODE_ID + 128) // range 128~255
Hex value (PARAMETER_ID) // range 0~127
Hex value (check sum) // range 0~255 includes all previous hex values
Stop character '\n'
```

Example

The ASCII text string **":850279/n"** requests node **5** report the value of parameter **2**.

Note:

Stop character '\n' is ASCII value 10 also denoted in C as newline **/n**.

SYNKRO device reports parameter values as follows:

```
Start character ':'
Hex value (NODE_ID) // range 0~127
Hex value (PARAMETER_ID) // range 0~127
Hex value (length of value) // range 0~255 length of data in bytes
Hex value (value) // range 0~255 MSB first for multi-byte values
Hex value (check sum) // range 0~255
Stop character '\n'
```

To set a parameter value in the SYNKRO device, send the following:

```
Start character ':'
Hex value (NODE_ID) // range 0~127
Hex value (PARAMETER_ID) // range 0~127
Hex value (length of value) // range 0~255 length of data in bytes
Hex value (value) // range 0~255 MSB first for multi-byte values
Hex value (check sum) // range 0~255
Stop character '\n'
```

The SYNKRO device will report the text name of the parameter along with its size and other properties if the PARAMETER_ID is sent with 128 added.

To request a parameter's text name and properties from the SYNKRO device, send the following:

```
Start character ':'
Hex value (NODE_ID + 128)           // range 128~255
Hex value (PARAMETER_ID + 128)     // range 128~255
Hex value (check sum)               // range 0~255
Stop character '\n'
```

SYNKRO device reports parameter's text name and properties as follows:

```
Start character ':'
Hex value (NODE_ID)                 // range 0~127
Hex value (PARAMETER_ID + 128)     // range 128~255
Hex value (parameter's length in bytes) // range 0~255      -not length of text name-
Hex value (parameter's properties) // range 0~255
Hex value (parameter's text name)  //each character is converted to it ASCII hex value
Hex value (check sum)               // range 0~255
Stop character '\n'
```

Note:

Parameter values sent to the SYNKRO device must be sized according to the parameter's designated length. It is best to request the parameters text name, property and size up on establishing connection.

Properties

The parameter's properties indicate such things as its type (signed or unsigned) and privileges such as read only, along with other uses. The following is partial listing of common properties and their hex codes:

Privileges	hex code	
Read only	0x80	cannot be written to
OEM	0x40	cannot be written to unless OEM (administrator)
User	0x00	fully read or write accessible

Types	hex code	how to interpret or display
integer	0x00	a value of 12345 = 12345, a value of 123 = 123
dp10	0x04	a value of 12345 = 1234.5, a value of 123 = 12.3
dp100	0x06	a value of 12345 = 123.45, a value of 123 = 1.23
percent255	0x03	a value of 255 = 100%, a value of 0 = 0%
signed integer	0x08	a value of -12345 = -12345, a value of -123 = -123
signed dp10	0x0C	a value of -12345 = -1234.5, a value of -123 = -12.3
signed dp100	0x0E	a value of -12345 = -123.45, a value of -123 = -1.23

Privileges and types are OR'd together into a single byte size property.

Example:

0x88 would be a read only signed integer.

Special Cases

Parameter 0 lists the number of parameters that node offers. Requesting parameter 0 first allows user to determine how many more parameters to scan.

Since CAN is typically limited to 8 byte packets, bulk transfers such as "Update Firmware" and "Retrieve Log" require special procedures not defined in this document.