Extron® Electronics

INTERFACING, SWITCHING AND DISTRIBUTION

User's Manual

IN1404XT

Video Scaler and Switcher

68-755-01
Rev. B
12 04

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.

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.

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.

Conserver 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.

Eviter 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.

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 la contourner ni de la 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'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

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.

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 Stomversorgung (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.

Litium-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.

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 especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

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 puentearia ni eliminaria.

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 sobrecalientamiento 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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Chapter One

Introduction

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About the Scaler

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Introduction

About this Manual

This manual contains installation, configuration, and operating information for the Extron IN1404XT video scaler and switcher (referred to in this manual as the "scaler").

- Chapter 1 identifies the scaler's features.
- Chapter 2 details how to install the scaler.
- Chapter 3 describes how to operate the scaler and use all of its features.
- Chapter 4 provides information about programming and operating the scaler under RS-232 control, such as from a PC or host controller.
- Appendix A lists the scaler's specifications and pertinent part numbers.

About the Scaler

The Extron IN1404XT is a video scaler that incorporates a four-input video and stereo audio switcher (figure 1-1). The scaler accepts NTSC/PAL/SECAM/NTSC 4.43 S-video (Y/C) and composite video inputs and stereo audio inputs on all four inputs and high resolution RGB video and interlaced or progressive component (YUV) video on inputs 3 and 4. The IN1404XT scales the inputs to standard VGA and HDTV resolutions and refresh rates and outputs RGBHV, RGBS, or RGsB video and stereo audio. Input 4 can also be set to a passive mode that provides no decoding, scaling or change of refresh rate and can be set as a timing reference for seamless switching. The scaler can seamlessly switch to and from passive input 4 to bring professionalism and style to boardrooms or other system integration environments. Seamless switching allows switching between sources without a loss of sync. The scalers' scaling capabilities permit differing video formats on each input to be displayed by a common projector.

Each video input is individually configurable to allow for different video formats. The scaler allows analog RGBHV, RGBS, and RGsB video, component video, S-video, and composite video signals to be displayed on a device with a fixed resolution and aspect ratio, such as an liquid crystal display (LCD) projector, digital light processor (DLP) projector, or plasma display.

The scaler inputs high-resolution RGBHV/RGBS/RGsB video, and component video on two sets of five BNC connectors. The scaler inputs S-video on 4-pin mini DIN connectors (inputs 1 and 2) and on two sets of two BNC connectors (inputs 3 and 4). The scaler inputs four composite video inputs on BNC connectors. The scaler inputs audio on RCA connectors.

The IN1404XT scales the input up to any of 48 output resolutions and rates and outputs the scaled video, as two identical RGBHV, RGBS, or RGsB video outputs, on five BNCs and a 15HD connector. Additionally, the scaler acts as a twisted pair (TP) transmitter, outputting the identical video signal on an RJ-45 connector for connection to an optional Extron VTR001CM TP receiver. (See *TP transmission*, in this chapter, for more information about the RJ-45 output.) With all three video outputs active at all times, the IN1404XT can drive three video displays simultaneously, with no need for a distribution amplifier.

There is one stereo audio output, on left and right RCA connectors.

For upscaling, the IN1404XT converts the horizontal and vertical sync timing and the number of lines of the lower-resolution video input to match the native resolution of the display. This produces an undistorted, brighter picture.

The scaler is housed in a rack-mountable, 1U high, 17.5" wide metal enclosure. With the included mounting ears, the scaler is rack-mountable. The scaler has an internal 100VAC to 240VAC, 50/60 Hz, 25 watts auto-switchable power supply that provides worldwide power compatibility.

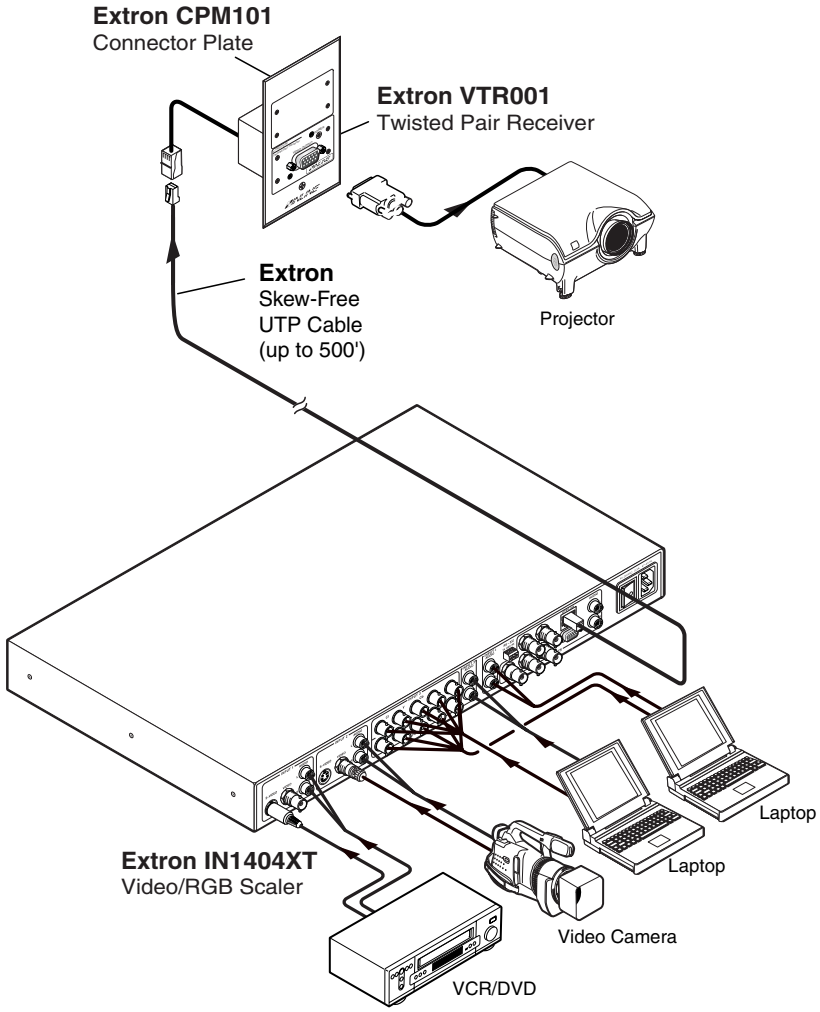


Figure 1-1— Typical IN1404XT Video Scaler and Switcher application

TP transmission

The TP output on the RJ-45 connector and an optional Extron VTR001CM receiver provide a system for long-distance distribution of computer (RGBHV or RGBS) video over Extron's skew-free A/V UTP cable or over CAT 5 unshielded twisted pair (UTP), shielded twisted pair (STP), or foil shielded twisted pair (FTP) cable.

NOTE *The VTR001CM can receive RGsB signals from the scaler. However, the red, green, and blue video signals' black levels are **not** clamped to a 0V reference, as for RGBHV or RGBS. For most displays, this is **not** a problem. On some displays (such as some LCD displays) however, the black levels of the red, green, and blue signals **may** change as the average picture level changes, resulting in an unacceptable image.*

TP cable advantages

Extron's skew-free cable or CAT 5 cable is a fraction of the size of coaxial cable, as well as being much lighter, more flexible, and far less expensive. These TP products make cable runs simpler and less cumbersome. Termination of the cable with RJ-45 connectors is simple, quick, and economical.

Features

Inputs —

Video inputs — The scaler switches among two fully-configurable RGB, HDTV component video, interlaced component video, progressive scan video, S-video, or composite video inputs on 5 BNC connectors (inputs 3 and 4); two S-video inputs on 4-pin mini-DIN connectors (S-video inputs 1 and 2 only); or composite video inputs on single BNC connectors (composite video inputs 1 and 2).

NOTE *Either S-video or composite video, but not both, can be connected to input 1 and to input 2. The two inputs can each be a different video format, but only one format can be connected to an input.*

Audio inputs — The scaler switches among four unbalanced stereo audio inputs on RCA connectors. Inputs can come from sources such as a VCR, DVD player, computer audio card, or other audio device that outputs a stereo line-level signal.

Outputs —

Standard video outputs — The IN1404XT outputs scaled video signals as progressive RGBHV, RGBS, or RGsB, from 640 x 480 up to 1365 x 1024, to match the optimum or native resolution of virtually any display device, on five BNC connectors and a 15-pin HD connector.

The output refresh rate is selectable as desired. When used with LCD or DLA displays, Extron recommends the 60 Hz setting. Higher output refresh rates can be used with CRT displays to reduce flicker.

TP video output — The scaler outputs a third video signal encoded into a set of proprietary analog signals on an RJ-45 connector. The scaler transmits this output in the same format as Extron's VTT001CM TP transmitter. An optional Extron VTR001CM receiver can receive this set of signals and convert them to a high resolution RGBHV, RGBS, or RGsB output (identical to the 5-BNC and 15-pin HD output).

Audio outputs — The scaler provides an unbalanced line level signal that is identical to the input signal. This output can drive any line level compatible audio unit, or a local device such as powered speakers.

Video output resolutions —

The IN1404XT outputs an image scaled up to the following output resolutions:

- 640 x 480 (VGA) at 60 Hz, 72 Hz, 75 Hz, 85Hz, 96 Hz, 100Hz, and 120 Hz
- 800 x 600 (SVGA) at 60 Hz, 72 Hz, 75 Hz, 85Hz, 96 Hz, 100Hz, and 120 Hz
- 852 x 480 at 60 Hz, 72 Hz, 75 Hz, 85Hz, 96 Hz, 100Hz, and 120 Hz
- 1152 x 864 at 60 Hz, 72 Hz, 75 Hz, and 85Hz
- 1024 x 768 (XGA) at 60 Hz, 72 Hz, 75 Hz, and 85Hz
- 1280 x 720 (HDTV - 720p) at 60 Hz, 72 Hz, 75 Hz, 85Hz, 96 Hz, and 100 Hz
- 1280 x 768 at 56 Hz, 60 Hz, and 65 Hz
- 1280 x 1024 (SXGA) at 60 Hz, 72 Hz, and 75 Hz
- 1365x 768 (wide XGA) at 60 Hz, 72 Hz, 75 Hz, and 85 Hz
- 1365 x 1024 (plasma) at 60 Hz

Advanced motion compensation — Extron's video processing techniques, advanced motion prediction and compensation methods treat motion content

and still content with different algorithms to yield high fidelity images that are free of visible scan lines.

Inverse 3:2 pulldown detection for NTSC for film-originated video material — This advanced film mode processing feature helps maximize image detail and sharpness for video sources that originated from film. When film is converted to NTSC video, the film frame rate has to be matched to the video frame rate in a process called 3:2 pulldown. Jaggies and other image artifacts can result if conventional deinterlacing techniques are used on film-source video. The IN1404XT's advanced film mode processing recognizes signals that originated from film. The scaler then applies video processing algorithms that optimize the conversion of video that was made with the 3:2 pulldown process. This results in richly detailed images with sharply defined lines.

Quad-standard decoding — The IN1404XT's video decoder provides accurate video decoding of composite video and S-video in the NTSC, PAL, SECAM, and NTSC 4.43 standards. The advanced 3-line adaptive comb filter that decodes composite video reduces cross-color interference and hanging dots while maintaining maximum image bandwidth and detail.

Seamless Switching - Input 4, when configured as a passive (unscaled) input, serves as a time reference for seamless switching. The IN1404XT provides a seamless transition between scaled inputs on 1, 2, or 3 (RGB, component, S-video, or composite video) and the passive RGB video on input 4.

Picture controls — A wide variety of picture controls are available for fine picture adjustments:

- Position
- Size
- Aspect ratio
- Hue
- Saturation
- Brightness and contrast
- Gamma
- Horizontal tracking
- Sharpness

Once these adjustments are made, the settings are stored in non-volatile memory and automatically recalled when the same input source is selected again.

Advanced image adjustment controls — A wide variety of picture controls are available to optimize the image when the scaler is used with proprietary and non-standard input signals.

Once these adjustments are made, the settings are stored in non-volatile memory and automatically recalled when the same input source is selected again.

Blue screen mode — The scaler can be set to output a blue video field, to help installers calibrate the monitor or projector. Blue screen is always available, whether or not an input is present or properly adjusted.

On screen menus - The scaler puts its menu displays on the output video stream, for display by the output monitors or projectors. The menu system provides easy control of video adjustments including hue, color, contrast, brightness,

gamma, sharpness, image size, image position, and edge blanking. Individual image settings can be optimized and stored for each input. Each time an input is selected, all image settings stored for that input are automatically recalled. The on-screen menus also make it easy to verify and adjust advanced settings such as output signal resolution, refresh rate, sync format; the RS-232 control options; and the reset to factory defaults function. A handy System Info menu option uses the on-screen display to show comprehensive information about the input and output signals and scaler settings.

Audio follow and breakaway — Audio switching can follow its corresponding video input signal or, under RS-232 control, audio can be broken away from the video input.

Except as noted in *Video breakaway*, below, when a new input channel is selected, the audio automatically switches to the newly selected input channel.

Video breakaway — Under RS-232 control, video can be switched without disturbing the audio switch.

Operational flexibility — Operations such as input and scaling selection, picture controls, and saving and recalling of presets can be performed on the front panel or over the RS-232 link. The RS-232 links allow remote control via a PC or control system.

- **Front panel control —** The scaler's front panel controller and on-screen menus support individual input selection, resolution selection, volume control, and complete configuration of the scaler.
- **ASCII character command set** — The remote control protocol uses Extron's ASCII character command set for easy programming and operation.

Freeze mode — Provides a high quality still image for applications that require close examination of a specific video frame. Freeze mode operates for video and RGB signals that are processed by the scaling circuitry. Passive (unscaled) video on input 4 cannot be frozen.

Blank mode — Suppresses the output video image. Blank silences the R, G, and B video outputs but the scaler still outputs sync. This ensures that the output device does not lose sync lock. Blank mode operates for video and RGB signals that are processed by the scaling circuitry. Passive (unscaled) video on input 4 cannot be blanked.

User memories — The IN1404XT provides 128 user memories that store all video, audio, and input parameters. User memories allow the unit to be optimized for a large number of sources and gives the capability to recall those settings quickly. The memories make it easier to add to the number of inputs to the scaler by putting a switcher in front of an input.

Rack mountable — The 1U high scaler can be mounted in any conventional 19″ wide rack using the included IN9123B rack ears.

Power — The 100VAC to 240VAC, auto-switchable, internal power supply of the IN1404XT provides worldwide power compatibility.

Chapter Two

Installation

Installation Overview

Mounting the Scaler

Cabling and Rear Panel Views

Configuration

Installation

Installation Overview

To install and set up an IN1404XT video scaler and switcher for operation, perform the following steps:

1. Disconnect power from all of the equipment, including the video and audio source(s), and the devices that will receive the output video and audio signals. Ensure the power switch on the scaler is off.
2. Rack mount the scaler if desired. See *Mounting the Scaler* in this chapter.
3. Connect the video and audio input cables. See *Input connections* in this chapter.
4. Connect the standard video and audio output cables. See *Standard output connections* in this chapter.
5. If desired, connect the TP cable between the scaler and an optional VTR001CM TP receiver and connect the output cables from the TP receiver to the display. See *TP output connection* in this chapter and refer to the *VTT001CM and VTR001CM - Twisted Pair Transmitter and Receiver* manual, part # 68-760-01.
6. If desired, connect the RS-232 cable. See *RS-232 connection* in this chapter.
7. Connect the AC power cable. See *Power connection* in this chapter. Turn on the sources, video and audio destinations, and the scaler.
6. Configure the scaler's inputs and configure the output for the optimum image. See chapter 3, *Operation* and chapter 4, *Programmer's Guide*.

Mounting the Scaler

The scaler includes four installed rubber feet. If you are going to rack mount the scaler, mount it before cabling it (see *Rack mounting*, below). The IN1404XT is exactly 1U high without the rubber feet; if you plan to rack mount the scaler with other equipment directly underneath it, the feet must be removed.

Rack mounting

Rack mount the scaler as follows:

1. Remove the three enclosure screws on one side of the scaler (figure 2-1).

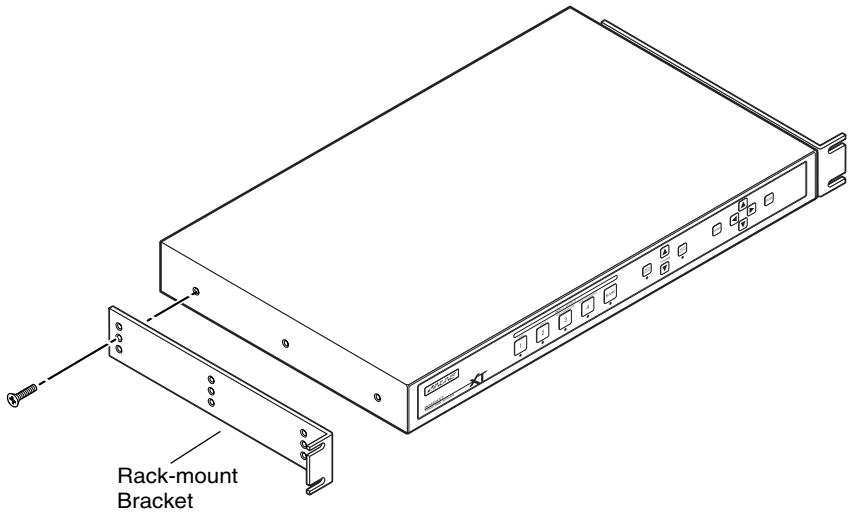


Figure 2-1 — Mounting the scaler

2. Attach one rack mount bracket to that side of the scaler with three screws removed in step **1**.
3. Repeat steps **1** and **2** on the other side of the scaler.
4. Insert the scaler into the rack, align the holes in the mounting bracket with those of the rack.
5. Secure the scaler to the rack with machine screws.

Cabling and Rear Panel Views

All connectors are on the rear panel (figure 2-2).

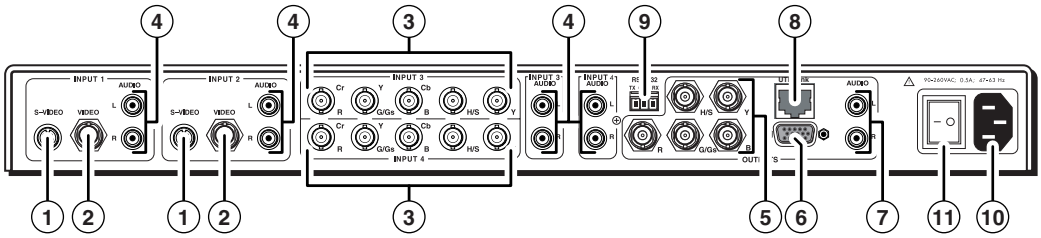
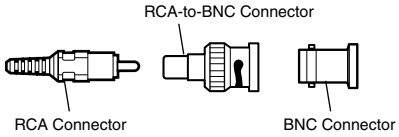


Figure 2-2 — IN1404XT rear panel connectors and power switch

NOTE *With the exception of input 1 and 2 S-video, all video input and output connections to the scaler are made with female BNC connectors. Some types of video output devices do not have BNC video output connectors. For these cases, a suitable cable or connector adapter is necessary between the device output connector and the BNC input connector of the switcher. The Extron part number for the RCA-to-BNC adapter is 10-264-01.*



Input connections

1. **Input 1 and Input 2 S-video connectors** — Connect S-video sources to these 4-pin mini DIN connectors. If necessary, use an 8″ Extron SVHS - BNC adapter, part #**26-353-01**.

