

Highland DNC, Inc. Terminal Users Guide



Introduction

This operator interface terminal is designed specifically for the initiation of part program transfers and subsequent viewing of transfer activity, utilizing DNC systems manufactured by Highland Technology, supported now by Highland DNC, Inc.

In addition, this terminal was designed to become the functional replacement of the existing Highland rugged terminal (Map-501B Highland) used by existing DNC installations.

Features

1. Flat membrane, non-tactile, 59-key keyboard.
2. Audible key press tone.
3. 4 line by 40-character backlit, LCD display.
4. Rugged aluminum housing, NEMA 12 and IP54 rating.
5. **SETUP** key in conjunction with the FN key will put the terminal in the setup mode for adjusting the Baud rate 110 – 38.4k, Stop bits 1 or 2, Parity, even or none, and permanently store this configuration in non-volatile ram.
6. Nine programmable baud rates, 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 baud
7. RS232/422 capability on the Main and Auxiliary1 ports, 232 on Auxiliary2 and AUXUART port.
8. Full duplex Main port, i.e. keyboard entered characters are transmitted out the main port, received characters from the Main port or Auxiliary ports are displayed on the terminal display.
9. True transparent Auxiliary port on Auxiliary1 and Auxiliary2. Characters received and displayed on the terminal are passed directly through to the Auxiliary port without processor intervention. Characters received on the Auxiliary port are displayed on the terminal and passed directly through to the Main port without processor intervention.
10. Quick button access to **DOWNLOAD** and **UPLOAD** “DNC” functions. (Compatible to Map-501B Highland terminal **DOWNLOAD** and **UPLOAD** functions).
11. Internal quick disconnect Main and Auxiliary wiring terminal strip as well as Main and Auxiliary Rj11 jacks for modular cable installation.
12. Power supply, wide-range input 100-250VAC, 5VDC output, small profile with captive 5VDC output cable for wiring to internal quick disconnect terminal strip.
13. 32K byte non-volatile Ram for **Setup** configuration and special functions storage.

Design Enhancements to Map-501B Highland Terminal

1. 4 line by 40-character back lit, LCD display (2 line on Map-501B).
2. Additional transparent port Auxiliary2 and processor controlled UART port allow up to 2 additional downstream devices to be connected, i.e. another CNC Control serial port, Bar Code reader, other input device, etc.
3. Surge suppression on Main and Auxiliary1 ports.
4. Socketed components on all communication line I/O, enabling customer field replacement.
5. Designed for 24 – 48 hour turnaround on in-house service to be performed by Highland DNC.

Operating Temperature

0°C to 50°C, 32°F to 122°F

Storage Temperature

-20°C to 70°C, -68°F to 158°F

Terminal Operation

1. General:

The terminal functions as a full duplex terminal, displaying all received characters and transmitting all keyboard key entries with the exception of the “local” function keys. Characters received from the Main port are displayed on the terminal and passed directly through to the Auxiliary1 and Auxiliary2 port without processor intervention. Characters received on the Auxiliary1 and Auxiliary2 port are displayed on the terminal and passed directly through to the Main port without processor intervention. Characters received on the AUXUART port are displayed on the terminal and passed directly through to the Main port using processor intervention.

2. Terminal Display Function:

The terminal display function performs no emulation but simply responds to a Backspace as a non-destructive backspace, a Delete as a destructive backspace, a CR (carriage return) as a current line home position (non destructive), a LF (line feed) as a new line home position, and displays the standard upper case alpha character set and shifted/unshifted numeric and punctuation characters (As shown on keyboard layout).

3. Terminal Key Functions:

Keys Performing Local Functions

Download and Upload function keys are provided for compatibility with the Map 501B terminal.

DOWN LOAD – local message prompt “Enter download name:” “Enter” will send the entered character string and appended “XXXXX D <character string> CR ” out the main port.

UP LOAD – local message prompt “Enter upload name:” “Enter” will send the entered character string and appended “XXXXX U <character string> CR ” out the main port.

The **UP** and **DOWN** cursor allow scrolling through the past 16 lines of stored received character history. Any non-up or down cursor key pressed restores current line to bottom line.

The **LEFT** arrow is a destructive backspace on local character entry.

The **SETUP** key in conjunction with the FN key will put the terminal in the setup mode for adjusting the Baud rate 110 – 38.4k, Stop bits 1 or 2, Parity, even or none.

