

STARLOG

STARFLOW LCD MODULE

**Model 6701S/LCD**  
**Model 6526LCD**

**Instructions for Unidata Starflow LCD (4 x 16) Display Module – HSIO Version**

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## Instructions for Unidata Starflow LCD (4 x 16) Display Module – HSIO Version

### 1 Introduction

The Starflow Liquid Crystal Display (LCD) Module interfaces with the Model 6526 STARFLOW Ultrasonic Doppler Flow Instrument sold by Unidata. The LCD Module can also be used with similar MicroLogger instruments, such as the 8007WDP Digital Water Level Recorder and the 6538A Digital Water Turbidity Instrument. In the case of the 8007WDP Digital Water Level Recorder, an external power source should be arranged as the internal lithium power-pack is not adequate for long-term use of the display module.

The **6701S/LCD** (referred to as a **Type 1 Module**) has the LCD mounted on the hinged lid of a large weatherproof poly-carbonate enclosure. The Type 1 enclosure is fitted with a Field Termination Strip (FTS – 6103K), 12V 12AH Sealed Lead-Acid Battery (6907C), and Drying Tube (6603DT). Four (4) pre-wired 'SQL' type connectors for direct connection to the instrument, computer, solar panel/external power, and Auxiliary equipment are wired to the FTS.

The **6526LCD** (referred to as a **Type 2 Module**) is packaged in a small weatherproof poly-carbonate enclosure, fitted with pre-wired 'SQL' type connectors for direct connection to an instrument, and computer/external power (using a 6603D cable assembly). The SQL connections are designed to be 'pass through' so that the computer can connect to the instrument without disconnecting the power or display.

Both Type 1 and 2 modules use the HSIO data bus or the RS232 to communicate with the Starlogger and Instruments.

In the HSIO implementation, the RS232 line is still available for other purposes such as dialing out modems. To use the HSIO bus two signal lines (data + clock) and ground are required – the 'sync' line used on older HSIO instruments is not required. The SQL connections are designed to be 'pass through' so that the computer can connect to the instrument without disconnecting the display.

To save power, the display modules power supply can be wired to a user installed switch so that the module is switched on when necessary. The module display is refreshed every scan (i.e. normally 15 seconds with a STARFLOW or 60 seconds with a DWLR) and will display a test message when power is applied until a message from the instrument is received. The button on the front panel is to reset the display.

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

### 2 Specifications

<b>Display format</b>	4 lines x 16 characters Super Twist Display – no backlight
<b>Power supply</b>	8 to 18 VDC @ 3.5mA
<b>Housing size</b>	<b>Type 1:</b> 280mmH x 190mmW x 130mmD (Standard Enclosure) <b>Type 2:</b> 110mmH x 130mmW x 75mmD
<b>Operating temperature</b>	0° to 50°C (32° to 122°F)
<b>Storage temperature</b>	-10° to 60°C (14° to 140°F)
<b>LCD type</b>	Supertwist (STN), yellow-green
<b>Optimum viewing direction</b>	6 o'clock
<b>Type II Connectors</b>	SQL 7 pin connectors (pass through – 1 x male, 1 x female)
<b>Serial Signal</b>	Unidata HSIO standard Synchronous Protocol – RS232 also available.
<b>Serial Protocol</b>	ASCII text with special commands for formatting

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### 3 Installation

#### 3.1 Scheme

The Scheme that the instrument uses must be set up to accommodate the display module as an additional instrument. If this is not done the display will remain blank. There is a group of standard instruments defined for the display module called '6526LCDM', '8007LCDM', '6538LCDM', '6526LCDI', '8007LCDI', '6538LCDI' – this instrument will set the scheme to display the appropriate data required from the selected instrument in the appropriate metric or imperial units. If you do not have the instrument definitions they are available on the Unidata Australia website ([www.unidata.com.au](http://www.unidata.com.au)). As an example the '6526LCD' instrument will cause the display module to show the following information.

2	2	.	3	2	°	C	0	3	2	1	m	m	/	S
1	2	.	3	6	V		1	2	0	1	m	m		
1	2	3	4	5	6		M	L						
L	O	G	G	I	3.1	G	O	K						

The information shown is:

- Line 1 Water temperature                      Water flow in mm per second,
- Line 2 Battery supply voltage              Water depth in mm
- Line 3 Totalized flow
- Line 4 Logging status.