— Or —

2. **Input 1 and Input 2 composite video connectors** — Connect composite video sources to these female BNC connectors.

NOTE *For input 1 and input 2, video can be connected to either the S-video input or the composite video input, but not both. If you connect to both, the scaler will not accept either signal.*

3. **Input 3 and Input 4 connectors** — Connect computer or RGB video, component video, S-video, or composite video to these female BNC connectors. Figure 2-3 shows how to connect the various video formats.
4. **Input 1 through Input 4 audio connectors** — Connect each unbalanced stereo audio input to these pairs (left and right) of RCA connectors. Computer sound cards and other devices with a 3.5 mm mini output connector can be connected using an optional Extron IN9107 3.5 mm stereo mini male to (2) RCA male cable.

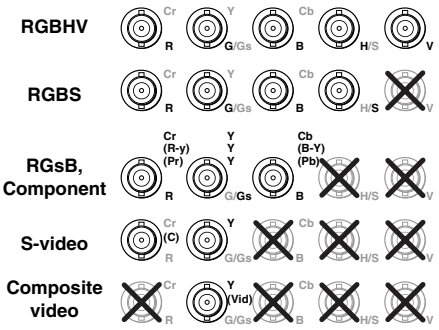


Figure 2-3 — Connections for various input video formats

The audio bass, treble, and balance levels for each input can be individually set via the front panel or the RS-232 link. See chapter 3, *Operation*, and chapter 4, *Programmer's Guide* for details.

Standard output connections

NOTE *The two standard outputs, consisting of five BNC connectors and a 15HD connector, output the identical video signal and the same sync format.*

(5) **Output BNC connectors**— Connect an RGBHV, RGBS, or RGsB video display to these female BNC connectors. Figure 2-4 shows how to connect the various video formats.

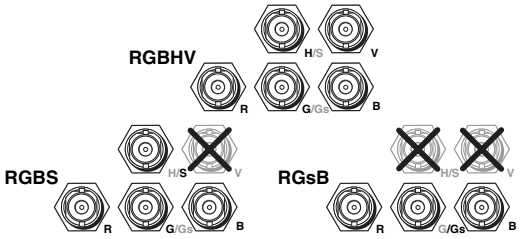


Figure 2-4 — BNC output connections for RGBHV and RGBS video

(6) **Output 15HD connector** — Connect an RGBHV, RGBS, or RGsB video display to this female 15HD connector.

NOTE *The two standard output connectors, BNCs and 15-pin HD, are individually buffered (even when input 4 is configured as passive (unscaled). They can both be simultaneously connected and transmitted up to 100 feet on high quality coax cable without degradation of either output.*

(7) **Output audio connectors**— Connect an audio device, such as an amplifier or powered speakers, to these left and right RCA connectors.

By default, the audio output follows the video switch. Audio breakaway, commanded via the RS-232 link, allows you to select from any one of the audio input sources. See chapter 3, *Operation* and chapter 4, *Programmer's Guide* for details.

TP video output connection

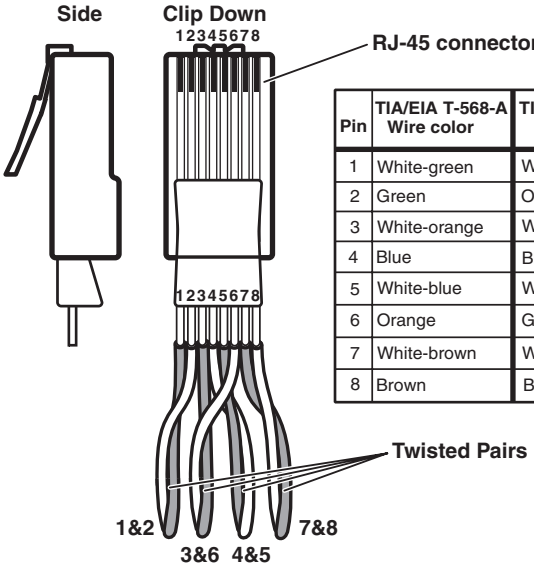
NOTE *RJ-45 termination must comply with the TIA/EIA T 568A or TIA/EIA T 568B wiring standards for all connections.*

8 **RGB video transmission connector —** Connect one end of a TP cable to this RJ-45 female connector. Connect the other end of the TP cable to an optional Extron VTR001CM or other compatible Extron TP receiver. See *Optional Accessories*, in Appendix A, *Reference Information*, for compatible TP receivers.

NOTE *The VTR001CM can receive RGBHV and RGSB signals from the scaler with no loss of image quality. The VTR001 CM can also receive RGsB signals from the scaler. However, the red, green, and blue video signals' black levels are **not** clamped to a 0V reference, as for RGBHV or RGBS. For most displays, this is **not** a problem. On some displays (such as some LCD displays) however, the black levels of the red, green, and blue signals **may** change as the average picture level changes, resulting in an unacceptable image.*

Termination of TP cable

Figure 2-5 details the recommended termination of TP cables in accordance with the TIA/EIA T 568A and TIA/EIA T 568 B wiring standards. You can use either standard, but ensure you use the same standard on both ends of the cable.



Pin	TIA/EIA T-568-A Wire color	TIA/EIA T-568-B Wire color	RGB video signal
1	White-green	White-orange	Red/V. sync+
2	Green	Orange	Red/V. sync-
3	White-orange	White-green	Power
4	Blue	Blue	Green+
5	White-blue	White-blue	Green-
6	Orange	Green	Power
7	White-brown	White-brown	Blue/H. sync+
8	Brown	Brown	Blue/H. sync-

Figure 2-5 — TP cable termination

Cable testing

To ensure proper cable termination, each transmission cable system that uses CAT 5 cable should be tested (Extron's skew-free UTP cable does not need to be tested). Testing the cable from the RJ-45 connections at the transmitter and receiver gives the most accurate indications of cable problems.

There are two varieties of cable runs: simple runs, in which a single cable is terminated only at the transmitter and receiver, and complex runs, which can include patch bays and multiple terminations and lengths of cable. In either case, the entire cabling system should be tested.

A complete test measures cable length and tests the wire map, attenuation, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, ACR and PSACR. All of these tests are critical for digital data transfer, but not for analog video. While all of these tests are important indicators of the quality of the cable termination, the most critical testing parameters for video transfer are wire map (T-568-A or B termination) and pair length measurements. The largest concern is equalization of skew between cable pairs. Cable systems of 300 feet or less should exhibit no transmission problems if they pass at least CAT 5 channel certification testing.

The Microtest OMNI SCANNER 2 performs comprehensive certification testing to the proposed CAT 6 standards. Other manufacturers also make testing equipment. The tests include advanced diagnostics for troubleshooting the cause and location of many cable and termination problems. For simple installation testing, the Microtest MICRO SCANNER PRO tests wire map and cable length, including individual cable pair length.

Equalizing pair skew

The manufacturing process for network (CAT 5) UTP cable leads to a condition called pair skew. For best results, pair skew needs to be equalized when using the CAT 5 cable in A/V applications. The design of Extron's skew-free A/V UTP cable minimizes pair skew to the point that equalization is not required.

Skew exists between pairs when the physical length of one wire pair is different from another. As the transmission cable length increases, the amount of skew increases. Skew affects the displayed image when the differential length between wire pairs exceeds 2 feet, causing the timing of the red, green, and blue video signals to appear out of alignment (horizontal registration errors). A white vertical line on a black field can appear as individual red, green, and blue lines that are close together; the signal transmitted on the shortest wire pair leads the other colors and appears to the left on the display.

UTP cable test equipment measures and reports wire pair length. The report on the various pair lengths can be used in equalizing pair skew. The nominal velocity of propagation (NVP — the speed at which the signal travels on the transmission line, measured as a percentage of the speed of light) of TP cable is very close to that of conventional coaxial cable. The similarity in NVP means that:

- by using an Extron IN9045-L6 15HD male-to-5 BNC male, 6' cable, to adapt the output on a 15HD connector to BNC connectors,
- and then adding an additional length of coax equal to the length of pair skew, placed on the receiver's output,

you can equalize the effects of pair skew (figure 2-6).

If UTP cable test measurement cannot be done, pair skew can still be equalized by viewing a test pattern with a critical eye. Examine the test pattern for loss of horizontal registration and, through a process of trial and error, equalize any pair skew with coax extensions on the red, green, and/or blue outputs.

Extron skew compensation coax cables are available in lengths of 2 through 20 feet, see Appendix A, *Reference Information*, for part numbers.

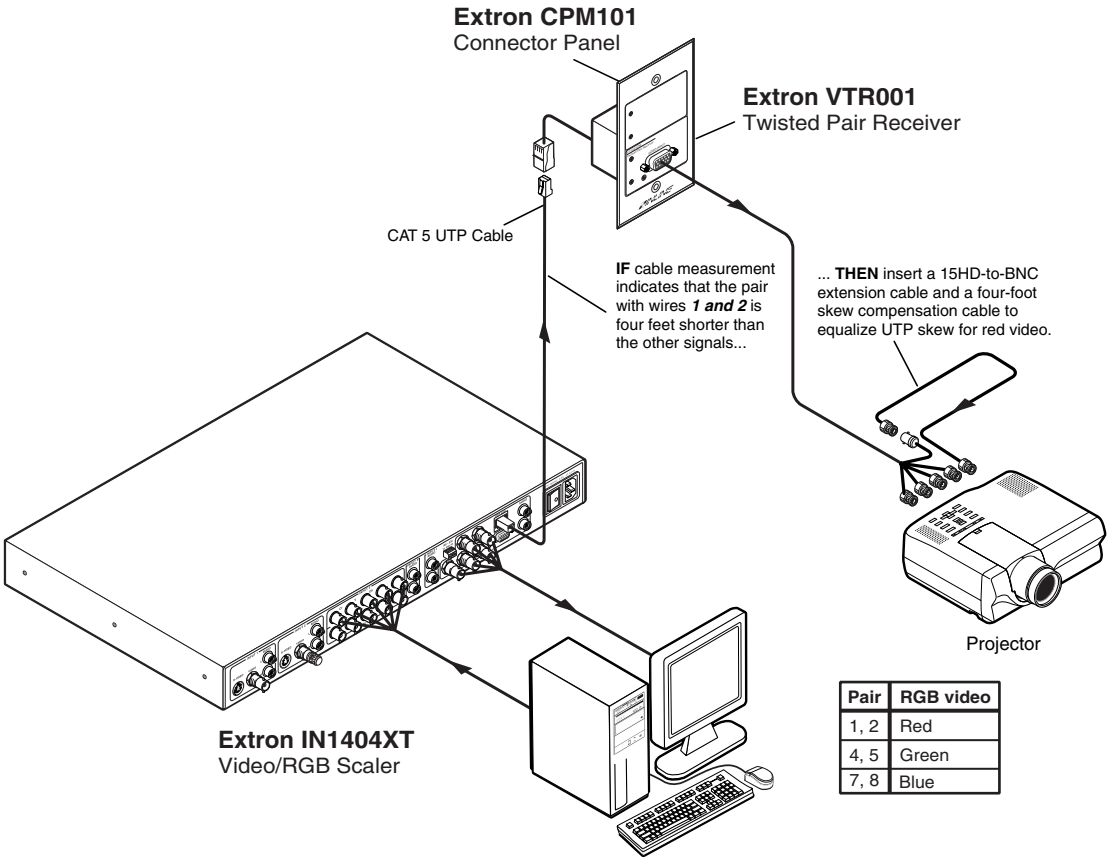


Figure 2-6 — Pair skew equalization

RS-232 connection

(9) **RS-232 port** — Connect a host device, such as a computer, RS-232 capable PDA, or third-part control system, to the scaler via this 3.5 mm, 3-pole captive screw connector for serial RS-232 control (figure 2-7).

Pin	Function
TX	Transmit data
Gnd	Signal ground
RX	Receive data

Figure 2-7 — RS232 port pin assignments

See chapter 4, *Programmer's Guide*, for definitions of the ASCII command set.

Power connection

(10) **AC power connector** — Plug a standard IEC power cord between this connector and a 100 to 240VAC, 50 Hz or 60 Hz power source.

(11) **Power switch** — Turn the power switch on. The front panel LEDs flash twice during power-up and then all but the LED for the previously selected input go out.

Configuration

The IN1404XT can be configured using either the front panel controls or the ASCII command set. See chapter 3, *Operation and* chapter 4, *Programmer's Guide*.

Chapter Three

Operation

Front Panel Controls and Indicators

Front Panel Operations

Optimizing the Video

Optimizing the Audio

Troubleshooting

Operation

Front Panel Controls and Indicators

All of the scaler's controls are on the front panel (figure 3-1). Front panel LEDs provide graphic indication of some of the basic system functions. For more complex tasks, such as system configuration, the scaler has a menu system that is operated using the front panel buttons and displayed on the output monitors (figure 3-2).

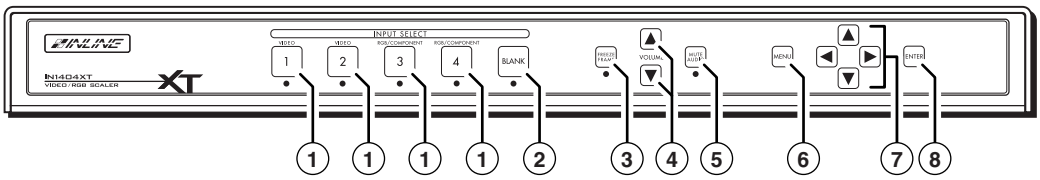


Figure 3-1 — IN1404XT video scaler and switcher front panel

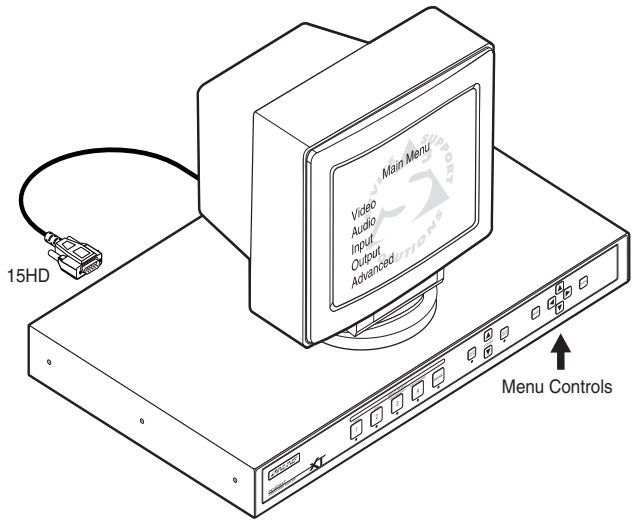


Figure 3-2 — Menu system display

Video controls

(1) **Input 1 through 4 buttons** — The Input 1 through Input 4 buttons select the associated video input to scale (except for input 4 when configured as passive) and display on the output(s). Audio follows (switches with) the front panel video selection.

Input 1 through 4 LEDs — The lit Input 1 through Input 4 LED indicates the video and audio input that is selected.

(2) **Blank button** — The Blank button switches the output(s) to a black screen.

NOTE *Blank turns off the R, G, and B video output signals only; the H and V sync outputs remain active. This ensures that the display(s) retains sync lock.*

Blank has no affect on input 4 when it is passive (unscaled).

Blank LED — The Blank LED indicates that the video output is blanked.

(3) **Freeze button** — The Freeze button locks the output display to the current image being input. When the freeze function is enabled, the Freeze LED is lit. To unfreeze the image, press the Freeze button again.

NOTE *When the output is frozen, the video input cannot be removed without losing the displayed image.*

If a different input is selected, see ①, the switching action deselects the freeze function, the frozen image is lost, and the Freeze LED returns to its unlit state.

NOTE *Freeze has no affect on input 4 when it is passive (unscaled).*

Audio controls

④ **Volume ▲ and ▼ buttons** — The Volume buttons regulate the volume level of the selected audio input. Use the Volume buttons to increase and decrease the audio level for the current input. Press and release a button to raise or lower the volume level by one step, or press and hold a button to change the level continuously. The on-screen display (figure 3-3) shows a quantitative volume measurement for 15 seconds.

NOTE *The **IN1404XT** automatically saves the volume levels for each input. This is the **only** adjustment that does not need to be saved by pressing the Enter button.*

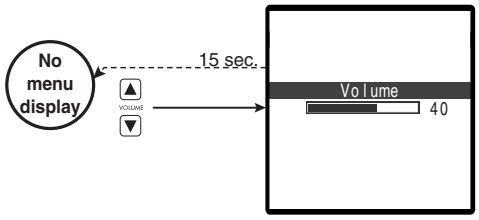


Figure 3-3 — Volume on-screen display

⑤ **Mute button** — The Mute button mutes the audio output.

Mute LED — The Mute LED indicates that the audio output is muted.

Menu control buttons

⑥ **Menu button** — The Menu button enters and backs out of the main menu system in the IN1404XT. See *Front Panel Operations* in this chapter for details.

⑦ **Menu ◀, ▲, ▼, and ▶ buttons** — The Menu buttons navigate the main menu main menu system. See *Front Panel Operations* in this chapter for details.

If you aren't in the menu system, pressing any of these buttons causes the scaler to display the Position screen (figure 3-4) on the output monitors. The screen features two status indicators that show the horizontal and vertical position settings. The position adjustments move the output image on the monitor. Press the ▲ and ▼ buttons to shift the display vertically on the screen. Press the ◀ and ▶ buttons to shift the display horizontally on the screen. Press the Enter button to save the changes and return to normal system operations.

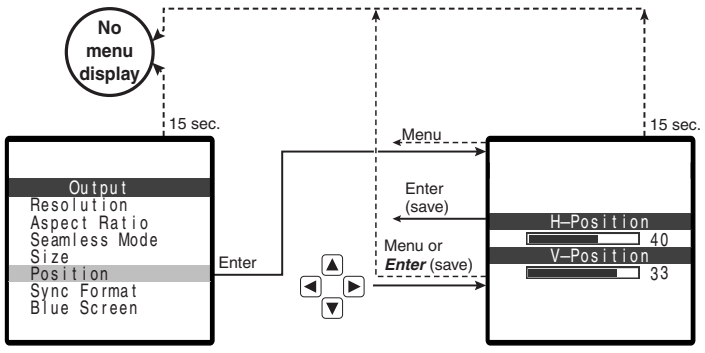


Figure 3-4 — Horizontal and vertical position on-screen display

⑧ **Enter button** — The Enter button either activates a submenu or function in the IN1404XT menu system or saves a changed value. See *Front Panel Operations* in this chapter for details.

