



Voyager Camera System Alternate Serial Connection

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Revision

Initial Release – 11 May 2009 th

revision 101 – added pin number to Figure-8. altered Table-4

revision 110 – added footnote on cover sheet to reflect more detailed information pertaining to EAR. – Altered coversheet.



1.0 Introduction

This document describes a method to connect external RS422 devices to the Voyager System.

Many installations have Pelco joystick or computers with Pelco-D protocol installed. Additionally many “installations” do not have control panel space to mount Voyager specific joystick. Under these conditions, customer preference may be to use existing human interface to control Voyager.

This instruction documents a method of injecting serial communication string using external electronics.

Baud rate is limited to 192.K into the main unit or 19.2K or 4800 pass through JCU.

Following the outlined steps, Voyager can sustain normal operation (respond to external command) up to ~50 messages per second.

2.0 Applicable Documents

2.1 Internal Documents

432-0002-19 Voyager Mechanical Installation Description Document

2.2 External Documents

Reference document identifying pin# and signal names for DB-9 RS422 serial interface.

Reference pin/signal designation is tabulated below.

Table 1
RS-422/485 Pinout

Pin #	Signal
2	RD(A)-
3	TD(B)+
4	GND
6	GND
7	RD(B)+
8	TD(A)-

CAUTION

Non-isolated connection to an external electronics may result in damage to the Voyager Camera System.

3.0 Block Diagram

3.1 Voyager System Diagram

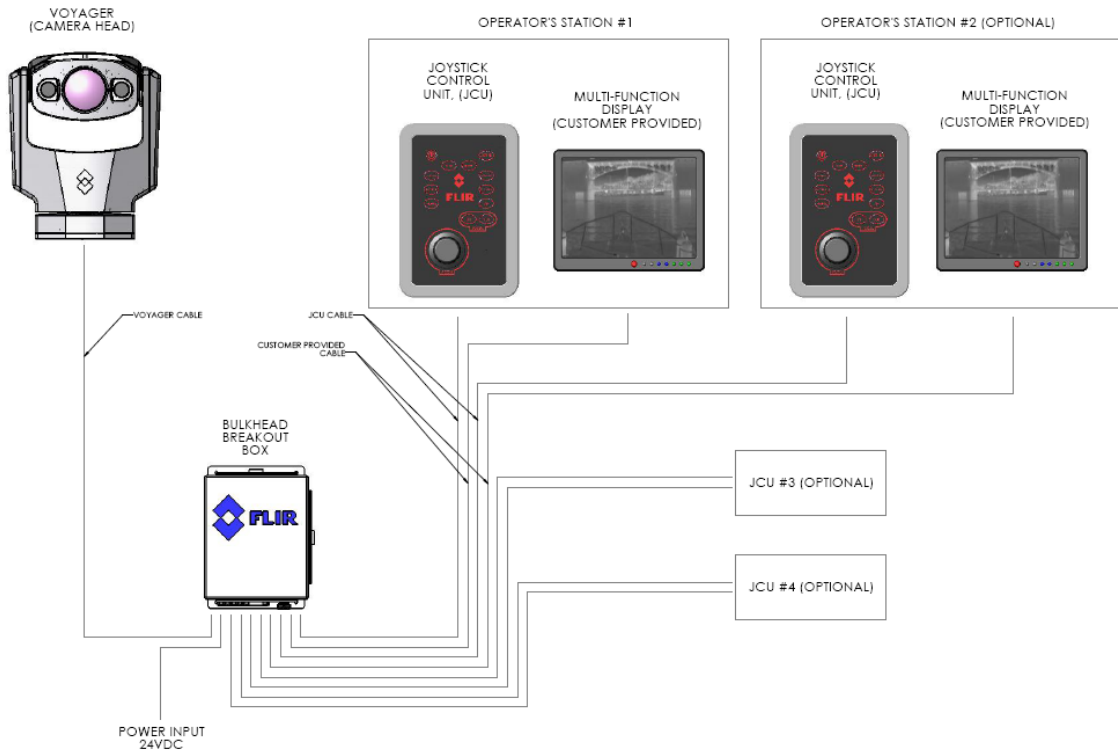


Figure Voyager System Block Diagram with 2 JCUs

3.1.1 Major Components

- Voyager Sensor Unit
- Bulkhead Box Assembly
- Joystick Control Unit (JCU) [up to 4]
- Joystick to Bulkhead Box cable
- Main Power Cable

