99-1428
16X2 SOURCE SELECTOR

INSTALLATION NOTES: READ ME FIRST!

The **16X2 Source Selector** uses one rack space. Equipment can be placed directly above or below the **16X2**.

The **16X2** is a sixteen input, two output, line preselector for the NetWave console (and other applications). It has two AES-3 digital outputs that connect to two channel inputs. Any input can be selected to go to one or both outputs.

At installation, each input is set for either a digital input (AES-3 or S/PDIF) or an analog input. The analog inputs are also set for either +4 dBu or -10 dBV signals. There are no internal adjustments, settings, nor serviceable parts on the **16X2**.

The sixteen inputs are designed for line level analog or digital devices (CD players, MiniDisc recorders, satellite receivers, etc.). Microphones must be preamplified before connection to the **16X2**. In most applications, balanced analog and digital signals can connect without using a ground/shield connection.

Digital inputs are passed thru the **16X2** without any format change. Analog inputs are converted to AES-3 digital using 24-bit Delta-Sigma conversion (specs listed on page 3).

Output signal control is done in one of two ways: using a serial data connection (RJ-45) from a NetWave **Dual Selector** panel or by using the **4-bit Binary Remote**, a 10-pin AMP MOD IV connector. The RJ-45 connection takes precedence over the 4-bit binary connection, which can be used with any BMXdigital console or with a custom 4-bit binary switcher/controller.

The **99-1428-1** NetWave upgrade kit adds source selection ability to any Dual Fader panel (turning it into a **Dual Selector** panel). Two digital audio cables and one standard CAT-5 cable (all customer-supplied) connect the **16X2** to the upgraded **Dual Selector** panel. Page 4 covers installing the source selector kit parts into a NetWave Dual Fader panel.

When the **16X2** is used with a BMXdigital console (or with a custom 4-bit binary selector), two digital audio cables and a custom logic cable are required to connect the **16X2** to two BMXdigital RLS or Telco modules. Similar cabling is required for a 4-bit binary selector. Wiring diagrams for these two applications are presented on page 2.

INSTALLATION PROCEDURE

1. Remove the cosmetic front cover from the **16X2 Source Selector** by lifting it up and off the chassis (it hooks into two cutout tabs along the top of the chassis).

2. Mount the **16X2 Source Selector** into a 19" rack using two rack screws (customer-supplied).

3. Reattach the cosmetic cover by placing the tabs into the two slots and pressing down to lock it onto the chassis.

4. Plug the power supply (50-29) DC cable into the DC input jack, then insert the power supply, DC cable and ferrite core first, into the "cubbyhole" on the back of the unit. Plug in the AC cord to the supply but do not connect it to AC power at this time. A tie wrap mount is provided near the DC jack to secure the DC and AC cords.

5. If necessary, attached a technical ground wire to the rear panel ground screw (#2 Phillips screw, near DC input jack).

6. Follow the information below, and on page 2, to make up cabling. Note that digital audio inputs use only pins 1, 2 and 3 of the six-pin AMP MOD IV housings. MOD IV connectors use gold-contact crimp terminals crimped using an AMP crimp tool (70-126, used with all Harris/PRE consoles). Refer to any console manual for additional information on wire preparation and MOD IV crimping.

7. When the **16X2** is connected to a NetWave console, connect a standard CAT-5 cable from the **Dual Selector** RJ-45 connector to the appropriate **LAN Passthru** jack on the rear of the console. See page 2 for detailed connections.

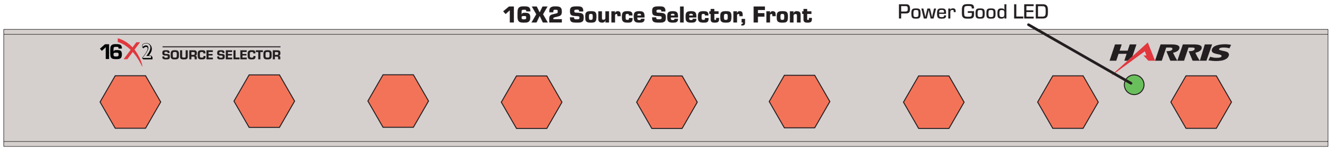
When the **16X2** is controlled by a BMXdigital, connect the **4-bit Binary Remote** connector to the Logic I/O connectors on two RLS or Telco modules. This connection is also used when the **16X2** is controlled by a custom 4-bit binary controller or switch. See page 2 for detailed connections.

