Raven BPI Operation Manual

Raven Bluetooth Pilot Interface

Jan 13, 2008

Raven Industries, Inc.
14000 Summit Drive
Suite 700
Austin, Tx. 78728

Voice: 512-238-1128
Fax: 512-238-1135

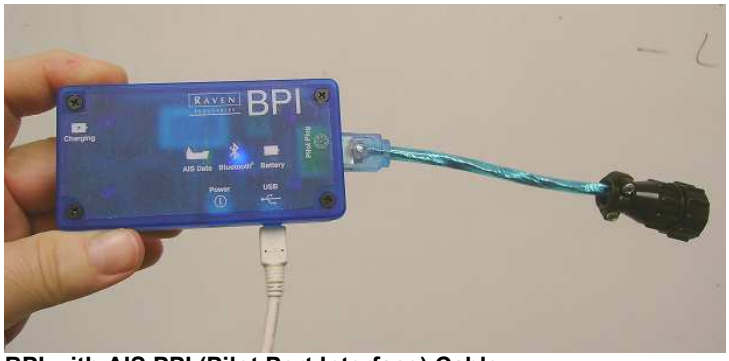
Printed in the United States of America

This Manual Part Number.. 016-0171-222
BPI Part Number …… 063-0173-005

Intentionally Left Blank

The Raven Bluetooth Pilot Interface (BPI)

The Raven BPI (Bluetooth Pilot Interface) is a bluetooth wireless device that takes data from an AIS Pilot Port Interface (PPI) found on a ship and transmits that AIS data to a computer via a bluetooth data link



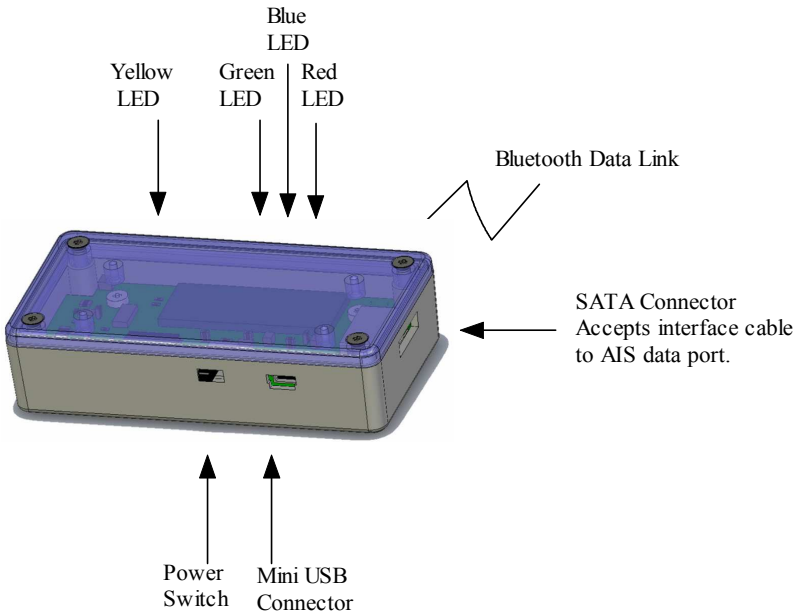
BPI with AIS PPI (Pilot Port Interface) Cable

The BPI has the following features:

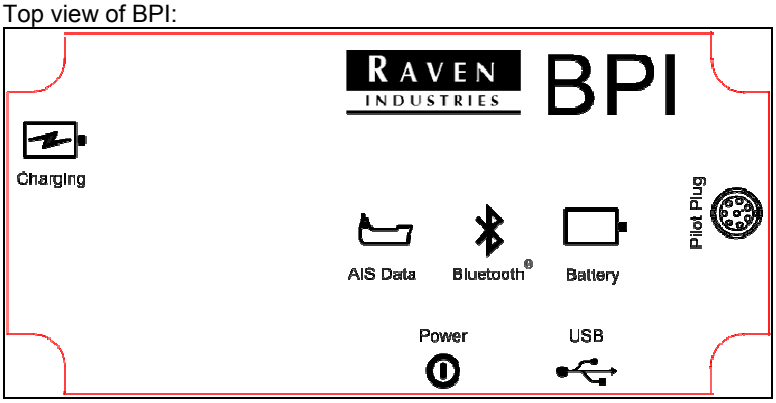
1) Rechargable Battery (20+ hours of operation between charges)
2)
3) Status LEDs
4)
5) On-Off Switch
6)
7) Mini-USB Connector (for configuring, debugging, updating firmware, and getting AIS data over a physical wire if the bluetooth link should fail; also charges the battery)
8)
9) SATA Connector (accepts Raven-supplied cable that connects to the AIS data port on the ship)