3.2 Bulkhead Box Connector Diagram

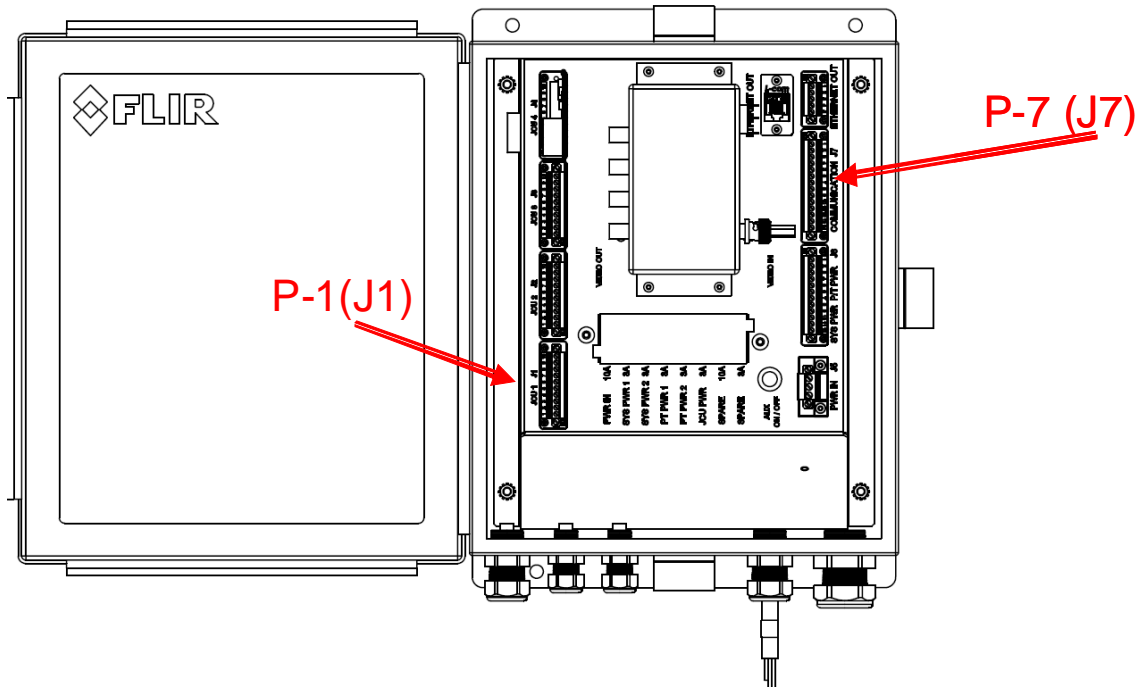


Figure 2 Voyager Bulkhead Box

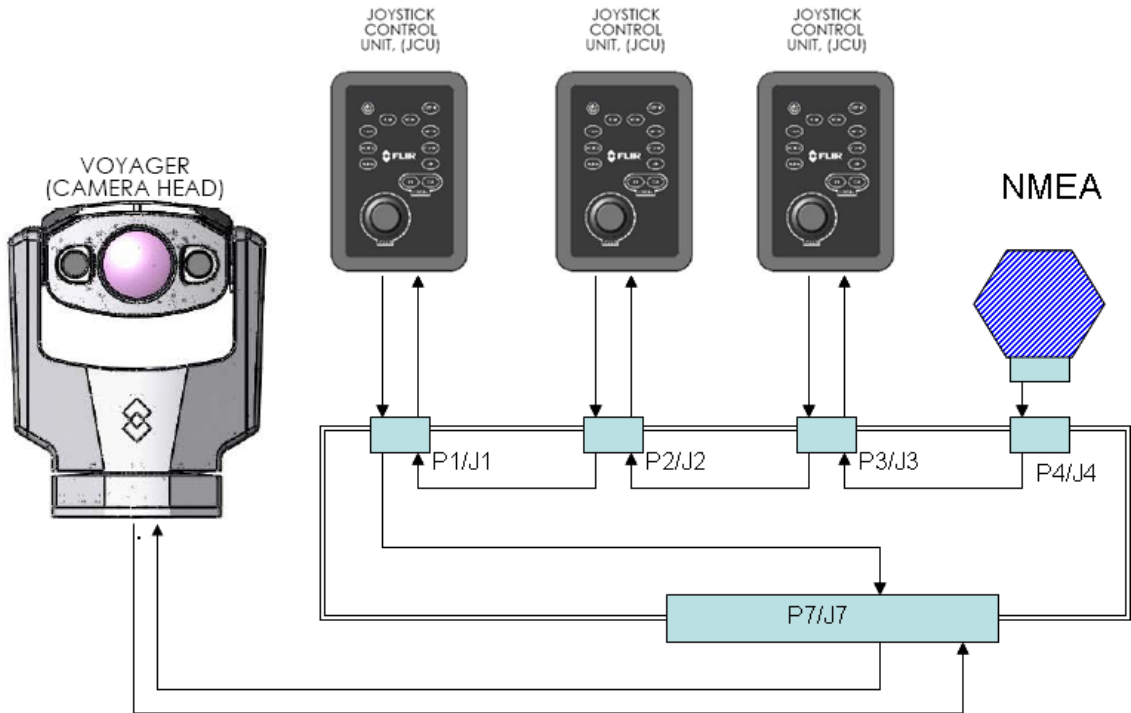


Figure 3 Serial Communication Daisy-chain Routing

4.0 Attachment

CAUTION

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Non-isolated connection to an external electronics may result in damage to the Voyager Camera System.

4.1 Electrical Attachment

One of the major concerns addressed in Voyager was ground loops, specifically for lightning and ESD considerations. Voyager has been designed to be fully isolated from its environment and it is vital that the electrical isolation be maintained even after the installation of user hardware.

4.1.1 Interconnect Via the Joystick Control Unit Port at the Bulkhead Box

Overview

As diagrammed in Figure-3, there is only one serial communication port available to connect to the Voyager camera head. To support multiple JCUs and an NMEA interface card, the serial communication is daisy-chained through the JCUs and jumpers in the Bulkhead Box.

Figure-3 shows the full up configuration with 3 JCUs and one NMEA interface card. In this example, the NMEA message is routed from the interface through JCU3, JCU2 and JCU1 before the message reaches the Voyager camera head.

The connection via the JCU port at the bulkhead box addresses the case where the external electronics is connected to P1/J1 connector as shown in Figure #4.

Electrical connection can be made at the J-1 joystick interconnect connector (lower left side in Figure 2). Using the supplied P-1 connector, attach TD(B+), TD(A-) and signal reference ground to pins 1, 2 and 6 respectively per Table-2.

If the external electronics is capable of pass-through of upstream JCUs (those connected to J-2, J-3 and J-4), then attach RD(B)+ and RD(A)- to pins 8 and 9 respectively per Table-2.

Table 2 Interconnect Jumper Cable Pin Designation

Signal	J-1 Connector	DB-9 Pin #	Comment
TD(B)+	1	3	from external
TD(A)-	2	8	from external
RD(B)+	8	7	to external
RD(A)-	9	2	to external
Signal Ground	6	4	common

Figure 4 is a diagram of the modified baseline Voyager interconnection of Figure-3 for an external electronics injection at JCU #1 slot. In order for the upstream JCUs and NMEA interface messages to reach Voyager camera head, the external electronics must be capable of receiving messages at the RX port and re-transmitting the message at the TX port.

