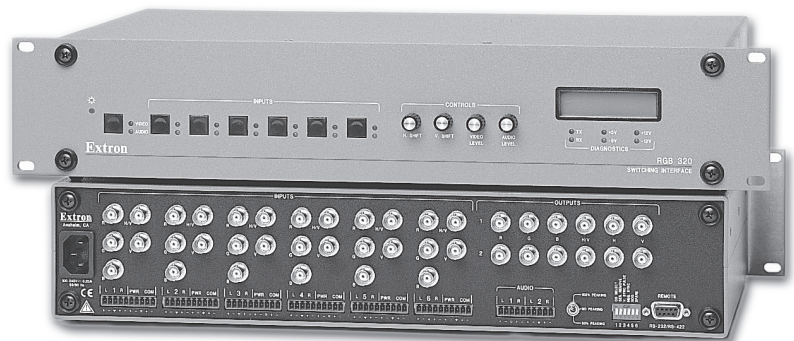


Extron Electronics

INTERFACING, SWITCHING AND DISTRIBUTION



User's Manual



RGB 320 Switching Interface

Six Input, Two Output System

68-341-01
Printed in the USA

Precautions

Safety Instructions • English



This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.



This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Consignes de Sécurité • Français



Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).



Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions • Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conservier les instructions • Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Éviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Sicherheitsanleitungen • Deutsch



Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.



Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits- und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Instrucciones de seguridad • Español



Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.



Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean específicamente recomendados por el fabricante, ya que podrían implicar riesgos.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Avertissement

Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de le contourner ni de le désactiver.

Déconnexion de l'alimentation • Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'il y a un remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandée par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stromversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Lithium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearla ni eliminarla.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.



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Legend of Icons

The following icons may be used in this manual:

-  _____ Important information – an action or a step that must be done before proceeding.
-  _____ A Warning – possible dangerous voltage present.
-  _____ A Warning – possible damage could occur.
-  _____ A Note, a Hint, or a Tip that may be helpful.
-  _____ Additional information may be referenced in another section or document.

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RGB 320 Switching Interface System User's Manual



Chapter One **Introduction to Switching Interface**

What is a Switching Interface?

Features

Specifications



What is a Switching Interface?

Extron's RGB 320 combines an interface and a switcher with six inputs and two outputs. It was designed as a system solution for installation environments such as conference or training rooms and command/control centers. The six inputs can use RGSB, RsGsBs, RGSBs, RGBHV and line level audio. There are two buffered outputs. One, for example, may go to a projector (the main presentation display) and the other to a viewing monitor located near a podium.

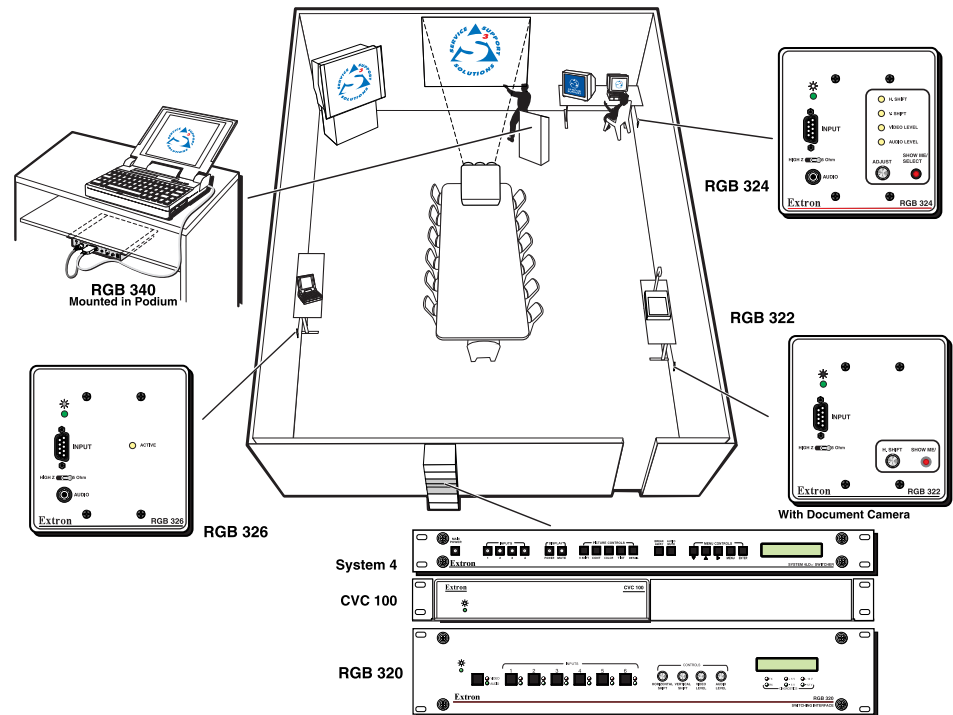


Figure 1-1. Example of an RGB 320 System Using Four Possible Buffer Types in a Conference Room

The RGB 320, together with the RGB 322, RGB 324, RGB 326 and RGB 340 input buffers, acts as a switching interface system, with up to six remote (or local) buffer modules as inputs. These buffers can be installed in various convenient places in a room, such as in a wall, or under a podium or a table. They transfer the individual computer-video and audio signals (RGB 322 does not include audio) to the RGB 320, where they are switched to a display device, a system switcher or a line doubler, etc. The RGB 320 can be mounted in a rack with other A/V components.

Figure 1-1 shows an example of a custom A/V installation in a conference room. An RGB 320 is mounted in the rack outside the room. Inside the room, an RGB 324 has been installed in the wall (top right), an RGB 326 in the left wall, and an RGB 322 is mounted in the right wall, next to the document camera. An RGB 340, mounted in the podium, accommodates the presenter's laptop computer.

The RGB 322 buffer has Horizontal Shift adjustment and Show Me. The RGB 326 has video and audio inputs, a termination switch and an LED that indicates when this buffer is the active input.

Function

While the interface functions are processed within the RGB 320, "virtual interfacing" can be done from the RGB 322, RGB 324 or RGB 340 buffers. The "Show Me" button on these buffers requests that its signal(s) be switched to the RGB 320 output device. It can also initiate communication with the RGB 320 to allow the following adjustments to be made from the panel:



- horizontal shift (from RGB 322, RGB 324 & RGB 340)
- vertical shift (from RGB 324 & RGB 340)
- video level (from RGB 324 & RGB 340)
- audio level (from RGB 324 & RGB 340)

The RGB 320 saves these adjustments in a memory associated with each input.

The RGB 320 has 15 memory blocks for each of the six inputs. The memory blocks store the picture controls needed for an application or installation. When an input buffer is selected, with a computer connected, the RGB 320 searches for a match for that scan rate and automatically recalls the appropriate input settings for that device. This eliminates having to recalibrate the settings each time a specific computer is selected. Ten of the most popular computer scan rates are permanently programmed into the RGB 320's memory so programming may not be necessary.

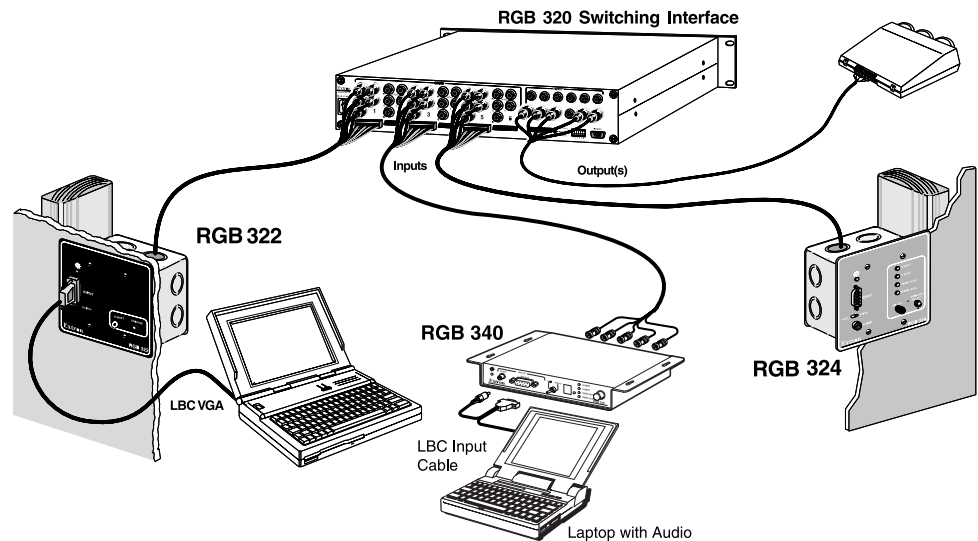


Figure 1-2. The RGB 322 and RGB 324 Can Be Installed in Walls

The RGB 320 has features that help to maintain the original signal integrity and enhance overall system performance. A video level control is provided to compensate for weak signal source or signal loss due to cables or other system components. For example, if the signal from input #1 is weak, this control can boost it; if the signal from input #3 is strong, it can be attenuated. Each setting is stored for that input.

The RGB 320 also provides LCD sync processing that ensures a stable image for LCD and DLP presentation devices.

Controlling the RGB 320 Interface

The RGB 320 can be controlled from front panel control buttons, from the RGB 322, RGB 324 and RGB 340 buffers with “virtual interfacing” or with Extron’s Windows® Control Program software. An RS-232 serial port allows control by a third party control system. Extron’s software allows control of the RGB 320 from a remote PC with a graphic interface.

The six inputs to the RGB 320 can originate from remote input buffers or from a (local) device in the rack, such as another switcher, a line doubler, a dedicated audio system or a computer interface. The RGB 322, 324, 326 or 340 input buffers may be located in various places around a room. The RGB 320 switches the signals to a display device, a system switcher or a line doubler, etc.



Features

- *High bandwidth* – The RGB 320 provides a 220 MHz bandwidth for effective transmission of high resolution computer video and audio signals.
- *Central control*– The RGB 320 interfaces and switches input sources from buffers throughout the room to two displays for professional presentations.
- *RS-232 control* – Allows for third party control system (such as AMX® or Crestron®) integration via the RS-232 serial port.
- *Universal compatibility* – The RGB 320 accepts RGsB, RsGsBs, RGBS and RGBHV video signals, ensuring compatibility with all types of computer inputs.
- *Rack mountable* – The RGB 320 is housed in a 17 inch wide, 2U high metal enclosure, with a 19-inch rack-mount face and mounting hardware.
- *Digital Sync processing* – Provides image stability for all CRT, LCD and DLP projection devices.
- *System diagnostics* – Operations are monitored by LEDs on the front panel.
- *Peaking* – The RGB 320 has peaking control to maintain the original signal integrity over long cable runs.
- *Horizontal & vertical centering* – This allows position (shift) control of the image.
- *Audio gain & attenuation* – Audio levels may be set for each input in increments of 1 dB, from -15 dB to +9 dB.
- *Video levels* – The RGB 320 provides adjustment for all RGB video levels via the front panel buttons or remote PC with RS-232 control.
- *Memory blocks* – Ensures that each computer's settings are saved, storing horizontal & vertical centering, audio and video levels.
- *Audio follow & breakaway* – The RGB 320 allows audio to be switched with video (follow) or switched separately from video (breakaway).