**Note:** There are instrument definitions available for Metric and Imperial Measurements.

#### 3.2 Wiring

**Type 1** – The type 1 display is wired into a STARFLOW field termination strip (6103K). There are four connections as outlined in the table below. The type 1 display can be connected also to an SQL connector for direct connection to an instrument once it has been wired.

Description	PCB Connector Pin No.	Wire Color	STARFLOW FTS Connection No.	SQL Connector Pin No.
+ Power	Pin 1	Red	Parallel with +12VDC BAT+ terminal – Terminal No. 15.	Pin 1
Ground	Pin 2	Green (& Brown)	Parallel with –12VDC BAT- terminal – Terminal No. 16.	Pin 7
RS232 Rx (Inst. Tx)	Pin 3	Yellow	Parallel with Tx Data from Instrument – Terminal No. 2	
Clock Signal from Instrument	Pin 4	Purple	–Terminal No. 5	Pin 5
Data Signal from Instrument	Pin 5	Blue	–Terminal No. 6	Pin 6
Aux (Reserved)	Pin 6	-	No connection	-

**Note:** Where a wire is to be 'paralleled' both wires should be securely connected to the screw terminal.

**Type 2** – The type 2 display is to be connected directly to an instrument via the female SQL connector (on the left side of the enclosure). The Male SQL connector (on the right side of the

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enclosure) supports connection to Comms and Power, and should be attached to the standard Unidata SQL power and signal connector cable Model 6603D.

When used with a 8007WDP Digital Water Level Recorder, an external 8 - 18VDC (3mA) power source is required to run the display module as there is no power available from the self-powered instrument itself. Unidata sells a range of 12V batteries and solar panels suitable for this purpose.

### 4 Modification of the Display Software

It is possible for the displayed data and format to be modified by an experienced Starlog user. To do this the instrument file called 'LCD\_HS.INC' located in the c:\Starlog\Schemes directory needs to be edited with a notepad editor. This file uses the standard Unidata PDLASM language. If you are not experienced in programming using the PDLASM language please request a Unidata office to assist.

### 5 Programming a Scheme to Use the LCD Instrument

There is a default scheme available for each of the LCD instrument. The default scheme can be used immediately, once programmed into the correct logger.

#### 5.1 Installing an Imperial LCD Instrument

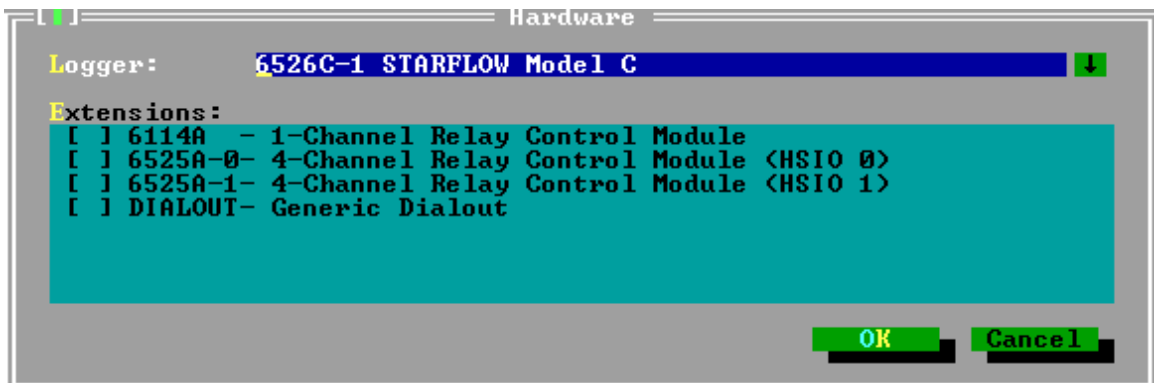
The following section describes how-to create a scheme and install the LCD instrument. The following example uses the Starflow Model C and the 6526LCDI LCD Display instrument (I = Imperial).