8. Set the input configuration switches for the signal type (analog or digital). On analog inputs, select the nominal level for each signal (+4 dBu or -10 dBV). See page 3 for more details.

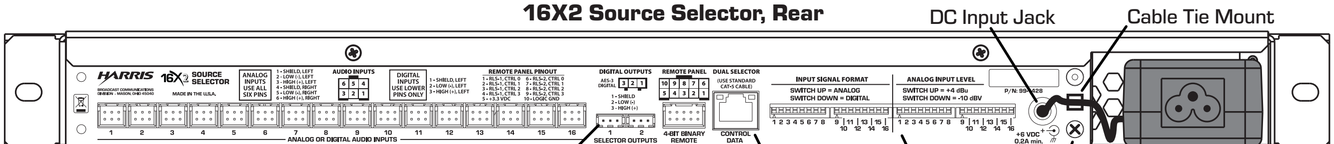
9. Plug in the AC cord to power (100 - 240 VAC, 50/60 Hz) and verify that the front panel green LED lights.

16X2 SOURCE SELECTOR FEATURE SUMMARY

16X2 Source Selector, Front



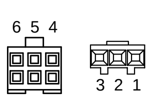
16X2 Source Selector, Rear



ANALOG CONNECTION TABLE (Belden 1504A or equiv.)

PIN	WIRE	SIGNAL	JACKET
1	SHIELD	GROUND	GRAY
2	BLACK	LEFT LOW (-)	
3	RED	LEFT HIGH (+)	
4	SHIELD	GROUND	RED
5	BLACK	RIGHT LOW (-)	
6	RED	RIGHT HIGH (+)	

Audio Connection Summary



MOD IV CONNECTOR PINOUTS, WIRE INSERTION END VIEW

DIGITAL CONNECTION TABLE (Quabbin 5100, unshielded twisted pair or equiv.)

PIN	WIRE	SIGNAL	JACKET
1	NONE		BLACK
2	BLUE	LOW (-)	
3	WHITE	HIGH (+)	

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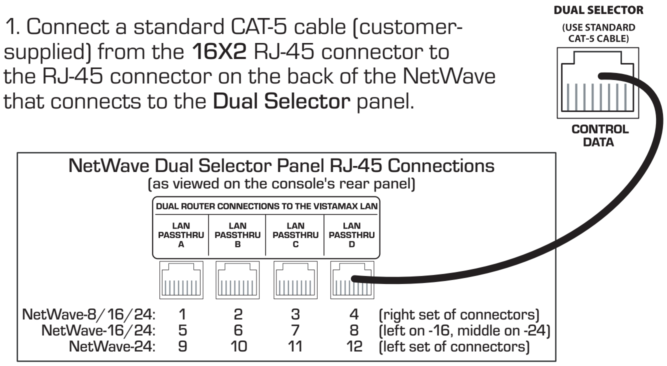
16X2 SOURCE SELECTOR CONNECTION DETAILS

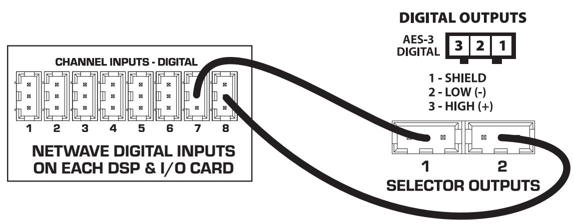
NETWAVE CONNECTIONS

1. Connect a standard CAT-5 cable (customer-supplied) from the **16X2** RJ-45 connector to the RJ-45 connector on the back of the NetWave that connects to the **Dual Selector** panel.



Note: the NetWave RJ-45 connectors are labeled "LAN Passthru A - D" since their primary use is to connect Dual Router panels to the VistaMax LAN.

2. Determine which two channels are controlled by the **Dual Selector** panel. Connect a digital audio cable from **Selector Output 1** to the left fader's digital Channel Input (an odd numbered input). Connect **Selector Output 2** to the right fader's digital Channel Input (next even number), like that shown below.