If the external electronics is not capable of pass through, then JCU#2, JCU#3 and the NMEA interface will not function.

If JCU control is necessary, then place the external electronics upstream of the last JCU. However, the NMEA interface will not function.

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Sample of three NMEA messages

```
$RATTM,00,2.00,0.00,T,0.00,0,R,1.1,3.0,M,TGT00-00005,T,R,000005.00,M*29  
$GPGGA,000006.00,0000.00,N,00000.00,E,1,03,1.1,3.0,M,500.0,M,,ZULU*49  
$GPHDT,0.00,T*05
```

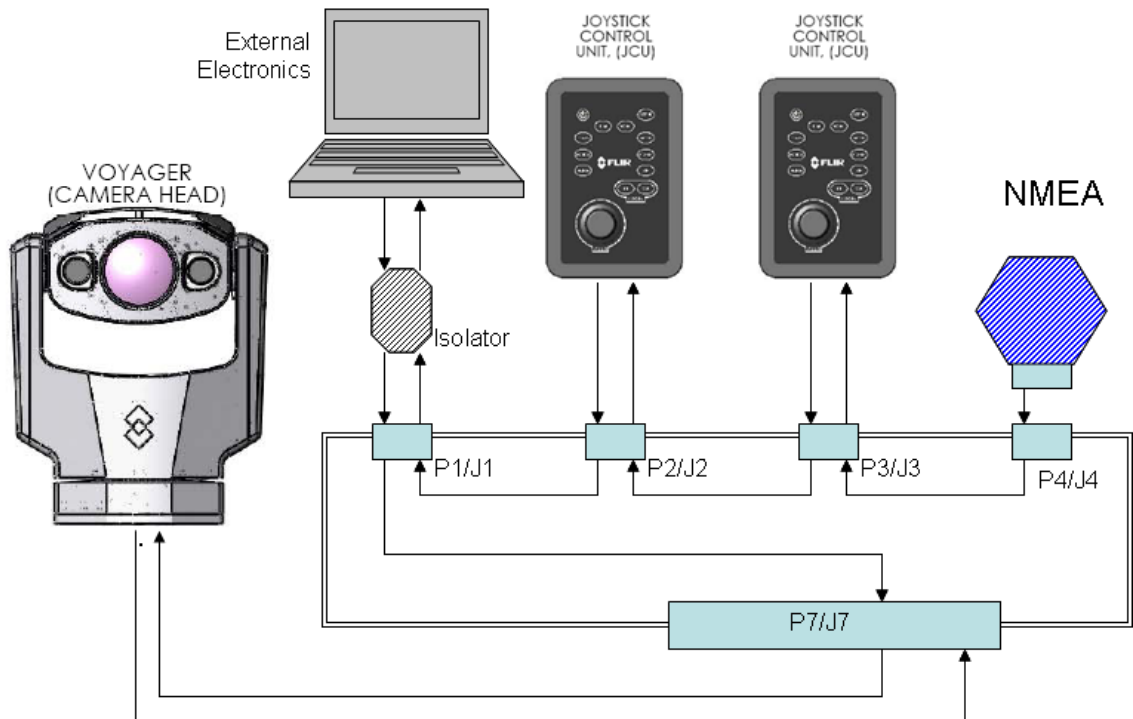


Figure-4 Pass-through Capable External Electronics Connected At J-1 (JCU #1 slot)

Sample of a non-pass through connection is shown in Figure-5 and photo of P1 connected to the Bulkhead Box (J1) is shown in Figure-6.