*Note: Make sure you have Imperial units selected (From the Starlog Software's opening screen menu bar select CONFIGURE then UNITS).*

##### 5.1.1 Create a scheme

From the Starlog Version 3 software's opening screen menu bar select, SYSTEM then SCHEME EDITOR, this will launch the scheme editor in which you will be able to create a new scheme.

From the Scheme Editor's menu bar select SCHEME then CREATE, a dialog box similar to the following will be displayed:



Click the Small (drop down) arrow on the right hand side of the Logger field; scroll down to select the logger type to be used. In this case it's a 6526C-1 STARFLOW Model C.

Click OK, The scheme editor will open a scheme template for the STARFLOW Model C. The template contains default values for scan rate, logging interval etc...

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Two instruments need to be included into the scheme to allow the LCD instrument to work, the first instrument is a set of Starflow flow extensions (located in pdltrans.imp). The second instrument is the 6526LCDI instrument, which has three different types of flow extension, Small, Large and Very Large. The flow extension you choose depends on your application.

### 5.1.2 Installing a Flow Extension instrument

From the scheme editor's menu bar select WINDOW then INSTRUMENTS then INSTALL a dialog box similar to the following will be displayed:



Select the PDLTRANS.IMP entry then click OK.

A list box will be displayed allowing you to select the appropriate flow extension for you application. In this example the 6526-1g (Large) flow extension will be used. Once a flow extension has been selected click OK, the flow extension will be added to the instruments list.

### 5.1.3 Installing the 6526LCDI instrument

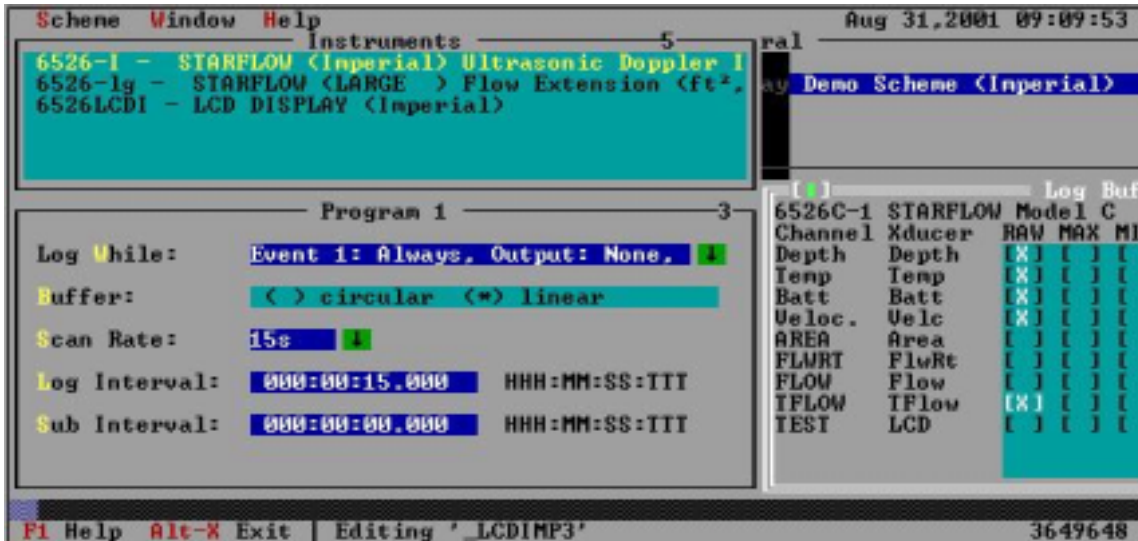
From the Scheme editor's menu bar select WINDOW then INSTRUMENTS then INSTALL. A dialog box similar to the following will be displayed.



Select the 6526LCDI.imp entry then click OK. Another dialog box will be displayed listing the 6526LCDI instrument select it then click OK.

The 6526LCDI instrument will be added to the Instruments list along with the flow extension instrument inserted earlier in this example. The instruments list should appear as below.

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The scheme can now be configured as normal (e.g. scan rate, logging interval).

Once configuration changes have been made save the scheme by selecting SCHEME then SAVE from the scheme editor's menu bar. The scheme is now ready to be programmed into the Starflow.

