



Technical Application Note TAN2004001

*Configuring and testing the RS-232 serial port
Revised June 1, 2004*

1.1. Subject

Technical Application Note (TAN2004001): Configuring and testing the RS-232 serial port.

1.2. Applicable Product(s)

All PGR *Scorpion* (SCOR-XXXX) and *Flea* (FLEA-XXXX) IEEE-1394 digital camera models with firmware version 0.9.0.4 or higher. Consult Knowledge Base Article 94 (<http://www.ptgrey.com/support/kb/details.asp?id=94>) to determine firmware versions.

1.3. Application Note Description

The purpose of this Technical Application Note is to provide the user with a set of basic instructions on how to configure and test the RS-232 serial port functionality for the Applicable Product(s) above. The Applicable Product(s) is/are equipped with a set of general purpose input/output (GPIO) pins that can be accessed via the Hirose connector on the back of the camera. Different products may use different Hirose connectors; consult your camera's *Technical Reference* or *Getting Started* manual for part numbers and specifications.

Specific GPIO pins are used for RS-232 serial port communications. Consult your camera's *Technical Reference* or *Getting Started* manual for GPIO connector pin layouts, specific wiring information and GPIO electrical characteristics.

1.4. Application Note Examples

To configure and test these examples:

1. **Connect the camera's serial port to your PC's serial port.** Consult your camera's *Technical Reference* or *Getting Started* manual for:
 - a. GPIO connector pin layouts, including which pins are designated for RS-232; and
 - b. GPIO electrical characteristics.
2. **Access the camera's register space.** The easiest way to try this is using the FlyCap demo software included with the *PGR FlyCapture SDK*.

For register definitions and individual bit descriptions, please refer to the Serial Port Input/Output section of the *PGR IEEE-1394 Digital Camera Register Reference*.

1.4.1. Transmit Characters to the PC

This example describes how to send four (4) characters from the camera to the serial port on a PC. Microsoft's HyperTerminal program (*Start Menu > All Programs > Accessories > Communications*) is used to display the characters received from the camera.

	Action	Register	Input / Expected Output
1. Plug the camera in and start FlyCap.			
2. Open the Camera Control Dialog and select the Register tab.			
3. Get the current baud rate, character length setting, parity setting and stop bit setting.	Get Register	0x2000	0x060800FF <ul style="list-style-type: none"> ▪ 0x06 = 19200bps ▪ 0x08 = 8bit, no parity, 1 stop ▪ 0xFF = 255 byte buffer
4. Open a HyperTerminal window and create a new connection, setting the COM Port Settings to match the current camera settings obtained in step 3.			
5. Enable the serial output (transmit).	Set Register	0x2004	0x40000000
6. Verify transmit buffer ready.	Get Register	0x2004	0x40800000
7. Send four (4) characters to the output buffer on the camera.	Set Register	0x2100	0x31323334 <ul style="list-style-type: none"> ▪ ASCII = 1234
8. Verify that the transmit buffer is currently storing 4 bytes worth of characters.	Get Register	0x200C	0xFF040000 <ul style="list-style-type: none"> ▪ 0xFF = 255 bytes of buffer space remaining ▪ 0x04 = 4 bytes currently stored and waiting to be transmitted
9. Send the characters from the output buffer to the PC's serial port.	Set Register	0x200C	0xFF040000 <ul style="list-style-type: none"> ▪ HyperTerminal should echo the characters "1234"

Other Comments

- To send more than four characters, either:
 - a. Repeat step 7 above, and send characters in sets of four using register 0x2100; or
 - b. Do a block write of all the characters using registers 0x2104 – 0x21FF.
- The actual transmit buffer size may be larger than that reported in step 3 above. Consult the Serial Port Input/Output section of the *PGR IEEE-1394 Digital Camera Register Reference*. When this is the case, the "buffer space remaining" that is reported in step 8 will not decrease until the actual buffer space remaining is less than 255 bytes.

1.4.2. Receive Characters from the PC

This example describes how to send four (4) characters from the PC to the camera's serial port. Microsoft's HyperTerminal program (*Start Menu > All Programs > Accessories > Communications*) is used to send the characters received from the camera.

	Action	Register	Input / Expected Output
1. Repeat steps 1 to 4 described above in section 1.4.1.			
2. Enable the serial input (receive).	Set Register	0x2004	0x80000000
3. Verify no receive data framing errors.	Get Register	0x2004	0x80000000 <ul style="list-style-type: none"> • 0x80040000 indicates a receive data framing error, possibly due to a noisy RS-232 line or incorrect baud rate/port settings. • 0x80020000 indicates a receive data parity error
4. Send four (4) characters to the input buffer on the camera. For test purposes, type the characters "ABCD" in the HyperTerminal window.			By default, characters will not be displayed in the HyperTerminal window. To echo typed characters to the screen, select <i>File > Properties > Settings</i> tab > <i>ASCII Setup...</i>
5. Verify that the receive data buffer is ready (has received characters).	Get Register	0x2004	0x80200000
6. Verify that the receive buffer is currently storing 4 bytes worth of characters, which are waiting to be read.	Get Register	0x2008	0x04000000
7. Send four (4) characters from the input buffer to the data access register.	Set Register	0x2008	0x00040000
8. Verify that four (4) characters are ready to be read from the data access register.	Get Register	0x2008	0x00040000
9. Read the four (4) characters from the data access register.	Get Register	0x2100	0x41424344 <ul style="list-style-type: none"> • Assumes input was "ABCD"

Other Comments

- To receive more than four characters, either:
 - Repeat steps above, and receive characters in sets of four using register 2100h; or
 - Do a block write of all the characters using registers 0x2104 – 0x21FF. For example, if 12 characters were received (0x2008 = 0x0C000000), Set Register 0x2008 to 0x000C0000 and begin reading the bytes starting at 0x2104.
- The actual receive buffer size may be larger than that reported in step 3 above. Consult the Serial Port Input/Output section of the *PGR IEEE-1394 Digital Camera Register Reference*.