NOTE *The effects of all adjustments are visible on the screen or audible on the audio output, but they are temporary unless saved. The adjustments return to their previous settings when the adjustment screen exits by either a timeout or the operator pressing the Menu button. For a setting that you have made to become permanent (until replaced in favor of a newer setting), it must be **saved** by pressing the **Enter** button. With the exception of the volume adjustment (see item ④, above), if you do not save the value by pressing the Enter button, your adjustment is lost.*

Front Panel Operations

The following paragraphs detail the power-up process and then describe the menu system, the picture adjustments, and selection of executive mode.

Power

Power is applied when the power cord is connected to an AC source and the rear panel Power (|/O) switch is set to the on (|) position. When AC power is applied, the scaler performs a self-test that blinks all of the front panel LEDs twice and then defaults to indicating the selected input. An error-free power up self-test sequence leaves all of the LEDs, with the exception of the selected input's LED, off. If Blank or Mute Audio were selected when the scaler was powered down, those LEDs light too on power up.

The selected input, the picture adjustments, and other current settings are saved in non-volatile memory. When power is applied, the latest configuration is retrieved.

Menu operation

Figure 3-5 shows a flowchart of the main menus in the menu system. Each menu leads to a series of submenus that accomplish individual tasks or groups of tasks.

Menu button — Press the Menu button to activate the menu system or to back up one level from the currently selected menu or submenu (for example, pressing the Menu button in the Video submenu returns the scaler to the Main menu).

◀, ▲, ▼, and ▶ buttons — Press the ◀, ▲, ▼, and ▶ buttons to move the highlight bar over submenus or selections.

Enter button — Press the Enter button to select a highlighted submenu or selection. Press the Enter button to save a value that you have set to memory. On the menu system flowcharts (figure 3-7, figure 3-8, figure 3-9, figure 3-11, figure 3-12, and figure 3-13) and in the following descriptions, "save" functions of the Enter button are shown in a bold, italics font: ***Enter*** (and save).

NOTE *For a setting that you have made to become permanent (until replaced in favor of a newer setting), it must be **saved** by pressing the **Enter** (and save) button. With the exception of the volume adjustment (see item ④), if you do not save the value by pressing the **Enter** (and save) button, your adjustment is lost.*

NOTE *To exit an adjustment screen without saving the change, press the Menu button to return to the previously selected screen.*

NOTE *To return to normal operation (no menus), let the scaler remain idle for 15 seconds until the selected screen times out, or press the Menu button repeatedly until the Main Menu is deselected.*

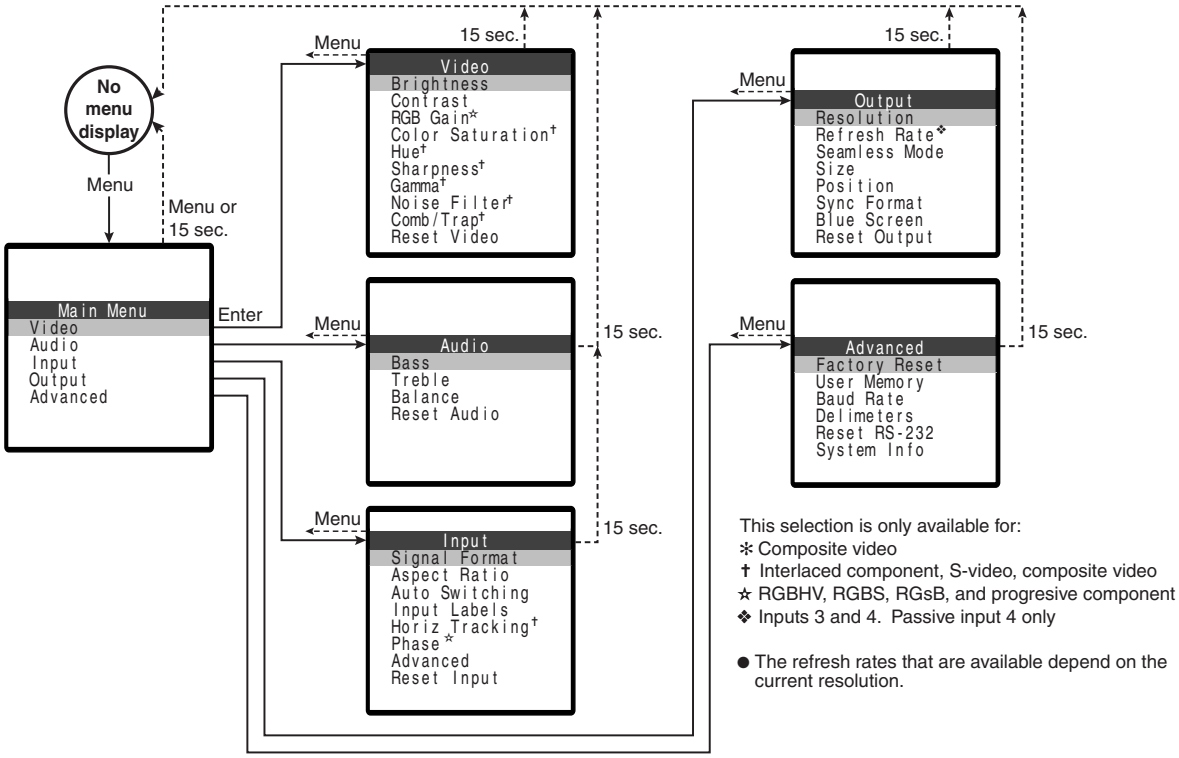


Figure 3-5 — Menu system flowchart

NOTE *To enable seamless switching, input 4 must be configured as RGB passive (unscaled) on the Signal Format screen. However, once it is configured as passive and if input 4 is selected, on-screen menus are not displayed.*

No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled) but audio and other input variables are still adjustable. Because on-screen displays will be blanked for input 4 once it is configured as passive, it will be helpful to configure all of the input 4 options ***before*** *you configure the input as passive. If, later, you need to change any of the input 4 settings, the easiest way is to temporarily set input 4 to one of the scaled output settings. See* Signal Format screen *in this chapter.*

Alternatively, you can make the adjustments under RS-232 control.

Status indicators

Most of the Video and Audio menus (see *Video menu* and *Audio menu* in this chapter) and a select few Output menu operations (see *Output menu* in this chapter) are performed using on-screen status indicators (figure 3-6) that resemble slide bars but are controlled using the Menu ▲ and ▼ buttons.

Figure 3-6 — Typical status indicator

Unless shown in the Video menu and Audio menu subparagraphs, adjusting the Video and Audio menu settings is accomplished as follows:

1. For the Video, Audio, and Input menu screens, select the input that you want to adjust by pressing that Input button.

2. Press the Menu button. The on-screen Main Menu display appears on the connected monitors, overlaid on top of the output image.
3. Use the Menu ▲ and ▼ buttons to highlight the desired menu option on the Main menu (such as Video) and press the Enter button. The selected submenu appears on the connected monitors.
4. Use the Menu ▲ and ▼ buttons to highlight the desired option on the selected submenu (such as Brightness) and press the Enter button. The selected status indicator appears on the on-screen monitor.
5. Press and release the ◀ and ▶ buttons to decrease and increase the selected level by 1 step or press and **hold** the buttons to flow through the adjustment range.
6. Press the ***Enter*** (and save) button to save the adjusted value.

To make another adjustment to the same input, return to step **2** or **3**.

To adjust another input, exit the menu system by letting the scaler remain idle for 15 seconds until the selected screen times out, or press the Menu button repeatedly until the Main Menu is deselected and then return to step **1**.

Menu system

The main menu selections and their functions are:

- **Video menu** — Changes the input signal parameters
- **Audio menu** — Changes the input signal audio parameters
- **Input menu** — Changes the input signal parameters
- **Output menu** — Changes the output signal parameters
- **Advanced menu** — Displays advanced options

Video menu

Figure 3-7 is a flowchart that shows an overview of the Video menu, its submenus, and their available settings.

NOTE *No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled).*

Brightness screen

The Brightness screen displays a status indicator that shows the brightness setting for the selected input. Brightness adjusts the brightness of the image on the screen. Use the Menu ◀ and ▶ buttons to adjust the brightness control through a range of 0 to 255. The default setting is 128.

Contrast screen

The Contrast screen displays a status indicator that shows the contrast setting for the selected input. Contrast adjusts the difference between the input signals brightness and darkest settings. Use the Menu ◀ and ▶ buttons to adjust the contrast through a range of 0 to 255. At the minimum setting, 0, the entire picture is shown at about the same brightness (gray). At the maximum setting, 255, there is a marked difference between the dark and light areas of the image. The default setting is 128.

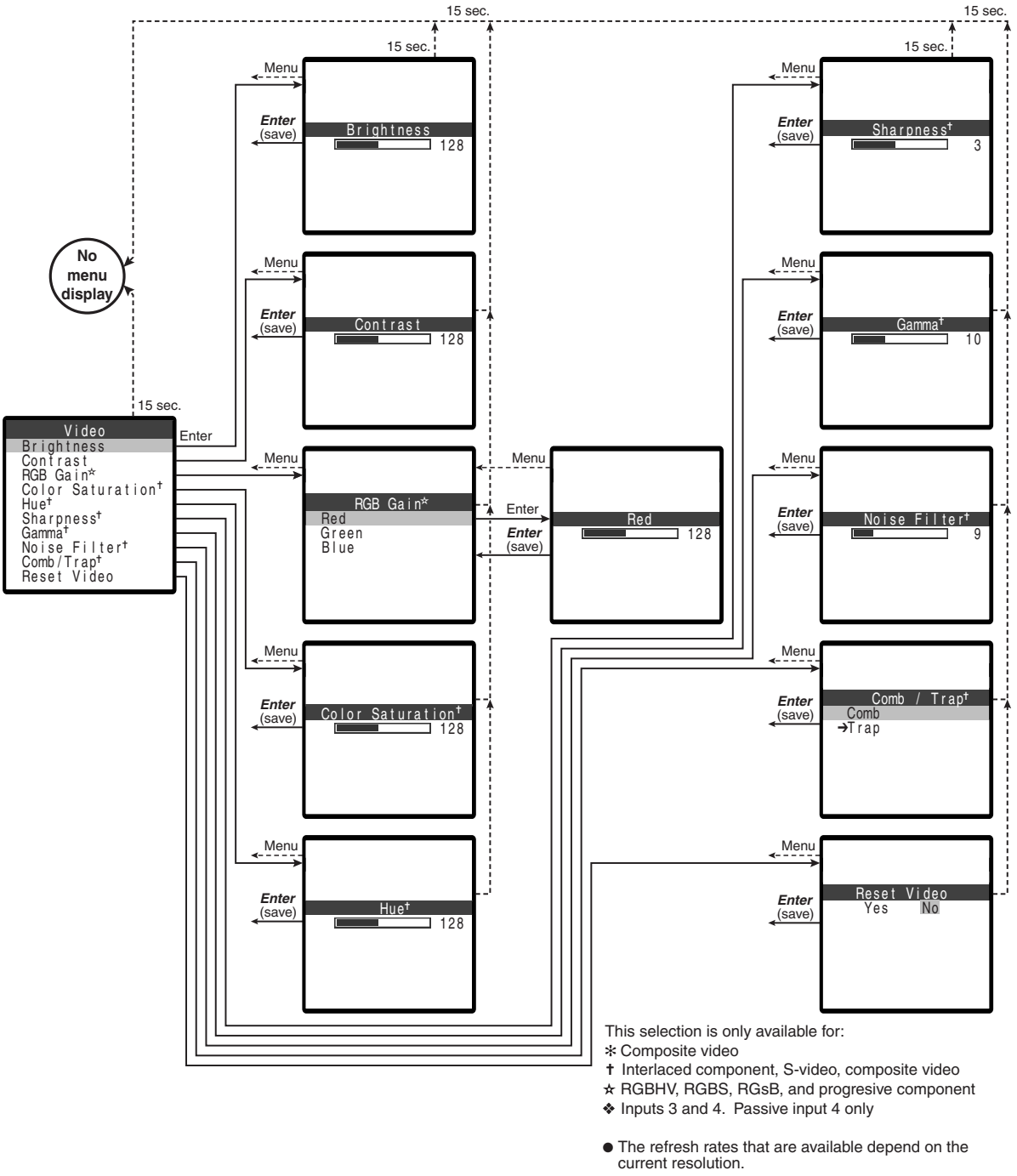


Figure 3-7 — Video menu flowchart

RGB Gain screen

NOTE *The RGB gain adjustment is available for RGBHV, RGBS, RGsB, and progressive component video inputs only.*

The red, green, and blue gain screens display a status indicator that shows the input signal gain (contrast) setting for each individual color. Use the Menu ◀ and ▶ buttons to adjust each color's gain control through a range of 0 to 255. The default setting is 128.

An extra step is required to adjust the display, as follows:

1. Select the RGB Gain screen (see steps **1** through **4** in *Status indicators* in this chapter).
2. Use the Menu ▲ and ▼ buttons to highlight the desired color option (such as Red) and press the Enter button. The selected color's gain status indicator appears on the on-screen monitor.
3. Press and release the Menu ◀ and ▶ buttons to decrease and increase the selected level by 1 step or press and **hold** the buttons to flow through the adjustment range.
4. Press the ***Enter*** (and save) button to save the adjusted value.

Color Saturation screen

NOTE *The color saturation adjustment is available for interlaced component video, S-video, and composite video inputs only.*

The Color Saturation screen displays a status indicator that shows the color saturation setting. Color saturation increases and decreases the color of the picture. Use the Menu ◀ and ▶ buttons to adjust the color saturation control through a range of 0 to 255. At the minimum setting, 0, the scaler removes most of the color. The default setting is 128.

Hue screen

NOTE *The hue adjustment is available for NTSC interlaced component video, S-video, and composite video inputs only.*

The Hue screen displays a status indicator that shows the hue setting. Hue adjusts the picture's color toward red or green. Use the Menu ◀ and ▶ buttons to adjust the color saturation control through a range of 0 to 255. Press the Menu ▶ button to increase the green (and decrease the red). Press the Menu ◀ button to increase the red (and decrease the green). The default setting is 128.

Sharpness screen

NOTE *The sharpness filters are available for interlaced component video, S-video, and composite video inputs only.*

The Sharpness screen displays a status indicator that shows the sharpness setting. Sharpness uses variable filtering to affect input picture detail and definition. Use the Menu ◀ and ▶ buttons to increase or decrease the sharpness filtering through a range of 0 to 8. The default setting is 3.

NOTE *Increasing the sharpness gives the visual affect of decreasing the noise filter setting (see* Noise filter screen *in this chapter). Although the two filters* ***appear*** *to counteract each other, the two adjustments are completely separate. Adjust both settings for optimum picture quality.*

Gamma screen

NOTE *The gamma filters are available for interlaced component video, S-video, and composite video inputs only.*

The Gamma screen displays a status indicator that shows the selected gamma filter. The scaler has 30 programmed gamma filters that compensate for the non-linear response of many display devices. Use the Menu ◀ and ▶ buttons to step to lower- or higher-numbered gamma curves through a range of 1 to 30. The default setting is 10, which selects a gamma correction curve of 1.0.

NOTE *For best results, before selecting the gamma filter, set the brightness and contrast controls to their factory default settings of 128 (see* Brightness screen *and* Contrast screen *in this chapter). Once the optimum gamma filter is selected, fine tune the output with the brightness and contrast controls.*

Noise Filter screen

NOTE *The noise filters are available for interlaced component video, S-video, and composite video inputs only.*

The Noise Filter screen displays a status indicator that shows the selected noise filter. Use the Menu ◀ and ▶ buttons to step to lower- or higher-numbered noise filters through a range of 0 to 47. The default setting is 9.

NOTE *Increasing the noise filter setting gives the visual affect of decreasing the sharpness (see* Sharpness screen *in this chapter). Although the two filters* ***appear*** *to counteract each other, the two adjustments are completely separate. Adjust both settings for optimum picture quality.*

Comb/Trap selection screen

NOTE *The Comb/Trap selection screen is available for composite video inputs only.*

The Comb/Trap selection screen displays the currently selected Y/C separation filter (comb filter or trap filter) and provides the ability to change the unselected filter. The selected filter is indicated by an arrow (➔).

To change the selected filter, use the Menu ▲ or ▼ button to highlight the desired filter and press the ***Enter*** (and save) button. In general, the trap filter is the better setting when scaling composite video from a VCR, but try both filters to determine which is best for your application.

Reset Video screen

The Reset Video screen provides the ability to reset all of the video settings for the selected input to the factory defaults. Use the Menu ◀ button to highlight "Yes" and press the ***Enter*** (and save) button to reset the video input. Use the ▶ button to highlight "No" and press the Enter button to exit the screen without resetting the video input (or back out of the screen by pressing the Menu button).

Audio menu

Figure 3-8 is a flowchart that shows an overview of the Audio menu, its submenus, and their available settings.

Bass screen

The Bass screen displays a status indicator that shows the bass setting for the selected input. Bass enhances or attenuates the lower frequencies of the audio signal. Use the Menu ◀ and ▶ buttons to increase or decrease the lower frequencies through a range of 6 to 27. The default setting is 16 (0dB, no gain or attenuation).

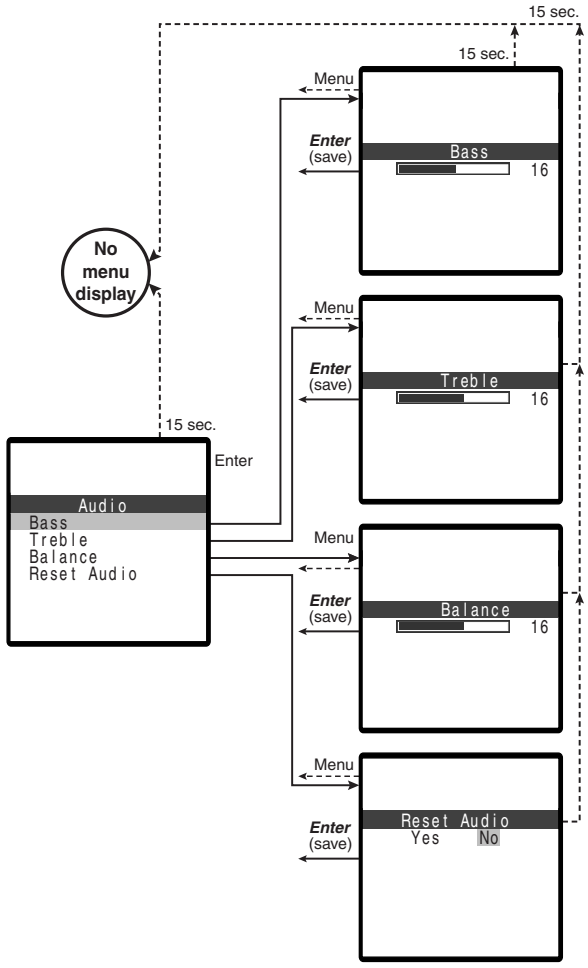


Figure 3-8 — Audio menu flowchart

Treble screen

The Treble screen displays a status indicator that shows the treble setting for the selected input. Treble enhances or attenuates the higher frequencies of the audio signal. Use the Menu ◀ and ▶ buttons to increase or decrease the higher frequencies through a range of 8 to 25. The default setting is 16 (0dB, no gain or attenuation).

