

# *Using the BayRAD*

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## **DISCLAIMER**

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## **FCC COMPLIANCE**

The RAD is classified as a sub-assembly per FCC CST bulletin, #62, May 1984. The bulletin states that sub-assemblies are not themselves subject to the FCC rules. Only the end product is directly subject to the rules.

# HARDWARE DESCRIPTION

The BayRAD can be powered by 5V, by connecting a standard floppy-drive type power connector. JP3 must always be in the A position; with this setting the 12V input can be connected or unconnected without any effect.

CN1

```

1
.   5V
.|  ground
.|  ground
.|  12V
4

```

← outer edge of board

## SERIAL PORT

CN2 is the serial connector and the pinouts for the as follows:

CN2			CN2		
RS-232			RS-422/485		
	1	2		1	2
nc	.	nc	nc	.	nc
Tx	.	nc	TxB	.	RxB
Rx	.	nc	TxA	.	RxA
nc	.	nc	nc	.	nc
GND	.	nc	GND	.	nc
	9	10		9	10

With the standard serial configuration, the DB9 to 10 pin adapter may be connected to any RS-232 serial port. DB9 to 10 pin connectivity is shown below:

10 pin side		1	2	3	4	5	6	7	8	9
DB9 side		1	6	2	7	3	8	4	9	5

If the RS-422/485 option is installed, JBLK1 will also be installed and jumpers, when installed in positions 1 through 6, will perform the following:

JB1

- A . . This connects TxA to RxA.
- B . . This connects TxB to RxB.
- C . . This pulls RxA up to Vcc through a 36K resistor.
- D . . This pulls RxB to ground through a 36K resistor.
- E . . This places a 120 ohm terminating resistor across RxA and RxB.
- F . . This places a 120 ohm terminating resistor across TxA and TxB.

# COMMUNICATION PROTOCOL

All characters sent to the BayRAD with an ASCII code less than 80h and greater than 9f will be interpreted as display data or single byte control characters.

Following is a list of standard ASCII control characters that are used by the BayRAD :

07H Bell:	Turn on the beeper momentarily
08H Backspace:	Move cursor 1 space back
0AH Linefeed:	Move cursor 1 line lower. Wrap-around to the top if at the bottom.
0DH Carriage return:	Move cursor to beginning of current line
1AH Clear Screen:	Clear display and move cursor to home
1EH Home:	Move cursor to upper left corner

This should allow simplified code since many languages support carriage return and linefeed as an inherent part of their output functions.

## COMMANDS

The following are the commands supported by the BayRAD in instant mode:

- 80H Resync command. Sending 80H by itself will return the BayRAD to a known state. It is a good practice to do this as the first step of initialization. To understand the purpose of this command, consider the following: If the state of a particular BayRAD was not known, it could possibly be waiting for the second byte of a 2 byte command. When the 80H is received, it will be used as the data in this case. If the BayRAD was not waiting for a 2nd byte the 80H is simply ignored.
- 82H Return the firmware version for the BayRAD as 0FEH followed by two bytes of the version number.
- 84H Return Unit Status command. The response to this command is described in the RETURN CODES section.
- 86H Initialize the display type specified by the byte that follows. Currently the only type supported is 0 which is for 20x2 character displays.
- 88H Send the byte following this command to the display command register.
- 8AH Repeat the last character sent to the display the number of times selected by the byte following this command.
- 8CH Write to control register command. The control register can be manipulated 2 ways. The easiest way is to follow the register command with one of the following bytes:
  - 01H Turn relay 1 off (default)
  - 02H Turn relay 1 on
  - 03H Turn relay 2 off (default)
  - 04H Turn relay 2 on
  - 05H Send no response when opto-input changes state
  - 06H Send response when opto-input changes state (default).
  - 07H Select single character response to opto-input change of state. Send "Q" (51H) on a falling edge, and "R" (52H) on a rising edge (default).
  - 08H No beep when key pressed
  - 09H Beep when key pressed.

The second method is used when it is desired to have direct control over the register. When bit 7 of the second byte is set, the rest of the byte is written to the control register. For example, if the value of the second byte has bit 7 set then:

- Bit 0 would control relay 1 (1=on, 0=off)
- Bit 1 would control relay 2 (1=on, 0=off)
- Bit 2 if set, would cause a response to be sent when the opto-input changes state.
- Bit 3 would define the type of response sent as a result of an opto-input change of state. If 0, a "Q" (51H) will be sent on a falling edge, and "R" (52H) will be sent on a rising edge. If 1, the header 0FDh, will be sent followed by the unit status (the same response as received from a Return Unit Status command).
- Bit 4 if set, will generate a beep when a key pressed.

8EH Control LCD backlight according to the data byte following the command. Setting bit 3 in the data byte will turn on the LCD backlight (if so equipped). Clearing bit 3 will turn it off.

## RETURN CODES

The following codes are returned from the BayRAD:

0FDH,x This is sent in response to the Return Unit Status command (or, if programmed to do so, in response to a transition on the opto-input), where x is the status byte which is formatted as follows:

BIT	DESCRIPTION
0	Relay 1 state: 0=off, 1=on
1	Relay 2 state: 0=off, 1=on
2	Opto-input state: 0=off, 1=on
3-7	(reserved)

0FEH,x This is sent in response to the Return Firmware Version command, where x is the version number.

0FFH,01H This is sent when an invalid character or command was received.

0FFH,02H This is sent if the BayRAD receive buffer overflows.

Each of the 4 keys return a different character when pressed as shown below:

KEY	CHAR	CODE
Menu	M	4DH
Select	S	53H
+/Yes	Y	59H
-/No	N	4EH