



NetLinx Module Interface Specification

for a

Sharp Aquos LCD Display

TABLE OF CONTENTS

Introduction	3
Overview	3
Implementation	3
Channels	4
Levels	4
Command Interface	6
String Feedback	8
Device Notes	10
Programming Notes	10
Adding Functions to Modules	10
Commands to the device	10
Additional Feedback from the device	11

Revision History

Date	Initials	Comments
6/9/08	DC	Initial release
6/27/08	DC	Added volume control and Mute
2/5/12	DC	Added Tuner Control
7/23/13	DC	Allow for volume > 99

Introduction

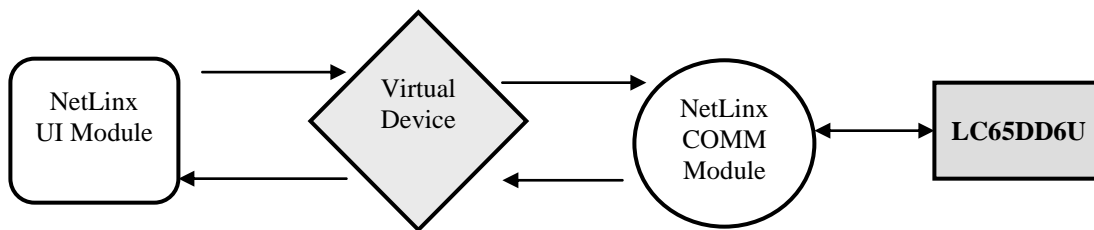
This is a reference manual to describe the interface provided between an AMX NetLinx system and a Sharp LCD display. The required communication settings are a baud rate of 9600, 8 data bits, 1 stop bit, no parity, and handshaking off.

Overview

The COMM module translates between the standard interface described below and the **LCD** serial protocol. It parses the buffer for responses from the LCD, sends strings to control the LCD, and receives commands from the UI module or telnet sessions.

A User Interface (UI) module is also provided. This module uses the standard interface described below and parses the string responses for feedback.

The following diagram gives a graphical view of the interface between the interface code and the NetLinx module.



Implementation

To interface to the LCD module, the programmer must perform the following steps:

1. Define the device ID for the LCD that will be controlled.
2. Define the virtual device ID that the LCD COMM module will use to communicate with the main program and User Interface. NetLinx virtual devices start with device number 33001.
3. If a touch panel interface is desired, a touch panel file Sharp_Aquos.tp4 and module (Sharp_LCD_UI.axs) have been created for testing.
4. The NetLinx LCD module must be included in the program with a `DEFINE_MODULE` command. This command starts execution of the module and passes in the following key information: the device ID of the LCD to be controlled, and the virtual device ID for communicating to the main program.

An example of how to do this is shown below.

```

DEFINE_DEVICE
  dvLCD          = 5001:1:0    // The LCD connected to the NetLinx on 1st RS-232 port
  dvLCD TPI      = 10001:1:0  // The touch panel used for output

  vdvLCD         = 33001:1:0  // The virtual device use for communication between the
                               // Comm module interface and User_Interface (UI) module interface

DEFINE_VARIABLE
//Define arrays of button channels used on your own touch panel
integer nTP_BUTTONS[]={1,2,3,4,5,6,7}

DEFINE_START    // Place define_module calls to the very end of the define_start section.
// Comm module
DEFINE_MODULE 'Sharp_LCD_Comm' mdlLCD_APP(dvLCD, vdvLCD)

// Touch panel module
DEFINE_MODULE 'Sharp_LCD_UI' mdlLCD_APP(vdvLCD, dvTPArray, nTPButtons, nTuneButtons)

```

Upon initialization the AMX Comm module will communicate with the Sharp LCD LCD and information will be exchanged.

Channels

The channels supported by the COMM module are listed below. These channels are associated with the virtual device(s) and are independent of the channels associated with the touch panel device.

Note: An ‘*’ indicates an extension to the standard API.

Channel	Description
225	PULSE: Channel up
226	PULSE: Channel down
251	This channel is used for feedback only. ON: Device is online. OFF: Device is offline.
255	This channel is used for feedback only. ON: POWER is ON. OFF: POWER is OFF

Levels

The levels supported by the COMM module are listed below. These levels are associated with the virtual device(s) and are independent of the channels associated with the touch panel device.

Level	Description
1	Level for volume. Range is 0-60.

Command Interface

The UI module controls the LCD via command events (NetLinx command *send_command*) sent to the COMM module. The commands supported by the COMM module are listed below.

NOTE: AMX has not defined a standard API for LCD devices.