Balance screen

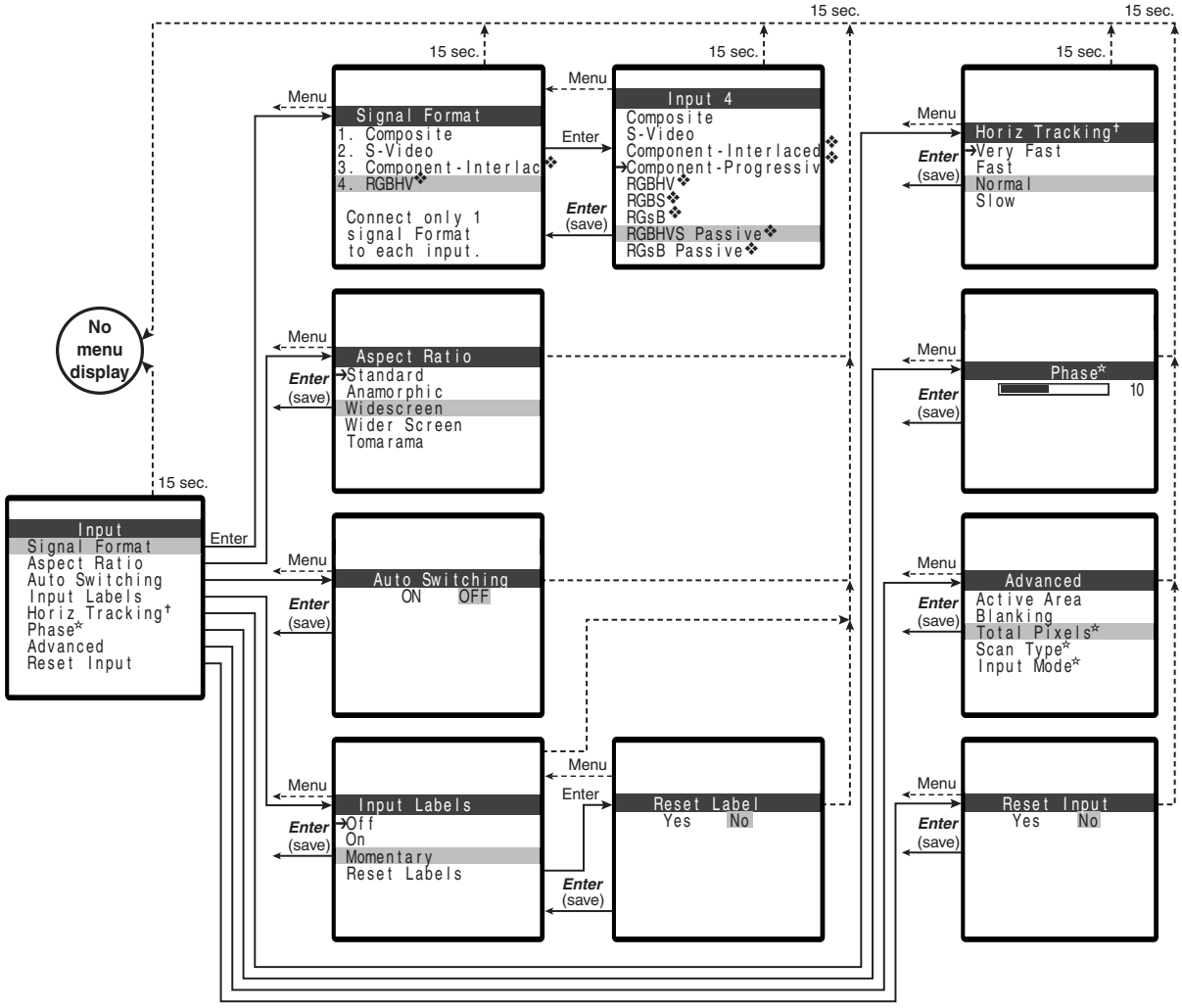
The Balance screen displays a status indicator that shows the balance setting for the selected input. Balance shifts the stereo audio signal to the left or right channel in incremental steps. Use the Menu ◀ (left) and ▶ (right) buttons to shift the audio to the left and right through a range of 0 to 31. The default setting is 16 (audio in the center).

Reset Audio screen

The Reset Audio screen provides the ability to reset all of the audio settings for the selected input to the factory defaults. Use the Menu ◀ button to highlight "Yes" and press the ***Enter*** (and save) button to reset the audio input. Use the ▶ button to highlight "No" and press the Enter button to exit the screen without resetting the audio input (or back out of the screen by pressing the Menu button).

Input menu

Figure 3-9 is a flowchart that shows an overview of the Input menu, its submenus, and their available settings.



This selection only available for:

✻ Composite video

† Interlaced component, S-video, composite video

✯ RGBHV, RGBS, RGsB, and progresive component

❖ Inputs 3 and 4. Passive input 4 only

● The refresh rates that are available depend on the current resolution.

Figure 3-9 — Input menu flowchart

Signal Format screen

The Signal Format screen shows the video format (such as RGBHV, component video, or S-video) assigned to each input and provides the ability to change the video format assigned to each input.

NOTE *It is critical that the signal format selected is correct. If the wrong input circuitry is selected for the input signal, the scaler will not function properly and will display either a distorted image or no image at all.*

NOTE *To enable seamless switching, input 4 must be configured as passive (unscaled) on the Signal Format screen. However, once it is configured as passive and if input 4 is selected, the scaler cannot place the on-screen displays on the output video stream.*

*No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled) but audio and other input variables are still adjustable. It is helpful, therefore, to configure all of the input 4 options **before** you configure input 4 as passive. If, later, you need to change any of the input 4 settings, the easiest way is to temporarily set input 4 to one of the scaled output settings.*

*The signal format is the only input variable that you can change when that input is not selected. By selecting an input other than input 4 **before** pushing the Menu button, you **can see** the on-screen display to reconfigure input 4 from passive (all on-screen displays blanked for input 4) to one of the scaled outputs. That will allow you to see the on-screen menu and change other settings. For seamless switching, remember to set input 4 back to passive.*

Change the input video format as follows:

1. Press the Menu button. The on-screen Main Menu display appears on the connected monitors, overlaid on top of the output image.
2. Use the Menu ▲ and ▼ buttons to highlight the Input menu option on the Main menu and press the Enter button. The Input screen appears on the connected monitors.
3. Use the Menu ▲ and ▼ buttons to highlight the desired input and press the Enter button. The selected input's format selection options appear on the connected monitors (inputs 1 and 2 can be set to S-video and composite video only, only input 4 can be set to passive (unscaled)).

NOTE *If seamless switching is on and you select input 4, the format selection options do **not** appear. Rather, the connected monitor displays, "**Seamless is ON — RGB passive only**".*

4. Use the Menu ▲ and ▼ buttons to highlight the desired video format, then press the ***Enter*** (and save) button.

Aspect Ratio screen

The Aspect Ratio screen displays the relative image width and height that are currently selected for the selected input and provides the ability to change the aspect ratio. For best results, the input aspect ratio should match the output device aspect ratio (see *Resolution screen* in this chapter). The selected aspect ratio is indicated by an arrow (➔). The following aspect ratio selections are available:

- **Standard** — For standard 1.33 inputs (also known as full screen).
- **Anamorphic** — Provides vertical image squeezing to accommodate anamorphically enhanced DVDs (1.85).
- **Wide screen** — For wide 1.78 inputs (letterbox).
- **Wider screen** — For wider screen 2.35 inputs (narrow letterbox).
- **Tomarama** — Expands a 16:9 signal to fill a 4:3 screen (1.78). As it expands the signal, it cuts off the left and right sides, simulating the movie aspect ratio "Cinemascope".

To change the selected aspect ratio, use the Menu ▲ or ▼ buttons to highlight the desired ratio and press the ***Enter*** (and save) button.

Most VCRs and satellite receivers output a signal with a 4:3 aspect ratio. How this signal is filled with video determines its aspect ratio. Figure 3-10 shows four examples of different input aspect ratios in their native 4:3 format and as they appear after scaling.

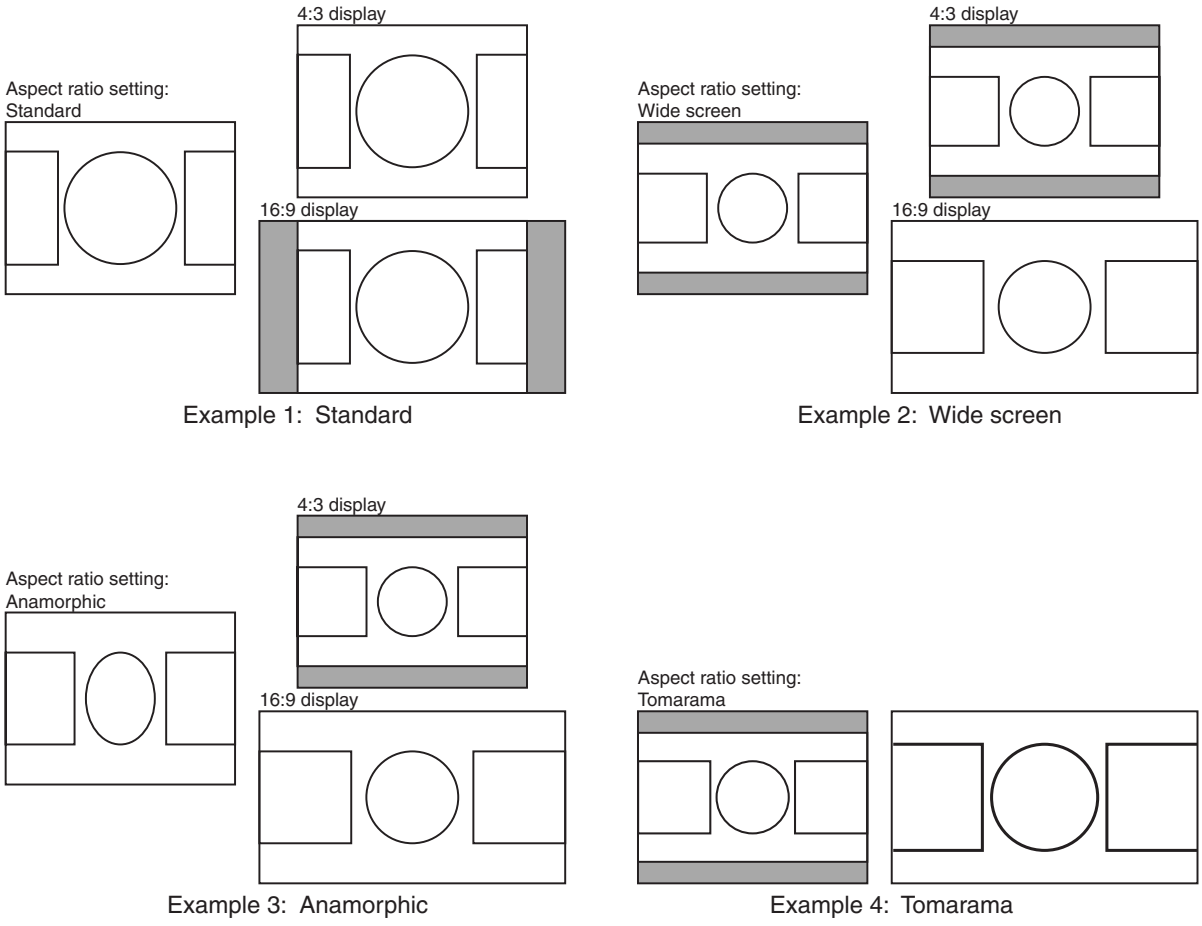


Figure 3-10 — Aspect ratio examples

Auto Switching screen

The Auto Switching screen indicates whether the scaler's autoswitching feature is turned on or not and the provides the ability to turn autoswitching on or off. When autoswitching is on, the scaler automatically switches to the highest numbered

input with an active video signal. If no inputs are active, input 1 is selected. Manual input selection is not available on the front panel or via RS-232 control.

Use the Menu ◄ or ► button to highlight "On" or "Off" and press the ***Enter*** (and save) button to turn autoswitching on or off.

Input Labels screen

The Input Labels screen provides the ability to set the status of the label that can appear on the output displays when you switch inputs: on, off, or momentary (approximately 3 seconds) display. The default label is "Input *n*", but these labels can be customized under RS-232 control (see chapter 4, *Programmer's Guide*). This screen also provides the ability to reset the labels to their factory defaults.

To change the label display option, use the Menu ▲ or ▼ button to highlight the desired option and press the ***Enter*** (and save) button.

Reset labels to the factory default as follows:

1. Use the Menu ▲ or ▼ button to highlight the desired option and press the Enter button. The Reset Label screen appears.
2. Use the Menu ◄ button to highlight "Yes" and press the ***Enter*** (and save) button to reset the audio input.

   — OR —

   Use the ► button to highlight "No" and press the Enter button to exit the screen without resetting the audio input (or back out of the screen by pressing the Menu button).

Horizontal Tracking screen

NOTE *The horizontal tracking adjustment is available for interlaced component video, S-video, and composite video inputs only.*

The Horizontal Tracking screen provides the ability to view the current horizontal sync tracking and to set a different speed. The horizontal tracking setting compensates for input video signals of differing quality. The following settings are available:

- **Very fast** — For video from poor quality sources, such as a VCR
- **Fast** — For video from normal quality video sources, such as a cable box or satellite receiver
- **Normal** — For video from good quality video sources, such a DVD player
- **Slow** — For video from high quality video sources, such as broadcast video

To change the horizontal tracking selection, use the Menu ▲ or ▼ button to highlight the desired selection and press the ***Enter*** (and save) button.

Phase screen

NOTE *The Phase screen is available for RGBHV, RGBS, RGsB, and progressive component video inputs only.*

The Phase screen displays a status indicator that shows the phase adjustment setting. The phase control adjusts the amount of phase shift applied to the input video signal. Use the Menu ◄ and ► buttons to increase or decrease the amount of phase shift through a range of 0 to 31. The default setting is 10.

Advanced screen

The Advanced screen provides a submenu of advanced selection options: active area, blanking, total pixels, scan type, and input mode. These advanced settings are rarely needed for standard video and computer video signals, but allow the

knowledgeable user to optimize the quality when the input is non-standard or proprietary video. They are described in more detail in *Optimizing the Video*, in this chapter.

NOTE *The Advanced Input settings are a complex set of adjustments to optimize the scaler for non-standard video inputs. Most users will not encounter such signals.*

Only qualified A/V technicians should adjust these settings.

To select one of the advanced settings, use the Menu ▲ or ▼ button to highlight the desired option and press the Enter button. The selected Advanced screen appears.

Reset Input screen

The Reset Input screen provides the ability to reset all of the settings that are available from the Input menu for the selected input to the factory defaults.

Use the Menu ◀ button to highlight "Yes" and press the ***Enter*** (and save) button to reset the input. Use the ▶ button to highlight "No" and press the Enter button to exit the screen without resetting the input (or back out of the screen by pressing the Menu button).

Output menu

Figure 3-11 is a flowchart that shows an overview of the Output menu, its submenus, and their available settings.

Resolution screen

The Resolution screen identifies the currently selected output resolution and provides the ability to select a different output resolution. The following table defines the combinations of resolutions and refresh rates that the scaler can output.

Resolution	Aspect ratio	56 Hz	60 Hz	65 Hz	72 Hz	75 Hz	85 Hz	96 Hz	100 Hz	120 Hz
640 x 480	4:3		●		●	●	●	●	●	●
800 x 600	4:3		●		●	●	●	●	●	●
852 x 480	16:9		●		●	●	●	●	●	●
1024 x 768	4:3		●		●	●	●	●	●	
1152 x 864	4:3		●		●	●	●			
1280 x 720	16:9		●		●	●	●	●	●	
1280 x 768	16:9	●	●	●						
1280 x 1024	5:4		●		●	●				
1365 x 768	16:9		●		●	●	●			
1365 x 1024	4:3		●							

To select a different resolution, use the Menu ▲ or ▼ button to highlight the desired resolution and press the ***Enter*** (and save) button.

NOTE *Resolution and refresh rate are crucial variables for optimum image quality. For best results, set the scaler output to match the capabilities of your display. If necessary, see* Optimizing the Video, *in this chapter for detailed guidelines for choosing the proper resolution and rate.*

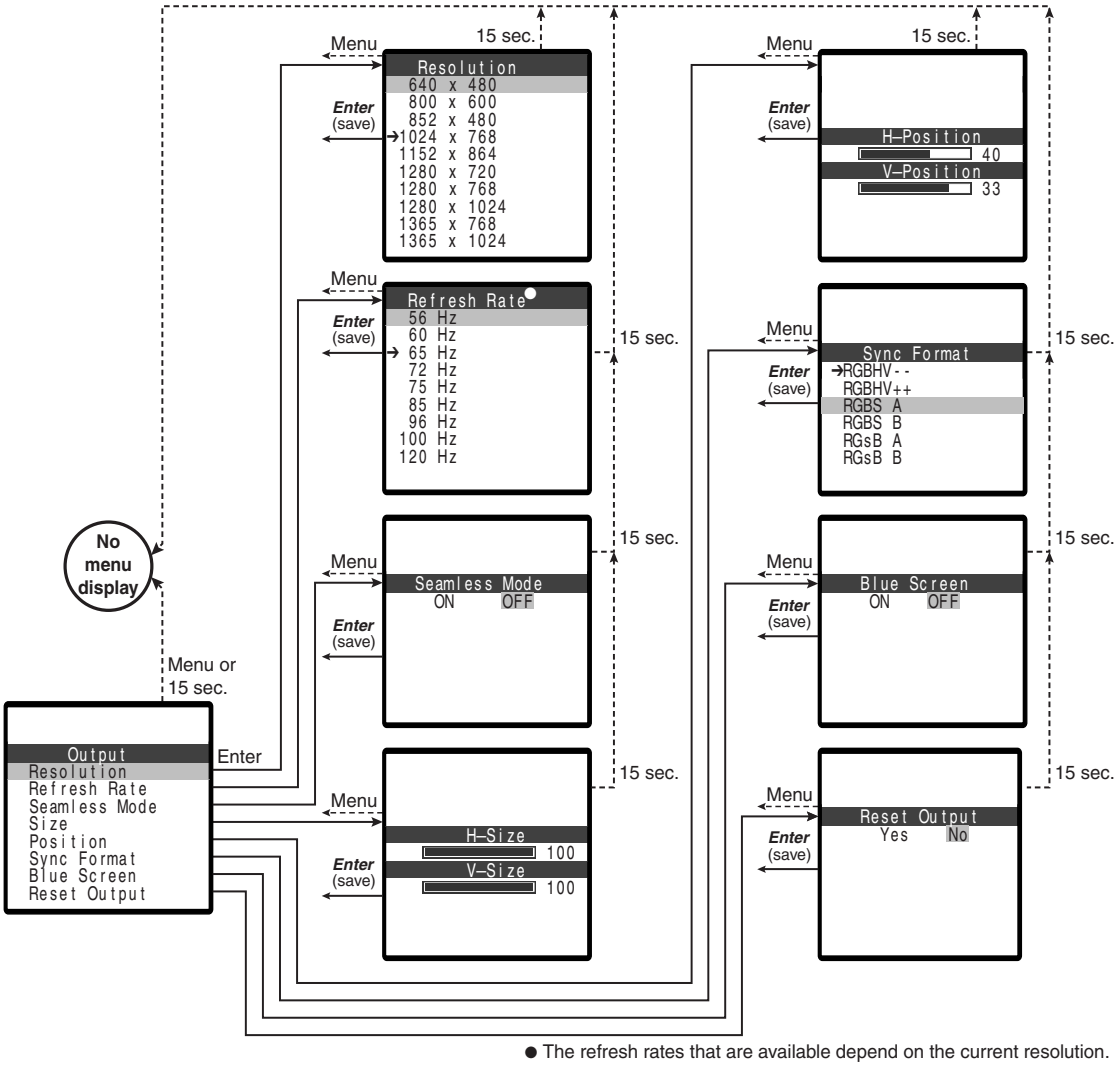


Figure 3-11 — Output menu flowchart

Refresh Rate screen

NOTE *Not all refresh rates are available for a given resolution. The table in* Resolution screen *defines the available combinations of resolutions and refresh rates.*

The Refresh Rate screen identifies the currently selected output refresh rate and provides the ability to select a different rate.

