

Programming directions for the compact Brookhouse NMEA Multiplexer LCD

Preparations

Unless you already know what the NMEA sentences that are produced by the instruments look like, you will need to analyse the sentence contents closely to determine which data you want to extract to be displayed.

1. Connect your Brookhouse multiplexer as explained in the installation instructions and the diagrams available on the Brookhouse website.
2. Configure standard Windows program Hyperterminal for capturing NMEA data from the instruments. Hyperterminal can also be used later for uploading the screen definitions.
 - Go to Start->Programs->Accessories>Communication. Click Hyperterminal.
 - New Connection name: NMEA Mux direct COMn, where n is the port number.
 - "Connect to" - Window: Select COMn, where n is the port number where the mux is connected to.
 - Select BPS: 9600, Data bits: 8, Parity: None, Stop bits: 1, Flow control: none. Click OK. If the mux output transmission speed is set to 4800, select 4800.
 - Go to File->Properties->Settings
 - Select Emulation: TTY, ASCII setup: Tick Send Line ends with Line feeds.
3. With the multiplexer and instruments switched on, NMEA sentences should now be displayed on the Hyperterminal screen. To capture the data, go to the transfer menu Transfer and select <Capture Text> or <Capture to Printer>. When finished, terminate Hyperterminal and save the session for later use.
4. Make a list of NMEA data-items you wish to display, in which combinations and in which sequential screen-numbers.
5. Use pencil and paper to draw layouts of the required screens (2 lines of 16 characters per screen).

1. Determine where fixed text and data from NMEA sentences has to be placed. Character positions are numbered 1-32, i.e. character 1 on line 2 is pos. 17.
2. Creating and/or editing the Screens definition text file can best be explained with an example. Create a special directory NMEAMUX on your hard drive and copy file lcddefs.txt from the supplied CD to this directory.
3. Double click on the file name. This will start program Notepad. It will show the following:

```
-- GPS Position (GLL) --  
12345678901123456  
  
#SCREEN 1  
Lat: --β--.'-  
Lon:---β--.'-  
* 9,GPGLL,1,1,6,2,0
```

* 9,GPGLL,1,3,9,6,0
* 9,GPGLL,2,1,16,1,0
* 9,GPGLL,3,1,21,3,0
* 9,GPGLL,3,4,25,6,0
* 9,GPGLL,4,1,32,1,0

-- Course & Speed over ground (RMC) --
1234567890123456

#SCREEN 2
COG: ----- β
SOG: ----- Knots
* 9,GPRMC,7,1,22,5,0
* 9,GPRMC,8,1,6,5,0

-- Heading and speed through the water (VHW) --
1234567890123456

#SCREEN 3
Speed: ----- Kn
Heading: -----β
* 9,??VHW,1,1,26,6,0
* 9,??VHW,5,1,9,5,0

-- Relative wind direction and speed (VWR) --
1234567890123456

#SCREEN 4
Wind: -----β -
Speed: ---- Kn
* 9,??VWR,1,1,7,5,0
* 9,??VWR,2,1,15,1,0
* 9,??VWR,3,1,24,4,0

-- Log total & trip (VLW) --
1234567890123456

#SCREEN 5
Log: -----NM
Trip: -----NM
* 9,??VLW,1,1,6,9,0
* 9,??VLW,3,1,23,7,0

-- Depth below transducer (DBT) --
1234567890123456

#SCREEN 6
Depth: ----- M
----- f
* 9,??DBT,1,1,25,6,0
* 9,??DBT,3,1,9,6,0

-- Cross Track Error (RMB) --
1234567890123456

```

#SCREEN 7
Cross Track Err.
----- NM -
* 9,??RMB,2,1,20,6,0
* 9,??RMB,3,1,30,1,0

-- Water temperature (MTW)
1234567890123456

#SCREEN 8
Water Temp.
----- B -
* 9,??MTW,1,1,21,5,0
* 9,??MTW,2,1,29,1,0

-- UTC latest fix (RMC) --
1234567890123456

#SCREEN 9
Time latest fix
(UTC) --:--:--
* 9,??RMC,1,1,23,2,0
* 9,??RMC,1,3,26,2,0
* 9,??RMC,1,5,29,2,0

#C
#END