Locally and remotely, all the **Alpha**, **Numeric**, and **Punctuation** keyboard keys will display the respective ASCII character.

The **ESC** key will return the terminal from local function to full duplex terminal mode.

Keys Performing Remote Terminal Mode Functions

ESC, **SPACE**, **Alpha**, **Numeric**, and **Punctuation** keyboard keys will be transmitted as the respective ASCII character.

Received characters "A" through "Z" will be displayed and entered from the keyboard into the display as upper case only.

LEFT cursor = non-destructive backspace, **LEFT** arrow = destructive backspace, **ENTER** = CR.

"**CTRL**" + "A" through "Z" will transmit out the Main port the respective ASCII control codes; control codes will be non-displayable characters.

"**FN**" + Characters on keyboard shown shifted, will transmit out the Main port the respective ASCII control codes.

MEM and F1 through F10 keys are function keys utilized by special firmware.

4. **Scroll Buffer:**

Characters scrolled off the top of the display are entered into a memory buffer. This memory buffer and the currently displayed 4 lines are termed the "scroll buffer". The **UP** and **DOWN** cursor allow scrolling up or down respectively through the 16 line scroll buffer. Any character key, other than the **UP** and **DOWN** cursor, pressed while positioned up in the scroll buffer restores current line to bottom line and terminates the scroll function.

5. **Terminal SETUP Operation:**

A SETUP menu can be entered by simultaneously pressing the SETUP and FN key. The display will show

**BAUD = 9600 1-ALTER 2-NEXT 3-PREVIOUS
4-QUIT 5-SAVE**

1-ALTER will toggle through **110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400** in circular fashion from smaller to larger and from the end to the beginning.

2-NEXT will show

**PARITY = NONE 1-ALTER 2-NEXT 3-PREVIOUS
4-QUIT 5-SAVE**

1-ALTER will toggle between **NONE EVEN**

2-NEXT will show

**STOP BITS = 1 1-ALTER 2-NEXT 3-PREVIOUS
4-QUIT 5-SAVE**

1-ALTER will toggle between **1 2**

2-NEXT will wrap to baud menu again

4-QUIT will quit without altering the COM setup in the non-volatile RAM, **5-SAVE** will change the old COM setup in the non-volatile RAM to the just entered COM setup and reprogram the UART and baud rate clock to the new settings. A checksum of the 4-byte variables representing the Baud, Parity, and Stop bits will be calculated and stored in the non-volatile RAM. Upon power on, the settings checksum will again be calculated and compared to the stored checksum. If the checksums compare, the terminal COM will be initialized to these stored COM settings, else if not comparing the terminal will be set up for a default setting of 9600, 7, E, 1 and the stored COM settings will now reflect the default setting.

Pinouts

Terminal Strip Pinouts

Terminal strip provides RS232/422 for Main and AUX1 ports, RS232 only for AUX2 and AUXUART ports.

The terminal strip is typically used with stranded conductor wiring using Belden 8723. The terminal strip also enables wiring of existing cabling where the Highland terminal is replacing a Map 501B terminal.

Terminal strip pins 1 - 20

Main	AUX1	AUX2	AUXUART	Power
1 Ground	7 Ground	13 Ground	16 Ground	19 Ground
2 Rx- 232/422	8 Rx- 232/422	14 Rx	17 Rx	20 +5
3 Tx 232	9 Tx 232	15 Tx	18 Tx	
4 Rx+ 422	10 Rx+ 422			
5 Tx- 422	11 Tx- 422			
6 Tx+ 422	12 Tx+ 422			

Wiring for the Highland terminal in the Shop or Line Terminal configuration

Hub/Node	Cable 8723	Terminal Strip	Terminal Strip	Cable 8723	Typical CNC
22 Tx-	Black	2 Main Rx-	AUX1 Tx 9	White	3 Rx
23 Tx+	Red	4 Main Rx+	AUX1 Rx- 8	Red	2 Tx
15 Rx+	Green	6 Main Tx+	AUX1 Ground 7	Black	7 Ground
3 Rx-	White	5 Main Tx-			4,5 jumpered
1	Shield				6,8,20 jumpered

Wiring for the Highland terminal used with a UBTR (422 configuration)

Terminal Strip In	Cable 8723	UBTR Term Port
2 Main Rx-	White	5 Tx-
4 Main Rx+	Green	4 Tx+
6 Main Tx+	Red	6 Rx+
5 Main Tx-	Black	3 Rx-