CUSTOM 4-BIT BINARY CONTROL CONNECTIONS

1. Make a logic cable, following the the BMXdigital logic cable drawing, to connect the **16X2** to a custom dual 4-bit binary controller to separately control the two **16X2** digital outputs, using the Code Table, shown below.

2. Connect the logic cable from the **4-Bit Binary Remote** connector to the custom dual 4-bit binary controller.

3. Connect the two digital Selector Outputs to two digital inputs. The source for **Selector Output 1** is controlled by the RLS-1 4-bit code on pins 1 - 4 of the 4-Bit Binary Remote connector. The source for **Selector Output 2** is controlled by the RLS-2 4-bit code on pins 6 - 9. The binary bits must be constantly maintained to keep a selected input routed to an output.

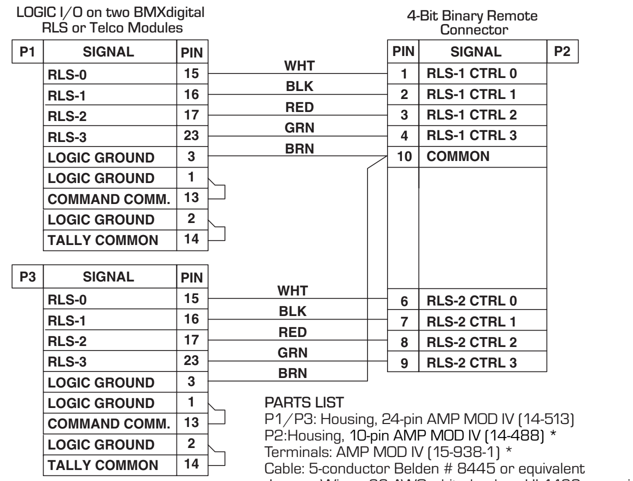
4-BIT BINARY CODE TABLE
(active low inputs)

INPUT	BITS: 0 1 2 3
Select Input 16	0 0 0 0
Select Input 15	1 0 0 0
Select Input 14	0 1 0 0
Select Input 13	1 1 0 0
Select Input 12	0 0 1 0
Select Input 11	1 0 1 0
Select Input 10	0 1 1 0
Select Input 9	1 1 1 0
Select Input 8	0 0 0 1
Select Input 7	1 0 0 1
Select Input 6	0 1 0 1
Select Input 5	1 1 0 1
Select Input 4	0 0 1 1
Select Input 3	1 0 1 1
Select Input 2	0 1 1 1
Select Input 1	1 1 1 1

NOTE: If there is no connection on the **4-Bit Binary Remote** or on the **Dual Selector** RJ-45 connector, the source for both outputs is Input 1.

BMXDIGITAL CONNECTIONS

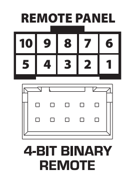
1. Make up a logic cable, following the design below, to connect the **16X2** to the **Logic I/O** connectors on the two BMXdigital modules that will control the **16X2.** Consult the BMXdigital manual Installation section for Logic I/O connector pinout.



PARTS LIST
P1/P3: Housing, 24-pin AMP MOD IV (14-513)
P2:Housing, 10-pin AMP MOD IV (14-488) *
Terminals: AMP MOD IV (15-938-1) *
Cable: 5-conductor Belden # 8445 or equivalent
Jumper Wires: 26 AWG white hookup, UL1429 or equiv.

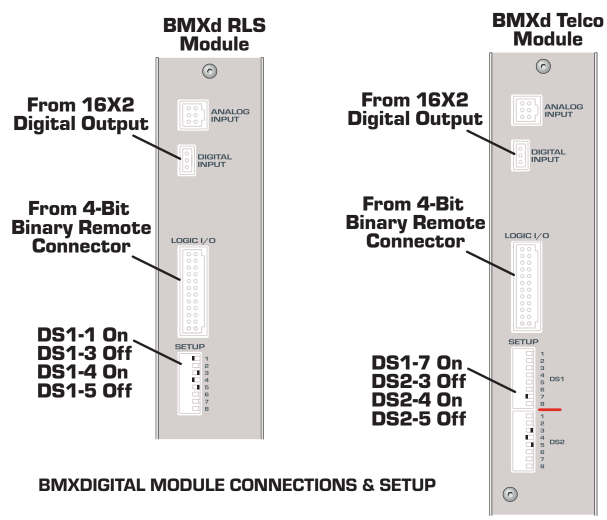
* A 10-pin housing and terminals are included in the 76-1428 connector kit

2. Connect the logic cable from the **4-Bit Binary Remote** connector to the Logic I/O connectors on the two BMXdigital **input modules**.