To select a different rate, use the Menu ▲ or ▼ button to highlight the desired resolution and press the ***Enter*** (and save) button.

NOTE *Resolution and refresh rate are crucial variables for optimum image quality. For best results, set the scaler output to match the capabilities of your display. If necessary, see* Optimizing the Video, *in this chapter for detailed guidelines for choosing the proper resolution and rate.*

Seamless Mode screen

The Seamless Mode screen indicates whether the scaler's seamless mode feature is turned on or not and the provides the ability to turn seamless mode on or off. When turned on, seamless switching provides a seamless transition between scaled inputs 1, 2, or 3 (RGB, component, S-video, or composite video) and the passive

RGB video on input 4. Input 4 must be configured as a passive (unscaled) to serve as a time reference for seamless switching.

NOTE *If input 4 is not already configured as passive, the scaler automatically reconfigures the input when you turn seamless switching on.*

Use the Menu ◄ or ► button to highlight "On" or "Off" and press the ***Enter*** (and save) button to turn seamless mode on or off.

Size screen

The Size screen displays two status indicators that show the horizontal and vertical size settings. The size adjustments shrink the output image to a percentage of the selected output resolution. The most obvious application of this adjustment is to manually reduce the height of the output signal when an anamorphic input signal is connected. Size is automatically reset to default values each time a new input aspect ratio is selected. Size automatically changes to the previously selected values when an input with a different aspect ratio is selected.

NOTE *The IN1404XT only scales up. Therefore, the output size controls may stop at a certain point, which varies depending on the selected resolution, where the input and output resolution are equal.*

Press the ▲ and ▼ buttons to shrink or (if not at 100%) expand the display vertically on the screen. Press the ◄ and ► buttons to shrink or (if not at 100%) expand the display horizontally on the screen. Press the ***Enter*** button to save the changes.

Position screen

The Position screen displays two status indicators that show the horizontal and vertical position settings. The position adjustments move the output image on the monitor. Unlike input blanking, the position adjustments do not crop the image or add blank lines. The position is automatically reset to default values each time a new input aspect ratio is selected. The position automatically changes to the previously selected values when an input with a different aspect ratio is selected.

Press the ▲ and ▼ buttons to shift the display vertically on the screen. Press the ◄ and ► buttons to shift the display horizontally on the screen. Press the ***Enter*** button to save the changes and return to normal system operations.

Sync Format screen

The Sync Format screen identifies the currently selected sync format and provides the ability to select a different format. The display or projector may require RGBHV video with positive or negative horizontal (H) and vertical (V) sync polarity. For RGBS or RGsB video, many LCD and DLP projectors and plasma displays will not display properly if serration pulses are present in the sync signal. (Flagging or bending at the top of the video image is a sign that the serration pulses should be removed.) The Sync Format screen displays the following options:

- **RGBHV--** — Negative sync on the H and V sync lines
- **RGBHV++** — Positive sync on the H and V sync lines
- **RGBS A** — Composite sync with serration pulses
- **RGBS B** — Composite sync with **no** serration pulses
- **RGsB A** — Sync on green with serration pulses
- **RGsB B** — Sync on green with **no** serration pulses

To select a different sync format, use the Menu ▲ or ▼ button to highlight the desired sync format and press the ***Enter*** (and save) button.

NOTE *If you set the scaler to output RGsB video, you **may** encounter image problems on the display connected to the TP output.*

*The VTR001 CM that receives the TP output can receive RGsB signals from the scaler. However, the red, green, and blue video signals' black levels are **not** clamped to a 0V reference, as for RGBHV or RGBS. For most displays, this is **not** a problem. On some displays (such as some LCD displays) however, the black levels of the red, green, and blue signals **may** change as the average picture level changes, resulting in an unacceptable image.*

Blue Screen screen

The Blue Screen screen turns the blue screen feature on and off. When on, the blue screen feature is helpful in the setup of the size and position adjustments *on the display*. In the blue only mode, a solid blue field is passed to the display.

NOTE *The video and input screen settings have no affect on the blue screen. Once the output settings have been adjusted, turn the blue screen off and then you can adjust the video and input settings.*

Use the Menu ◀ button to highlight "ON" and press the ***Enter*** (and save) button to turn on the blue screen feature. Use the ▶ button to highlight "OFF" and press the ***Enter*** (and save) button to turn the blue screen feature off and return to the normal video output.

Reset Output screen

The Reset Output screen provides the ability to reset all of the settings that are available from the Output menu to the factory defaults.

Use the Menu ◀ button to highlight "Yes" and press the ***Enter*** (and save) button to reset the output. Use the ▶ button to highlight "No" and press the Enter button to exit the screen without resetting the output (or back out of the screen by pressing the Menu button).

Advanced menu

Figure 3-12 is a flowchart that shows an overview of the Advanced menu, its submenus, and their available settings.

Factory Reset screen

The Factory Reset screen provides the ability to reset all of the video, audio, input, output, and RS-232 settings to the factory defaults.

Use the Menu ◀ button to highlight "Yes" and press the ***Enter*** (and save) button to reset the scaler. Use the ▶ button to highlight "No" and press the Enter button to exit the screen without resetting the scaler (or back out of the screen by pressing the Menu button).

User Memory screen

The User Memory screen provides the ability to either save all of the current video, audio, and input settings to one of 128 memory blocks, recall the settings from a block, or reset the contents of a block to the factory defaults.

Save, recall, or reset a memory block as follows:

1. Use the Menu ▲ or ▼ button to highlight the desired option and press the ***Enter*** (and save) button. The Save, Recall, or Reset status indicator appears.
2. Press the ◀ and ▶ buttons to count up or down to the desired memory block number.
3. Press the Enter button to save, recall, or reset the video, audio, and input settings and return to normal system operations.

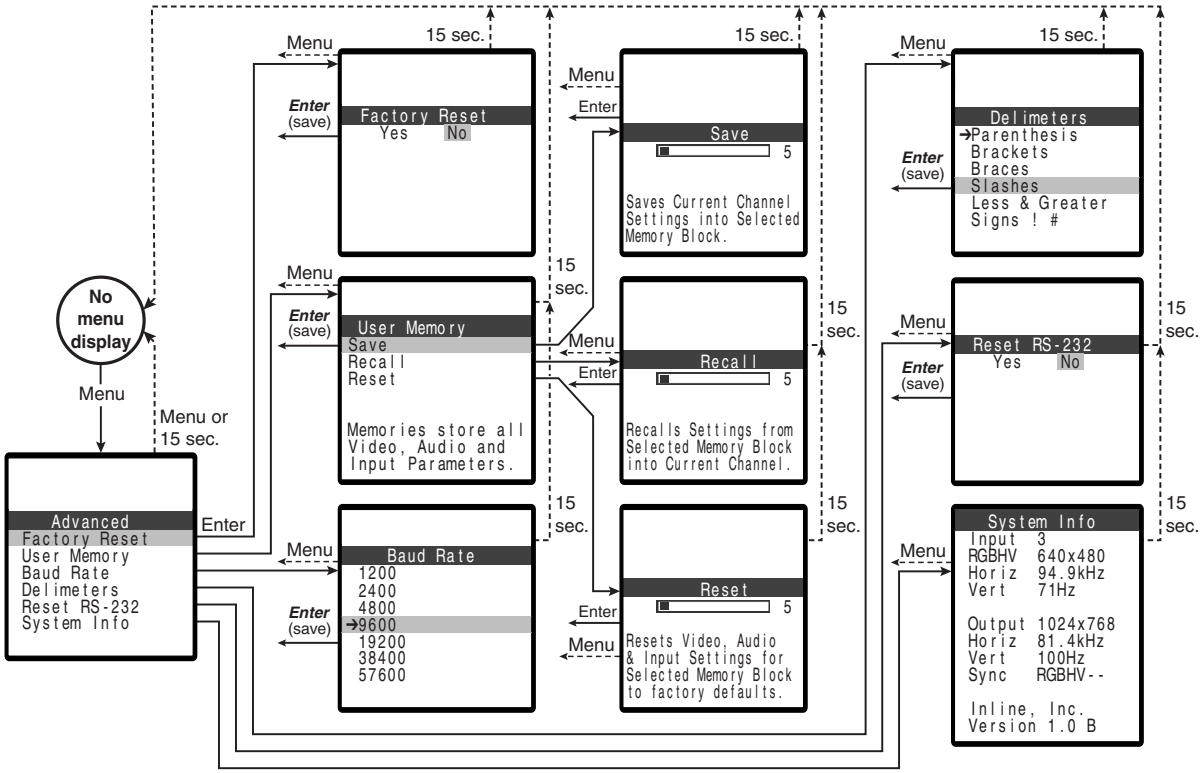


Figure 3-12 — Advance menu flowchart

NOTE *Some parameters, such as the advanced input active area and blanking parameters, are input mode dependent. Before recalling a user memory that has not been previously saved, Extron suggests that you reset that memory so that it is programmed for the current input mode.*

Baud Rate screen

The Baud Rate screen displays the currently selected RS-232 port baud rate and provides the ability to select a different rate.

To select a different baud rate, use the Menu ▲ or ▼ button to highlight the desired rate and press the ***Enter*** (and save) button.

Delimiters screen

The Delimiters screen displays the currently selected RS-232 delimiters and provides the ability to select a different set of delimiters. Delimiters are the leading and end codes that identify the beginning and end of an RS-232 command code. Extron products that use this command set can be set to recognize one of six different delimiters: parenthesis ( ), brackets [ ], braces { }, slashes \ / less-than and greater-than symbols < >, and the ! and # signs. If desired, several Extron products that use this set can be connected together on one RS-232 serial control line, with each device set for a different delimiter pair. Each unit only responds to codes sent with the appropriate deliminators and ignores all other codes.

To select a deliminator set, use the Menu ▲ or ▼ button to highlight the desired set and press the ***Enter*** (and save) button.

Reset RS-232 screen

The Reset RS-232 screen provides the ability to reset all of the RS-232 settings, such as the baud rate and delimiters, to the factory defaults.

Use the Menu ◄ button to highlight "Yes" and press the ***Enter*** (and save) button to reset the RS-232 settings. Use the ► button to highlight "No" and press the Enter button to exit the screen without resetting the RS-232 settings (or back out of the screen by pressing the Menu button).

System Information screen

The System Information screen is an informational display only that shows:

- The selected input number
- The selected input's sync format (RGBHV, RGBS, and so on) and resolution
- The selected input's horizontal and vertical rates
- The output's resolution
- The output's horizontal and vertical rates
- The firmware version

Enabling seamless switching

When the scaler is in seamless switching mode, it uses input 4's passive (unscaled) synchronization signals as a reference for locking the output video signal. For seamless switching to work properly, the following three conditions must be true:

- Input 4 must be set to be passively output without scaling.
- The output's resolution, refresh rate, and sync format must be set to those of the channel 4 input.
- The Input 4 reference must be within ±2% of the selected output resolution and refresh rate.

NOTE *When input 4 is passive, the scaler performs no decoding, scaling, or video adjustment functions. Blank and freeze functions, and on-screen menus are not available for input 4. The scaler functions as a switcher only for input 4.*

Setting up seamless switching

Set the IN1404XT to seamlessly switch between scaled inputs on 1, 2, or 3 (RGB, component, S-video, or composite video) and the passive RGB video on input 4 as follows:

1. Apply the RGBHV, RGBS, or RGsB reference to input 4.
2. Press Menu and then select Output>Resolution, select the same resolution as the input 4 reference signal, and press ***Enter*** (and save).
3. While still in the Output screen, select Refresh Rate, select the same refresh rate as the input 4 reference signal, and press ***Enter*** (and save).
4. While still in the Output screen, select Sync Format, select the same sync format (RGBHV, RGBS, or RGsB) as the input 4 reference signal, and press ***Enter*** (and save).
5. While still in the Output screen, select Seamless Mode, select On, and press ***Enter*** (and save).

NOTE *When you turn seamless mode on, the scaler automatically sets the input 4 signal format to passive if necessary.*

When seamless mode is on, the scaler will not let you change the input 4 signal format. To change the signal format, you must first turn seamless mode off.

Seamless switching operation

When seamless switching is on; and you switch to input 1, 2, or 3; that input is synced to the input 4 reference. The synced input 1, 2, or 3 is termed the "channel

in common". Seamless switching only occurs between the passive channel 4 input and the channel in common input.

Switching between input 4 and a non-channel in common input occurs during the vertical interval of input 4. There is a slight delay without blanking while the new input syncs to input 4 and becomes the new channel in common input.

When you switch between two scaled inputs without going through input 4, the switch is not seamless. A brief blanking interval is seen on the output.

If the input 4 signal is turned off, the scaler switches over to an internal crystal reference and operates in free-run mode. When seamless switching is not available, the scaler blanks the screen when the scaler switches among inputs. The sync signal remains present on the output while the scaler begins processing the new video signal. The blanking during this interval ensures that a noise-filled scramble is not shown on the output during the transition. When the input 4 video signal is restored and a switch to input 4 is made, seamless switching mode reactivates.

Power-up shortcuts

Several menu functions or combinations of menu functions are coded as shortcuts into the power up process. These shortcuts can be particularly useful is the monitor does not display an image or the image is scrambled. Press and **hold** the following buttons while powering up the scaler to perform the following functions:

Input 1 — Factory reset

Input 2 — Sets the output sync to RGBHV- - (negative sync)

Input 3 — Sets the output sync to RGBHV+ + (positive sync)

Input 4 — Sets the output sync to RGBS A (with serration pulses)

Blank — Sets the output sync to RGsB A (with serration pulses)

Freeze Frame — Enables the front panel

Mute — Turns autoswitch mode off

Menu — Sets the output resolution at 640 x 480 and refresh rate at 60 Hz

NOTE *The arrow buttons below, ◄, ▲, ▼, and ►, are the arrow buttons associated with he menu system, not the volume ▲ and ▼ buttons.*

◄ — Sets the output resolution at 800 x 600 and refresh rate at 60 Hz

▲ — Sets the output resolution at 1024 x 768 and refresh rate at 60 Hz

▼ — Sets the output resolution at 1152 x 864 and refresh rate at 60 Hz

► — Sets the output resolution at 1280 x 1024 and refresh rate at 60 Hz

Enter — Factory reset (identical to the Input 1 shortcut, above)

Optimizing the Video

Setting up a DVD source

To get the best results when using a DVD as a video source, Extron recommends that the DVD player itself be set up to output an aspect ratio of 16:9 and not 4:3. Because all DVDs are mastered as 16:9, having them set up for anything else causes the player to internally scale and compress the signal. The DVD player's scaling and compression defeats the advantage of having 3-2 pulldown detection in the IN1404XT.

All sizing adjustments to correct aspect ratio should be done using the IN1404XT.

To change the output aspect ratio of most DVD players:

1. Enter the DVD player's setup or action menu while the disc is stopped.
2. Select the 16:9 aspect ratio.

Resolution and refresh rates

Resolution and refresh rate are probably the most crucial variables for optimum image quality. Every display has an optimal or native resolution and an optimal refresh rate. These will vary, depending on:

- The type of display technology
- Whether the display has a fixed number of pixels (a native resolution)
- The size of the pixels
- The size of the display or screen
- The distance of the viewer from the screen.

For best results, set the scaler's output resolution and refresh rate to match the capabilities of your display.

NOTE *The ideal resolution must lie within the compatible range of the display. For example, some 27" to 36" presentation monitors are limited to input signals in the 30 hKz to 50 kHz range. Check the Direct View Display Cross Reference and the Projector Cross Reference in the Extron catalog or on the Extron web site (www.extron.com) for the most up-to-date compatible ranges of most displays.*

CRT displays — selecting the optimum resolution

While CRT displays do not have a native resolution, they do have a "sweet spot" for input signal resolution. When the scaler is set to output at the sweet spot of the CRT, it results in a detailed image with no visible scan lines. If the scaler is set to output below the sweet spot, the displayed image has small scan lines between the image lines. If the scaler is set to output above the sweet spot, the images lines overlap and the image loses detail because there are more lines and pixels than the display can clearly resolve. When experimenting to find the sweet spot, start with the output refresh rate set at 72 Hz and the resolution shown in the table on the next page. Then, with a critical eye, try higher and lower resolutions until you achieve a solid image with optimum image detail.

CRT displays — selecting the optimum refresh rate

CRTs tend to flicker at refresh rates below 70 Hz. To achieve a flicker-free image, try an output refresh rate of 72 Hz or 75Hz. With a critical eye, try even higher rates to see if they improve the display. In some cases, you will find that the image suddenly appears significantly improved at a higher rate such as 85 Hz.

Note that as the refresh rate increases, the horizontal scan rate also increases, placing greater bandwidth demands on the video distribution system and the display. If the bandwidth is too high, you may see a softer image because the signal exceeds the bandwidth of the distribution system and the display. An extremely high refresh rate can also create a compatibility problem in which the video signal is beyond the scan rate of the display.