10) Bluetooth Data Link

11) Weight: 3.6 oz, Dimensions: 4” x 2” x 1”



Top view of BPI:



LED States

The BPI has 4 Light Emitting Diodes (LEDs) with the following meanings:

Charging (Yellow LED)
Solid ……. battery is charging
Off ……. battery is fully charged or external power via USB cable is not present

AIS Data (Green LED)
Flash Codes … 3 – receiving AIS data from mis-wired Pilot Plug Interface
2 – in loopback mode
1 – searching for data on one of the various wire-pair combinations
Solid ……. receiving AIS data from properly wired Pilot Plug Interface
Off ……. battery discharged or no activity on ship's AIS PPI

Notes:
1) AIS data must stop for 10 seconds for Solid to change to Blinking.
2) See BPI message, 'Query PPI State', to determine details of mis-wiring.

Bluetooth (Blue LED)
Flash Codes … 3 – Initializing
2 – Waiting for pairing with host device
1 – Paired, but not connected
Solid ……. paired and connected
Off ……. battery discharged or on/off switch is off

Battery (Red LED)
Flash Codes … 2 – battery communications error
1 – battery charge is low
Solid ……. battery charge is not low
Off ……. battery is discharged or on/off switch is off

Messages Overview

The messages defined in this document pertain to the Raven BPI (Bluetooth Pilot Interface). These messages will be transmitted over the bluetooth wireless link between the BPI and the host computer running AisClient. They will also work when transmitted to the USB port of the BPI.

Messages Protocol

The messages use the Raven Starlink proprietary NMEA format and follow the NMEA sentence rules, including checksum, carriage return, and line feed ASCII control characters.

EXAMPLE: $PSLIQ,NAME,friendlyName*cc

In the example
- $PSLIQ represents a Starlink proprietary query message.
- BPI indicates the BPI device family.
- NAME indicates the type of query information desired.
- friendlyName indicates a message-specific field
- *cc indicates the checkusum, per NMEA.
- There is an assumed carriage return, 0x0d, and line feed, 0x0a, after the checksum.

Command Messages and Related Query Messages

The BPI responds to each set message with a response message, as indicated below. Some Set messages have corresponding Query messages and some do not.

Set BPI Name

$PSLIS,BPI,NAME,friendlyName*cc
$PSLIR,BPI,NAME,friendlyName*cc
friendlyName = user-friendly device name for the BPI when making a connection from a PC

$PSLIQ,BPI,NAME*cc
$PSLIR,BPI,NAME,friendlyName*cc

Set BPI Bluetooth Security Key

$PSLIS,BPI,BTKEY,key*cc
$PSLIR,BPI,BTKEY,key*cc
key = 4-digit bluetooth security key

$PSLIQ,BPI,BTKEY*cc
$PSLIR,BPI,BTKEY,key*cc

The BPI will not set the bluetooth security key until the the power is cycled on the BPI. The default securit key is 12345.

Set Event Messages On/Off

$PSLIS,BPI,EVENT,eventState*cc
$PSLIR,BPI,EVENT,eventState*cc
eventState = ON or OFF (power-on default = ON)

$PSLIQ,BPI,EVENT*cc
$PSLIR,BPI,EVENT,eventState*cc

Reset Command

$PSLIS,BPI,RESET*cc

This command restarts the BPI system, but does not change any saved settings. There is no response message.

Factory Default Command

$PSLIS,BPI,SETFACTORYDEFAULT*cc

This command restarts the BPI system with the factory default configuration values. Any previously saved configuration values will be lost. Issuing this command will cause loss of the bluetooth connection, if there is one. This command can be issued via the bluetooth or USB link, but the USB link is preferrable, since the USB link works regardless of the state of the bluetooth link. After issuing this command via the USB link, you will have to close and reopen the USB device. There is no response message.