3. Connect the two digital Selector Outputs to the digital inputs on the two **input modules**.

4. Adjust the Setup switches, as shown below, on the two **input modules** to set them up to control the **16X2**. Reset the console (push the Session module reset button) to use the new setup switch settings. Caution: this may interrupt audio going through the console.



BMXDIGITAL MODULE CONNECTIONS & SETUP

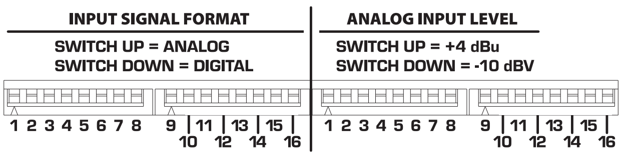
5. Follow the **External RLS and the BMXdigital Server** section of the BMXdigital manual (pg 6-5, rev C manual) to enter names for the sixteen inputs into the standard session files used on that console.

16X2 SOURCE SELECTOR CONNECTION DETAILS

16X2 INPUT CONFIGURATION SWITCHES

These four banks of switches set the type of input signal that is connected to each input (analog or digital) and, for analog signals, the level of the input (+4 dBu or -10 dBV).

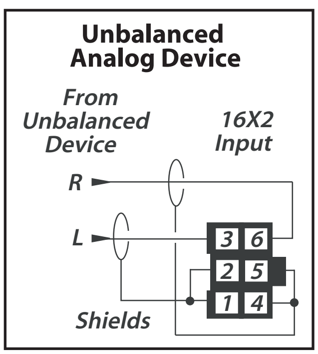
Inputs are identified below each switch. For an analog signal set the switch Up. For an AES-3 or S/PDIF digital signal set the switch down.

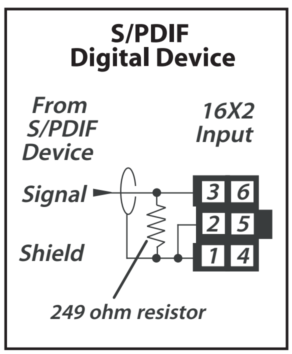


On analog inputs, use the two right-hand banks of switches to set the input level between a professional +4 dBu input (switch set Up) and a "prosumer" or unbalanced -10 dBV input (switch set down). These switches have no effect on digital inputs.

UNBALANCED INPUTS

The **16X2** inputs are designed for balanced inputs (+4 dBu analog or AES-3 digital). When an unbalanced analog signal is connected, use the wiring shown below, left. When a S/PDIF digital signal is connected, use the wiring shown below, right.





16X2 CIRCUIT OPERATION /TESTING

Each **16X2** input connects through a pair of balanced opamp circuits to unbalance and buffer the analog input. This signal connects to two stereo switches (solid-state opto-isolated relays), controlled by an FPGA (Field Programmable Gate Array). This is what "routes" a particular analog input to one or both digital outputs.

The output of the stereo switches are buffered and then converted to digital using a Cirrus Logic 4-channel A-D chip, which converts the analog audio into a 24-bit, 44.1 kHz digital signal.

Pins 2 and 3 of each input connector also connect to a digital signal transformer for coupling of a digital signal into the FPGA.

The FPGA controls which input signal is connected to which digital output. When a digital input is selected, it is connected directly to the AES/EBU digital output transmitter, effectively passing the digital signal through the **16X2** without any format changes. When an analog input is selected, the output of the A-D chip is routed to the AES/EBU digital output transmitter, again through the FPGA.

The four banks of switches control which input signal (analog or digital) is used by the FPGA, and on analog signals, whether there is +12 dB of gain added to the A-D output (for those signals identified as being -10 dBV inputs).

