

12X SERIES

12x1 Switcher

Video / Stereo-Audio or Video Only

Instruction Manual



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Rev 1.2 (10-01)

12X Series

RECEIVING:

It is recommended that the switcher be inspected immediately after receipt. Report any damage to the shipping company and to SIGMA ELECTRONICS, INC. Shipping cartons should be saved for use of reshipping the unit.

GENERAL:

The 12X Series is a low cost, 12 input by 1 output synchronous switcher with high performance specifications. The 12X SV rear frame is configured with video BNC connectors on the left side and three pin screw terminal audio connectors on the right side. The stereo audio connections provide the left channel across the top row and the right channel across the bottom row. Video and audio outputs are located in the center of the rear panel. The 12X VO version provides only the video connections

The control panel is provided on the front of the frame. Twelve momentary push buttons are used to select the source device in an Audio-Follow-Video mode. The far-left button is used for breakaway mode switching. The first press of the breakaway button sets up video breakaway, indicated by the red LED on the BREAKAWAY and selected channel button. The second press of the breakaway button sets up audio breakaway, indicated by the green LED.

POWER:

An IEC-320 AC power plug is provided on the rear of the frame. The cordset supplied for 120 VAC applications is a standard (NEMA 5-15P) 3-conductor North American plug and IEC 320 C13 receptacle which connects to the switcher. The 230 VAC configurations are supplied with a standard (CEE 7/7) 2-pole, 3-wire, grounding, Euro plug cord set. It is recommended that the cord set be securely plugged into the switcher first, then connected to the power source.

The operational voltage of the switcher may be selected as 120 VAC or 230 VAC depending upon the cord set, fuse rating and orientation of J3. This seven-position header (J3) is located on the inside of the unit on the front panel PCB. Before changing the voltage configuration the unit should be powered off. The J3 header will have the black wire towards the top for 120 VAC applications or the white wire towards the top for 230 VAC applications. The supplied cord set will indicate the power option set by the factory.

FRAME:

The single rack unit frame is designed for mounting in a standard EIA 19-inch rack mount cabinet. The frame's depth is compatible with video production consoles, vertical equipment cabinets, small desktop racks as well as dubbing and duplication racks.

CONNECTIONS:

The rear PCB provides video and audio connectors (12X VO only provides video connections). The rear panel also has a power plug as described in the "POWER" section above. The video connectors are BNC type while 3 Pin screw terminals are used for balanced or unbalanced stereo or mono audio signals. The Serial Port is provided via the 9 Pin SubD connector.

VIDEO

The BNC inputs are terminated into a 75Ω load. The video output should be connected to a 75Ω terminated destination device. Video cables should be strain relieved to minimize stress on the rear panel and BNC connectors.

AUDIO

The three-pin screw terminals provide a means of attaching either balanced or unbalanced audio devices. Refer to the audio wiring diagram in "Audio Configurations" for balanced and unbalanced wiring schemes. A three-position terminal block is supplied for each audio input and output. The screw terminal bush clamp opening is on the side of the connector towards the centerline of the PCB. Wire gauge should be 26 to 12 AWG and stripped to expose 0.3 inch (7.5 mm) of bare lead. Tin the lead and bend at a 90° angle before inserting into the connector. Note the (+) and (-) symbols on the PCB to maintain phase relationship of all input signals and output signal. The audio cables should be strain relieved to minimize the stress on the rear panel and screw terminals.

If required, the output can be terminated by inserting a 600Ω 1/2W resistor across the (+) and (-) pins. The 600Ω resistor will provide unity gain if the destination device is a high impedance input. Best results are achieved if the resistor leads are soldered to the cable leads before inserting the combination of leads into the clamp. The next best configuration is achieved by twisting the resistor and cable leads together and then clamping them into the terminal block. If the inputs are not fully populated and unused inputs are selected in the application of the switcher, it is recommended that a 600Ω resistor be attached across the unused inputs to reduce any audible click during switching of active and inactive inputs.

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CONTROL PANEL:

The front panel control of this switcher is very easy to use. A single push button is provided for each source input. The twelve buttons show status by two LEDs in each button. The illuminated LEDs will indicate the selected source. In an Audio-Follow-Video mode the switcher will denote both the audio and video source via the red and green LEDs.

The far-left button on the control panel is the breakaway button. When both LEDs are not illuminated the panel is operating in the follow mode. The first press of the breakaway button sets up a video breakaway. The RED LED on the breakaway button indicates a video only switch. A second press of the breakaway button sets up an audio breakaway. The GREEN LED indicates an audio only switch. The input buttons indicate the selected audio and video sources to the output.