Specifications

Video input	Number/type	_ 6 analog RGBHV, RGBS, RGsB, RsGsBs
	Connector	_ 5 BNC female x 6
	Nominal level(s)	_ Analog — 0.3V to 1.45V p-p
	Impedance	_ 75 ohms
	Horizontal frequency	_ 15 kHz to 150 kHz (optimum 15 kHz to 62 kHz)
	Vertical frequency	_ 30 Hz to 170 Hz
	Return loss	_ -30 dB @ 5 MHz
Video throughput	Routing	_ 6 X 1, 2 distributed outputs
	Gain	_ 0.5V to 1.45V p-p
	Peaking	_ 0%, 50%, 100% (switch-selectable)
Video outputs	Bandwidth	_ 220 MHz (-3dB)
	Number/type/format	_ 2 analog RGBHV, RGBS, RGsB
	Connectors	_ 2 x 6 BNC female
	Nominal level	_ 0.5V to 1.45V p-p
	Impedance	_ 75 ohms
Sync	Return loss	_ -30 dB @ 5 MHz
	Input type	_ Autodetect RGBHV, RGBS, RGsB, RsGsBs
	Output type	_ RGBHV at all times, RGBS at all times, RGsB switch-selectable
	Input level	_ 2.0V to 5.5V p-p with ± 0.2 VDC offset max.
	Output level	_ 4.0V to 5.0V p-p
	Input impedance	_ 10 kohms
	Output impedance	_ 75 ohms



Sync	Max. propagation delay	_ 88 nS
(continued)	Max. rise/fall time	_ 3.2 nS
	Polarity	_ Positive, negative
Audio input	Number/type	_ 6 stereo, balanced/unbalanced
	Connectors	_ 6 3.5 mm captive screw terminal, 5 conductor
	Impedance	_ Balanced 25 kohms, DC coupled Unbalanced 50 kohms, DC coupled
	Maximum level	_ +19.5dBu, balanced or unbalanced
	Input gain adjustment	_ -15.0dB to +9.0dB, adjustable per input
Audio throughput	Routing	_ 6 X 1, 2 distributed outputs
	Gain	_ Unbalanced 0dB, balanced +6dB
	Frequency response	_ ±0.05dB 20 Hz to 20 kHz
	THD + Noise	_ 0.03% @1 kHz, 0.3% @ 20 kHz +15dBu input, +21dBu output Balanced input and output
	S/N	_ >90dB, output 21dBu, balanced
	Adjacent input crosstalk	_ >65dB @ 20 kHz, >80dB @1 kHz, >80dB below 60 kHz
	Stereo channel separation	_ >80dB @1 kHz, >60dB @ 20 kHz
	CMRR	_ >75dB 20 Hz to 20 kHz
Audio output	Number/type	_ 2 stereo (2 channel), balanced/unbalanced
	Connectors	_ 2 3.5 mm captive screw terminals, 5 conductor
	Impedance	_ Unbalanced 50 ohms, balanced 100 ohms
	Gain error	_ ±0.1dB channel to channel
	Drive (HI-Z)	_ >+21.0dBu, balanced at stated %THD+N
	Drive (600 ohm)	_ > +15.0dBu, balanced at stated %THD+N
Control/Remote — switching interface	Serial control port	_ RS-232 9-pin female D connector
	Pin configurations	_ 2 = TX, 3 = RX, 5 = GND
	Baud rate and protocol	_ 9600, 8-bit, 1 stop bit, no parity
	Contact closure	_ 9-pin female D connector
	Pin configurations	_ 1 = input 1, 4 = input 2, 5 = GND, 6 = input 3, 7 = input 4, 8 = input 5, 9 = input 6
	Program control	_ Extron's control program for Windows® Extron's Simple Instruction Set™ - SIS™
General	Power	_ 100VAC to 240VAC, 50/60 Hz, 20 Watts, internal, auto-switchable
	Temperature/humidity	_ Storage -40° to +158°F (-40° to +70°C) / 10% to 90% Operating +32° to +122°F (0° to +50°C) / 10% to 90%
	Rack mount	_ Yes
	Enclosure type	_ Metal
	Enclosure dimensions	_ 3.50" H x 19.00" W* x 9.50" D 8.89 cm H x 48.26 cm W x 24.13 cm D *includes attached rack ears
	Shipping weight	_ 16 lbs (7.2 kg) DIM weight 25
	Vibration	_ NSTA 1A in carton (National Safe Transit Association)
	Approvals	_ UL, CE, FCC Class A
	MTBF	_ 30,000 hours
	Warranty	_ 2 years parts and labor



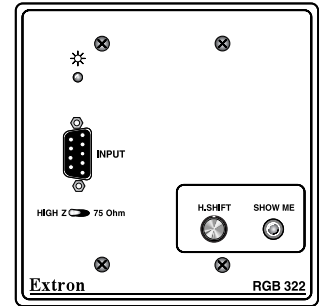
RGB 322, RGB 324, RGB 326 and RGB 340 Input Buffers

The RGB 322, 324 and 326 are each mounted on a two-gang wall plate that can be installed in a wall, conference table, podium, etc., while the RGB 340 mounts under a table or shelf. Each buffer has a 9-pin input connector compatible with computers that output analog RGsB, RsGsBs, RGSB and RGBHV.



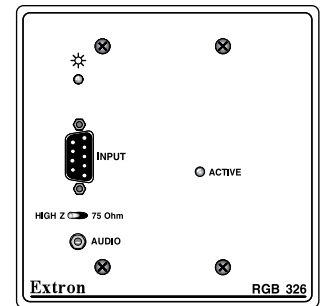
These buffer units have their own User's Manual (68-338-01).

A "Show Me" button on the RGB 322, RGB 324 and RGB 340 buffer units allows the user to select their buffer as the active source and present their output onto the main display via the RGB 320. This is called "virtual interfacing" control of the RGB 320. Virtual interfacing also allows interface adjustments to be made from certain buffer models. Thus, users may interact with the main display directly from their buffer locations.



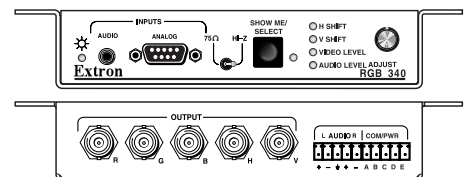
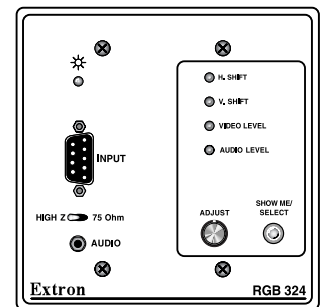
All buffers are available in gray, and the 2-gang wall plates are also available in black or white face plates, so they can blend into walls, podiums, tables, etc. Control can be via the RGB 320 front panel buttons, RS-232 control and Extron's control program for Windows®.

- *Virtual interfacing*— Allows you to make various video and audio adjustments that are passed to the RGB 320, which then executes the adjustments and stores them in memory.
- *Show Me button*— You can remotely select your own buffer to become the active input source and, via the RGB 320, display their information on the presentation devices.
- *Horizontal Shift (centering)*— This adjusts the horizontal position of the image on the video display.
- *Remote connection*— The buffers provide remote input connection for a permanent A/V installation that requires more than one interface location.
- *Universal compatibility*— The buffers output analog RGsB, RsGsBs, RGSB and RGBHV video signals, ensuring compatibility with all types of analog computer inputs.



The RGB 324 and RGB 340 have all of the features of the RGB 322 as well as these:

- *Show Me button*— With the RGB 324 and RGB 340, the Show Me button acts not only as the buffer's source selector, but also as the primary switch that allows video and audio level adjustments to be made.
- *Vertical shift (centering)*— This allows vertical movement of the video image for a centered presentation display.
- *Video & audio level*— The RGB 324 and RGB 340 allow you to make video and audio level adjustments right from the buffer.



RGB 320 Switching Interface System User's Manual



Chapter Two **Rear Panel Connections**

Connecting the RGB 320 Switching Interface

Rear Panel Connectors

Choosing Cables

Composite Cables

Buffer Input Cables



Connecting the RGB 320 Switching Interface

The RGB 320 has six inputs and two outputs, plus connections for RS-232 controls. Figure 2-1 shows an example of the types of equipment that may be part of the interface system.

Each RGB 320 input has five BNC connectors to allow for RGsB, RGSB or RGBHV input. There are also connectors for stereo audio. Although different devices can be used as inputs to the RGB 320, it was designed to be the center of a switching interface system, using buffer devices mounted in a wall, a table or a podium. Extron makes three types of buffer units that provide *remote* input to the RGB 320. In addition, the RGB 320 is a switcher, allowing one of six inputs to be displayed through a projector or monitor.

The two buffered outputs are identical, with six BNC connectors and 2-channel stereo audio. For example, one output may be used for the main display device (a projector or data monitor), while the other may go to a rack or podium mounted monitor. Switching and controls affect both output devices the same.

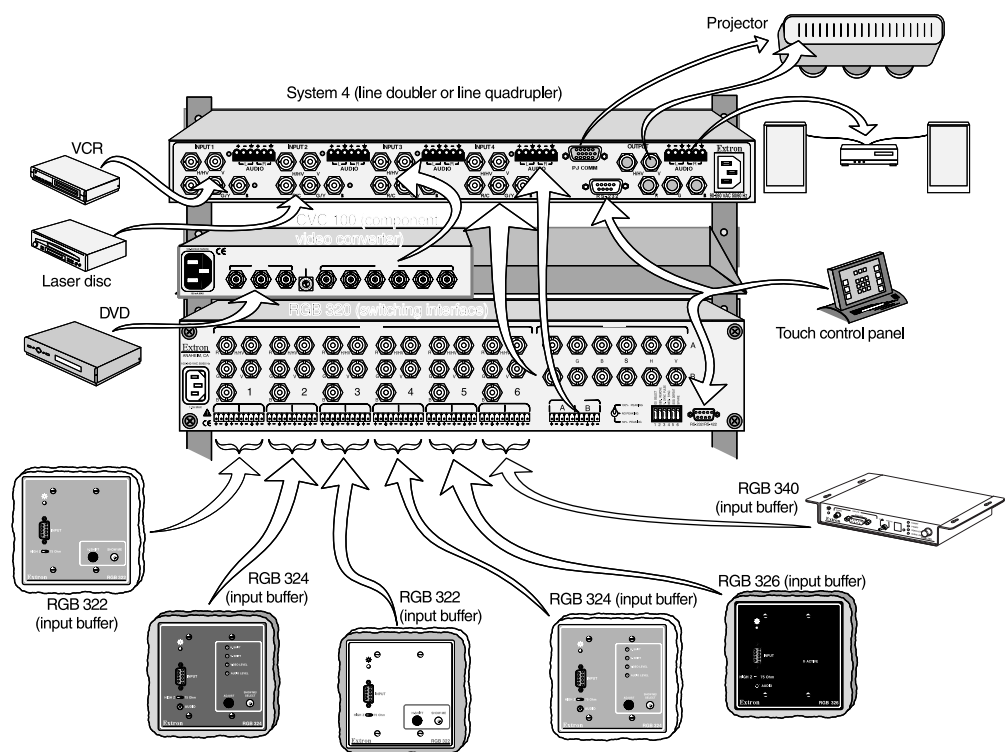


Figure 2-1. The RGB 320 as a Computer Video Switching Interface to a Line-quadrupling System

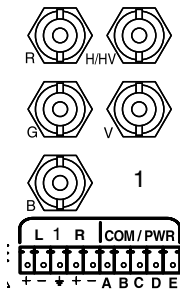
The example in Figure 2-1 includes a System 4LQ_{ex} as the device that feeds the projector, with the RGB 320 as its fourth input. This allows for six remote computer video inputs, through the RGB 322, 324, 326 and 340 buffers, and three System 4 inputs for other video input signals to be line-quadrupled.

The main focus of the procedures described here will be for using these input buffers: RGB 322, RGB 324, RGB 326 and RGB 340. A User's Manual (P/N 68-338-01), which gives details on installation and operation of the buffers, is also shipped with each buffer.