The FPGA also detects whether clock signals are coming into the RJ-45 connector from a NetWave Dual Selector panel. If so detected, any logic on the 4-Bit Binary Remote input is ignored. If there are no clock signals on the RJ-45 connector, then the 4-Bit Binary Remote signal input is active. Each RLS-X control line is normally high, being pulled up internally in the FPGA. Active lows are used to activate the binary logic.

With no CAT-5 cable or 4-Bit Binary Remote cable connected, the **16X2** automatically selects Input 1 to feed both outputs. Verify this signal is being received on both outputs. The four binary bit inputs can be manually grounded (following the 4-Bit Binary Code Table on page 2) to verify each output switches to the selected input (e.g., grounding RLS1-0 switches Input 2 to output 1; grounding all four RLS2 bits switches Input 16 to Output 2.

SPECIFICATIONS

0 dBu=0.775 volts RMS, regardless of circuit impedance (equal to 0 dBm into 600 ohms).

Noise measurements use a 20 kHz bandwidth (add 1.7 dB for a 30 kHz bandwidth).

FSD (Full Scale Digital) = +24 dBu

Analog Inputs (up to 16)
Nominal Input Level: switchable, +4 dBu or -10 dBV, any input
Input Impedance: >38k for +4 dBu, >15k for -10 dBV setting
Input Headroom: 20 dB above nominal (+4 dBu)

Digital Outputs (2) *
Reference Level: 20 dB below FSD
Signal Format: AES-3
Output Sample Rate: 44.1 kHz
Processing Resolution: 24-bit, fixed word, using extended precision accumulators
A/D Conversion: 24-bit, Delta-Sigma
Latency: <600µs, analog input to digital output

Analog Input to Digital Output
Frequency Response: +0.0 dB/-0.05 dB, 20 Hz-20 kHz
Dynamic Range: 110 dB (ref FS), 110 dB "A" weighted to FSD
THD + Noise: <0.00095%, 20 Hz-20 kHz, +18 dBu input; <0.0006%, typ. @ 1 kHz, +18 dBu input ,-6 dB FSD output
Crosstalk Isolation: -98 dB, 20 Hz-20 kHz **
Output Stereo Separation: >102 dB, 20 Hz-20 kHz **

Power Supply
+6 VDC, 250 mA

ESD Technical Ground Point
Chassis cover screw

Dimensions
1.5" x 19" x 7" (Height, Width, Depth)

Notes
* Digital output specifications are applicable only with an analog input source. Digital inputs are passed through the 16X2 to the digital outputs without any signal format change.

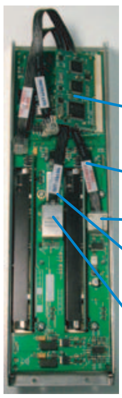
** Swept Bandpass measurement

99-1428-1 DUAL SELECTOR KIT INSTALLATION

INSTALLATION NOTES: READ ME FIRST!

The Dual Selector kit parts can be installed into any NetWave Dual Fader panel**. Fader panels can be removed or installed while the console is powered and on-air. Unassign all buttons and turn the channels off before upgrading a Dual Fader panel on an active console.

Dual Fader Panel and CAT-5 cables (after Dual Selector Kit installation)



Interface (99-1427*)

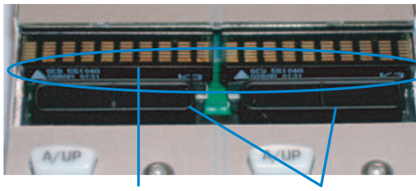
Red flat cable

J5

Blue flat cable (90-2131-2*)

J3

10-Character Display Installation



10-Char. Display (12-93*) Note contact row & part # orientation

Rubber silos for the NEXT/SETUP labels (80-2143*)

Chassis RJ-45 Labeling

Red CAT-5 cable from J5

Blue CAT-5 cable from J3

* Parts included in the 76-1428 Dual Selector Kit

** The Dual Selector requires that the Dual Fader panel PROM is rev B or later and that the DSP & I/O card PROM is rev J (PROM revision display: r 10) or later.