Display type	Suggested sweet spot/ native resolution	Suggested refresh rate	Comments
CRT Displays			
15" data monitor	800 x 600, 1024 x 768	72 Hz / 75 Hz	
17" data monitor	1024 x 768	72 Hz / 75 Hz	
19"-21" data monitor	1024 x 768, 1280 x 1024	72 Hz - 85 Hz	
27"-42" presentation monitor	800 x 600, 1024 x 768	72 hz / 75 Hz	
Data projector or retro display with 7" CRTs	800 x 600, 1024 x 768	72 Hz - 85 Hz	
Data projector or retro displays with 9" CRTs	1024 x 768, 1280 x 1024	72 Hz - 85 Hz	
Projectors, flat panels, and plasma displays			
DLP projectors	800 x 600, 1024 x 768 1280 x 720, 1280 x 1024	60 Hz	Check the display's native resolution. For 848 x 600, set the scaler to 800 x 600.
D-ILA projectors	1364 x 1024	60 Hz	
LCD projectors	800 x 600, 1024 x 768 1280 x 1024, 1365 x 768	60 Hz	Check the display's native resolution. Very old units may be 640 x 480
LCD 14"/15" flat panel display	1024 x 768	60 Hz	
LCD 18" flat panel display	1280 x 1024	60 Hz	
LCD 28"flat panel display	1280 x 768	60 Hz	
Plasma 40" display (4:3)	640 x 480	60 Hz	
Plasma 42" display (16:9)	852 x 480, 1024 x 768 1280 x 768	60 Hz	For Fujitsu / Sony 42" plasmas with 1024 x 1024, set the scaler to output 1024 x 768.
Plasma 50" / 60" (16:9) (Boxlight, Eizo, LG, Pioneer, Runco, Sharp, Viewsonic)	1280 x 768	56 Hz, 60 Hz, 65 Hz	For Pioneer PDP-505HD, use 56 Hz.
Plasma 50" / 60" (16:9) (Fuzitsu, JVC, Luce, Marantz, NEC, Panasonic, RCA, Runco, Samsung, Toshiba)	1365 x 768	60 Hz	For NEC 50", set sync format to RGBHV++.

Fixed pixel displays — selecting the optimum resolution and refresh rate

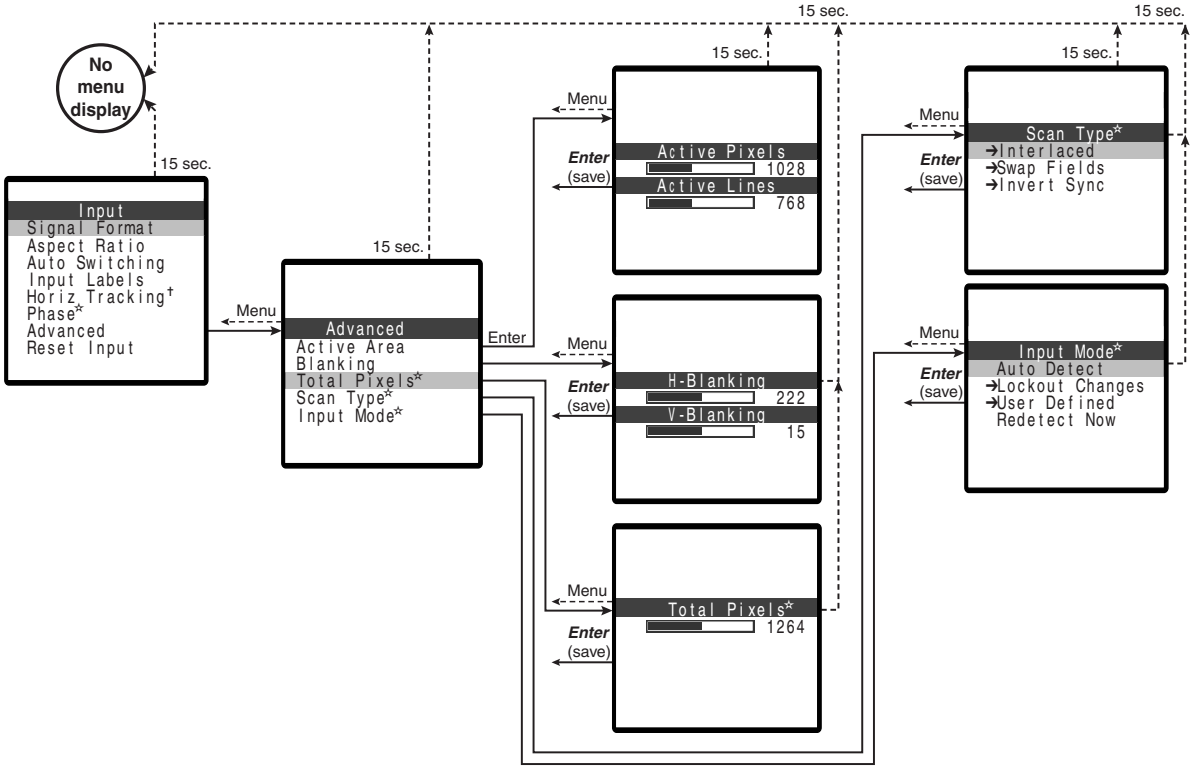
Display devices that are based on LCD, DLP, D-ILA, and plasma technology have a specific number of pixels, a native resolution. These displays typically can show higher or lower resolution signals, but can only do so by scaling the image up or down to the native resolution. To avoid additional image scaling by the display (and more processing is inherently bad for image quality), it is important to know your display's native resolution.

Check the display's operation manual to determine its native resolution. Set the scaler to match this native resolution. The scaler's refresh rate should be set to 60 Hz for most LCD, plasma, D-ILA, and DLP projectors.

NOTE *Higher refresh rates are **not** recommended for these display technologies. They usually do not improve the image and may cause compatibility problems.*

Advanced Input submenu options

Figure 3-13 shows the submenus that are available from the Advanced screen. The scaler automatically adjusts for different input and output modes. However, if the input signal has slightly different timing or is non-standard, some settings may need to be manually adjusted. All settings for each input and output mode (including non-standard input modes) are stored in non-volatile memory so that the adjustments do not need to be repeated after the settings are optimized.



☆ This selection only available for RGBHV, RGBS, RGsB, and progresive component video

Figure 3-13 — Input Advanced submenu

To select one of the advanced settings, use the Menu ▲ or ▼ button to highlight the desired option and press the Enter button. The selected Advanced screen appears.

NOTE *The Advanced Input settings are a complex set of adjustments to optimize the scaler for non-standard video inputs. Most users will not encounter such signals.*

Only qualified A/V technicians should adjust these settings.

The first three Advanced Input settings define the image area of the input (figure 3-14). There are settable variables for the following parameters:

- **Active pixels** — Set from the Active Area submenu. The number of pixels per line that are inside the input active area. The baseline for the active pixels adjustment is the right edge of the image.
- **Active lines** — Set from the Active Area submenu. The number of lines per frame that are inside the input active area. The baseline for the active lines adjustment is the bottom edge of the image.

  For interlaced input signals, this number refers to the total number of lines per frame after de-interlacing, not the number of lines per field.

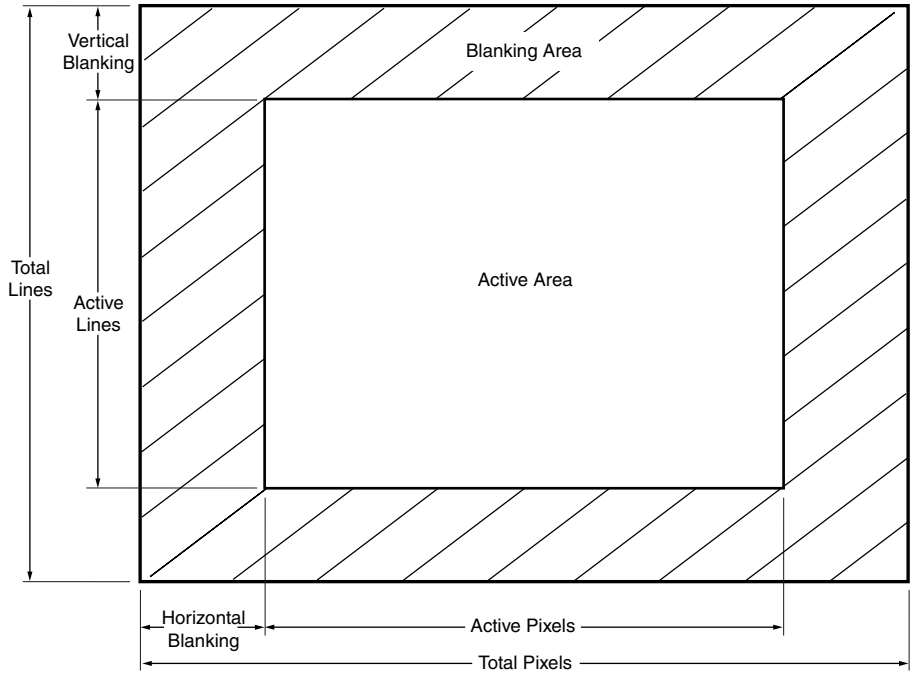


Figure 3-14 — Advanced input settings

- **Horizontal blanking** — Set from the Blanking submenu. The number of pixels per line that are inside the blanking area to the left of the active area (including the horizontal sync width and the horizontal back porch.
- **Vertical blanking** — Set from the Blanking submenu. The number of lines per frame that are inside the blanking area above the active area (including the vertical sync height and the vertical back porch).

- **Total pixels (RGBHV/RGBS/RGsB, and progressive component only)** — The total number of pixels per line, including the blanking on both sides of the input active area (active, horizontal sync width, back porch, and front porch).

NOTE *The total number of lines per frame, including the blanking above and below the active area is determined by the input signal and is not user adjustable.*

Use these controls to match the input video signal and to frame the active area.

NOTE *The active pixels and total pixels adjustments are interactive. Setting one of these variables may require adjusting the other.*

Input blanking adjustment

The input blanking controls adjust where the electronic scaling process takes effect. The input blanking and active area should be manually adjusted, if necessary, to match the input video signal, framing the active area of the input signal. If the blanking is set incorrectly, the scaler may add blank borders on the leading edges (top or left side) or it may crop the active area on the trailing edges (bottom or right side).

Figure 3-15 shows an image that is improperly blanked (as indicated by the dashed lines). If the horizontal blanking adjustment is set to less than the amount of actual blanking, the IN1404XT starts scaling the input before the start of the active image. This early scaling results in a blank border on the left side and cropping on the right side, and *looks* as if the image is shifted to the right.

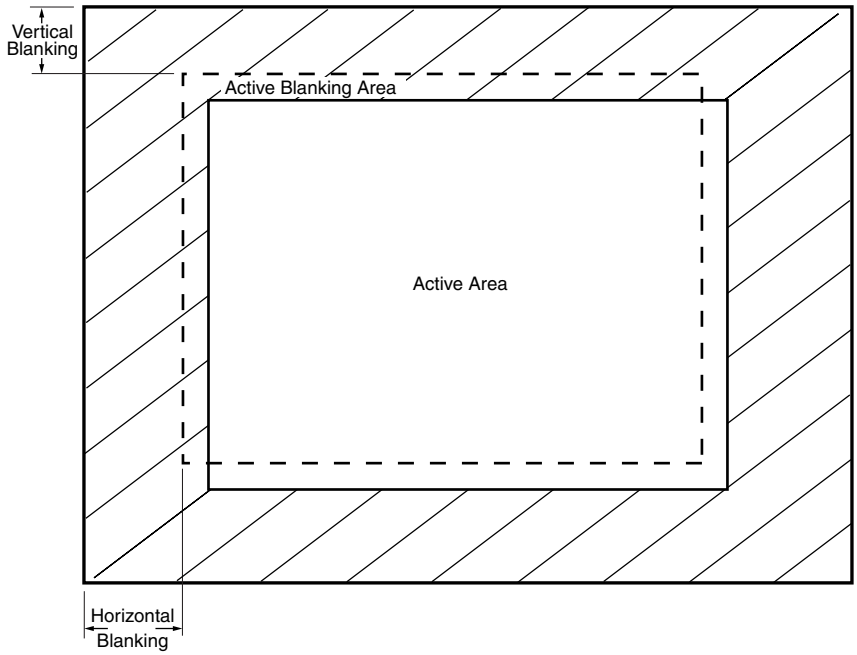


Figure 3-15 — Incorrectly blanked image

Similarly, if the vertical blanking adjustment is set to less than the amount of actual blanking, the IN1404XT starts scaling before the first line of the active image. This early scaling results in a blank border on the top and cropping on the bottom, and *looks* as if the image is shifted down.

Press the ▲ and ▼ buttons to shift the blanking period vertically on the screen. Press the ◀ and ▶ buttons to shift the blanking period horizontally on the screen. Press the ***Enter*** button to save the changes and return to normal system operations.

If improperly adjusted, the output position variable can result in an indication similar to figure 3-15. But, position only moves the image on the monitor. It does not add blank borders or crop any part of the image. However, the apparent effect of blank borders and a cropped image can be caused by the image being improperly positioned on the monitor. You can use the blue screen feature as a tool to help you adjust the *monitor's* controls. The blue screen is always available, even when the input settings are incorrectly adjusted or there is no input signal. Use the blue screen to adjust the output settings (resolution, refresh rate, size, position, and sync format) and to verify the image on the monitor. The video and input settings have no effect on the blue screen. Once the output settings have been properly adjusted and verified on the monitor, the blue screen can be turned off, and the video and input settings then can be adjusted.

Active area adjustment

Figure 3-16 shows an image whose active area is improperly set, as indicated by the dashed lines. If the number of active image pixels that the scaler is set to scale are less than the amount of actual active pixels that are input, the IN1404XT only scales the set active area and will skip some of the input pixels. This early end to the scaling process results in an output with fewer pixels than it should, and *looks* as if the image is stretched horizontally.

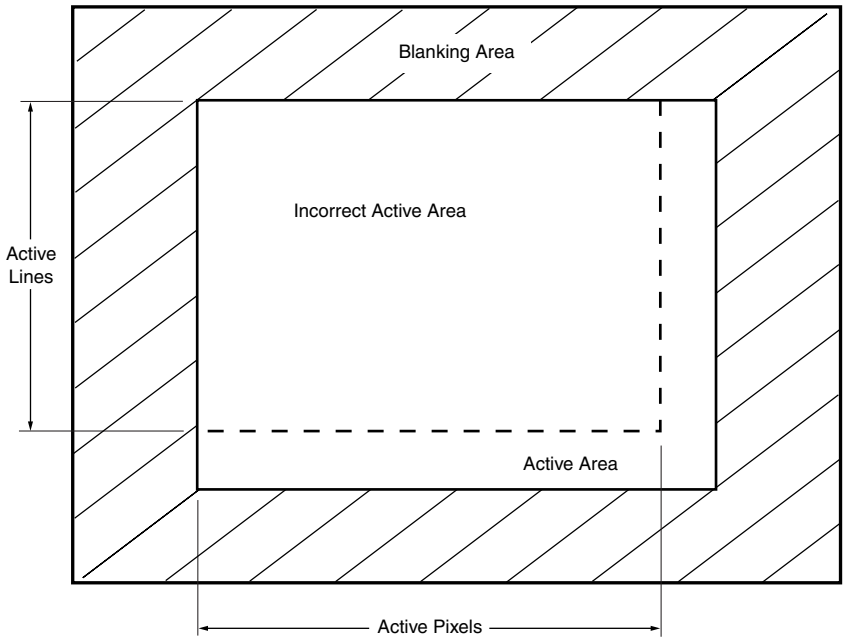


Figure 3-16 — Incorrect active area setting

Similarly, if the number of active image lines that the scaler is set to scale is set to less than the amount of actual active lines that are input, the IN1404XT only scales the set active area and will skip some of the input lines. This early end to the scaling process results in an output with fewer lines than it should, and *looks* as if the image is stretched vertically.

Depending on the RGB source, the input sampling rates in the following table may have the same horizontal scan rate and vertical refresh rate. The scaler does not detect pixel space differences (you can have different numbers of pixels in the same horizontal & vertical rates) between input rates. The scaler applies the default capture rate to the specified input frequency. It then maintains the aspect ratio based on the difference between the input active area and the output resolution (active area) by inserting blank borders around the images. If, however, you want to fill the entire monitor, you can adjust the input aspect ratio by tweaking the number of active pixels and active lines to stretch the image. You may also need to adjust the number of total pixels.

Active pixels	Active lines	Aspect ratio	Total pixels	Comment
Horizontal rate = 31.5 kHz, vertical rate 60 Hz				
640	480	4:3	780	Progressive NTSC
640	350	64:35	800	
640	400	8:5	800	
640	480	4:3	800	Factory default
720	350	72:35	900	
720	400	9:5	900	
Horizontal rate = 15.7 kHz, vertical rate 60 Hz				
768	480	8:5	910	NTSC 14.3
720	480	3:2	858	NTSC 13.5
640	480	4:3	780	NTSC 12.3 (default)

Press the ▲ and ▼ buttons to increase and decrease the number of active pixels. Press the ◀ and ▶ buttons to increase and decrease the number of lines. Press the ***Enter*** button to save the changes and return to normal system operations.

Total pixels adjustment

There are several methods to determine the correct value to use in the total pixels variable. Usually, the best method is to use the input signal specifications. For some input sampling rates, the scaler's setting can result in fine vertical lines (figure 3-17).

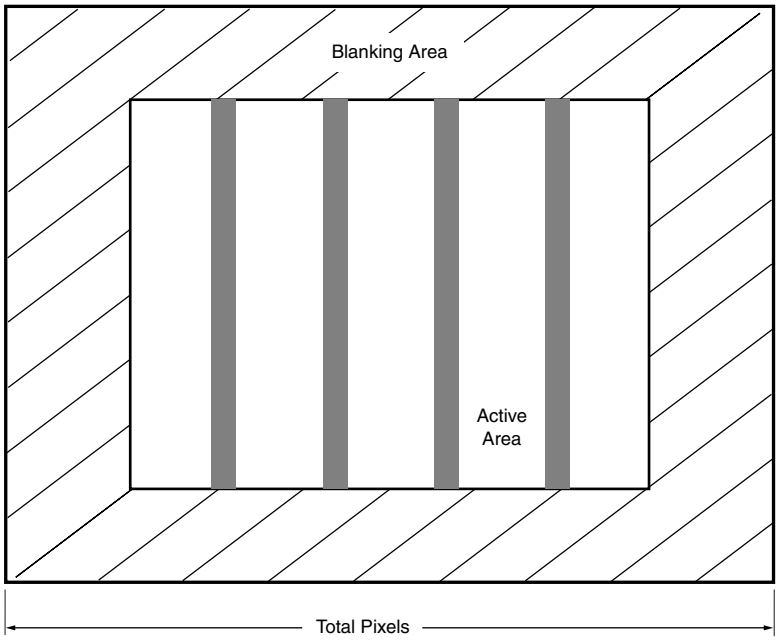


Figure 3-17 — Incorrect total pixels variable

As an approximate setting, multiply the active pixels setting (see *Active area adjustment*) by a factor of 1.3.