Wiring for the Highland terminal used with a UBTR (232 configuration)

Terminal Strip In	Cable 8723	UBTR Term Port
1 Main Ground	Black	7 Ground
2 Main Rx	Red	2 Tx
3 Main Tx	White	3 Rx

Wiring for the Highland terminal used in the Line Terminal/ BTR (422 6pin molex configuration)

Hub/Node	Cable 8723	Terminal Strip	Terminal Strip	Cable 8723	BTR
22 Tx-	Black	2 Main Rx-	AUX1 Tx- 11	White	6 Rx-
23 Tx+	Red	4 Main Rx+	AUX1 Tx+ 12	Green	5 Rx+
15 Rx+	Green	6 Main Tx+	AUX1 Rx+ 10	Red	4 Tx+
3 Rx-	White	5 Main Tx-	AUX1 Rx- 8	Black	3 Tx-
1	Shield				

RJ11 Pinouts are typically used in applications using modular cables and A90X modular connectors. A typical connection would be from the PC Workstation's 9-pin COM port, via an A900 modular connector, through a straight modular cable to the Main RJ1 connector. A typical CNC connection would be from the AUX1-RJ2 through a straight modular cable via an A904 modular connector to the CNC's COM port (Typically a DB25 male). Rj11 connectors provide RS232 only on RJ1, RJ2, RJ3, RJ4

6 Conductor Modular cable made straight through, with the RJ11 connectors (Tab down, White on left, both ends).

RJ11 pin	Cable Color	MAIN-RJ1	AUX1-RJ2	AUX2-RJ3	AUXUART-RJ4
1	White	1 RTS pass	1 RTS pass	1 RTS pass	1 RTS pass
2	Black	2 Ground	2 Ground	2 Ground	2 Ground
3	Red	3 Tx	3 Rx	3 Tx	3 Tx
4	Green	4 Rx	4 Tx	4 Rx	4 Rx
5	Yellow	n/c	n/c	n/c	n/c
6	Blue	n/c	n/c	n/c	n/c
A90X modular connector		A900	A904	A900	A900

CNC A90X connectors are fabricated to match the CNC's connector, usually a DB25 male or female, using Xon/Xoff protocol or Hardware handshake. The following details the A90X connector for respective connections.

CNC Connector	Protocol	A90X Type
DB25 Female	Xon/Xoff	A904
DB25 Male	Xon/Xoff	A905
DB25 Female	Hardware/HS	A906
DB25 Male	Hardware/HS	A907

Character ASCII Key Code Chart

Key	Normal	FN	CTRL
A ~	41H	7EH	01H
B	42H	N/A	02H
C	43H	N/A	03H
D _	44H	5FH	04H
E #	45H	23H	05H
F [46H	5BH	06H
G]	47H	5DH	07H
H {	48H	7BH	08H
I *	49H	2AH	09H
J }	4AH	7DH	0AH
K	4BH	N/A	0BH
L	4CH	N/A	0CH
M	4DH	N/A	0DH
N	4EH	N/A	0EH
O (4FH	28H	0FH
P)	50H	29H	10H
Q !	51H	21H	11H
R \$	52H	24H	12H
S ‘	53H	27H	13H
T %	54H	25H	14H
U &	55H	26H	15H
V	56H	N/A	16H
W @	57H	40H	17H
X	58H	N/A	18H
Y ^	59H	5EH	19H
Z	5AH	N/A	1AH
1	31H	TBD	N/A
2	32H	TBD	N/A
3	33H	TBD	N/A
4	34H	TBD	N/A
5	35H	TBD	N/A
6	36H	TBD	N/A
7	37H	TBD	N/A
8	38H	TBD	N/A
9	39H	TBD	N/A
0	30H	TBD	N/A
- +	2DH	2BH	N/A
: ;	3AH	3BH	N/A
/ ?	2FH	3FH	N/A
\	5CH	7CH	N/A
, <	2CH	3CH	N/A
. >	2EH	3EH	N/A
SPACE	20H	N/A	N/A
DEL(left arrow)	7FH	N/A	N/A
ESC	1BH	N/A	N/A
BS(left cursor)	08H	N/A	N/A

Product Support

**HIGHLAND DNC, INC.
2908 WARD KLINE RD.
MYERSVILLE, MD. 21773
PH. 301-293-9530
FAX. 301-293-1940
INFO@HIGHLANDDNC.COM**