DUAL FADER PANEL UPGRADE PROCEDURE

1. Follow the instructions on pages 1–3 for mounting and connecting the 99-1428 16X2 Source Selector.

2. Use a 2mm hex driver (70-57) to remove the four hex screws from the Dual Fader panel designated as the new Dual Selector panel. The screws are reused in step 8.

3. Remove the fader panel just enough to unplug the red cable from J5 on the Fader Panel.

4. Pry up and remove the two display lenses, then remove the two A/B labels and the black mask over the two IC sockets. Insert the two 12-93 Displays into the two sockets. Orient the displays so their bottom contact row is toward the rubber silos. Insert the two 80-2143 labels (NEXT/SETUP) into the ledges on the two rubber silos. Make sure the labels are securely held in place. Snap the two display lenses back onto the panel. Verify the NEXT/SETUP labels remain seated in the rubber silo ledges.

5. Turn the panel over and firmly seat the keyed 99-1427 Interface board into its socket at a 45° angle, then press the board back and down so the two latches snap over the board to hold it in place.

6. Verify that the correct PROMs are installed on the Dual Fader panel and on the DSP & I/O card.** Typically, if the Dual Fader PROM is correct, so is the DSP & I/O PROM.

7. Connect the blue cable between J3 and the LAN Passthru jack. Plug the red cable back into J5. Arrange the cables so the panel sits flush onto the upper and lower chassis mounting tabs without pinching either cable or pushing against the Interface board.

8. Fasten the panel using the four screws removed in step 2.

9. Follow the Setup Mode directions below to name the inputs.

DUAL SELECTOR PANEL CONTROL SUMMARY

BUS ASSIGNMENT BUTTONS

The PROGRAM and OFFLINE buttons function the same as on standard Dual Fader panels in normal operation.

SETUP MODE

Press the left fader OFFLINE and TAKE buttons together for three seconds to enter or exit Setup mode. Both red Setup labels light while in Setup mode. Setup mode is used to name the selector inputs. The left display shows one of the inputs, the right display shows the current name for that input:

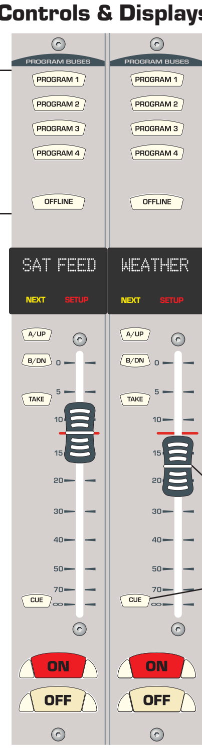
NAME IN 01   INPUT 1

Use the left fader UP/DN buttons to select an input (sixteen Selector inputs plus a local analog input for each fader) to view or edit (names can be one to ten characters long).

One character in the name blinks, indicating it can be changed. Use the right fader UP/DN buttons to select a different character (A-Z, 0-9,-,_,/,\,| and blank).

Press the right fader TAKE button to edit a different character. Each press moves the blinking character one to the right, then wrapping back to the left-most character.

Dual Selector Panel Controls & Displays



SOURCE SELECTION

The source for each fader is shown in the 10-character display whenever Next is unlit. The Next label lights to indicate the display is showing a potential next source name when the UP/DN buttons are used to step through the available signals in alphanumeric order. Holding UP or DN will quickly scan through the source names. The Next label turns off about three seconds after the last UP/DN button press, or when a new source is taken.

The next source can be taken when the channel is Off by pressing TAKE. If TAKE is pressed while the channel is On, the On button winks three times to indicate TAKE is locked out. This action will preselect the next source so that pressing TAKE after the channel is turned Off selects the preselected source. The last two sources can be toggled by pressing TAKE again without using the UP/DN buttons.

The remaining control functions are identical to those on standard Dual Fader panels.

CHANNEL FADER

Controls the signal level feeding the PROGRAM buses.

CUE ON/OFF CONTROL

Toggles the Cue function on and off.

ON & OFF CONTROL

Press ON to assign the channel audio to the selected buses. Press OFF to remove the audio from the selected buses.

To clear the name, press and hold the left fader TAKE button until the display clears (about three seconds). Leaving an input name blank allows that input to be skipped in the source selector list. To reset all names to their factory defaults, press and hold both TAKE buttons for three seconds. Names are stored using static memory.