Factory defaults are:
key = bluetooth security key or passkey, 12345
friendlyName = user-friendly name for use by hosts to better identify the BPI, “Raven-BPI”
eventState = event reporting is ON by default
lastHostAddress = none (cleared)

Loopback Mode

$PSLIS,BPI,LOOPBACK,state*cc
$PSLIR,BPI,LOOPBACK,state*cc
state = ON or OFF

When in the loopback mode, the BPI will place the AIS signal wires in their standard configuation and set the AIS data baud rate to 38400. The BPI turns off event-reporting while in loopback mode.

Nightmode for LEDs

The LEDs can be too bright at night. To dim the LEDs, send the following command with state = ON. To brighten the LEDs, let state = OFF. This command has no effect on the charging (yellow) LED.

$PSLIS,BPI,NIGHTMODE,state*cc
$PSLIR,BPI,NIGHTMODE,state*cc
state = ON or OFF

$PSLIQ,BPI,NIGHTMODE*cc
$PSLIR,BPI,NIGHTMODE,state*cc

Individual LED Brightness

The values for the day and night mode brightness (see Nightmode for LEDs, above) can be controlled using the following individual LED commands.

$PSLIS,BPI,RED,x,y
$PSLIR,BPI,RED,x,y

$PSLIS,BPI,GREEN,x,y
$PSLIR,BPI,GREEN,x,y

$PSLIS,BPI,BLUE,x,y
$PSLIR,BPI,BLUE,x,y

x is day brightness [10..254] default is x = 220 for RED, GREEN, and BLUE
y is night brightness [10..254] default is y = 20 for RED, GREEN, and BLUE

$PSLIQ,BPI,RED,x,y
$PSLIR,BPI,RED,x,y

$PSLIQ,BPI,GREEN,x,y
$PSLIR,BPI,GREEN,x,y

$PSLIQ,BPI,BLUE,x,y
$PSLIR,BPI,BLUE,x,y

Bluetooth AT Command Mode

$PSLIS,BPI,ATCOMMAND,state*cc
$PSLIR,BPI,ATCOMMAND,state*cc
state = ON or OFF

When in the AT Command mode, the host can send AT command modes over the bluetooth, AIS, or USB data link that will be sent by the Raven command processor to the bluetooth engine and the bluetooth engine responses will be sent back to the host. These are modem commands based on the Hayes standard, but specifically defined by the Ezurio bluetooth module.

This command is only valid when issued over the USB data link. The BPI ignores this command for the bluetooth or AIS data links.

Event and Diagnostic Messages

Event messages are returned unsolicted by the BPI if Event Messages have been turned on with the appropriate 'Set Event' message, previously described. Event messages are on by default, but can be turned off by using the EVENT message described earlier in this document.

Report PPI State

$PSLIR,BPI,PPI,baud,rxa,rxb,state*cc
baud = baud rate: 9600,19200,38400
rxa = the signal on the AIS XPNDR (TXA,TXB,RXA,RXB) to which the Raven RXA is connected
rxb = the signal on the AIS XPNDR (TXA,TXB,RXA,RXB) to which the Raven RXB is connected
state = <Data Found || Data Search> – <Wiring Error || Wiring ??? || Wiring Ok>

This message is the same as the response to a 'Query PPI State' message, but occurs automatically if event messages are on. If event messages are on, the BPI sends this message to the host each time the BPI switches wire states while searching for data.

Examples:
Seaching: $PSLIR,BPI,PPI,38400,TXA,TXB,Data Search,Wiring ???*cc
Data Found: $PSLIR,BPI,PPI,38400,TXB,TXA,Data Found,Wiring Ok*cc

Report AIS Data Scan Differential Voltages

$PSLIS,BPI,BEGIN_SCAN*cc
$PSLIR,BPI,SCAN,signalOne,signalTwo,voltage,positiveSamples,negativeSamples,baudMask*cc

Force the BPI to begin an AIS data scan, regardless of lock status.

This event is used by Raven internally for diagnostic purposes related to searching for valid AIS data on the PPI port. By default, the BPI automatically searches for data by trying different wire-pair combinations and baud rates. Baud rates are: 9600,19200,38400.

Signal Interval

$PSLIS,BPI,SIGINTERVAL,[secondsBetweenMeasurement]*cc
$PSLIQ,BPI,SIGINTERVAL

Reply:
$PSLIR,BPI,SIGINTERVAL,[seconds]

0 means the feature is off.

