GoGo Board Serial Protocol

Revision 4.0.2

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http://www.gogoboard.org

General Information

- This document describes only the serial protocol of the tethered mode. The protocol for Cricket Logo (autonomous mode) can be found on the handy-cricket website (http://www.handyboard.com/cricket)
- The serial port setting for the GoGo board:
  - Baud rate 9600 bps.
  - No parity, 8 data bits, 1 stop bit (N,8,1).
  - No flow control; neither in software (XON/XOFF) nor hardware (CTS/RTS, DTR/DSR).

- Here is a typical sequence of bytes flowing in a GoGo board command session

PC to GoGo	0x54	0xFE	Command Byte(s)
GoGo to PC	0x55	0xFF	Reply Byte(s)

  - There are two header bytes of 0x54, 0xFE preceding every command.
  - Following the header bytes are command bytes. Most commands require only one command byte, but some require a second parameter byte. See command chart for details.
  - After receiving each command, the GoGo board will respond by sending back an acknowledgment header. This header consists of two bytes with values 0x55 and 0xFF respectively. Other bytes may follow as described in the Command chart.

Structure of the Command Byte

CMD2	CMD1	CMD0	PARM2	PARM1	PARM0	EXT1	EXT0

Bit 7 Bit 0

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CMD0-2 = Command bits.
PARM0-2 = Parameter bits
EXT0-1 = Extended bits
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GoGo Board Command Chart

Note that every command byte is always preceded by two header bytes (0x54, 0xFE) and the reply byte(s) are also preceded by two header bytes (0x55, 0xFF).

Command	CMD Len	CMD Byte			2nd byte	Reply
		CMD	Parm	Ext		
Ping	1	000	Board ID		-	Ack.FVh.FVl
Read Sensor	1	001	SSS	RM	-	SSh.SSl
Motor Control	1					
ON		010	000	XX	-	Ack
OFF		010	001	XX	-	Ack
Reverse Dir		010	010	XX	-	Ack
This way		010	011	XX	-	Ack
That way		010	100	XX	-	Ack
Coast		010	101	XX	-	Ack
Set Motor Power	1	011	PPP	XX	-	Ack
Talk To Motor	2	100	XXX	XX	Motor Bits	Ack
Set Burst Mode	2	101	XXX	BM	Burst Bits	Ack + Burst Cycles …
Misc Control	2					
User LED on		110	000	00	Param Bits=0	Ack
User LED off		110	000	01	Param Bits=0	Ack
Beep		110	001	XX	Param Bits=0	Ack
Extended CMD Byte	2	111	XXX	XX	2nd CMD Byte	Depends on the command

Legend

Symbol	Values	Note
X		Don't care. This should always be 0
Ack	0xAA	Acknowledge byte
Board ID	0-31	Applicable only when using multiple GoGo boards (via RF, or I2C). 0=local board (default)
FVh, FVl		Firmware Version bytes (high and low respectively)
SSh, SSl		Sensor Value bytes (high and low respectively)
SSS	0-7	Sensor Number
RM (Read Mode)	0	Default. Get Current sensor value.
	1	Read-Max. Gets the maximum sensor value sensed since the last max-value read operation. The board resets this max-value after each read.
	2	Read-Min. This is the opposite of Max
PPP	0-7	Motor Power level
Motor Bits		Each bit in this byte represents a motor port (Bit 0 is port A, bit 1 is B, and so on.) If the bit is set, the corresponding motor port will be active.
BM	0,1	0=Normal mode(~30Hz per channel), 1=Slow mode (~10Hz).
Burst Bits		Each bit in this byte represents a sensor port (Bit 0 is sensor 1, bit 1 is sensor 2, and so on.) Each motor with its bit set will be included in the burst mode stream.
Burst Cycle		0x0C + High Byte + Low Byte. Bit 5-7 of the High Byte contains the sensor number.

Burst Mode.

Burst Mode is designed for applications that need maximum sensor refresh rate. With out the burst mode, you need to make a request to the GoGo board (with the read sensor command) every time you want to refresh your sensor data. With the burst mode, the GoGo board will actively stream new sensor data to you.

To activate the burst mode, you need to send a set-burst-mode command together with a burst-cycle byte (see command chart). The burst-cycle byte tells the GoGo board which sensor ports to include in the burst cycle. A burst-cycle byte of value 0 deactivates the burst mode.

A burst cycle consists of X sensor chunks where X is the number of activated sensors. Each sensor chunk is three bytes long and contains a sensor value. Here's the format of a sensor chunk:

Byte 1	Byte 2	Byte 3
0x0C	Sensor Value (high byte)*	Sensor Value (low byte)

0x0C is the header of a sensor chunk
Sensor Value bytes contain the 10 bits sensor value
*Bit 5-7 of the high byte sensor value contains the sensor number.

Example 1:

A burst-cycle byte of 0000 0010 will tell the GoGo board to stream sensor two.
Here's an example of a burst cycle:

Byte 1	Byte 2	Byte 3
0000-1100	0010-0001	0100-0100

Bits 5,6,7 of the sensor value high byte (underlined) is 001 indicating that this is sensor 2. The actual sensor value is 01 0100 0100 = 324

Example 2:

A burst-cycle byte of 1001 0010 will tell the GoGo board to stream sensor 2, 5, and 8. Thus, one burst cycle will consist of 9 (3x3) bytes. Here's an example of a burst cycle:

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0000-1100, 0010-0001, 0100-0100,
0000-1100, 1000-0000, 0000-0010,
0000-1100, 1110-0010, 0000 1001
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Bits 5,6,7 of the second, fifth, and eighth byte are 001, 100, and 111 indicating that they are sensor values of port 2, 5, and 8 respectively.
Their sensor values are 01 0100 0100, 00 0000 0010, and 10 0000 1001 accordingly.

Example commands:

Command	Bytes to send	Reply bytes
Ping	0x54 0xFE 0x00	0x55 0xFF 0xAA 0x02 0x00 (Firmware version = 02-00)
Turn on motor A	0x54 0xFE 0x80 0x01 (Activate motor A)	0x55 0xFF 0xAA
	0x54 0xFE 0x40 (Turn motor on)	0x55 0xFF 0xAA
Turn on motor C	0x54 0xFE 0x80 0x04 (Activate motor C)	0x55 0xFF 0xAA
	0x54 0xFE 0x40 (Turn motor on)	0x55 0xFF 0xAA
Turn on motor A and C	0x54 0xFE 0x80 0x05 (Activate motor A,C)	0x55 0xFF 0xAA
	0x54 0xFE 0x40 (Turn motor on)	0x55 0xFF 0xAA
Read sensor1	0x54 0xFE 0x20	0x55 0xFF 0x01 0x37 (Sensor value is 0x137)
Turn on burst mode for sensor 1 and 8	0x54 0xFE 0xA0 0x81	0x55 0xFF 0xAA + Burst Cycles …

Change Log

Version 4.0.2 Apr 12, 2004

- Fixed an error in the command chart (read sensor).

Version 4.0.1 Nov 28, 2003

- Added a slow burst mode. SetBurstMode command now uses the ext_parm_bits to set the burstmode speed. The default mode (ext_param_bits=0) gives ~30Hz per channel. The new slow mode (ext_parm_bits=1) gives ~10Hz per channel.