Rear Panel Connectors

Each of the six inputs has the following connectors:



- 5 BNCs
Red video (R)
Green video (G)
Blue video (B)
Horizontal sync, or composite (H/HV)
Vertical sync (V)
- 3.5 mm 10-pole captive screw (left 5 for audio)
Left channel audio +
Left channel audio –
Ground (common to both left and right channels)
Right channel audio +
Right channel audio –
- 3.5 mm 10-pole captive screw
(the right-most 5 are for communication and power between the input buffer and the RGB 320, and are labeled A, B, C, D and E)

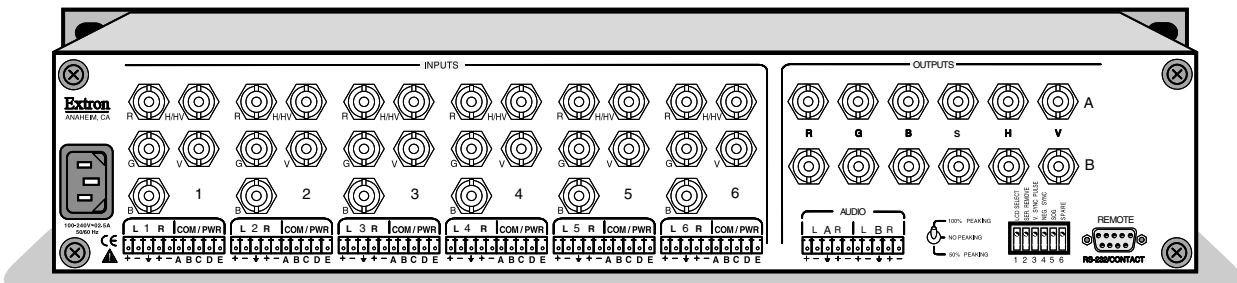
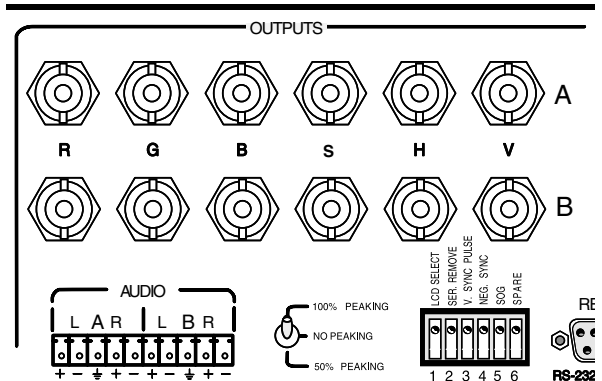


Figure 2-2. The Rear Panel Has Connectors for Six Inputs and Two Outputs

Each of the two outputs (A and B) has the following connectors:

- 6 BNCs
Red video (R)
Green video (G)
Blue video (B)
Composite sync (S)
Horizontal sync (H)
Vertical sync (V)
- 3.5 mm 10-pole captive screw (5 for audio A, 5 for audio B)
Left channel audio +
Left channel audio –
Ground (common to both left and right channels)
Right channel audio +
Right channel audio –

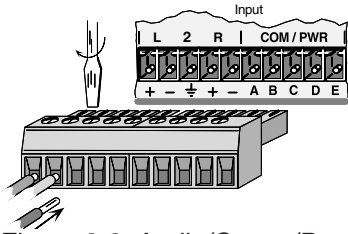


Seven 3.5 mm 10-pole captive screw connectors (P/N 10-319-11) are included with each RGB 320. Six are for the inputs (audio/communications/power), and one is for the output (audio A and audio B). One of these connectors is also included with each RGB 322/324/326/340 input buffer.



Audio Input Connections

The 10-pole receptacles are located on the rear panel below the BNC connectors. Inputs are on the left side, and outputs are on the right. Each input receptacle has five poles on its left labeled for left (L) and right (R) stereo, and the input number is also labeled. Polarity (+/-) and ground are marked below. The right five poles are labeled COM and PWR for use with an RGB 322/324/326/340 input buffer.



Cable connectors are supplied with the RGB 320, one for each input and output. The wires are secured using the captive screws inside the connectors. (See Figure 2-3.) Each connector is then plugged into the appropriate input channel position on the rear panel. *If you are not using RGB 322/324/326/340 input buffers, the right five poles are not used.*

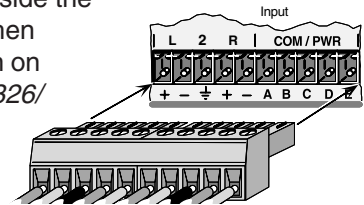
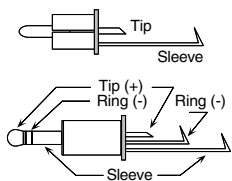
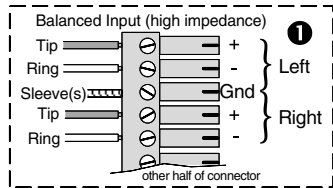


Figure 2-3. Audio/Comm/Power Input Connectors with Captive Screws



When making connections for the RGB 320 from existing audio cables, see Figures 2-5a and 2.5b. The round audio connectors are shown with the top one (tip and sleeve only) for unbalanced audio and the bottom one (tip, ring and sleeve) for balanced audio. The “ring”, “tip” and “sleeve” markings are also used on the captive screw audio connector diagrams in Figure 2-5a and 2-5b. These examples can be used together as a guide for making audio cables.

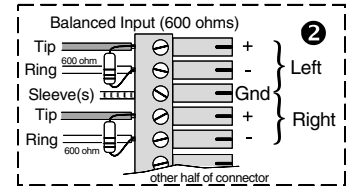
Figure 2-4. Examples of Round Audio Cable Connectors



Three methods of wiring the connectors for audio input are listed and shown here. Only the first method is used with RGB 324/326/340 input buffers.

- 1 **Balanced High Impedance (High Z) Stereo Tip, Ring (Left & Right)**
See Figure 2-8 for wiring RGB 324/326/340 buffers.

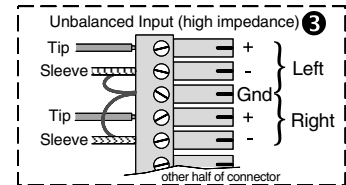
Figure 2-5a. Wiring the Input Audio Connectors Using RGB 324/326/340 Buffer



If you are not using RGB 324/326/340 for audio inputs, any of the three methods can be used.

- 2 **Balanced 600 ohm input Impedance Stereo Tip, Ring (Left & Right)**
- 3 **Unbalanced High Impedance (High Z) Stereo Tip, Ring, Ground (Left & Right)**

Figure 2-5b. Wiring the Input Audio Connectors Not Using RGB 324/326/340 Buffer



Audio Output Connections

There are two audio outputs in one 10-pole connector. The left half is output A, and the right half is output B. They can be wired in one of three ways.

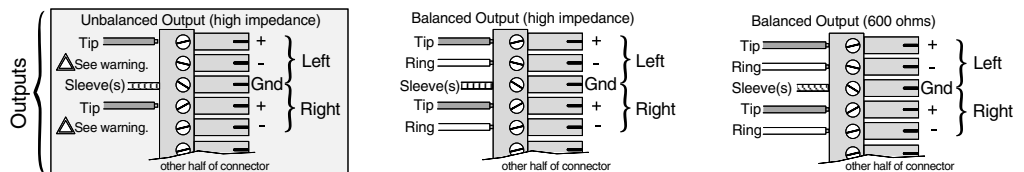


Figure 2-6a. Three Methods of Wiring Audio Output

△ ——— If using the Unbalanced Output example in Figure 2-6a (left-most example), connect the sleeve(s) to Ground (Gnd). Connecting the sleeve(s) to a negative (-) terminal will damage audio output circuits.

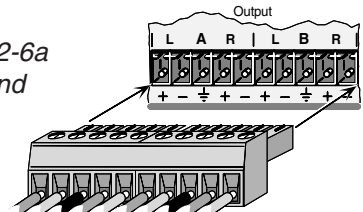


Figure 2-6b. Both Halves of the Output Connector Are Configured the Same



Choosing Cables for Remote Inputs

With the RGB 320 as the center of a computer video interface system, the input connectors have specific functions, and the connectors must not be misused. The ideal installation will use the RGB 322, RGB 324, RGB 326 or RGB 340 as inputs through an installation (or composite) cable. Most of the examples used in this manual will make this assumption. The User's Manual for the RGB 322, RGB 324, RGB 326, and RGB 340 gives detailed instructions for installing those devices. (P/N 68-338-01)



Regardless of which cables are used, their connectors must be wired the same way on both ends. Any crossing of lines could damage the electronic circuits in the buffer unit or in the RGB 320.

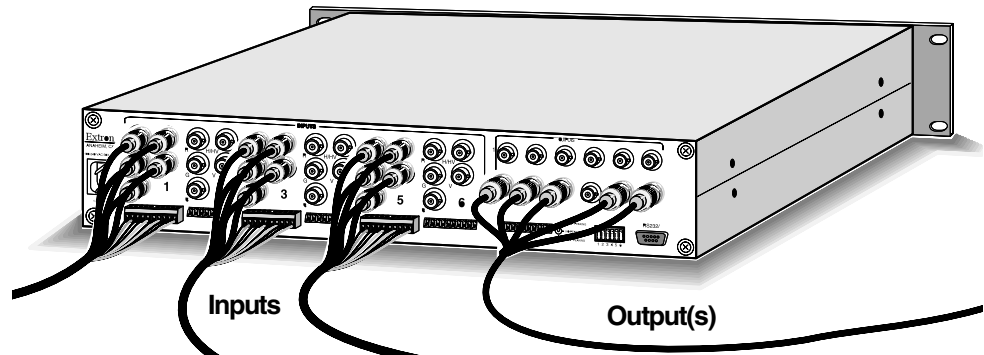


Figure 2-7. Installation Cables Connected to Inputs 1, 3 and 5

RGB 322/324/326/340 Input Buffer Connections

Figure 2-8 shows the wiring for the audio, communications and power connector for the buffer. Note that the wire and contact assignments must match those on the RGB 320 end of the cable shown in Figures 2-9a and 2-9b.

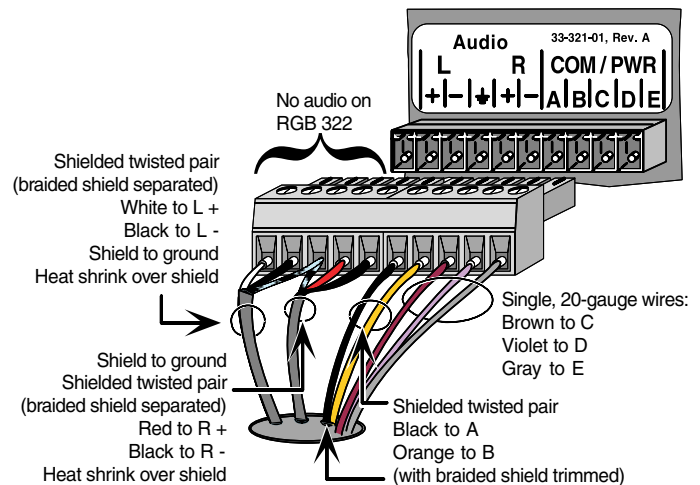


Figure 2-8. One Installation Cable Can Be Used for Each Input and Each Output

Composite Cables



Composite cables, such as Extron's Installation Cable, make installation easier, because one jacketed cable can be dedicated to one input or to one output.

Installation Cable includes a combination of several types of cables that are enclosed in one jacket. The combination can carry video, audio, power, communications, etc. If you will be making cables, follow the guidelines in Appendix A of the RGB 322, 324, 326 and 340 User's Guide.