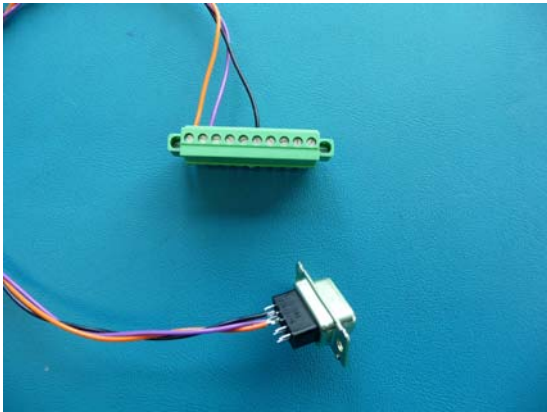


Figure 5 Interconnect Jumper Cable

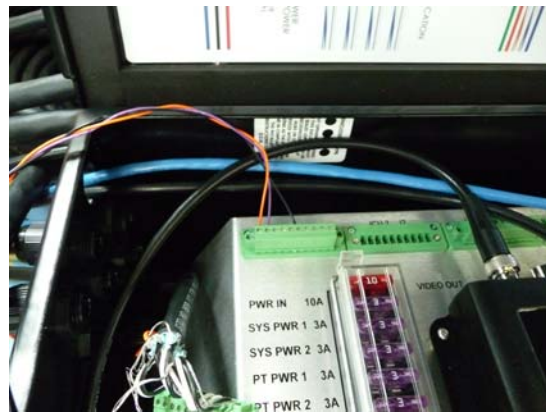


Figure 6 Connection in Bulkhead Box

4.1.2 P7/J7 Interconnect - Bypassing the Joystick Control Unit Port

Disconnect P1 from J-1.

Note: This disables all JCUs and NMEA.

The electrical connection can be made at the P7/J7 connector by piggybacking onto pins 1, 2, 3, 4 and 5 per Table-3.

Table 3 Interconnect Jumper Cable Pin Designation

Signal	P7/J7 Connector	DB-9 Pin #	Comment
TD(B)+	3	3	from external
TD(A)-	4	8	from external
RD(B)+	1	7	to external
RD(A)-	2	2	to external
Signal Ground	5	4	common

This provides transmit and receive communication with the Voyager camera head. Note that the Voyager configuration uses subset of Foveus command/status.

4.1.3 Interconnect Via the Joystick Cable End

This method is for a previously installed Voyager system where the user has access to the JCU cable. The external electronics can be connected at the circular 9 pin connector. The physical connector at the back of the JCU unit (JCU end of the JCU interconnect cable) is shown in Figure 7 with corresponding pin/signal names identified in Figure 8. Connection to the external electronics is tabulated in Table-4.