Performance

$PSLIR,BPI,PERF,[timeFor1000Loops,[SignalStrenghInDbm],[BER],[422DeltaV]*cc

Where:
timeFor1000Loops = time for the microprocessor to complete 1000 main loop iterations, in milliseconds
SignalStrenghInDbm = bluetooth transmit power, in dbm (only valid with monitoring on and connected)
BER = bluetooh bit-error-rate, in errors / million.
422DeltaV = RS422 signal strength, in millivolts (valid locked)
Due to peak-to-peak voltage measurment, 422DeltaV will be 0 from time to time.

This event message is sent every 10 seconds, like the battery message.

Stand-Alone Query Messages

When the BPI receives a specific query message, it will respond as indicated below.

Query Device ID
$PSLIQ,BPI,DID*cc

$PSLIR,BPI,DID,modelName,fwver,fwChecksum,hwver,nnnnnnnnnnnn,btkey*cc
modelName = "Raven-BPI". The model name cannot be changed. The model name and the user-friendly name used in the set NAME message are initially the same, but the user-friendly name can be changed.
fwver = firmware version
fwChecksum = firmware checksum
hwver = hardware version
nnnnnnnnnnnn = 12-digit MAC address of bluetooth module
btkey = bluetooth security key

Query Battery Parameters
$PSLIQ,BPI,BATTERY*cc

$PSLIR,BPI,BATTERY,charge,voltage,averageCurrent,charging,minutesToEmpty,minutesToFull*cc
charge = percent charged
voltage = battery output in volts
averageCurrent = average battery output current in milliamps
charging = 1 or 0 for YES or NO
minutesToEmpty = minutes to empty at current discharge rate (invalid if charging = 1)
minutesToFull = minutes to full at current charge rate (invalid if charging = 0)

If events are on (see 'Set Event Messages On/Off') the BPI automatically sends this message to the host each 30 seconds.

NOTE: If any of the variable fields above are unknown or invalid, then the value will be -1.

Query PPI State
$PSLIQ,BPI,PPI*cc

$PSLIR,BPI,PPI,baud,rxa,rxb,state*cc
baud = baud rate: 9600,19200,38400
rxa = the signal on the AIS XPNDR (TXA,TXB,RXA,RXB) to which the Raven RXA is connected
rxb = the signal on the AIS XPNDR (TXA,TXB,RXA,RXB) to which the Raven RXB is connected
state = <Data Found || Data Search> – <Wiring Error || Wiring ??? || Wiring Ok>

Example: $PSLIR,BPI,PPI,38400,AIS TXB,AIS TXA,Data Found,Wiring Ok*38

AIS XPNDR		Raven BPI
1 TXA	----------	1 RXA
4 TXB	----------	4 RXB
5 RXA	----------	5 TXA
6 RXB	----------	6 TXB
9 GND	----------	9 GND

Intentionally Left Blank

Contacting Raven Industries

Raven Industries is ready to receive your request for program and/or route data enhancements if you are an existing customer. If you are not a current customer, but would like to know more, please contact us.

Brad Anthenat, Program Manager (Raven ATC)
Raven ATC (Austin Technology Center)
14000 Summit Dr.
Suite 700
Austin, TX 78728
Ph. (512) 238-5821
Fax (512) 238-1135
Email: brad.anthenat@ravenind.com

Darrell McCauley, Ph.D., P.E.
Operations Manager, Austin Technology Center
14000 Summit Dr.
Suite 700
Austin, TX 78728
Ph. (512) 238-5826
Fax (512) 238-1135
Email: darrell.mccauley@ravenind.com

Charles D. Parker, Program Manager
43 Harrington Drive
Columbus, NJ 08022
Ph. (609) 424-0310
Fax (609) 424-0311
Email: chuckparkerrsc@att.net

Service and Support

Raven Industries
14000 Summit Drive
Suite 700
Austin, TX 78728
Phone: (800) 460-2167 (choose Option 4)
Email: MarineSupport@ravenind.com

Support hours: Monday – Friday 8 a.m. – 5 p.m. CST/CDT

Update History

By ……. Dale Gambill
Contributors …… Daniel Weber, Chuck Parker, Darrell McCauley

- 01-13-2008/dlg: Rev B, Added PERF and SIGINTERVAL messages; updated BPI photo on p. 4
- 08-29-2008/dlg: Rev A, First Release