If the input pixel clock rate is known, the input total pixels setting can be calculated with this equation: Total pixels = input pixels clock ÷ input horizontal scan rate. (The input horizontal scan rate is one of the parameters reported on the Advanced menu>System Info screen.)

Once a preliminary setting is saved, some faint vertical lines may remain. Adjust the total pixels variable as necessary until the lines are completely out of view or as far apart as you can make them. If one line remains, it can be moved out of view using the Input menu>Phase Adjustment screen.

NOTE *The active pixels and total pixels adjustments are interactive. Setting one of these variables may require adjusting the other.*

Scan Type screen

NOTE *The Scan Type screen is available for RGBHV, RGBS, RGsB, and progressive component video inputs only.*

The Scan Type screen identifies the currently selected scan types and provides the ability to select a different type. Three scan type options are available; one, two, or all three can be turned on simultaneously:

- **Interlaced** — Some video sources output interlaced video at rates that the scaler interprets as progressive scan mode. This option lets you force the scaler to recognize it as interlaced video.
- **Swap Fields** — Swaps the interlaced fields (if necessary). Although this option **can** be turned on when the input is progressive, it has no affect on progressive video.
- **Invert Sync** — To invert the sync polarity (if necessary).

Input Mode screen

NOTE *The Input Mode screen is available for RGBHV, RGBS, RGsB, and progressive component video inputs only.*

The Input Mode screen identifies the currently selected input format detection mode and provides the ability to select a different mode or to lock out changes. Four options are available:

- **Auto Detect** — The default mode at power on. Allows the scaler to automatically detect new input sampling rates and adjust itself accordingly.
- **Lockout Changes** — Prevents the scaler from switching back and forth between input sampling rates, or flickering when small input sampling rate changes occur (such as from a VCR that is scanning forward or scanning backward).
- **User Defined** — All input sampling rates have the same user-definable settings. However, the inputs are restricted to values that are close to the sampling rate detected. If a full range of values is necessary, the user-defined mode can be manually selected.

NOTE *If the Auto Detect mode cannot determine the input sampling rate, the User Defined mode is selected automatically.*

- **Redetect Now** — The scaler automatically reconfigures when each new input is detected and when each new output mode is detected. If the scaler does *not* detect a change in the input sampling rate, or if the input/output settings become invalid, the Redetect Now option allows users to initiate a new detection sequence and reload the input/output settings.

To select a Input Mode option, use the Menu ▲ or ▼ button to highlight the desired option and press the ***Enter*** (and save) button.

Optimizing the Audio

Each individual input's audio bass, treble, and balance levels can be adjusted for maximum sound quality. Adjust the audio as follows:

1. Connect audio sources to all desired inputs and connect the audio output to output devices such as audio players. See *Input connections* and *Standard output connections*, in chapter 2, *Installation*.
2. Power on the audio sources, the scaler, and the audio players.
3. Select an input, listening to the audio with a critical ear.
4. As necessary, adjust each variable for the input (see *Audio menu*, in this chapter) for optimum audio quality.
5. Select each input in turn and repeat step **4** for each input.

Troubleshooting

This paragraph gives recommendations on what to do if you have problems operating the scaler, and it provides examples and descriptions for some image problems you may encounter.

The following tips may help you in troubleshooting.

1. Some symptoms may resemble others, so you may want to look through all of the examples before attempting to solve the problem.
2. Be prepared to backtrack in case the action taken does not solve the problem.
3. It may help to keep notes and sketches in case the troubleshooting process gets lengthy. This will also give you something to discuss if you call for technical support.
4. Try simplifying the system by eliminating components that may have introduced the problem or made it more complicated.
5. For sync-related problems: Portable digital projectors are designed to operate close to the video source. Sync problems may result from using long cables or from improper termination. A sync adapter, such as Extron's ASTA (active sync termination adapter), may help solve these problems.
6. For LCD and DLP projectors and plasma displays: In addition to the sync-related information above, check the user's manual that came with the projector for troubleshooting tips, as well as for settings and adjustments. Each manufacturer may have its own terms, so look for terms like "auto setup", "auto sync", "pixel phase", and "tracking".

General checks

1. Ensure that all devices are plugged in and powered on. The scaler is receiving power if one of the Input LEDs is lit.
2. Ensure that the input selected is active.
3. Ensure that the proper signal format is supplied.
4. Check the cabling and make corrections as necessary.
5. Call the Extron S^3 Sales & Technical Support Hotline if necessary.

Specific problems

The table below shows some common operating problems and their solutions.

Problem	Possible cause	Solution
No image appears.	Power.	Ensure that the video source, the scaler, and the display are plugged into a live AC power source and the scaler is turned on.
	No video input.	Check that the input device is outputting a video signal.
	No video output.	Press the Menu button, if the on-screen display does not appear, check the output connection.
	The output signal is incompatible.	Use the power up shortcuts to select an output rate that is compatible with the display.
	The output resolution is lower than the input resolution.	Select an output resolution that is greater than or equal to the input resolution.
	The display may not accept the output sync format.	Check the display's sync capability and select the correct output sync.
	The input/output settings may be incorrect or may have been changed with Lockout Changes enabled.	Select Input>Advanced>Input Mode>Redetect Now.
	The input is improperly configured.	Use the Input menu to select the correct input format.
	Freeze mode was entered when the image was black.	Deactivate freeze mode.
No audio output.	Power.	Ensure that the audio source, the scaler, and the amplifier/speakers are plugged into a live AC power source and the scaler is turned on.
	The source is incorrect.	Ensure that the source is connected to the correct input and that the volume has not been turned down or muted.
	The output is incorrect.	The IN1404XT outputs line level audio *only*. Ensure that it is connected to a mixer/amplifier or to amplified speakers.
	Volume too low.	Increase the volume with the scaler's Volume ▲ button.
	Audio may be muted.	Press the Mute Audio button.
The input source cannot be changed.	Autoswitching is turned on via an RS-232 command.	Use the RS-232 AS0 command to turn autoswitching off. See chapter 4, *Programmer's Guide*, for details.

Problem	Possible cause	Solution
The on-screen menu does not appear	Input 4 is set for passive (unscaled).	Select a different input. If necessary to configure input 4, select Input>Signal Format to reconfigure input 4 to a scaled format.
The image is scrambled.	The input signal format is incorrect.	Select Input>Signal Format and verify that the input format is set correctly.
	The output signal is incompatible.	Use the power up shortcuts to select an output rate that is compatible with the display.
The image is scrambled (cont'd).	The input mode may have been changed with Lockout Changes enabled.	Select Input>Advanced>Input Mode>Redetect Now.
The image is stretched horizontally.	Total pixels may be set too high.	Select Input>Advanced>Total Pixels and reduce the setting to match the input signal.
	Active pixels may be set too low.	Select Input>Advanced>Active Area and increase the setting to match the input signal.
	Output resolution may be too low.	Select Output>Resolution and increase the resolution to a value greater than the input active area.
The image is compressed horizontally.	Total pixels may be set too low.	Select Input>Advanced>Total Pixels and increase the setting to match the input signal.
	Active pixels may be set too high.	Select Input>Advanced>Active Area and reduce the setting to match the input signal.
The image is stretched vertically	Active lines may be set too low.	Select Input>Advanced>Active Area and increase the setting to match the input signal.
	Output resolution may be too low.	Select Output>Resolution and increase the resolution to a value greater than the input active area.
The image is compressed vertically.	Active lines may be set too high.	Select Input>Advanced>Active Area and reduce the setting to match the input signal.
The image is cropped on the left.	Input horizontal blanking may be set too high.	Select Input>Advanced> H. Blanking and reduce the setting to match the input signal.
	Horizontal position may be set too far to the left.	Increase the horizontal position setting.
	Display may be set incorrectly.	Use the blue screen and the display's position or size controls to fit the image on the display.

Problem	Possible cause	Solution
The image is cropped on the right.	Input horizontal blanking may be set too low.	Select Input>Advanced> H. Blanking and increase the setting to match the input signal.
	Horizontal position may be set too far to the right.	Reduce the horizontal position setting.
	Display may be set incorrectly.	Use the blue screen and the display's position or size controls to fit the image on the display.
The image is cropped on the top.	Input vertical blanking may be set too high.	Select Input>Advanced> V. Blanking and reduce the setting to match the input signal.
	Vertical position may be set too far to the top.	Increase the vertical position setting.
	Display may be set incorrectly.	Use the blue screen and the display's position or size controls to fit the image on the display.
The image is cropped on the bottom.	Input vertical blanking may be set too low.	Select Input>Advanced> V. Blanking and increase the setting to match the input signal.
	Vertical position may be set too far to the bottom.	Reduce the vertical position setting.
	Display may be set incorrectly.	Use the blue screen and the display's position or size controls to fit the image on the display.
Double image.	Multiple formats connected to a single input.	Ensure only one signal is connected to each input.
	(Interlaced component and RGB video) Even and odd fields improperly detected.	Select Input>Advanced>Scan Type and then select Invert Sync.
Black & white image only.	Signal format incorrect.	Select Input>Signal Format and ensure that signal format selected matches the signal input.
Hooking along the top of the image.	Horizontal tracking too slow.	Select Input>Horiz Tracking and increase the tracking speed.
	(RGBS and RGsB video) Incorrect serration pulses status.	Select Output>Sync Format and select pulses on (A) if off (B) or turn pulses off if on.
Frozen image.	Freeze is activated.	Press freeze to deactivate the feature.
Displayed image is the wrong shape.	Input aspect ratio incorrect.	Select Input>Aspect Ratio and select the correct aspect ratio.
	Output aspect ratio incorrect.	Select Output>Resolution and select a resolution to match the display.

Problem	Possible cause	Solution
Output resolution cannot be increased.	Input resolution too high.	The IN1404XT can *only* scale up. Connect a signal with a lower active area.
	Active pixels and/or active lines may be too high.	Select Input>Advanced>Active Area and reduce the active lines and/or active pixels to match the input signal.
Input aspect ratio cannot be selected.	Output resolution too low.	The IN1404XT can *only* scale up. Select Output>Resolution and increase the resolution until the desired aspect ratio becomes available.
	Image size too high	Select Output>Size and decrease the image size.
		Select a different available aspect ratio.
The output size cannot be increased.	Output resolution too high.	Select Output>Resolution and decrease the resolution.
Multiple faint vertical lines appear.	Input total pixels setting incorrect.	Select Input>Advanced>Total Pixels and experiment with settings until the lines move completely out of view or only one remains. See *Single faint vertical line appears*, below, if necessary.
Single faint vertical line appears.	Input phase setting incorrect.	Select Input>Phase and experiment with settings until the line moves completely out of view.
The entire image is too soft.	Sharpness setting too low.	Select Video>Sharpness and increase the sharpness setting.
	Noise filter incorrect.	Select Video>Noise Filter and select a different setting.
	The refresh rate may be too high.	Select Output>Refresh Rate and lower the refresh rate.
Some characters are too soft.	Total pixels setting incorrect.	Select Input>Advanced>Total Pixels and experiment with settings until the characters are sharp.
	Input phase setting incorrect.	Select Input>Phase and experiment with settings until the characters are sharp.
Only the top half of the image displays.	**(Non-interlaced video)** Scan type incorrect.	Select Input>Advanced>Scan Type and select Interlaced to toggle the setting off.
Image jitters up and down.	**(Interlaced video)** Scan type incorrect.	Select Input>Advanced>Scan Type and select Interlaced to toggle the setting on.

Problem	Possible cause	Solution
Image has jagged edges.	**(Interlaced video)** Even and odd fields. are swapped.	Select Input>Advanced>Scan Type and select Swap Fields to toggle the setting on.
Unable to select some scaler settings.	Desired settings are outside the range of. the predefined modes.	Select Input>Advanced>Input Mode and select User Defined to enable the full range of settings.
Total pixels setting cannot be decreased.	Horizontal blanking may be too high	Select Input>Advanced>H. Blanking and reduce the setting to match the input signal.
	Active pixels setting may be too high.	Select Input>Advanced>Active Area and reduce the setting to match the input signal.
Total pixels setting cannot be increased.	Active pixels setting may be too low.	Select Input>Advanced>Active Area and increase the setting to match the input signal.
	Horizontal blanking may be too high	Select Input>Advanced>H. Blanking and reduce the setting to match the input signal.
	Output resolution may be too low.	Select Output>Resolution and select a setting that is greater than or equal to the active area.
Active lines setting cannot be increased.	Vertical blanking may be too high	Select Input>Advanced>V. Blanking and reduce the setting to match the input signal.
	Output resolution may be too low.	Select Output>Resolution and select a setting that is greater than or equal to the active area.
Horizontal blanking setting cannot be increased.	Total pixels setting may be too low.	Select Input>Advanced>Total Pixels and increase the setting to match the input signal.
	Active pixels setting may be too high.	Select Input>Advanced>Active Area and reduce the setting to match the input signal.
Vertical blanking.	Active lines setting may be too high.	Select Input>Advanced>Active Area and reduce the setting to match the input signal.

Chapter Four

Programmer's Guide

Communications Protocols

Serial Control Cable Wiring

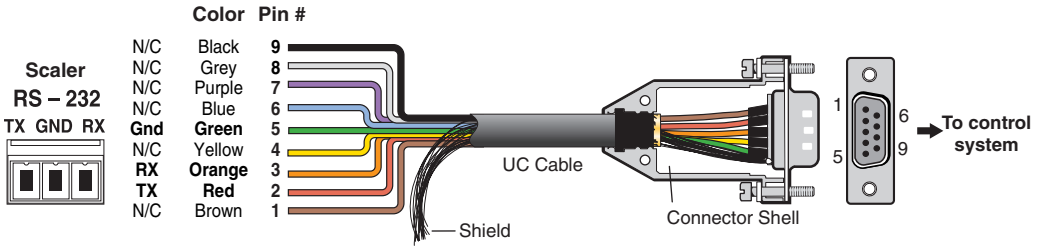
Host-to-Scaler Instructions

Scaler Responses

Using the Command/Response Table

Command/Response Table for RS-232 Commands

The scaler's rear panel RS-232 3.5 mm, 3-pole captive screw connector (figure 4-1) can be connected to the RS-232 serial port output of a host device such as a computer running the HyperTerminal utility, an RS-232 capable PDA, or a control system. This connection makes software control of the scaler possible.



One device		Up to 6 devices	
Controller	**Scaler**	**Controller**	**Scaler**
Receive (2)	TX	Receive (2)	Each scaler's TX
Gnd (5)	Gnd	Gnd (5)	Each scaler's Gnd
Transmit (3)	RX	Transmit (3)	**One scaler's** RX

Figure 4-1 — RS-232 port pin assignments

Communication Protocols

The scaler has a factory-set baud rate of 9600 bps, but can communicate at baud rates from 1200 bps up to 57,600 bps. Baud rates can be set from the Advance menu, see *Baud rate screen* in chapter 3, *Operation*, and with an RS-232 command (although communications are lost until the baud rate on the computer, PDA, or control system are updated to the new baud rate).

NOTE *The baud rate on the computer, PDA, or control system must match the baud rate selected on the IN1404XT.*

The remaining protocols, which are constant, are: 8-bit, 1 stop bit, no parity, and no flow control.

Serial Control Cable Wiring

Figure 4-1 shows the serial control cable configured between the scaler's 3.5 mm, 3-pole captive screw connector and a computer or control system's 9-pin D connector. Figure 4-1 shows the pin number in parenthesis for a PC's standard 9-pin D connection.

NOTE *When controlling multiple units, the control device or PC can only be connected to the TX pin on **one** of the controlled devices; the device that is connected is unimportant. Multiple TX lines cannot be connected together, otherwise, signal contention will occur. Therefore, in this configuration, only one of the controlled devices can send responses to the control system.*

Each controlled device must be set to a different set of delimiters.

Command and Response Structure

The scaler accepts commands through its RS-232 port. Valid commands consist of a leading delimnator, one or more characters in a command code, and an ending deliminator. The control panel module's response to an RS-232 command also consists of a leadingdeliminator, a command code, and an ending deliminator. The ending deliminator signals the end of either the command or the response.

The scaler's default leading delimiter code is a left bracket ([ ). The default ending delimiter code is a right bracket ( ]).

Example: [CH3] — where "[" is the leading code, "CH3" is the command (select input 3), and "]" is the ending code.

The scaler can be set to recognize one of six different delimiters: parentheses ( ), brackets [ ], braces { }, slashes \ / less-than and greater-than symbols < >, and the ! and # signs. If desired, several Extron products that use this command set protocol can be connected together on one RS-232 serial control line, with each device set for a different delimiter pair. Each unit only responds to codes sent with the appropriate deliminators and ignores all other codes.

See *Delimiters screen* in chapter 3, *Operation* to change the delimiters to which the scaler responds.

Scaler Responses

When the scaler receives an RS-232 command and determines that it is valid, it performs the command and sends a response to the host device. If the scaler is unable to perform the command because the command is invalid or contains invalid parameters, the scaler returns an error response to the host. The error response codes are:

Invalid parameter — The scaler received a parameter outside the valid range

Not available — The scaler received a parameter that is within the valid range, but is not allowed given the current settings

E10 — Invalid command
E11 — Invalid preset number (too large)
E12 — Invalid output number (too large)
E13 — Invalid value (out of range)

Using the Command/Response Table

The command/response table begins on the next page. Upper or lower case letters are acceptable in the command field. The table below shows the hexadecimal equivalent of each ASCII command. All entries in the command/response table are shown using the [] delimiters, but any other valid delimiters could be used instead.

ASCII to HEX Conversion Table																				Esc	1B	CR	ØD	LF	ØA
	2Ø	!	21	"	22	#	23	$	24	%	25	&	26	'	27										
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F										
Ø	3Ø	1	31	2	32	3	33	4	34	5	35	6	36	7	37										
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F										
@	4Ø	A	41	B	42	C	43	D	44	E	45	F	46	G	47										
H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F										
P	5Ø	Q	51	R	52	S	53	T	54	U	55	V	56	W	57										
X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F										
`	6Ø	a	61	b	62	c	63	d	64	e	65	f	66	g	67										
h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F										
p	7Ø	q	71	r	72	s	73	t	74	u	75	v	76	w	77										
x	78	y	79	z	7A	{	7B	l	7C	}	7D	~	7E	DEL	7F										

Symbols, defined below, are used throughout the table to represent variables in the command/response fields. Command and response examples are shown throughout the table. The symbols are defined below.