Buffer Input Cables

Computer video signals coming through a buffer unit (RGB 322/324/326/340) use the red, green, blue, horizontal and vertical sync connectors. The audio, communications and power (to the buffer) come through the 3.5 mm, 10-pole connectors below the BNC connector.

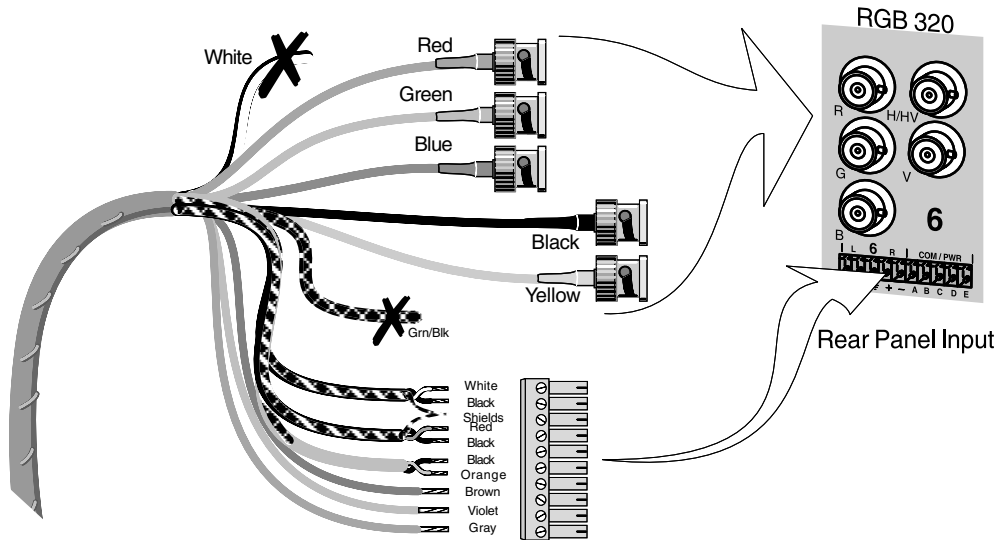


Figure 2-9a. Installation Cable Wired for the RGB 320

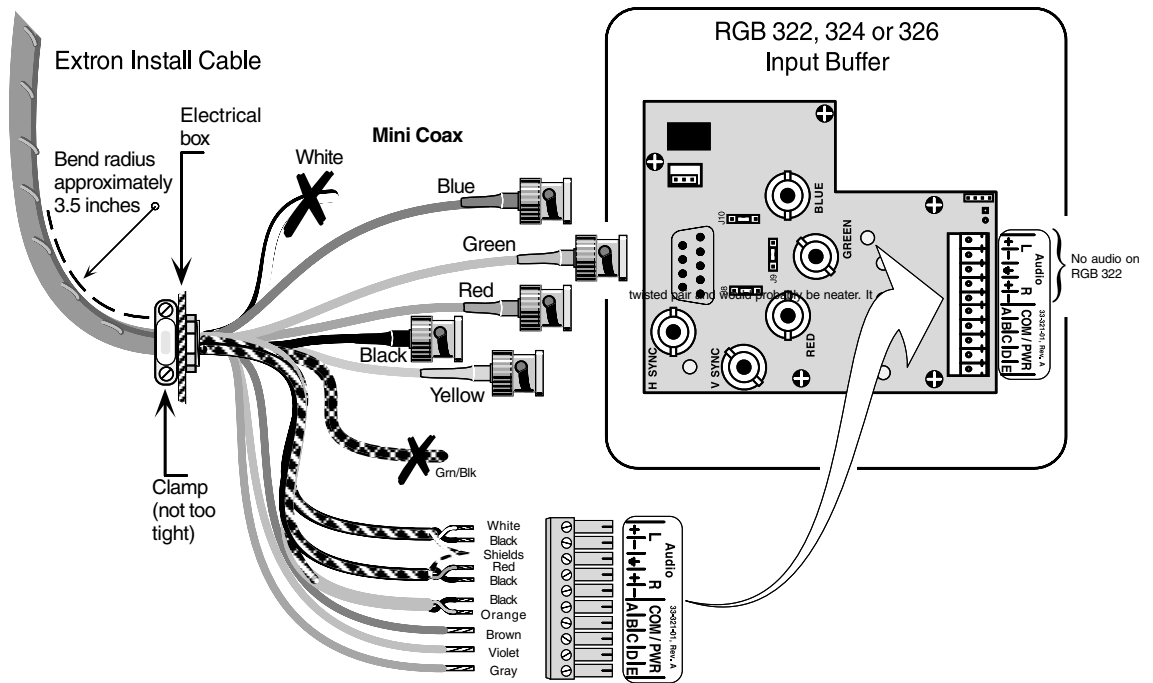


Figure 2-9b. Installation Cable Wired for the RGB 322/324/326/340 (RGB 322 Has No Audio)

The type of adapter cable used to connect the computer to an input buffer will depend on the brand and type of computer. It must adapt to the 9-pin, male connector on the RGB 322, 324, 326, or 340 buffer unit.

RGB 320 Switching Interface System User's Manual

Chapter Three **Operating the RGB 320 Panels**

Controlling the RGB 320 Interface

Input Buffer Control (RGB 322/324/326/340)

Using the RGB 320 Front Panel Buttons

Making Adjustments from the RGB 320 Front Panel

Rear Panel Switches



Controlling the RGB 320 Interface

The RGB 320 can be controlled from the front panel, from an input buffer, from an external RS-232 device or from Extron's Windows® based control software. This includes selecting video, audio or both from one of six inputs, adjusting horizontal and vertical centering or adjusting the video and audio levels. See Chapter 4 for Windows® software and Appendix A for RS-232 programming.

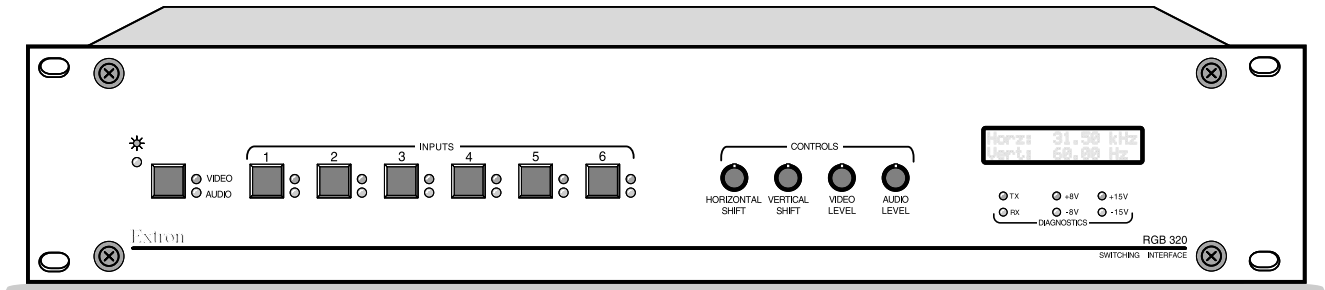


Figure 3-1. The RGB 320 Front Panel

Memory Functions (store/recall/clear)

Although the interface functions are processed within the RGB 320, “virtual interfacing” can be done from an RGB 322, RGB 324 or RGB 340 buffer by pressing the “Show Me” button on its panel. The button requests that the RGB 320 display the input signal from that buffer to the output display device(s), and also initiates communication with the RGB 320 to allow adjustments to be made from the buffer panel. These include horizontal shift, vertical shift, video levels and audio levels. See the user's manual 68-338-01 for details.

Adjustments for all inputs (buffers or other devices) can be made from the front panel, or from an RS-232 host device. Regardless of where they were made, these settings are saved in memory blocks associated with each input.



Memory blocks for each input can be cleared from the front panel by holding the Video/Audio button while pressing the Input button for the channel to be reset. The input LEDs blink and then are steady “on” when memory has been cleared.



When an input is selected, the RGB 320 searches for a configuration that matches that computer, and it automatically recalls the appropriate video scan rate. It may not be necessary to recalibrate the settings when a computer is selected from an input. Ten of the most popular computer scan rates are permanently programmed into the RGB 320's memory.

LCD Display

The front panel LCD screen displays five functions:

- The default display shows the scan rate for the selected input (if no video is connected to the selected input, both frequencies will appear as 00.00)
- Horizontal shift (see page 3-4)
- Vertical shift (see page 3-4)
- Video level (see page 3-4)
- Audio level (see page 3-4)



Figure 3-2. The Front Panel LCD Display



When switching from one input to another, regardless of where it is from, the LCD display blinks while “locking” in on the new input. For RS-232 programming, the message “reconfig” will appear during this time. If adjustments are made during this transition time, they may not be stored.



Front Panel Controls



There are panel controls for adjusting four functions for the selected input. These will be explained later in this chapter. Although the knobs can be turned endlessly (no physical limit), the adjustment level will stop at its highest or lowest value.

Input buffer control (RGB 322/324/326/340)

Before going into the operation of the RGB 320 panel, here is an overview of the input buffers that can be used with the RGB 320. Details on installing and operating the buffer units are in the RGB 322/324/326/340 User's Manual (68-338-01). The buffer units' features are summarized as follows:

Feature/Buffer model	Type	322	324	326	340
Power LED	indicator	yes	yes	yes	yes
Video In	connector	yes	yes	yes	yes
Audio In	connector	no	yes	yes	yes
75 Ohm/Hi Z	switch	yes	yes	yes	yes
Horizontal shift adjust	control	yes	yes	no	yes
Vertical shift adjust	control	no	yes	no	yes
Show me/Select button	control	yes	yes	no	yes
Show me/Select light	indicator	yes	yes	no	yes
Mount in wall/furniture	design	yes	yes	yes	no
Mount under table/shelf	design	no	no	no	yes
Available in three colors	design	yes	yes	yes	no

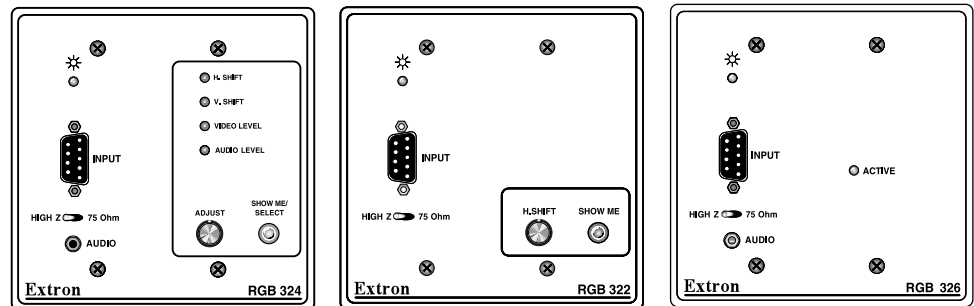
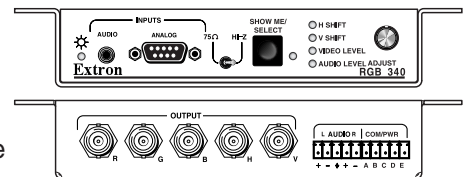


Figure 3-3. RGB 322/324/326/340 Differences



All buffers except the RGB 326 have some control of the RGB 320, as initiated by the “Show Me” button. Pressing this button initiates communication with the RGB 320 for the following:

- Request that the image from this buffer be displayed on the output device(s).
- The “Show Me” light on the buffer indicates when the input is selected, and it blinks for audio breakaway.
- On the RGB 322, if “Show Me” is lit, use the H. Shift knob for horizontal centering.
- With either the RGB 324 or 340, if “Show Me” is lit, press the “Show Me” button again and observe which of the four green LEDs is lit for the four adjustments: H Shift, V. Shift, Video Level and Audio Level. Press the “Show Me” button until the desired function is selected. Turn the “Adjust” knob to make the adjustment.
- The buffer’s power light shows “power on” and blinks when the RGB 320 is busy.
- Although the RGB 326 cannot request that its input be displayed, it has an active light to show that it has been selected by the RGB 320 from another source.
- Adjustable horizontal and vertical shift (centering) for the selected input.