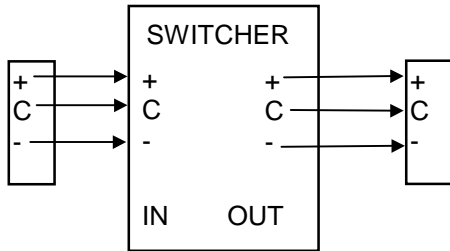
The switch occurs during the vertical interval of the source being viewed. If all sources are properly timed, the output switches synchronously between sources without an added external reference.

COMPUTER CONTROL

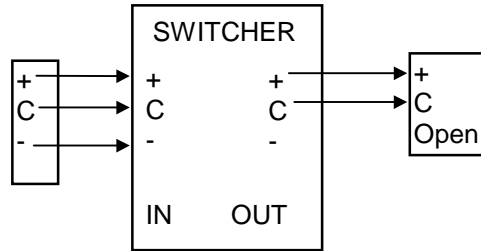
The 12X Series of switchers can also be remotely controlled via the serial port using RS 232 or RS 422 protocol. A complete explanation of the RS 232 and RS 422 protocols can be found following the operating instructions in Appendix B.

AUDIO CONFIGURATIONS:

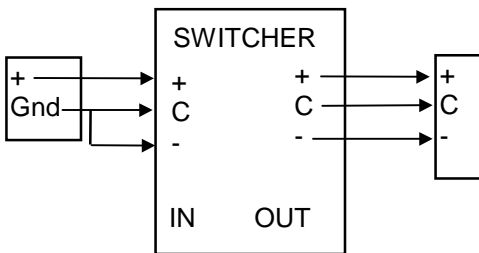
The source and destination audio equipment must be evaluated to determine if they are Balanced or Unbalanced. After determination is made, refer to the drawings below to select the proper audio configuration. The inputs can be any combination of balanced or unbalanced noting the level of the output.



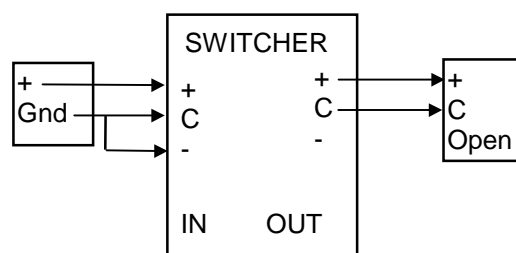
Balanced In to Balanced Out
 $V_{out} = \text{Unity Gain @ } 600\Omega (+) \text{ to } (-)$
 $V_{out} = +3.5 \text{ dB @ HiZ}$



Balanced In to Unbalanced Out
 $V_{out} = -6 \text{ dB @ } 600\Omega (+) \text{ to } (-)$
 $V_{out} = -2.5 \text{ dB @ HiZ}$



Unbalanced In to Balanced Out
 $V_{out} = \text{Unity Gain @ } 600\Omega (+) \text{ to } (-)$
 $V_{out} = +3.5 \text{ dB @ HiZ}$



Unbalanced In to Unbalanced Out
 $V_{out} = -6 \text{ dB @ } 600\Omega (+) \text{ to } (-)$
 $V_{out} = -2.5 \text{ dB Loss @ HiZ}$

It is recommended that a distribution amplifier be used if a common source must feed more than one switcher. If a distribution amplifier is not available, the switcher's inputs may be bridged noting the following provisions.

Note 1: When multiple switchers have the inputs bridged, power must be applied to all switchers to reduce loading of the source signal. An unpowered inactive unit has a different characteristic input impedance than that of an active unit.

Note 2: A slight output signal loss will be experienced when bridging inputs. Typical loss is about -0.2 dB when bridging three units and -0.4 dB when bridging six units. This assumes each output is terminated at 600Ω.

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APPENDIX A

SPECIFICATIONS:

Video

12X VO

12X SV

Maximum Input Level	1.4 V p-p, ± 5 VDC
Input Impedance.....	75 Ω , terminated AC coupled
Input Return Loss	>40 dB to 5 MHz
Output Impedance.....	75 Ω , source terminated
Output Level.....	1.4 V p-p maximum
Output DC Offset.....	< ± 100 mV
Differential Phase	<0.1 $^\circ$
Differential Gain.....	<0.2%
Frequency Response	± 0.1 dB from 1 to 20 MHz; ± 1 dB to 100MHz
Bandwidth.....	120 MHz minimum @ -3 dB
Crosstalk	<-55 dB to 5 MHz, input under test terminated all other channels driven
Hum & Noise	<0.1 mVrms (-80 dB), 10 MHz bandwidth
Connectors	BNC