**Note:** *Before Programming the Starflow with the scheme check the following:*

- If using the Imperial system make sure you have the software configured to use Imperial units. You can switch between Metric and Imperial units using the CONFIGURE then UNITS menu option on the Starlog Software's opening screen.
- Make sure the Starflow C to be used has had its firmware updated with the UDI4v2.BIN firmware file. (see upgrading firmware Starflow Hardware Manual)
- Make sure the Starflows CDT has been changed to use HSIO (HSIO checked) and The no. of data to send field is set to 0.

### 5.2 Installing a Metric LCD Display

The procedure for installing the Metric LCD display is the same as Section 5.1 above, except using Metric units and the 6526LCDM instrument.

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### Appendix A – Control Codes

The LCD uses very simple control codes.

There are listed below. To use a control code simply include the code in the transmitted string. (Note – the control code will NOT be shown on the LCD).

Command		Value	Description
Clear LCD	=	10 (decimal)	Clears LCD and returns Cursor to Position 1 – Note: takes time – use 13 if possible.
Move to Line 1 Start	=	13 (decimal)	Move cursor to Line 1 Position 1 – useful for refreshing display instead of clearing.
Move to Line 2 Start	=	'\`' -or- 92 (decimal)	Move to Line 2 Position 1
Move to Line 3 Start	=	'~' -or- 126 (decimal)	Move to Line 3 Position 1
Move to Line 4 Start	=	'`' -or- 96 (decimal)	Move to Line 4 Position 1
Turn off LCD	=	15 (decimal)	Shutdown display to save power
Turn on LCD	=	16 (decimal)	Turn display back on.
Turn off Instrument	=	27 (decimal)	Turn off instrument until reset button pressed or power on occurs. Saves power.
End of Transmission	=	03 (decimal)	Required at the end of all strings for sync purposes.

Appendix B – Character Set

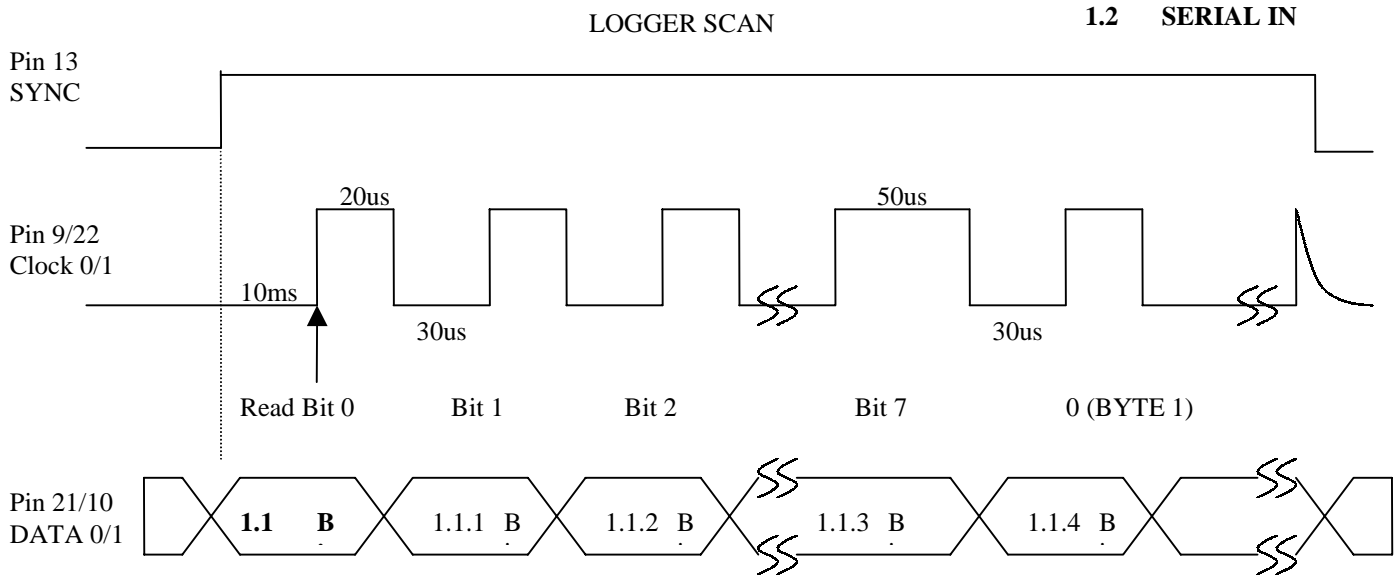
Upper 4bit Lower 4bit	Upper 4bit															
	LLLL	LLHL	LLHH	LHLL	LHHH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH	
LLLL	CG RAM (1)															
LLHH	(2)															
LJHL	(3)															
LJHH	(4)															
LHLL	(5)															
LHHL	(6)															
LHHH	(7)															
LHHH	(8)															
HLLL	(1)															
HLLH	(2)															
HLHL	(3)															
HLHH	(4)															
HHLL	(5)															
HHLH	(6)															
HHHL	(7)															
HHHH	(8)															