Command	Description
ASPECT=<value>	<p>Sets the current aspect ratio.</p> <p><value>: 1 = Normal 2 = Movie 3 = Game 4 = User 5 = Dynamic (Fixed) 6 = Dynamic 7 = PC 8 = xvYCC</p> <p>Note: This is for LC65D64U. Other models may vary.</p> <p>ASPECT=2: Turn aspect mode to Movie.</p>
ASPECT?	<p>Request for current aspect ratio.</p> <p>ASPECT?</p>
BAND=<value>	<p>Set the tuner band to use.</p> <p><value> : 1 = Analog 2 = Digital Air (##.##) 3 = Digital Cable (###.###) 4 = Digital Cable (1 number)</p>
DEBUG=<state>	<p>Set the debug state</p> <p><state> : 0 OFF 1 ON</p> <p>DEBUG=1</p>
DEBUG?	<p>Request the debug state.</p> <p>DEBUG?</p>
INPUT=<value>	<p>Selects the input source.</p> <p><value> : 1-9 (9 is internal tv tuner)</p> <p>INPUT=3</p>
INPUT?	<p>Request the current input setting.</p> <p>INPUT?</p>

MUTE=<value>	<p>Mutes audio</p> <p><value> : 0 - Unmuted 1 - Muted</p> <p>MUTE=1</p>
MUTE?	<p>Request the current mute state</p> <p>MUTE?</p>
PASSTHRU=<string>	<p>Allows user the capability of sending commands directly to the LCD without processing by the NetLinx module. User must be aware of the protocol implemented by the unit to use this command. This gives the user access to features which may not be directly supported by the module. See "Adding Functions to Modules" section at the end of this document for more information.</p> <p>The COMM module automatically adds the required checksum to the command string.</p> <p><string> : string to send to unit</p> <p>PASSTHRU=RVER</p>
POWER=<state>	<p>Sets the power state.</p> <p><state> : 0 = off 1 = on</p> <p>POWER=0</p>
POWER?	<p>Request the current power setting.</p> <p>POWER?</p>
VERSION?	<p>Request the current version number of the NetLinx module.</p> <p>VERSION?</p>
XCH?	<p>Get the current tuner station.</p> <p>XCH?</p>
XCH=<station>	<p>Set the current tuner station.</p> <p>Note: The valid range of channels for XCH depends on the current BAND setting:</p> <p>ANALOG : 1..135 DIGITAL_AIR : 2..69 for the major channel 0..99 for the minor channel DIGITAL_CABLE : 1..16383 for the major channel 0..999 for the minor channel</p> <p><station> : string representing the station</p> <p>XCH=101.1</p>

Table 1 – Send Command Definitions

String Feedback

The NetLinx COMM module provides feedback to the User Interface module for **LCD** changes via string events. The strings supported are listed below.

String	Description
ASPECT=<value>	<p>Reports the current aspect ratio.</p> <p><value>: 1 = Normal 2 = Movie 3 = Game 4 = User 5 = Dynamic (Fixed) 6 = Dynamic 7 = PC 8 = xvYCC</p> <p>Note: This is for LC65D64U. Other models may vary.</p> <p>ASPECT=2:</p>
INPUT=<value>	<p>Reports the input source.</p> <p><value> : 1-9</p> <p>INPUT=3</p>
MUTE=<value>	<p>Reports the current mute state.</p> <p><value> : 0 - Unmuted 1 - Muted</p> <p>MUTE=1</p>
POWER=<value>	<p>Reports the power status.</p> <p><value> : 0 power is off 1 power is on</p>
VERSION=<version>	<p>Reports the current version number of the NetLinx module.</p> <p><value> : current version number in xx.yy format</p> <p>VERSION=1.06</p>
XCH-<station>	<p>Returns the current tuner station.</p> <p><station> :</p> <p>XCH-101.1</p>

Table 2 - String Feedback Definitions

Device Notes

Commands implemented by this interface include those that are commonly used and shared between various LCD devices. Several of the LCD commands have been omitted and may be executed using the PASSTHRU command.

A periodic poll will return the power state and the total number of hours used by the device. Should the LCD shift into sleep mode, it will be automatically shifted back into power-on mode.

Programming Notes

The COMM module imposes synchronous operation i.e. the COMM will not send a command to the LCD until it has gotten a response or a timeout from the previous command.

A queue is implemented so that the commands from can be stacked. Commands are pulled off the queue (1) when a reply is received or, (2) after the reply timer times out (200 milliseconds). The device is polled every 10 seconds to return the power state and the input selected.

The Request commands return the state that is currently stored in the COMM module. They do NOT send a new Request to the device. The COMM module states are updated either by the periodic poll or by the enforced feedback. When a state changes, the UI is automatically informed.

Adding Functions to Modules

Commands to the device

This module supplies a mechanism to allow additional device features to be added to software using the module. This is the PASSTHRU command, which allows protocol strings to be passed through the module. The device-specific protocol must be known in order to use this feature.

As an example, suppose that a module for a projector has not implemented the 'white balance adjustment' feature. The command that the projector protocol requires is 03H, 10H, 05H, 14H, followed by a checksum. The documentation for the PASSTHRU command specifies that the module will automatically generate the checksum. In this case, the following string should be sent from the UI code to implement 'white balance adjustment'.

```
send_command vdvDevice,"PASSTHRU=',$03,$10,$05,$14"
```

The reason to use PASSTHRU instead of sending a protocol string directly to the device port is that the device may require command queuing, calculation of checksums, or other internal processing, which would not be done if the string was sent directly. Because of this, it is best to filter all communication TO

the device through the module. (The module documentation will indicate any processing that will be automatically done to the PASSTHRU string like checksum calculation.)

Additional Feedback from the device

The module documentation indicates what feedback is provided. If additional feedback is required, a `CREATE_BUFFER` for the device must be implemented in the user code to process the strings from the device manually. Note that the module will still be processing the response strings independently and sending the interpreted feedback up to the user code.