Using the RGB 320 Front Panel Buttons

Of the seven buttons on the front panel shown in Figure 3-4, the left-most button (A/V Mode) determines what will be selected (audio, video or both), and the other six buttons are used to select an input.

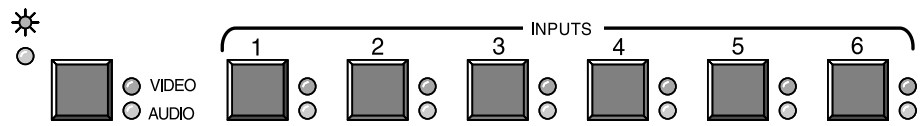


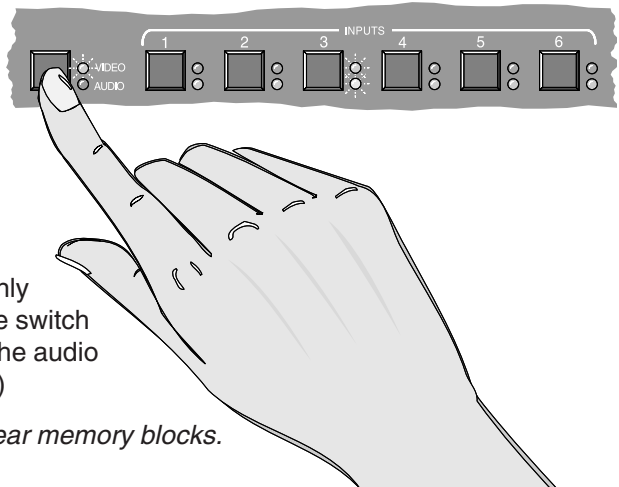
Figure 3-4. RGB 320 Front Panel A/V Mode and Input Selection Buttons

The A/V Mode button has two LEDs next to it. The top one (red) is for video and the bottom one (green) is for audio. Press the button for one of three modes:

- Video and audio (audio follow)
- Video only (breakaway)
- Audio only (breakaway)

The two LEDs will light according to the active mode. Before selecting an input, if you do not want the mode that is indicated, press the button until the LEDs indicate the mode you want.

Example: If both LEDs are lit, both video and audio will be switched. If you want video only from input #6, press the mode switch until the video LED is lit and the audio LED is unlit. (See Figure 3-5.)



This button is also used to clear memory blocks. See note on Page 3-1.

Figure 3-5. Select the A/V Mode by Pressing the Button on the RGB 320 Front Panel

Press the input #6 button. Because you selected the video-only mode, the video LED #6 (next to button #6) will light, but the audio LED #6 will not light.

When the RGB 320 switches to input #6, the horizontal and vertical frequencies for the computer video from that input will be displayed in the LCD default screen. (See Figure 3-7.)

The audio input LED will remain lit for the last input selected with audio. For this example, input #3 had been selected previously, and it had audio; therefore, the input #3 audio LED will remain on, as will the input #6 video LED.

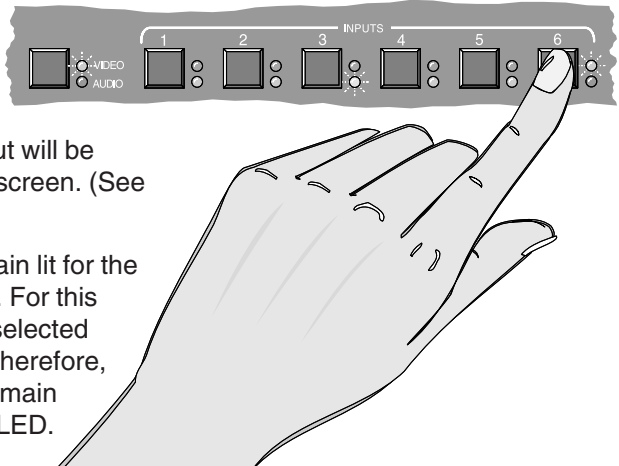


Figure 3-6. Select the Desired Input by Pressing Its Button



Making Input Adjustments from the RGB 320 Front Panel

When adjustments are being made from the front panel, an input buffer or an RS-232 device, the results are displayed on the LCD screen. Otherwise, the default screen displays the horizontal and vertical frequencies. See Figure 3-7.



Do not make adjustments immediately after switching inputs. Wait for the Horz and Vert frequency values on the LCD panel to stabilize, or for the image on the output display to stabilize. If adjustments are made before that time, they may not be stored.



Turn any of the four adjustment knobs to adjust the current setting for that function, for the selected input – if it is not currently being adjusted from another source. This appears on the LCD screen as the adjustment is being made. When the adjustment is complete, release the knob and, after a 7.5 second time-out, the Tx LED blinks and the LCD once again displays the default screen.

Figure 3-7. Example of the Input Frequencies Being Displayed on the Default Screen



The LCD display will also show an adjustment that is being made from a remote buffer unit or an RS-232 device. However, the buffer unit has priority over the panel and the RS-232 device. (For example, if an RGB 324 has V. Shift selected, turning a knob on the panel does nothing until after the time-out.)

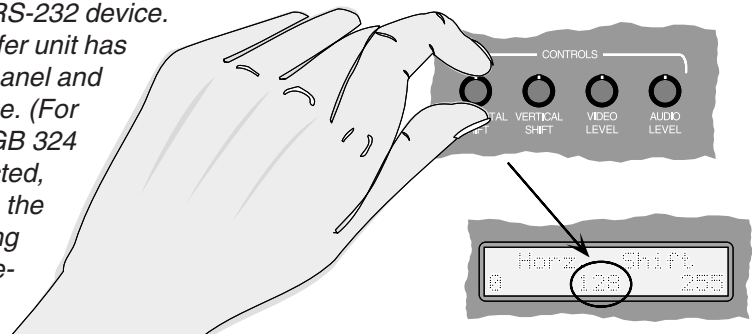


Figure 3-8. Turn the Appropriate Knob to Adjust an Input Function; the LCD Displays the Action

Four Video and Audio Adjustments

Following is a description of each of the four adjustments. The LCD screen displays the high and low limits for the adjustments, as well as the current value.

Adjustments affect both of the RGB 320 outputs; therefore, for best results, observe the primary display (projector), instead of the secondary display (a monitor in a rack or podium), while making the adjustment.

Horizontal shift – Moves the displayed image left and right on the screen. This is also called Horizontal Centering.

Vertical shift – Moves the displayed image up and down on the screen. This is also called Vertical Centering.

Video level – A video level control is provided to compensate for a weak or strong video signal. For example, if the signal from input #1 is weak and the signal from input #3 is strong, each signal can be adjusted and stored to memory. This allows for better balance when switching from one input to another. (Unity gain is the middle of the range, at 128.)

Audio level – Adjusts the audio level for the selected input and saves it to memory.



In breakaway mode, the audio and video adjustments will be for different inputs.

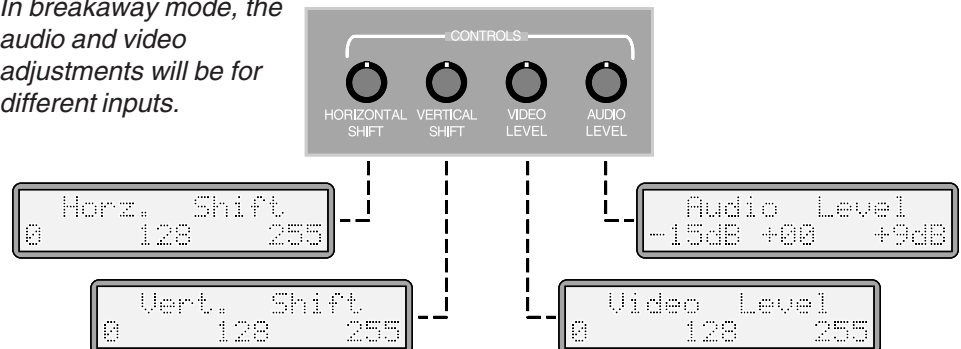


Figure 3-9. The Appropriate Display Will Appear on the LCD Screen



Diagnostic LEDs

The front panel has six diagnostic LEDs. The right-most pair monitor +15 and -15 voltages, and the middle pair monitors +8 and -8 voltages. If any of these four LEDs are not lit, the system will malfunction.

The left-most pair of LEDs will blink during RS-232 communication with a controlling device. Tx is transmit and Rx is receive.



Tx blinks each time a panel change has been completed to notify the host of a change in status.



Figure 3-10. Six Diagnostic LEDs on the Front Panel

Rear Panel Switches

Switches on the rear panel affect all the video signals that come from the RGB 320.

Peaking Switch

To the left of the DIP switches is a three-position toggle switch. If the RGB 320 is driving long cables, this switch allows compensation for cable capacitance. The middle position is Normal and does not alter the output load. The lower position provides 50% peaking, and the upper position provides 100% peaking. Set the switch in the position that provides the best image on the output display device.

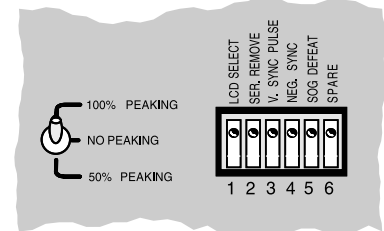


Figure 3-11. Peaking Switch and DIP Switches are Located in the Lower-right Section of the Rear Panel

DIP Switches: Sync Options and Serration Pulses

The DIP switches are located in the lower-right section of the rear panel. The factory settings are all *Off*. Their functions are as follows:

1 LCD Select

Use the on position for an LCD output device or other digital device. In this position, the horizontal and vertical shift (centering) controls are not active. Use the off position for non-LCD or analog devices.



Because this switch disables the RGB 320 centering controls, when adjusting centering from the projector, turn this switch on before adjusting the projector's centering controls.

2 Ser. Remove

Use the on position to remove serration pulses. In the off position, the RGB 320 will allow serration pulses, or it will add them if they are not already present.

3 V. Sync Pulse

In the on position, this switch increases the width of the vertical sync pulse to approximately twice its original duration. The actual sync width will depend upon the frequency of the incoming signal. Use the off position for normal width.

4 Neg. Sync

Use the on position for negative sync. This setting would depend upon the requirements of the output display device (projector).

5 SOG

In the on position, sync on green is forced. Because the RGB 320 has three BNC connectors for output sync, there is always one output with composite and two for separate horizontal and vertical sync.

6 Spare

*RGB 320 Switching Interface System
User's Manual*



Chapter Four

Using Windows® Control Program

Installing Windows® Software Control

Normal Windows Control Panel

Executive Mode Panel

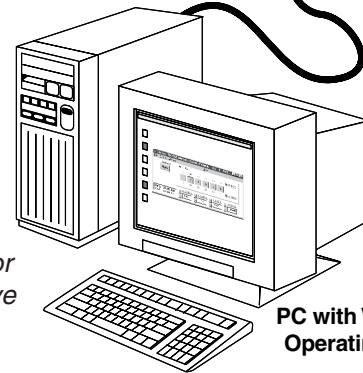
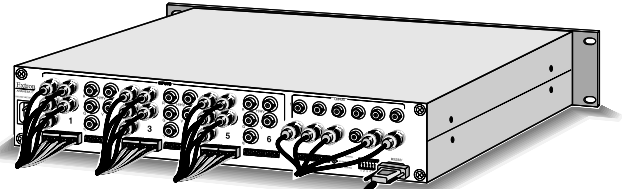
RGB 320 Help



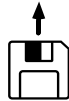
Installing Windows® Control Software

This chapter is dedicated to using Extron's "Windows Control Program for RGB 320 via RS-232" software. Extron supplies this software that runs in the Windows® operating system, version 3.1 or later. Communication between the computer software and the RGB 320 is established after connecting the computer to the RS-232 port on the rear panel of the RGB 320.

