

Manual
LCD (2 x 16) Display Module
Model 6526

Revision History

File name / Revision	Date	Authors
Previous version BX	2004	RS/ JH
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1 INTRODUCTION

The 6536LCD Display Module is designed to be used with:

- Model 6536 STARFLOW Ultrasonic Doppler Flow Instrument.
- Model 8007DWLR Digital Water Level Recorder.
- Model 6538A Digital Water Turbidity Instrument.

External power sources are required for Models 8007DWLR and 6538B. Their internal power sources are inadequate for long term use with this display module.

The 6536LCD is supplied in two forms. In Type 1 the unit is fitted to the lid of the standard Unidata Weatherproof enclosure. The weatherproof enclosure normally contains a field termination strip and batteries for a STARFLOW. In Type 2 it is enclosed in a small weatherproof polycarbonate box fitted with prewired SQL connectors for direct connection to an instrument. The SQL connections are designed to be 'pass through' so you can connect a computer to the instrument without disconnecting the power or display.

In low power applications the display module power supply can be wired to a switch so it is only switched on when necessary. The display is refreshed every scan - normally 15 seconds with a STARFLOW or 60 seconds with a DWLR. It will remain blank when power is applied until it receives a message from the instrument to which it is connected.

The contrast of the display can be varied with a potentiometer mounted on the circuit board. Turning it clockwise will darken the display.

2 SPECIFICATIONS

Display format:	Two lines of sixteen characters.
Power supply:	6 to 18 VDC @ 3mA.
Type 1 - Housing:	Standard 1U Unidata Weatherproof Enclosure Lid.
Type 2 - Housing:	110mm x 75mm x 55mm (W x H x D) polycarbonate box.
Operating temperature:	0° to 50°C (32° to 122°F).
Storage temperature:	10° to 60°C (14° to 140°F).
LCD type:	Supertwist (STN), yellow-green, no backlight.
Optimum viewing direction:	6 O'Clock.
Connectors:	Type II - SQL 7 pin connectors (pass through) - 1 x male and 1 x female.
Serial Signal:	RS232C @ 9600bps, 8 bits, no parity, 1 stop bit (TTL OK).
Serial Protocol:	ASCII text with special commands for formatting.

3 INSTALLATION

3.1 Scheme set-up

The scheme used for the parent instrument, such as the 8007DWLR, must include the display module as an additional instrument, otherwise the display will remain blank.

UNIDATA has defined a group of standard instruments called 6536LCD, 8007LCD, 6538LCD for the display module. These ensure the correct data are displayed on the LCD. For example, the 6536LCD instrument will cause the display module to show the following information.

2	2	.	3	2	°	C			1	2	.	3	6	V
0	3	2	1	m	m	/	s		1	2	0	1	m	m

The information shown is (left to right, top to bottom): water temperature, battery supply voltage, water flow in mm per second and water depth in mm.

If you do not have the instrument definitions they are available on the Unidata Australia website - www.unidata.com.au/files/index.htm.

3.2 Wiring

Type 1 - You can connect the Type 1 display to a STARFLOW field termination strip. There are three connections (shown in the following table). You can also connect the Type 1 display to an instrument (via an SQL connector) once it has been wired.

Description	Wire Color	STARFLOW FTS Connection No.	Connector Pin No.
+ Power	Red	Parallel with +12VDC BAT+ terminal – Terminal No. 15.	Pin 1
RxD Signal from Instrument	Black	Parallel with the RD signal line – Terminal No. 2 or 24 (SQL 1 or 2 respectively).	Pin 2
Ground	Braided Shield	Parallel with –12VDC BAT-terminal – Terminal No. 16.	Pin 7

Where a wire is to be ‘paralleled’ both wires should be securely connected to the screw terminal.

Type 2 - You can connect the Type 2 display directly to an instrument via the SQL connector marked *Instrument*. You must connect the SQL connector marked *Comms* and *Power* to the standard Unidata SQL power and signal connector Model 6603D.