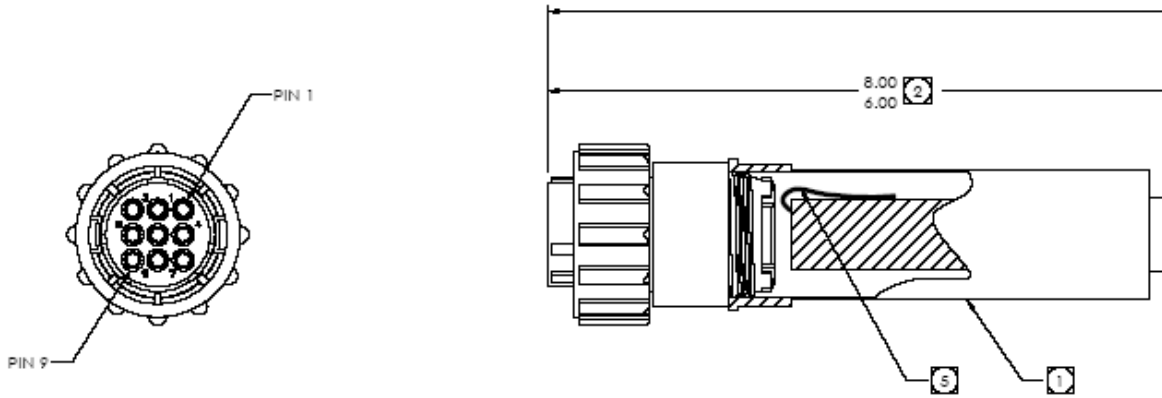


Figure 7 Cable End, JCU

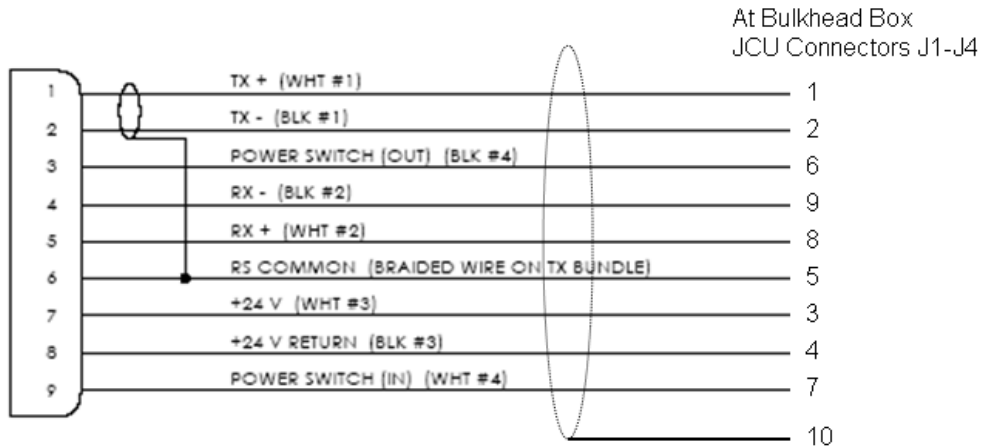


Figure 8 Interconnect Signals, Cable End, JCU

Note: Care should be taken to prevent connection to pins 3, 7, 8 or 9. Connection to these pins may result in permanent damage to the Voyager System.

Table 4 Interconnect Cross Reference Designation

Signal	JCU 9 pin Circular Connector	DB-9 Pin #	Comment
TD(B)+	1	3	from external
TD(A)-	2	8	from external
RD(B)+	5	7	to external
RD(A)-	4	2	to external
Signal Ground	6	4	common
Mating connector to JCU Cable - Tyco p/n 788159-2			

4.2 Alternate NMEA Connection

The Voyager NMEA interface module is designed to connect to the NMEA 0183 according to the standard. Many current “talkers” use RS422 electrical interface as the conduit to pass the serial message. The same connection method as outlined in this document can be used to inject NMEA signal via RS422 connection.