Audio

12X SV only

Input Impedance.....	66 K Ω , balanced, DC coupled
Bandwidth.....	150 kHz
Maximum Level	+24 dBm,
Output Impedance.....	300 Ω , balanced
Frequency Response	± 0.1 dB to 25 kHz, ± 0.5 dB to 100 kHz
Hum & Noise	< -95 dBm
Total Harmonic Distortion.....	0.007% @ +24 dBm
Crosstalk	< -95 dB @ 1 kHz, < -70 dB @ 20 kHz
Gain Accuracy.....	< ± 0.2 dB @ 600 Ω load
Common Mode Rejection.....	>40 dB balanced @ 60 Hz
Connectors	3-Pin, screw terminal

ELECTRICAL:

Power requirement.....	120 or 230 VAC, 50/60 Hz.
Power Consumption	8 Watts maximum
Fuse	120 VAC; 100 mA Slo-Blo $^{\text{®}}$, 5x20 mm 230 VAC; 63 mA Slo-Blo $^{\text{®}}$, 5x20 mm
Connector.....	IEC-320 AC power inlet with integral fuse holder

MECHANICAL:

Dimensions.....	1.70" H x 19" W x 14" D (43.2mmH x 483mmW x 356mmD)
Weight	5 lbs. (net), 7.2 lbs. (shipping) (2.3 kg net), (3.3 kg shipping)

All specifications, drawings, dimensions, weights and other details are subject to change without notification. Information is intended to give a general performance and operation guideline of the product.

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REVB MAR01

12X

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APPENDIX B

RS 232/422 PROTOCOL:

12X – RS 232 PROTOCOL

Communications Parameters

Serial port settings are as follows –

Baud Rate = 9600
Character bits = 8
Stop bits = 1
Parity = No

Command Entry

Commands are issued from a computer/terminal keyboard using standard ASCII letters and numbers. The 12X is not case sensitive, and operates identically whether capital or lower case letters are used

The ASCII protocol for making an audio-follow-video switch is:

IxxO01 {RETURN/ENTER}
-or-
IXXO1 {RETURN/ENTER}
-or-
Ixx {RETURN/ENTER}

The 'I' represents INPUT and the 'O' OUTPUT. The 'xx' represents the one or two digit number of the respective INPUT. A leading zero is optional. Valid INPUT numbers for the 12X are 01-12. The only valid OUTPUT number is 01, and its use is optional. To generate the TAKE, press the RETURN/ENTER key on the keyboard. When the 12X receives the request and executes the change, it will respond with an ASCII message 'OK'.

The ASCII protocol for making a BREAKAWAY is:

AxxO1 {RETURN/ENTER}
-or-
Axx {RETURN/ENTER}

The 'A' could actually be A or B. These two letters represent the two input levels respectively. So an "A" would correspond to Level 1 (video) and a "B" would represent Level 2 (audio). Again, the 'O' is the OUTPUT and its use is optional. In this case only the requested input Level will change.

The ASCII protocol for making a SPLIT is:

AxxBxxO1 OR BxxAxxO1 {RETURN/ENTER}
-or-
AxxBxx OR BxxAxx {RETURN/ENTER}

In these examples, it is possible to assign different video and audio signals to the output at the same time. Again, it is not necessary to supply the leading zero in assigning numbers. A07B03O1 or A8B5 will both work.

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APPENDIX B (cont.)

The STATUS of the 12X can be obtained by entering the following:

```
S1 {RETURN/ENTER}
-or-
SA {RETURN/ENTER}
```

The 'S' represents STATUS and the '1' represents the OUTPUT. Press the RETURN/ENTER key to generate execution. The 12X will respond with the following ASCII message:

```
L1 L2 OUT
xx xx 01
```

...where 'xx' is the input number for each level.

Anytime an invalid or incomplete message is sent to the 12X, it will respond with an ASCII '?'. This will occur for each group of invalid characters it receives. The RETURN/ENTER key is the delimiter between commands. Therefore, invalid characters will not cause a '?' response until the RETURN/ENTER key has been sent.

RS 422 CONTROL

RS 422 allows for multiple devices to be connected to a computer/terminal at the same time. In order for the computer/terminal to communicate with a device in RS 422, it must first tell the device to listen. This is the purpose of the logic address. The default logic address for the 12X is 01.

The format for protocols is identical to that of RS 232 with one exception. Any instruction must be preceded by the following:

```
/01
```

The slash is the precursor, and the 'xx' is the logic address of the device. This is ALWAYS a TWO DIGIT NUMBER. For the 12X, the composition is /01 .

By way of example, to generate a switch, the sequence would be as follows:

```
/01IyyOzz {RETURN/ENTER}
```

where first two digits are the 12X's logic address, the 'yy' is the one or two digit INPUT number and the 'zz' is the optional one or two digit OUTPUT number (always 01 for the 12X).