1. Connect the PC's serial port to the RS-232 connector on the back of the RGB 320.
2. Power up the RGB 320 and the PC, and load Windows.
3. To install the software from the 3.5" floppy disk onto the hard disk, run Setup.exe from the floppy disk. (It's just like any other Windows application.)



PC with Windows® Operating System



The floppy disk has instructions printed on the label. The software can be run from the floppy drive, or it can be loaded onto the hard drive and run from there.

Figure 4-1. Connect the PC to the RGB 320 Switching Interface

4. Installation of the software creates a program group (Windows 3.1) or a folder (Windows 95®) called "Extron Electronics". Icons for the control program and the help program are installed in that group or folder. The window in Figure 4-2 shows an Extron program group. This example is from Windows 3.1, and it includes Extron's VTG 200 Control Program; your system may not have the VTG 200 software. (VTG = Video Test Generator.)

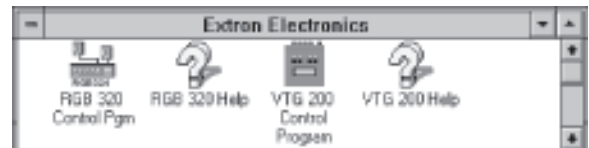


Figure 4-2. Extron's Program Group



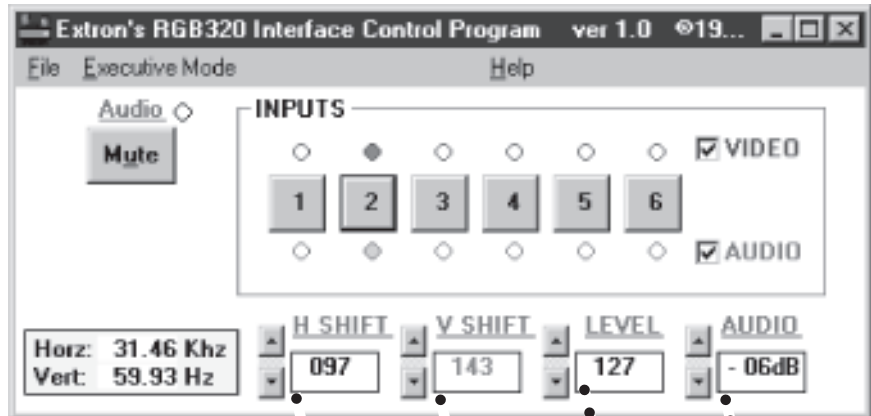
5. Double-click on the RGB 320 icon to start the program. You will be asked to select the serial port. After selecting the serial port, the software looks for the RGB 320, "reads" its configuration, and then displays it in a window called "Extron's RGB 320 Interface Control Program".



Normal Windows Control Panel

Figure 4-3 shows an example of the normal Windows control panel. In addition to the six input switches, there are:

- Audio Mute button
- Scan rate display screen (same information as on the front panel LCD screen)
- Video and Audio check boxes (right side) – this allows control for switching video and audio, or either video or audio (breakaway).



- The four controls have the same functions as the four knobs on the front panel. The up/down nudge buttons change the value of the function, while the numeric value is displayed in the window next to the set of buttons.



Figure 4-3. Control Panel Functions

Executive Mode Panel

Executive Mode allows a limited control panel so that the video and audio adjustments cannot be changed. Only input switching and audio mute are available from this panel.

See Figure 4-4.

After the adjustments have been set from the normal Windows control panel (Figure 4-3), switch to Executive Mode by selecting the Executive Mode pull-down menu.

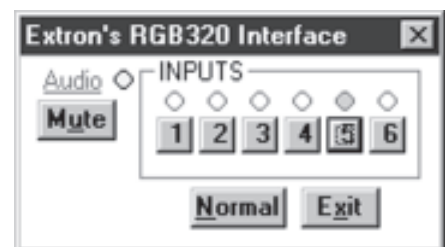


Figure 4-4. Executive Mode Uses a Limited Panel



RGB 320 Help

Double-click on the Help icon (or press F1 at any time) to open the Help window. Below is an example of what this might look like.

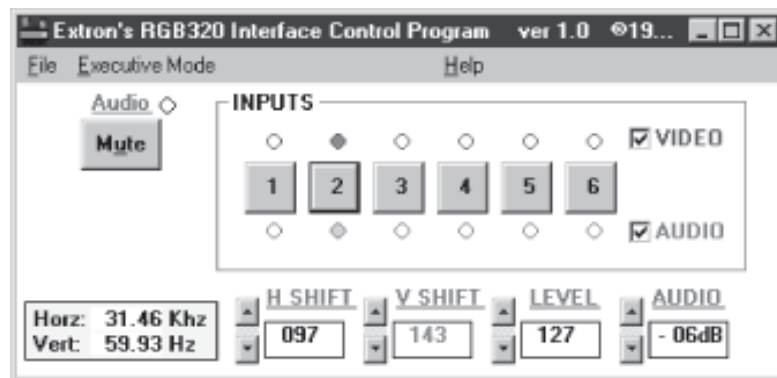
As with all Windows® help files, clicking on the underlined words will give more detailed help.

Extron's RGB 320 Control Program Help Contents

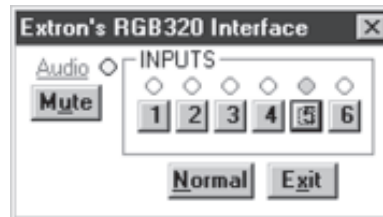
To learn how to use Help, press F1 or choose Using Help from the Help menu.

The RGB 320 Control program communicates with the Extron RGB 320 Switching Interface through the unit's RS-232 port. (Defaults to 9600 baud, 8-bit, 1 stop, no parity). It represents the same functions found on the unit's front-panel, but in an interactive graphical interface.

RGB 320 Main Screen (Normal mode):



RGB 320 Main Screen (Executive mode):



For Help on specific buttons and controls, click the appropriate item above.

Note that pressing F1 within the program will provide context-sensitive help.

Figure 4-5. RGB 320 Help

RGB 320 Switching Interface System User's Manual



Appendix A **Programming the RGB 320**

Remote Control Port (RS-232 and Contact Closure)

Host-to-RGB 320 Instructions

Command/Response Table

RGB 320-Initiated Messages



Remote Control Port (RS-232 and Contact Closure)

Figure A-1 shows the RS-232 port connector. This is used to connect to a host, or to an external controlling device, such as a computer or control panel, that can generate the proper command codes and can recognize the RGB 320 responses. In addition to having RS-232 connections (pins 2, 3 and 5), there are also six contact closure inputs that share the ground on pin #5.

Contact Closure Operation

A third party contact closure device can supply momentary contact between a designated input pin and ground (pin #5), causing the RGB 320 to switch to that input. Momentary contact is defined as having a duration of 250 to 500 milliseconds, e.g., touching pin #4 to pin #5 for the required time causes the RGB 320 to switch to input #2.



When connecting to RS-232, do not connect devices that use pins 1, 4, 6, 7, 8 or 9 for other signals or voltages. This will cause the RGB 320 to malfunction.

The RS-232 connector is a 9-pin D female connector with the following pin designations:

Pin	RS-232	Usage
1	Input #1	Contact Closure
2	Tx	RS-232 Transmit Data
3	Rx	RS-232 Receive Data
4	Input #2	Contact Closure
5	Gnd	Signal Ground (both)
6	Input #3	Contact Closure
7	Input #4	Contact Closure
8	Input #5	Contact Closure
9	Input #6	Contact Closure

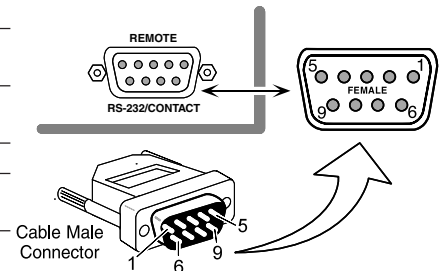


Figure A-1. Serial Port Connector Wired for Both RS-232 and Contact Closure

Commands and responses for programming the RGB 320 Switching Interface from a host system connected to the RS-232 port are listed on the next page.

The RS-232 protocol is 9600 baud, 8-bit, 1 stop bit and no parity.

Host-to-RGB 320 Instructions

The RGB 320 will recognize certain ASCII characters as instructions. It then responds to those characters with appropriate information. Unrecognizable codes will get an error code with the response.

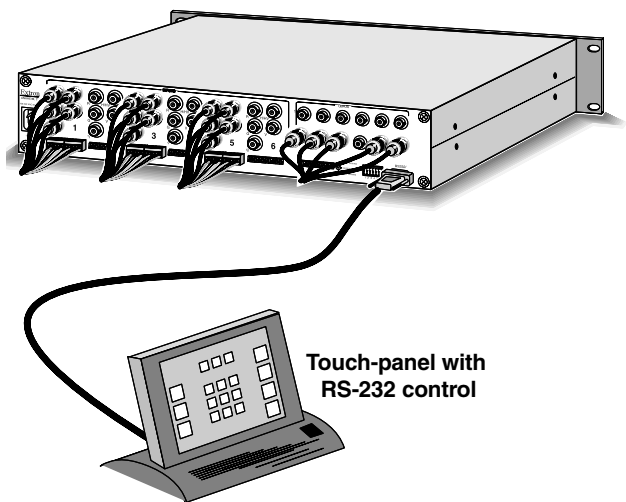


Figure A-2. Example of a Touch Panel Connected to the RS-232 Port



Command/Response Table

Definitions and abbreviations:

↵ = CR/LF

[X1] = input #1 through 6, or 0 = input disconnected

[X2] = 0 thru 255 (enhancement control range)

[X3] = xxx.xx (frequency in Hz or kHz)

[X4] = 0 thru 9 (10 steps of audio gain)

[X5] = numeric value -15 thru +09

[X6] = controller software version to 2nd decimal place

[X7] = 0 or 1, 0 = Off, 1 = On

[X8] = 15 thru 1 (15 steps of audio attenuation)

· = space (If indicated, the space must be there.)

