

The Communication Protocol for VideoRay Pro III and Desktop Computer

Revised 11/04/06 by Marcus Kolb

Physical media: RS232, baud rate 9600, 8 bit, 1 stop, no parity.

1. Enabling computer control

When the VideoRay is powered on it waits 5 seconds for a byte to be received on the RS-232 port. If it receives anything, it enters into computer control mode. Otherwise the vehicle will be directly controlled by the control panel.

2. Normal Communications Between VideoRay and PC

VideoRay waits for 8 bytes containing information for running the vehicle. Then, the VideoRay sends out 7 bytes containing a 3 byte identifier, compass and pressure data.

The PC sends 8 control bytes and waits for 7 data bytes coming from VideoRay and if it receives them, it sends out the next 8 control bytes immediately. VideoRay will keep waiting for the entire 8 bytes until it receives all of them (VideoRay Pro works in polling mode).

The total time used for exchanging information between VideoRay Pro and PC is about 15.6ms $((8+7)/(9600/(1+8+1)))$. This will not affect the control characteristics of the vehicle provided the PC does not make the VideoRay Pro keep waiting for too long.

2.1 Information of the 7 Bytes VideoRay Sends

The first 3 bytes of the 7 bytes contain an identifier then compass low byte, compass high byte, pressure low byte and pressure high byte.

All data is in hex.

- 1) 40 (All VideoRay models)
- 2) 31 (All VideoRay Pro III)
- 3) 02 (data type for future use)
- 4) Low byte of Orientation
- 5) High byte of Orientation
- 6) Low byte of Depth
- 7) High byte of Depth

The relation between low byte, high byte and the real value is:

Real value = Low byte + 256 x High Byte, for instance:

Orientation* = Low byte of Orientation + 256 x High Byte of Orientation (0-359)

Depth = Low byte of Depth + 256 x High Byte of Depth (0-1023)

*When Orientation is calculated, the following conversion is needed for the real orientation:

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Real Orientation = 360 - Orientation;    // mirror the image of the
orientation
if (Real Orientation < 90) Real Orientation = 270 + Real Orientation;
// shift 90 degrees counterclockwise
else Real Orientation = Real Orientation - 90;

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2.2 Information in the 8 Bytes PC Sends (in HEX)

- 1) 23 (for all VideoRay models)
- 2) 31 (for Pro III)
- 3) Current for the port thruster, minimum 0, maximum 220;
- 4) Current for the starboard thruster, minimum 0, maximum 220;
- 5) Current for the vertical thruster, minimum 0, maximum 220;
- 6) Current for the lights, minimum, maximum 200;
- 7) Bit level Controls for the manipulators and auto depth,

D7 D6 D5 D4 D3 D2 D1 D0

D0=0, Manipulator 1 close;	D0=1, Manipulator 1 open;
D1=0, Manipulator 1 disable;	D1=1, Manipulator 1 enable.
D2 Reserved	
D3 Reserved	
D4 Reserved	
D5 Reserved	
D6=0, Front light / camera;	D6=1, Rear light / camera
D7 Reserved	

- 8) Bit level controls of camera tilt and focus, the direction of the thrusters,

D7 D6 D5 D4 D3 D2 D1 D0

D0 = 0, Tilt up;	D0 = 1, Tilt down;
D1 = 0, Tilt disable;	D1 = 1, Tilt enable;
D2 = 0, Focus near;	D2 = 1, Focus far;
D3 = 0, Focus disable;	D3 = 1, Focus enable;
D4 = 0, Port backward;	D4 = 1, Port forward;
D5 = 0, STBD backward;	D5 = 1, STBD forward;
D6 = 0, Vertical up;	D6 = 1, Vertical down;
D7 is reserved.	