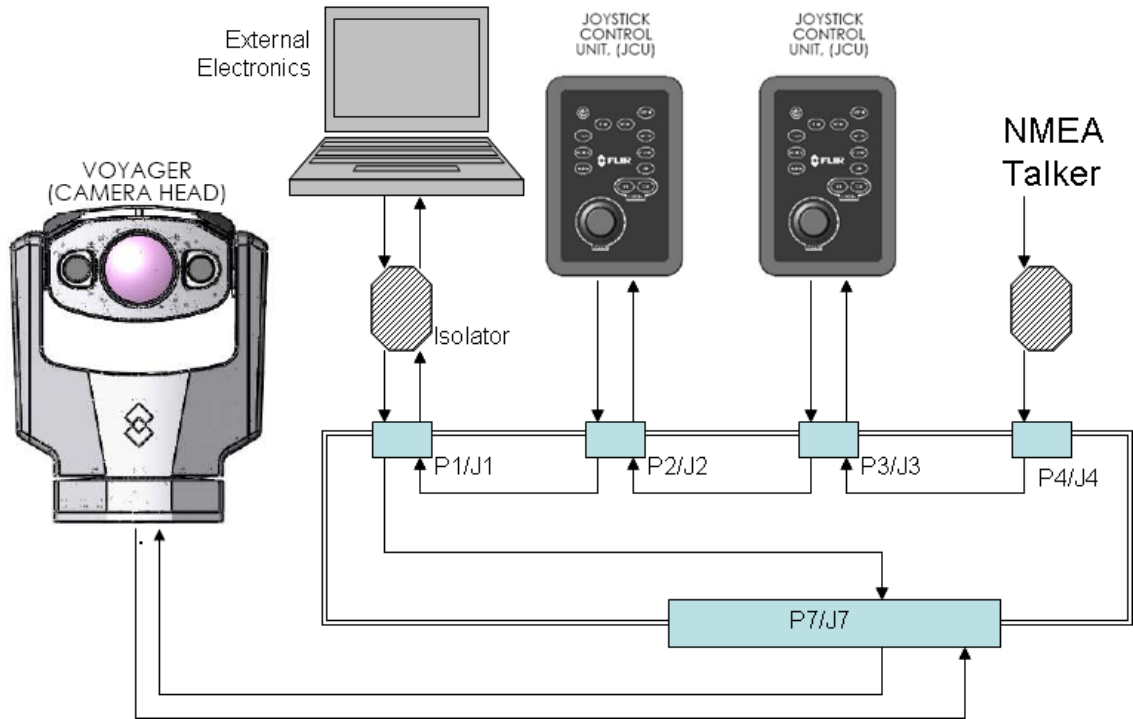


Figure 9 Voyager with an Ext Electronics, 2 JCU's and RS-422 NMEA Connection

Figure 9 represents a Voyager configuration with two external connections. NMEA message reception using RS422 electrical interface can be accomplished using the same method as external electronics connection.

Placing an isolator module and connecting TX(B)+ TX(A)- and gnd to pins 1, 2 and 6 of P-4 allows the Voyager system to receive and respond to NMEA messages.

In this configuration with the JCU in series, the NMEA talker baud rate can be set at either 4800 or 19.2K baud.

Voyager can reliably respond to 5 NMEA messages per second.

4.3 RS-422 Isolator Module

To ensure good electrical isolation, use RS422 isolators between Voyager and the external electronics. One manufacturer of electrically isolated serial interface is B&B Electronics (www.bb-elec.com).

CAUTION

Non-isolated connection to an external electronics may result in damage to the Voyager Camera System.



4.4 Baud Rate Setting

Using the Ethernet connection type into the address bar 192.168.250.116. This address is the default IP address of Voyager.

Voyager will respond by displaying the Nexus Configuration page and request user name and a password.

User name is “admin” and the password is “indigo”.

Press the “communication button followed by pressing the Serial Remote entry at the left edge. The resulting display is shown in Figure-10.

In this page, the serial communication protocol would need to be changed to reflect the external electronics; Namely the entry fields in the “Remote Port Setting”. Do not alter any other parameters.

Once the desire setting is set, perform the following

- 1) press the “save” button.
- 2) press the “stop” button on top of the page
(when executed, this button’s legend will change to “start”)
- 3) press the “refresh” button and verify that the parameters are correct
- 4) and finally press the “start” button.

When the primary video startup screen is replaced with “normal” Voyager video, Voyager should be able to communicate with the external electronics.

4.4.1 Alternate Baud Rate Setting

If the external electronics is capable of matching the Voyager’s JCU port, then set the external electronics to 19.2K baud, 1 start, 8 bit data, no parity and one stop bit.

Voyager JCU baud rate is fixed at 19.2K baud output. JCU will only work with 19.2K.

JCU will accept only 19.2K or 4800 baud from external serial device attached into the JCU (such as NMEA input of Figure-9).

The screenshot shows the Nexus WEB Configuration interface in a Windows Internet Explorer browser. The page title is "Nexus WEB Configuration - Windows Internet Explorer" and the address bar shows "http://192.168.250.116/main.php". The browser menu includes File, Edit, View, Favorites, Tools, and Help. The page header features the FLIR SYSTEMS logo, the title "Nexus Configuration", and a "Server Running..." status with "Refresh" and "Stop" buttons. The last modification date is "06/04/2009 15:35:09".