```

4. Explanation of the above definitions, starting with line 1:
- a. "GPS Position (GLL)" : Comment only.
 - b. 1234567890123456 : Comment only, used to aid counting of character positions of definitions on following lines.
 - c. # SCREEN 1 : Signals start of definitions for screen 1. Upper case characters are required. The number sign (#) is required, no space between # and SCREEN. A space between SCREEN and the screen number is required. A maximum of 25 screens can be defined.
 - d. The 2 lines immediately following #SCREEN 1 contain the fixed text for that screen. The hyphens (-) are only used as an aid to count position and length of the data. All hyphens will be translated to spaces when the definitions are loaded in the multiplexer. The symbol **B** is the degrees symbol. Unfortunately this symbol is not displayed correctly in Notepad. If you need the symbol elsewhere in a (new) definition, just copy it in Notepad with copy and paste.
 - e. * **9,GPGLL,1,1,6,2,0** Is the definition of the first data field:
 - i. * Indicates the start of a data-field definition.
 - ii. **9** = NMEA Multiplexer port number. If 1-4, only data from that port will be used for this data-item. 9 indicates "Any port number"
 - iii. **GPGLL** = NMEA Id and Sentence ID. This identifies the sentence which contains the data to be displayed. If the first 2 letters are question marks (??), this means "Any NMEA ID".
 - iv. **1** = Data field number (parameter number). 1 means "following the 1st comma" in the sentence.

- v. **1** = Start position within data field. Usually 1, except for split data fields (see 2nd definition).
- vi. **6** = Start position on LCD. Positions are numbered 1-32.
- vii. **2** = Number of characters. These 2 characters are the degrees part of the Latitude of the GPGLL NMEA sentence.
- viii. **0** = Always 0

All data-field definitions for screen 1 follow, one per line. A maximum of 50 data-items to be displayed can be defined for all screens combined.

- f. The second definition for screen 1: * **9,GPGLL,1,3,9,6,0** is an example of a data-field that does not start at pos. 1. This is the minutes-part of the Latitude from the \$GPGLL NMEA sentence.
- g. All subsequent definitions follow the same rules. The definitions end with the **#END** directive.
- h. The **#C** directive is for Seataalk conversion only, to select water temperature in degrees Celsius. Use **#F** for Fahrenheit.

Notes:

- i. The screen numbers do not have to be sequential in the definitions, but when displayed on the LCD they are displayed in sequence of screen number.
 - ii. A screen number should only be used once. During uploading, the multiplexer determines the highest defined screen number. When the LCD push button is depressed repeatedly, all screens are displayed one by one and after the highest defined number has been displayed, the message End – Version x.x is displayed. The first screen is displayed when the button is pressed again.
 - iii. If there are gaps in the screen definitions, blank screens appear in these positions.
 - iv. By default, the “power-up” screen is screen 1. However, this can be changed without having to redefine the screens. By keeping the pushbutton depressed while the required screen is displayed, until the word **Set** appears, next time the multiplexer is powered up, that screen will be displayed.
5. After completion of the editing of the screen definitions, save the text file. Uploading of the definitions can now start. Start the Hyperterminal program again. The session saved earlier after the data capturing can be used. If the multiplexer is still switched on, switch it off now. Make sure that both the TxD and RxD lines of the computer are connected to the mux. Uploading takes place at the baudrate currently set in the mux (initially 4800). If you need to change the baudrate in Hyperterminal, terminate Hyperterminal and start it up again for the new baudrate to take effect.
 6. The multiplexer can be started in “setup mode” in 2 ways. Program Hyperterminal must be the foreground application on the computer. If the LCD is already connected, keep the screen selection pushbutton depressed while the mux is switched on. The words <Option Select> will appear. Repeatedly press the pushbutton until <Upload> is displayed. Now press the button again but keep it depressed until <Press ESC> is displayed. Now press ESC on the computer keyboard and the Upload message from the multiplexer will appear on the Hyperterminal screen. The second method for starting the Upload is by keeping ESC on the keyboard depressed (in Hyperterminal) while the multiplexer is switched on. Please note that on some keyboards, <Shift-ESC> has to be entered.
 7. The text file with screen definitions can now be uploaded to the multiplexer by going to the Transfer menu in Hyperterminal and selecting <Send Textfile>. Specify the file containing your definitions and press OK.
 8. The definitions are transmitted and the multiplexer checks for syntax errors. If an error is found, a message appears and the uploading stops. Correct the error, switch off the mux

- and start the upload again. When all data is accepted, the message <Upload Complete> appears on the Hyperterminal screen.
9. Switch off the multiplexer and switch it on again. The defined screens can now be displayed one by one by pressing the pushbutton. You will probably have made some mistakes, resulting in data being displayed in the wrong positions. Review the definitions, make corrections and repeat the upload process. The flash memory can be re-written 100000 times.