Note that you will require an additional 6 to 12VDC (3mA) power source to run the display module with the 8007DWLR and the 6538A Turbidity Instrument AS THERE IS NO POWER available from those instruments. Unidata sells a range of 12V batteries and solar panels suitable for this purpose.

3.2.1 Modifying the Display Software

It is possible to modify the displayed data and format, however, Unidata recommends that only experienced Starlog users attempt such modifications. To modify the display data and format, you must edit (using a standard text editor) a file called 6526LCD.src. This file is located in the c:\starlog folder. The instructions in this file are written in the Unidata PDLMASM language. If you are not experienced with PDLMASM, request assistance from a Unidata office.

Appendix A Appendix Control Codes and Custom Characters

The table below shows the LCD instructions. To execute these send a 254 (decimal) code followed by the required instruction.

Table 1. LCD Instructions

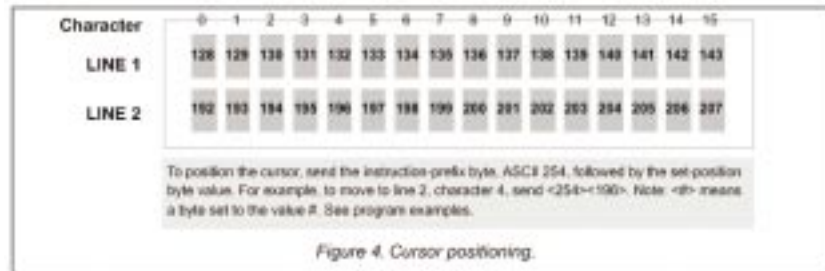
Instruction/Action	Code
✘ Clear Screen	1
Scroll display one character left (all lines)	24
Scroll display one character right (all lines)	28
✘ Home (move cursor to top/left character position)	2
Move cursor one character left	16
Move cursor one character right	20
Turn on visible underline cursor	14
Turn on visible blinking-block cursor	13
Make cursor invisible	12
Blank the display (without clearing)	8
Restore the display (with cursor hidden)	12
Set cursor position (DDRAM address)	128 + addr
Set pointer in character-generator (CG) RAM	64 + addr

✘ These instructions take more than 1 ms for the LCD to execute. At 9600 bps, either pause 1ms after these instructions or follow them with <254><128> (where <#> means a byte set to #). At 2400 bps, no pause or extra instruction is required.

Advanced LCD users: These are the actual LCD instruction codes. When the interface receives the instruction prefix, it clears the register select (RS) bit. The next received byte is written to the LCD with RS low. After writing that byte, it returns RS high (normal data mode). This means that you can send any valid LCD instruction through the interface. Since the interface initializes the LCD at startup, you must **not** send any initialization instructions. If you did not understand the preceding, don't worry. You don't need to know any of this to use this product. The info may be handy to advanced users adapting programs written to drive the BPI-216 to applications that drive an LCD directly through its parallel interface.

Positioning the Cursor

You can position the cursor anywhere on the screen by sending the proper instruction. Figure 4 shows the layout of the 2x16 LCD screen with the cursor-positioning instruction for each character location.



Off-Screen Memory (No Line Wrap)

When you print past the end of a line, the next 24 characters do not show up on the screen. They are not lost, they are in an off-screen memory area. All alphanumeric LCD modules have 80 bytes of memory, arranged appropriately for a 2x40 screen. On LCDs with smaller screens (such as this 2x16), text printed past the end of a visible line goes into memory, but can't be seen on the screen. Use cursor-positioning instructions to print to a particular location on the display. Or deliberately print in off-screen memory to temporarily hide text, then send scroll-left instructions to reveal it.

Defining Custom Symbols

Most of the LCD characters (figure 6) cannot be changed because they are stored in ROM. However, the first eight symbols, corresponding to ASCII 0 through 7, are stored in RAM. By writing new values to the character-generator (CG) RAM, you can alter these characters. Changing a symbol is easy; just point to the beginning of the symbol's RAM location, then write eight bytes whose bits form the desired pattern. Then position the cursor onto the screen. See figure 5.

Manipulating custom characters allows you to create special effects, like simple animations. See serial display application notes at www.seetron.com for examples and a handy visual character editor.