The main content area is titled "Serial Remote Configuration" and is divided into several sections:

- General:** Includes "Enabled" (yes), "Remote Port" (USER), "Remote Port Settings" (Speed: 19200, Data Bits: 8, Parity: None, Stop Bits: 1), "Application Protocol" (Pelco D), "Address" (01), and "Hardware Protocol" (RS-422).
- Joystick:** Includes "Mode" (FOV Dependant), "Azimuth FOV Factor" (2), "Elevation FOV Factor" (2), "Resolution" (100%), and "Pilot mode" (yes).
- Radar NMEA:** Includes "Allow Radar NMEA" (yes), "NMEA Radar Sensor Id" (1), and "NMEA Radar Id" (0).

At the bottom of the configuration area are "Save", "Read", and "Set default values" buttons. The browser status bar at the bottom shows the URL "javascript:top.change_second('page.php?type=remote')", the Start button, and several open windows: "sn7382", "192.168.250.116 - PuTTY", "Nexus WEB Configurat...", and "Nexus Console".

Figure 10 Nexus Configuration Web Page – Serial Remote Communication



5.0 Voyager Camera Systems Pelco-D Command Set

Voyager responds to the following subset of Pelco-D commands.

A Pelco-D message is a string of seven (7) binary bytes. Message starts with a hex “FF” and ends with a CRC byte. NMEA messages are variable length of printable ASCII characters starting with ASCII “\$” and terminated with <CR> <LF>.

Table 3A. Standard Commands

	Pelco Standard Commands (except where noted)	Additional info	Voyager Action
Focus Far	Set Focus Speed (extended command)	focus speed	4 Focus speeds This is 2nd of two command packets. First to re-define rate, 2nd is to focus
Focus Near	Set Focus Speed (extended command)	focus speed	4 Focus speeds This is 2nd of two command packets. First to re-define rate, 2nd is to focus
Zoom In	Set Zoom Speed (extended command)	zoom speed	Clockwise (64 speed) 4 Zoom speeds, based on Zoom knob displacement from center
	Zoom Tele		this is 2nd of two command packets. First to re-define rate, 2nd is to zoom
Zoom Out	Set Zoom Speed (extended command)	zoom speed	Counter-clockwise (64 speed) 4 Zoom speeds, based on Zoom knob displacement from center
	Zoom Wide		this is 2nd of two command packets. First to re-define rate, 2nd is to zoom
Joystick Up	Up	Tilt speed	64 Tilt speeds, based on Joystick displacement from center
Joystick Down	Down	Tilt speed	
joystick Left	Left	Pan speed	64 Pan speeds (includes turbo), based on Joystick displacement from center
Joystick Right	Right	Pan speed	



Table 3B. Extended Commands

	Pelco Extended Commands	Additional Info	Voyager Action
HOME			
key down	Clear Preset	Preset id 8	initial key down. Tells Voyager to display "Home" icon
key up <2 seconds	Go To Preset	Preset id 8	key up before 2 seconds timer
2 second timer expires	Set Preset	Preset id 8	timer event (not user action) Tells Voyager to set home & flash Home icon
key up >2 seconds	Clear Preset	Preset id 8	key up after 2 seconds timer. Tells Voyager to display the Home icon
POINT (was AZ LOCK)	Set Auxiliary 6		toggle between Azimuth lock on and off
STAB	Set Auxiliary 7		toggle between image stabilization on and off (E-stab, M-stab, or both?)
NIGHT	Set Auxiliary 5		toggle between 2 LUTs. Daytime (normal) and Nighttime (reddish)
VIS/IR	Set Auxiliary 2		toggle between DLTV and IR
SCENE	Set Auxiliary 3		toggles through 4 AGC & DDE preset settings
AF	Set Auxiliary 4		activate one-shot autofocus
SETUP	Set Auxiliary 8		enter Setup mode Note: Use Joystick up/down to move to menu item and Joystick right to select the menu item.
	Set Auxiliary 1		reserved for Black hot/ White hot