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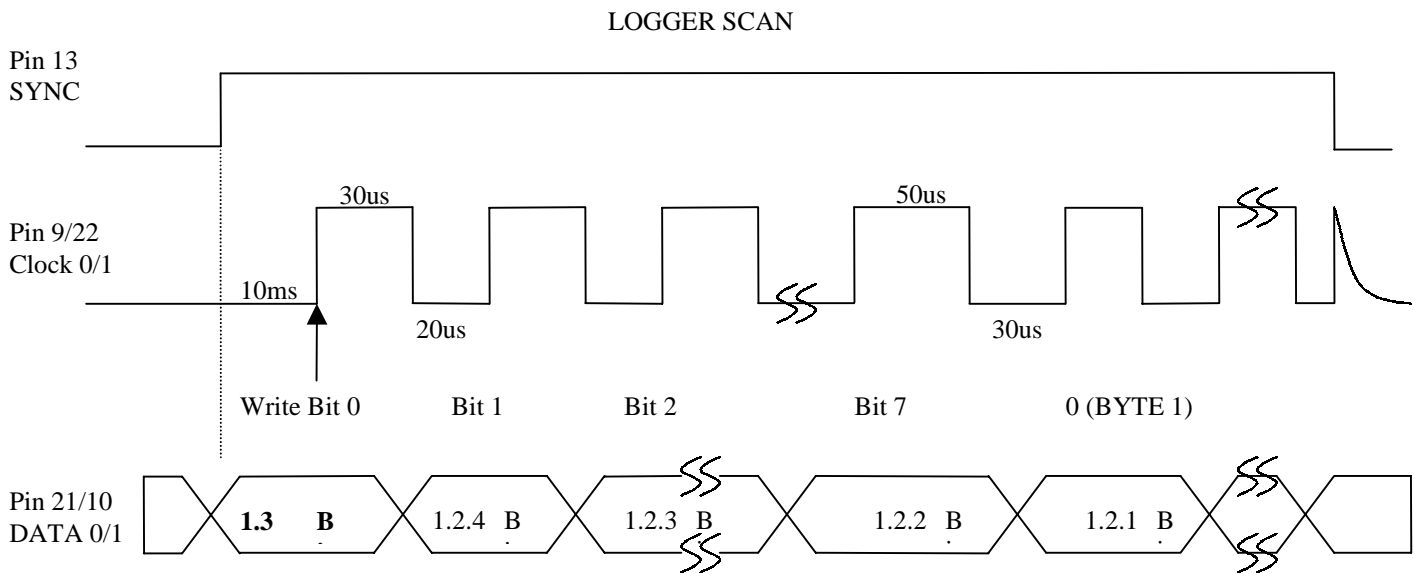
**Appendix C – HSIO Specifications**

Each logger scan the High-Speed Serial ports are read. The Sync signal (Pin 13) is used to indicate to the remote equipment that a logger read scan is about to begin. The signal is usually used to load the serial shift register(s) in the remote equipment in preparation of being read. Serial transfer rate is 50 Microseconds per bit with a 30-microsecond gap between each byte (see timing diagrams for both Serial In and Serial Out below)

***Note: The first data bit LSB must be present on the Data (0/1) signal within 7ms after the Sync signal.***



**Figure1: Serial Timing Diagram**



**Figure2 Serial Out Timing Diagram**