A_n = this is a hexadecimal number

ph = phase: Hph - horiz shift; Vph - vert shift

rt = rate: Hrt - horiz frequency rate; Vrt - vert frequency rate

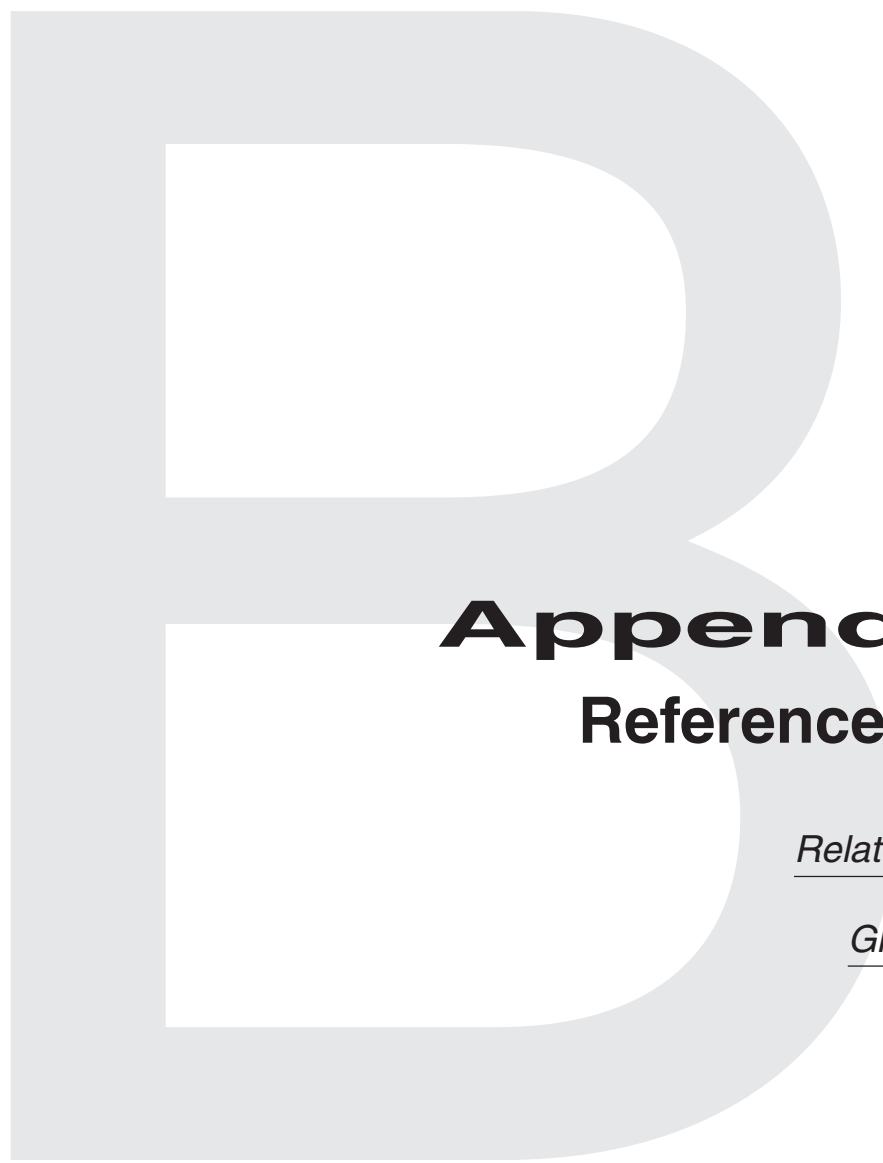
mt = mute: Amt - audio mute

brt = brightness - video level

Command from Host	Host Code	Resp	Examples
Description	ASCII HEX	to Host	Com. Response Action/Explanation
Select input channel (aud & vid) [X1]	[X1] 21 _n	C [X1]↵	5! C5↵ Select input channel #5(aud & vid)
Select input channel (audio only) [X1]	[X1]\$ 24 _n	A [X1]↵	3\$ A3↵ Select audio input channel #3
Select input channel (video only) [X1]	[X1]& 26 _n	V [X1]↵	4& V4↵ Select video input channel #4
Set hor. shift value (Hph) to [X2]	[X2]H 48 _n	Hph [X2]↵	39H Hph039↵ Set horizontal shift value to 39
Increment horizontal shift value	{H 7B _n 48 _n	Hph [X2]↵	{H Hph040↵ Increase horizontal shift by 1
Decrement horizontal shift value	}H 7D _n 48 _n	Hph [X2]↵	}H Hph039↵ Decrease horizontal shift by 1
Set vert. shift value (Vph) to [X2]	[X2]/ 2F _n	Vph [X2]↵	57/ Vph057↵ Set vertical shift value to 57
Increment vertical shift value	{/ 7B _n 2F _n	Vph [X2]↵	{/ Vph058↵ Increase vertical shift value by 1
Decrement vertical shift value	}/ 7D _n 2F _n	Vph [X2]↵	}/ Vph057↵ Decrease vertical shift value by 1
Note: A higher value moves the image downward, and a lower value moves it upward on the screen.			
Set video level value (Br) to [X2]	[X2]Y 59 _n	Br [X2]↵	32Y Brt032↵ Set video level value to 32
Increment video level value	{Y 7B _n 59 _n	Br [X2]↵	{Y Brt033↵ Increase video level by 1
Decrement video level value	}Y 7D _n 59 _n	Br [X2]↵	}Y Brt032↵ Decrease video level by 1
Audio un-mute	z 7A	Amt0↵	z Amt0↵ Mute is off.
Audio mute	Z 5A	Amt1↵	Z Amt1↵ Mute is on.
Set channel gain (Aud) to [X4]	[X4]G 47 _n	Aud [X4]↵	7G Aud+07↵ Set audio value to +7 dB
Set audio channel attenuation	[X8]g 67 _n	Aud [X4]↵	1g Aud-01↵ Set audio value to -1 dB
Increment audio level value	{G 7B _n 47 _n	Aud [X4]↵	{G Aud+08↵ Increase audio level by 1
Decrement audio level value	}G 7D _n 47 _n	Aud [X4]↵	}G Aud+06↵ Decrease audio level by 1
Information request (Same as I)	i 69 _n	V [X1]·A [X1]·Amt [X7]·Hph [X2]·Vph [X2]·Br [X2]·Aud [X5]·Hrt [X3]·Vrt [X3]·Max6↵	
Information request	I 49 _n	V [X1]·A [X1]·Amt [X7]·Hph [X2]·Vph [X2]·Br [X2]·Aud [X5]·Hrt [X3]·Vrt [X3]·Max6↵	
Where: V=video channel; A=audio channel; Amt=aud mute; Hph = horiz shift; Vph=vert shift; Max=highest channel#			
Response example: V2·A2·Amt0·Hph000·Vph255·Br127·Aud+03·Hrt015.75·Vrt059.93·Max6			
Request part number (Same as N)	n 6E _n	N60-232-01↵	(60-232-01 = RGB 320)
Request part number	N 4E _n	N60-232-01↵	(60-232-01 = RGB 320)
Query software version (Same as Q)	q 71 _n	QVER [X6]↵	q QVER1.23↵ (1.23 is example only)
Query software version	Q 51 _n	QVER [X6]↵	

Error Response	Code	Description
Invalid channel number	E01↵	Input number requested could be greater than 6 (too large).
Invalid command	E10↵	Command code not recognized.
Invalid value	E13↵	Specified number could be out of range. (e.g., set video level to 256)
Busy	E16↵	Adjustments are being made from an RGB 322/324/340 buffer.

*RGB 320 Switching Interface System
User's Manual*



Appendix B
Reference Material

Related Product Lists

Glossary of Terms

**Related Parts****Monitor Breakout Cables**

MBC VGA/XGA HR	26-162-01
MBC Mac/Quadra	26-018-02
MBC SUN Sparc HR	26-424-01

Laptop Breakout Cables

LBC VGA HR 3'	26-224-02
LBC VGA HR 6'	26-224-01
LBC VGA HR 12'	26-224-03
LBC Mac HR 3'	26-363-03
LBC Mac HR 6'	26-363-01
LBC Mac HR 12'	26-363-04
LBC SUN HR 3' (61 kHz)	26-413-04
LBC SUN HR 6' (61 kHz)	26-413-01
LBC SUN HR 12' (61 kHz)	26-413-05
LBC SUN HR 3' (71 kHz)	26-413-06
LBC SUN HR 6' (71 kHz)	26-413-02
LBC SUN HR 12' (71 kHz)	26-413-07
LBC SUN HR 3' (81 kHz)	26-413-08
LBC SUN HR 6' (81 kHz)	26-413-03
LBC SUN HR 12' (81 kHz)	26-413-09
LBC Mac/VGA 35 HR	26-394-01

Laptop Breakout Cables with Audio

LBC VGA HR 3'A	26-441-01
LBC VGA HR 6'A	26-441-02
LBC VGA HR 12'A	26-441-03
LBC Mac HR 3'A	26-442-01
LBC Mac HR 6'A	26-442-02
LBC Mac HR 12'A	26-442-03
LBC SUN HR 3'A (61 kHz)	26-443-01
LBC SUN HR 6'A (61 kHz)	26-443-02
LBC SUN HR 12'A (61 kHz)	26-443-03
LBC SUN HR 3'A (71 kHz)	26-444-01
LBC SUN HR 6'A (71 kHz)	26-444-02
LBC SUN HR 12'A (71 kHz)	26-444-03
LBC SUN HR 3'A (81 kHz)	26-445-01
LBC SUN HR 6'A (81 kHz)	26-445-02
LBC SUN HR 12'A (81 kHz)	26-445-03

Cable and Connectors

Hi-Res Installation Cable (500 ft.)	22-111-03
Hi-Res Installation Cable (1,000 ft.)	22-111-04
3.5 mm 10-pole captive screw connectors	10-319-11
BNC connectors for mini-high-res cables	100-074-51
Red heat shrink, for mini-hi-res cable (1 ft.)	39-010-03
Green heat shrink, for mini-hi-res cable(1 ft.)	39-011-03
Blue heat shrink, for mini-hi-res cable (1 ft.)	39-012-03
Yellow heat shrink, for mini-hi-res cable(1 ft.)	39-013-03
Black heat shrink, for mini-hi-res cable(1 ft.)	39-018-03



Glossary of Terms

For a complete glossary, see Extron's web site (<http://www.extron.com>)

- AC** – Alternating current. The flow of electrons that changes direction alternately.
- AC reset** – The status that changes when power is removed from a device. Many electronic devices have live power inside, even after “power off” has been initiated from a panel or remote control device. This is not the same as “AC reset”, when power is removed at the AC cord.
- Amp** – Ampere. The international base unit of electric current. Symbolized by “A”. 1 amp is equal to the steady current produced by 1 volt applied across a resistance of 1 ohm.
- Analog** – A continuous action or movement that takes time to make a transition from one level to another. Standard audio and video signals are analog. An analog signal has an infinite number of levels between its highest and lowest value. (Changes are not made by steps, such as with digital.)
- ANSI** – American National Standards Institute. The organization that sets standards for US A/V equipment.
- ASCII** – American Standard Code for Information Interchange. The standard code consisting of 7-bit coded characters (8 bits including parity check), utilized to exchange information between data processing systems, data communication systems and associated equipment. The ASCII set contains control characters and graphic characters.
- Attenuation** – To reduce the amplitude (strength) of a signal or current.
- Audio follow** – A term used when an audio signal is tied to the video signal and they are switched together; the opposite of *breakaway*.
- Balanced audio** – Audio circuits that use three conductors for one audio signal: plus (+), minus (-) and ground. The ground conductor is strictly for shielding, and does not carry any signal. Also called *differential audio*.
- Bandwidth** – A frequency range, or “band” of frequencies, between the limits defined by the “half power points”, where the signal loss is -3dB. In audio and video, it is this band of frequencies that can pass through a device without significant loss or distortion. The wider the bandwidth, the better the quality that results, such as a sharper picture, better sound, etc. The higher the bandwidth number, the better the performance. (300 MHz is better than 250 MHz.) When a signal passes through a path with more than one device (including cables), the limiting factor (bottleneck) in that path is the device with the narrowest bandwidth.
- Blooming** – Most noticeable at the edges of images on a CRT, “blooming” is when the light hitting the screen is too intense and overdrives the phosphors. The edges of an image seem to exceed its boundaries. Thin lines and sharp edges may look thick and fuzzy. This may be caused by the brightness being set too high, or by a high voltage problem.
- BNC** – A cylindrical bayonet connector that operates with a twist-locking motion. Two curved grooves in the collar of the male connector are aligned with two projections on the outside of the female collar. This allows the connector to be locked in place without tools.
- Breakaway** – The ability to separate video and audio signals for the purpose of switching them independently. For example, an audio and video signal from the same source may be “broken away” and switched to different destinations. This is the opposite of *audio follow*.
- Buffer** – Generally referred to as a unity gain amplifier, a buffer is used to isolate the signal source from the load. A buffer can be used for digital or analog signals. The RGB 322, 324, 326 and 340 are input buffers to the RGB 320 switching interface.



- Cable equalization** – The method of altering the frequency response of a video amplifier to compensate for high frequency losses in cables that it feeds. See *peaking*.
- Capacitance** – The storing of an electrical charge. Capacitance is a condition that exists between conductors in a cable. At high frequencies, this represents an impedance called *capacitive reactance* (X_c), which can cause signal loss or distortion.
- Chroma** – The characteristics of color information, independent of luminance intensity. Hue and saturation are qualities of chroma. Black, gray and white objects do not have chroma characteristics.
- Chrominance signal** – Part of a television signal containing the color information. Abbreviated as *C*.
- Coaxial cable** – A two-conductor wire in which one conductor completely wraps the other conductor, with the two separated by insulation. Constant impedance transmission cable. Abbreviated as *coax*.
- Component video** – Our color television system starts with three channels of information; red, green, & blue (RGB). In the process of translating these channels to a single composite video signal, they are often first converted to Y, R-Y, and B-Y. Both 3-channel systems, RGB and Y, R -Y, B -Y, are component video signals. They are the components that eventually make up the composite video signal. Higher quality program production is possible if the elements are assembled in the component domain.
- Composite sync** – A signal combining horizontal and vertical sync pulses and equalizing pulses, with no picture information and no signal reference level. Sometimes called *C, S* (as in *RGBS*) or *HV*.
- Composite video** – An all-in-one video signal comprised of the luminance (black and white), chrominance (color), blanking pulses, sync pulses and color burst.
- Contact closure** – A device that provides electrical contact between a designated input pin and ground, causing a device, such as a switcher, to do a particular function.
- Contrast** – The range of light and dark values in a picture, or the ratio between the maximum and the minimum brightness values. Low contrast is shown mainly as shades of gray, while high contrast is shown as blacks and whites with very little gray. It is also a TV monitor adjustment that increases or decreases the level of contrast of a displayed picture. Also called *white level*.
- Crosstalk** – Interference between two audio or video signals, usually from an adjacent channel, that adds an undesired signal to the desired signal. Crosstalk is caused by magnetic/capacitive coupling or electrostatic induction, and can occur when there are grounding problems or improper cable shielding. Video symptoms include noise/ghosting, and audio symptoms include signal leakage.
- Crosstalk isolation** – Attenuation of an undesired signal introduced by crosstalk.
- D connector** – A connector with rounded corners and angled ends, taking on the shape of the letter *D*. Commonly used in computers and video.
- dB** – Decibel. The standard unit used to express gain or loss of power. It indicates the logarithmic ratio of output power divided by input power. A power loss of 3 dB is an attenuation of half of the original value. The term “3 dB down” is used to describe the “half power point”.
- DC** – Direct current. The flow of electrons in one direction.
- Decibel** – See *dB*.
- Decoder** – A device used to separate the RGSB (red, green, blue and sync) signals from a composite video signal.
- Differential audio** – See *balanced audio*.



- Distribution amplifier** – DA. A device that allows connection of one input source to multiple, isolated (buffered) output sources such as monitors or projectors.
- FCC** – Federal Communications Commission. The US governmental agency that controls and makes all policy for the use of broadcast airwaves.
- Field** – One half of a standard television frame, containing every other line of information. Each standard video frame contains two interlaced fields, sometimes referred to as “field 1 and field 2”.
- Flicker** – An alternating change of light intensity, typically perceived at a rate of a few hertz to 60 Hz when viewing static images such as text. Flicker can occur when the electron gun paints the screen too slowly, giving the phosphors on the screen time to fade before they are refreshed.
- Frame** – One complete picture in interlaced video. A video frame is made up of two fields, or two sets of interlaced lines.
- Frequency range** – The low-to-high limits of a device such as a computer, projector or monitor. See *bandwidth*.
- Gain** – A general term used to denote an increase in signal power or voltage produced by an amplifier. The amount of gain is usually expressed in decibels above a reference level. Opposite of *attenuation*.
- Hertz** – Hz. The international term for cycles per second.
- High impedance** – Hi Z or High Z. In video, when the signal is not terminated it is said to have a Hi Z load. Hi Z is typically 800-10k ohms or greater.
- Horizontal rate** – Horizontal frequency. The number of complete horizontal lines (trace and retrace) scanned per second. Typically measured in kHz.
- Horizontal resolution** – The number of vertical lines that can be perceived in a video device.
- Hue** – Tint control. The parameter of color that allows us to distinguish between colors.
- Impedance** – Z. The opposition or “load” to a signal, measured in ohms and abbreviated Ω or Z. In video, typical low impedance circuits (low Z) are 600 ohms or less, and high impedance circuits (high Z) may be 10k ohms or greater. Video termination impedance is 75 ohm. Also see *high impedance* and *low impedance*.
- Interlaced** – The process of scanning the picture onto a video screen whereby the lines of one scanned field fall evenly between the lines of the preceding field.
- IRE scale** – An oscilloscope scale that applies to composite video levels. Typically there are 140 IRE units in one volt (1 IRE = 7.14 mV).
- K** – kilo. An abbreviation for 1,000. A kilobyte is 1,000 bytes. Because numbers used in computer RAM sizes are in binary, the closest number is used. When talking about memory size, etc., the numbers are rounded off (e.g., 1k byte is really 1,024 bytes.)
- kHz** – Kilohertz. One thousand cycles per second.
- LED** – Light-emitting diode. A low-power, long-life light source, usually red, green or yellow in color. Some LEDs can produce two colors.
- Level control** – The level control on some interface products is similar to the contrast control on a data monitor. It can either increase or decrease the output signal level from the interface to a data monitor or projector. This results in more or less contrast in the picture.
- Low impedance** – The condition where the source or load is at a lower impedance than the characteristic impedance of the cable. Low source impedance is common; low load impedance is usually a fault condition.



- Luminance** – The photometric radiance of a light source. The signal that represents brightness in a video picture. Luminance is any value between black and white. Luminance is abbreviated as *Y*. Also see *chrominance*.
- MHz** – Megahertz. One million cycles per second.
- NTSC** – National Television Standards Committee. The television standard, for North America and parts of South America, having 525 lines/60 Hz (60 Hz refresh). Two fields per frame and 30 frames per second.
- Output** – The product of an operation by a device going to some external destination, such as another device, a video screen, image or hard copy.
- PAL** – Phase Alternate Line. The phase of the color carrier is alternated from line to line. It takes four full pictures for the color to horizontal phase relationship to return to the reference point. This alternation helps cancel phase errors. For this reason, the hue control is not needed on a PAL TV set. PAL, in many forms, is used in Australia, England, Scandinavia, South Africa and Western Europe. PAL uses a 625-line, 50-field composite color transmission system.
- Peak-to-peak** – p-p. The amplitude (voltage, for example) difference between the most positive and the most negative excursions (peaks) of a signal.
- Peaking** – A means of compensating for mid and high frequency RGB video bandwidth response in data monitors and projectors, and for signal losses due to cable capacitance. The higher the frequency and the greater the cable length, the more peaking may be required.
- Phantom power** – Power supplied to a microphone using the shield of a balanced audio connection. Microphones using phantom power must be condenser style microphones designed for use with phantom power systems. Damage can result to other types of audio components from the improper use of phantom power.
- Pin out** – An illustration or table that names signals, voltages, etc. that are on each pin of a connector or cable.
- Plenum cable** – Cable having a covering that meets the UL specifications for resistance to fire.
- PLUGE** – Picture line up generation equipment. The name of a test pattern that assists in properly setting picture black level. PLUGE can be part of many test patterns. The phrase and origination of the test signal are both credited to the BBC.
- Power (electrical)** – The dissipation of heat by passing a current through a resistance. Measured in Watts (W), it is expressed by Ohm's law from the three variables: Voltage (E) and Current (I) and Resistance (R), i.e., $P = I^2 \times R$, or, $P = E^2/R$ or $P = EI$.
- Resolution** – The density of lines or dots for a given area that make up an image. Resolution determines the detail and quality in the image. A measure of the ability of a camera or video system to reproduce detail. A measure of the amount of detail that can be seen in an image. Often expressed as a number of pixels, but more correctly it is the bandwidth. We say that a sharp, clear picture has high resolution.
- RGB** – Red, green, blue. The chrominance information in a video signal. The basic components of the color television system. They are also the primary colors of light in the additive color process.
- RGB video** – A form of color video signal (red, green, blue) distinctly different from the composite color video used in standard television sets. RGB can be displayed only on an RGB monitor, which has a separate electron gun for each of these primary colors. Some color television sets use only one gun. RGB monitors are noted for their crisp, bright colors and high resolution.



- RS-232** – An Electronic Industries Association (EIA) serial digital interface standard specifying the characteristics of the communication path between two devices using D-type connectors. This standard is used for relatively short range communications and does not specify balanced control lines. A serial control standard with a set the number of conductors, data rate, word length and type of connector to be used. Also specifies component connection standards with regard to computer interface. Also called RS-232-C, which is the third version of the RS-232 standard, which is functionally identical to the CCITT V.24 standard.
- SECAM** – Sequential Couleur Avec Memoiré, translated as *Sequential Color with Memory*. A composite color transmission system that potentially eliminates a need for both a color and hue control on the monitor. One of the color difference signals is transmitted on one line and the second is transmitted on the second line. Memory is required to get both color difference signals for color decoding. SECAM is used in France, Africa, Asia, Russia, Saudi Arabia and many Eastern European countries. Similar to PAL, but it produces color signals in a different manner. 625 horizontal scan lines, 50 fields per second (625/50).
- Serial port** – An input/output connection on the computer that allows it to communicate with other devices in a serial fashion – data bits flowing on a single pair of wires. The serial port is used with RS-232 protocol.
- SMPTE** – Society of Motion Picture and Television Engineers. A global organization, based in the United States, that sets standards for baseband visual communications. This includes film as well as video standards.
- SMPTE pattern** – The video test pattern consisting of color, black and white bands used as a standard for setting up video equipment.
- Software** – The programs used to instruct a processor and its peripheral equipment.
- Switcher** – Term often used to describe a special effects generator, which allows the operator to switch between video camera signals. Switchers are often used in industrial applications to switch between video cameras monitoring certain areas for display on a monitor or system of display devices.
- Sync** – In video, a means of synchronizing signals with timing pulses to insure that each step in a process occurs at exactly the right time. For example, horizontal sync determines exactly when to begin each horizontal line (sweep) of the electron beam. Vertical sync determines when to bring the electron beam to the top-left of the screen to start a new field. There are many other types of sync in a video system. (Also called *sync signal* or *sync pulse*.)
- S-VHS** – Super-Video Home System. A high band video recording process for VHS that increases the picture quality and resolution capability. See S-Video.
- S-video** – The composite video signal is separated into the Luminance (Y; black and white) and the Chrominance (C; color).
- Terminal** – A device, typically having a keyboard and display, that is capable of sending text to and receiving text from another device, a network, etc.
- Termination** – A load, or impedance, at the end of a cable or signal line used to match the impedance of the equipment that generated the signal. The impedance absorbs signal energy to prevent signal reflections from going back toward the source. For video signals, termination impedance is typically 75 ohms.
- Vertical interval** – The synchronizing information that is presented between fields, and then signals the picture monitor to return to the top of the screen to start another vertical scan.
- Z** – A symbol for impedance.



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FCC Class A Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Note: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

Extron's Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of two years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

**USA, Canada, South
America, Central
America, and Asia:**

Extron Electronics
1230 South Lewis Street
Anaheim, CA 92805, U.S.A.

**Europe, Africa, and the
Middle East:**

Extron Electronics, Europe
Beeldschermweg 6C
3821 AH Amersfoort
The Netherlands

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Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

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