Symbols

← = CR (no line feed)

X1 = Input number 1 through 4

X2 = Autoswitch/seamless/blank/blue/freeze/mute/front panel lockout status:

0 = Off
1 = On
2 = (Invalid option)
3 = **Blue** screen on

X3 = Video type:

0 = Composite video
1 = S-video
2 = Component-I
3 = Component-P
4 = RGBHV
5 = RGBS
6 = RGsB
7 = RGBHVS passive
8 = RGsB passive

X4 = Aspect ratio:

0 = Standard (4:3)
1 = Anamorphic
2 = Wide screen (16:9, 1.78)
3 = Wider screen (2.35)
4 = Tomarama

X5 = Scaler resolution:

0 = 640x480
1 = 800x600
2 = 852x480
3 = 1024x768
4 = 1152x864
5 = 1280x720 (720p)
6 = 1280x768
7 = 1280x1024
8 = 1365x768
9 = 1365x1024

X6 = Video refresh rate:

0 = 60 Hz
1 = 72 Hz
2 = 75 Hz
3 = 85 Hz
4 = 96 Hz
5 = 100 Hz
6 = 120 Hz

X7 = Sync format:

0 = RGBHV- -
1 = RGBHV+ +
2 = RGBS
3 = RGBS (no serrations)
4 = RGsB
5 = RGsB (no serrations)

X8 = Brightness, contrast, gain, color saturation, and hue value (000 thru 255)

X9 = Sharpness value (1 thru 8)

X10 = Gamma value (1 thru 30)

X11 = Noise filter value (0 thru 47)

X12 = Comb/trap filter:

0 = Comb filter
1 = Trap filter
2 = Both filters off

X13 = Horizontal tracking:

0 = Very fast (for poor quality input video (VCR))
1 = Fast (For normal quality input video (cable box))
2 = Normal (for good quality input video (DVD))
3 = Slow (for high quality input video (broadcast))

X14 = Label status:

0 = Off
1 = On
2 = Momentary

X15 = Custom label to be displayed, up to 15 characters

X16 = Horizontal or vertical size (up to 100 (%))

X17 = Horizontal shift value (variable, per resolution)

X18 = Vertical shift value (variable, per resolution)

X19 = Pixel phase value (0 - 31)

X20 = Preset number (5 - 128)

X21 = Volume (12-63)

X22 = Bass (6-27)

X23 = Treble (8-25)

X24 = Balance (0-31, 16 = center)

X25 = Firmware version

X26 = Reset parameter:

1 = Video
2 = Audio
3 = Input
4 = Output
5 = RS-232

X27 = Baud rate:

3 = 1200
4 = 2400
5 = 4800
7 = 9600
7 = 19,200
8 = 38,400
9 = 57,600

X28 = Delimitors:

0 = Brackets []
1 = Braces {}
2 = Parenthesis ()
3 = Less than/greater than <>
4 = Slashes \ /
5 = Signs !#

X29 = Total pixels. Variable, depending on the resolution.

X30 = Total lines. Variable, depending on the resolution.

X31 = Horizontal blanking. Variable, depending on the resolution.

X32 = Vertical blanking. Variable, depending on the resolution.

X33 = Total pixels. Variable, depending on the resolution.

X34 = Scan type parameters. Three bit number; each bit is a specific function,any bit can be set at any time. MSBs with a value of 0 are not returned.

*xx*1 = Interlaced on
*x*1*x* = Fields swapped
1*xx* = Inverted sync on
*xx*0 = Interlaced off
*x*0*x* = Fields not swapped
0*xx* = Inverted sync off

X35 = Input mode:

0 = Auto detect
1 = Lockout changes
2 = User defined
3 = Input

Command/Response Table for RS-232 Commands

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Input selection			
Select a video and audio input	[CH X1]	[OK]←	Select video and audio input X1.
Example:	[CH3]	[OK]←	Select video and audio input 3.
View input video selection	[CH?]	[X1]←	Video input X1 selected.
NOTE *The CH? command code views the selected video input only. There is no corresponding view audio input command.*			
Select a video input	[CHV X1]	[OK]←	Select video input X1.
Select an audio input	[CHA X1]	[OK]←	Select audio input X1.
Autoswitch mode			
Autoswitch mode **on**	[AS1]	[OK]←	Scaler autoswitches to the highest numbered input with an active input. If no inputs are active, input 1 is selected.
NOTE *Manual input selection is not available, neither on the front panel nor via RS-232 control.*			
Autoswitch mode **off**	[AS0]	[OK]←	Autoswitch mode off.
View autoswitch mode	[AS?]	[X2]←	View autoswitch mode status.
Seamless switch mode			
NOTE ***1***. *Input 4 must be configured as passive. Turning seamless switch mode on automatically configures input 4 as passive if necessary.* ***2***. *Turning seamless switch mode off does not reconfigure input 4.* ***3***. *When seamless switching is on; and you switch to input 1, 2, or 3; that input is synced to the input 4 reference. The synced input 1, 2, or 3 is termed the "channel in common". Seamless switching only occurs between the passive channel 4 input and the channel in common input.* *Switching between input 4 and a non-common in channel input occurs during the vertical interval of input 4. There is a slight delay without blanking while the new input syncs to input 4 and becomes the new channel in common input.* *When you switch between two scaled inputs without going through input 4, the switch is not seamless. A brief blanking interval is seen on the output.*			
Seamless mode **on**	[SM1]	[OK]←	Turn seamless mode on (and configure input 4 as passive, if necessary).
Seamless mode **off**	[SM0]	[OK]←	Turn seamless mode off.
View seamless mode	[SM?]	[X2]←	View seamless mode status.
Blue screen and video blank			
Blue screen on	[BLANK3]	[OK]←	Set the video output to blue.
Blue screen off	[BLANK2]	[OK]←	Set the video output to either the selected input 1 through 4 or the blank screen (if enabled).
Video **blank on**	[BLANK1]	[OK]←	Set the video output to blank.
Video **blank off**	[BLANK0]	[OK]←	Set the video output to either the selected input 1 through 4 or the blue screen (if enabled).

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Blue screen and video blank (continued)			
Toggle video **blank**	[BLANK]	[OK]←	Change the state of video blank (off to on or on to off).
NOTE	*The blue screen has priority over the blank screen feature. If you turn the blue screen on while the blank screen feature is turned on, the blue screen appears. If you turn the blue screen off, while the blank screen feature is turned on, the blank screen appears.*		
View **blank/blue screen**	[BLANK?]	[X2]←	View the status of the blank screen/blue screen setting.
NOTE	*If the blue screen feature is on, the scaler returns [3]←. If the blue screen feature is off, the scaler returns either [1]← or [0]←.*		
Input video type			
Set selected input's **video type**	[FMT X3]	[OK]←	Specify the video type for the selected input.
Example:	[FMT4]	[OK]←	Specify the selected input type as RGBHV.
NOTE	*1. Inputs 1 and 2 can be set to S-video and composite video only.*		
	2. Only input 4 can be set to RGBHVS passive or RGsB passive.		
View selected input's **video type**	[FMT?]	[X3]←	Selected input video type is X4.
Input video aspect ratio			
Set selected input's **aspect ratio**	[ASP X4]	[OK]←	Specify the aspect ratio for the selected input.
Example:	[ASP2]	[OK]←	Specify the selected input aspect ratio as widescreen (1.78).
View selected input's **aspect ratio**	[ASP?]	[X4]←	Selected input aspect ratio is X4.
Output resolution			
Set output **resolution**	[SCS X5]	[OK]←	
Example:	[SCS3]	[OK]←	Set output to 1024x768.
View output **resolution**	[SCS?]	[X5]←	
Output refresh rate			
Set output **refresh rate**	[REF X6]	[OK]←	
Example:	[REF1]	[OK]←	Set refresh rate to 72 Hz.
View output **refresh rate**	[REF?]	[X6]←	
Output sync			
NOTE	*If you set the scaler to output RGsB video, you **may** encounter image problems on the display connected to the TP output. The VTR001 CM that receives the TP output can receive RGsB signals from the scaler. However, the red, green, and blue video signals' black levels are **not** clamped to a 0V reference, as for RGBHV or RGBS. For most displays, this is **not** a problem. On some displays (such as some LCD displays) however, the black levels of the red, green, and blue signals **may** change as the average picture level changes, resulting in an unacceptable image.*		
Set output **sync** format	[SYNC X7]	[OK]←	Set output sync format to X7.
View sync format	[SYNC?]	[X7]←	
Example:	[SYNC?]	[3]←	Sync format is set to RGBS with no serration pulses.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Brightness			
NOTE *No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific **brightness** value	[BRG X8]	[OK]←	Specify the brightness adjustment.
Increment brightness value	[BRG+]	[OK]←	Increase the brightness setting by one.
Decrement brightness value	[BRG-]	[OK]←	Decrease the brightness setting by one.
Set **brightness** value to **default**	[BRG@]	[OK]←	Reset the brightness setting to its factory default (128).
View the **brightness** value	[BRG?]	[X8]←	Show the brightness setting.
Contrast			
NOTE *No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific **contrast** value	[CON X8]	[OK]←	Specify the contrast adjustment.
Increment contrast value	[CON+]	[OK]←	Increase the contrast setting by one.
Decrement contrast value	[CON-]	[OK]←	Decrease the contrast setting by one.
Set **contrast** value to **default**	[CON@]	[OK]←	Reset the contrast setting to its factory default (128).
View the **contrast** value	[CON?]	[X8]←	Show the contrast setting.
RGB Gain			
NOTE 1. *The **RGB gain** adjustment is available for RGBHV, RGBS, RGsB, and progressive component video inputs only.* 2. *No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific **red gain** value	[RED X8]	[OK]←	Specify the red gain adjustment.
Increment red gain value	[RED+]	[OK]←	Increase the red gain setting by one.
Decrement red gain value	[RED-]	[OK]←	Decrease the red gain setting by one.
Set **red gain** value to **default**	[RED@]	[OK]←	Reset the red gain setting to its factory default (128).
View the **red gain** value	[RED?]	[X8]←	Show the red gain setting.
Set a specific **green gain** value	[GRN X8]	[OK]←	Specify the green gain adjustment.
Increment green gain value	[GRN+]	[OK]←	Increase the green gain setting by one.
Decrement green gain value	[GRN-]	[OK]←	Decrease the green gain setting by one.
Set **green gain** value to **default**	[GRN@]	[OK]←	Reset the green gain setting to its factory default (128).
View the **green gain** value	[GRN?]	[X8]←	Show the green gain setting.
Set a specific **blue gain** value	[BLU X8]	[OK]←	Specify the blue gain adjustment.
Increment blue gain value	[BLU+]	[OK]←	Increase the blue gain setting by one.
Decrement blue gain value	[BLU-]	[OK]←	Decrease the blue gain setting by one.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Set **blue gain** value to **default**	[BLU@]	[OK]←	Reset the blue gain setting to its factory default (128).
View the **blue gain** value	[BLU?]	[X8]←	Show the blue gain setting.
Color saturation			
NOTE 1. ***Color saturation*** *adjustments are available only for NTSC interlaced component video, S-video, and composite video inputs only.* 2. *No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific color saturation value	[SAT X8]	[OK]←	Specify the color saturation adjustment.
Increment color saturation value	[SAT+]	[OK]←	Increase the color saturation setting by one.
Decrement color saturation value	[SAT-]	[OK]←	Decrease the color saturation setting by one.
Set color saturation value to default	[SAT@]	[OK]←	Reset the color saturation setting to its factory default (128).
View the color saturation value	[SAT?]	[X8]←	Show the color saturation setting.
Hue			
NOTE 1. ***Hue*** *adjustments are available only for NTSC interlaced component video, S-video, and composite video inputs only.* 2. *No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific hue value	[HUE X8]	[OK]←	Specify the hue adjustment.
Increment hue value	[HUE+]	[OK]←	Increase the hue setting by one.
Decrement hue value	[HUE-]	[OK]←	Decrease the hue setting by one.
Set hue value to default	[HUE@]	[OK]←	Reset the hue setting to its factory default (128).
View the hue value	[HUE?]	[X8]←	Show the hue setting.
Sharpness			
NOTE 1. ***Sharpness*** *adjustments are available only for interlaced component video, S-video, and composite video inputs only.* 2. *No video adjustments are available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific sharpness value	[SHP X9]	[OK]←	Specify the sharpness adjustment.
Increment sharpness value	[SHP+]	[OK]←	Increase the sharpness setting by one.
Decrement sharpness value	[SHP-]	[OK]←	Decrease the sharpness setting by one.
Set sharpness value to default	[SHP@]	[OK]←	Reset the sharpness setting to its factory default (3).
View the sharpness value	[SHP?]	[X9]←	Show the sharpness setting.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Gamma			
NOTE 1. ***Gamma*** *adjustments are available only for interlaced component video, S-video, and composite video inputs only.* 2. *The* ***gamma*** *adjustment is not available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific **gamma** value	[GAM X10]	[OK]←	Specify the gamma adjustment.
Increment gamma value	[GAM+]	[OK]←	Increase the gamma setting by one.
Decrement gamma value	[GAM-]	[OK]←	Decrease the gamma setting by one.
Set gamma value to **default**	[GAM@]	[OK]←	Reset the gamma setting to its factory default (10).
View the **gamma** value	[GAM?]	[X10]←	Show the gamma setting.
Noise filter			
NOTE 1. ***Noise filter*** *adjustments are available only for interlaced component video, S-video, and composite video inputs only.* 2. *The* ***noise filter*** *adjustment is not available for the input 4 video signal when it is configured as passive (unscaled).*			
Set a specific **noise filter** value	[NOISE X11]	[OK]←	Specify the noise filter adjustment.
Increment noise filter value	[NOISE+]	[OK]←	Increase the noise filter setting by one.
Decrement noise filter value	[NOISE-]	[OK]←	Decrease the noise filter setting by one.
Set noise filter value to **default**	[NOISE@]	[OK]←	Reset the noise filter setting to its factory default (9).
View the **noise filter** value	[NOISE?]	[X11]←	Show the noise filter setting.
Comb/trap filter			
NOTE *The* ***comb*** *or* ***trap filter*** *setting is available only for composite video inputs only on input 1 and input 2 only.*			
Select comb filter or **trap filter**	[CTF X12]	[OK]←	Select the comb filter, trap filter, or neither.
View the selected **filter**	[CTF?]	[X12]←	Show the filter selection.
Horizontal tracking			
NOTE *The horizontal tracking adjustment is available for interlaced component video, S-video, and composite video inputs only.*			
Set horizontal tracking	[HTK X13]	[OK]←	Set horizontal tracking rate.
View horizontal tracking	[HTK?]	[X13]←	View horizontal tracking rate.
Input labels			
Set input **label status**	[LBL X14]	[OK]←	Set the label feature (displayed upon input selection) to X14.
Set custom label	[LBL= X15]	[OK]←	Set the label to the custom contents X15.
Example:	[LBL=DVD #1]	[OK]←	Display the label "DVD #1" when this input is selected, if X14 is on (1) or momentary (2).

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Input labels (continued)			
View current **label**	[LBL:]	[X15] ←	Shows the current custom or default label for the selected input.
Example:	[LBL]	[DVD #1] ←	
Reset custom label	[LBL3]	[OK] ←	Erase custom label and return to default (Input n). Label status (X14) is not affected.
View the label **status**	[LBL?]	[X14] ←	Shows whether the label feature is on, off, or momentary.
Horizontal size			
Set a specific **horizontal** size value	[SH X16]	[OK] ←	Set the size as a specific percentage.
Increase the **horizontal** size	[SH+]	[OK] ←	Widen the picture by 1%.
Decrease the **horizontal** size	[SH-]	[OK] ←	Narrow the picture by 1%.
Set horizontal size to **default**	[SH@]	[OK] ←	Set the size to the default for the selected resolution.
View the **horizontal size**	[SH?]	[X16]	
Vertical size			
Set a specific **vertical** size value	[SV X16]	[OK] ←	Set the size as a specific percentage.
Increase the **vertical** size	[SV+]	[OK] ←	Widen the picture by 1%.
Decrease the **vertical** size	[SV-]	[OK] ←	Narrow the picture by 1%.
Set vertical size to **default**	[SV@]	[OK] ←	Set the size to the default for the selected resolution.
View the **vertical size**	[SV?]	[X16]	Show the vertical size setting.
Horizontal shift			
Set a specific **horizontal** shift value	[PH X17]	[OK] ←	Shift the image on the screen a specific amount.
Increase the **horizontal** shift	[PH+]	[OK] ←	Shift the picture to the right.
Decrease the **horizontal** shift	[PH-]	[OK] ←	Shift the picture to the left.
Set horizontal shift to **default**	[PH@]	[OK] ←	Set the shift to the default for the selected resolution.
View the **horizontal shift** value	[PH?]	[X17]	Show the horizontal shift setting.
Vertical shift			
Set a specific **vertical** shift value	[PV X18]	[OK] ←	Shift the image on the screen a specific amount.
Increase the **vertical** shift	[PV+]	[OK] ←	Move the picture up.
Decrease the **vertical** shift	[PV-]	[OK] ←	Move the picture down.
Set vertical shift to **default**	[PV@]	[OK] ←	Set the shift to the default for the selected resolution.
View the **vertical shift** value	[PV?]	[X18]	Show the vertical size setting.
Pixel phase			
Set a specific pixel sampling phase	[PHS X19]	[OK] ←	Specify the pixel sampling phase.
Increment sampling value	[PHS+]	[OK] ←	Increase the phase value.
Decrement sampling value	[PHS-]	[OK] ←	Decrease the phase value.
Set pixel phase to **default**	[PHS@]	[OK] ←	Set the pixel phase value to the default for the selected resolution.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Pixel phase (continued)			
View the sampling value	[PHS?]	[X19] ←	Show the pixel sampling phase.
Freeze			
Video **freeze on**	[FRZ1]	[OK] ←	Freeze the video output.
Video **freeze off**	[FRZ0]	[OK] ←	Unfreeze.
Toggle video **freeze**	[FRZ]	[OK] ←	Change the state of video freeze (off to on or on to off).
View **freeze**	[FRZ?]	[X2] ←	View the status of the freeze setting.
Memory preset			
Save preset	[MSAV X20]	[OK] ←	Save the video, balance, and input settings as preset X20.
Recall preset	[MRCL X20]	[OK] ←	Recall preset X20 settings.
Reset preset	[MRST X20]	[OK] ←	Erase preset X20 settings.
Volume			
Set volume	[VOL X21]	[OK] ←	Set volume for the selected input.
Increment level	[VOL+]	[OK] ↵	Increase balance level for the selected input.
Decrement level	[VOL-]	[OK] ↵	Decrease volume level for the selected input.
Set volume level to **default**	[VOL@]	[OK]	Set the volume to the default.
View volume level	[VOL?]	[X21] ↵	View the volume level for the selected input.
Bass			
Set bass	[BAS X22]	[OK] ←	Set bass for the selected input.
Increment level	[BAS+]	[OK] ↵	Increase bass level for the selected input.
Decrement level	[BAS-]	[OK] ↵	Decrease bass level for the selected input.
Set bass level to **default**	[BAS@]	[OK]	Set the input bass to the default.
View bass level	[BAS?]	[X22] ↵	View the bass level for the selected input.
Treble			
Set treble	[TRE X23]	[OK] ←	Set treble for the selected input.
Increment level	[TRE+]	[OK] ↵	Increase treble level for the selected input.
Decrement level	[TRE-]	[OK] ↵	Decrease treble level for the selected input.
Set treble level to **default**	[TRE@]	[OK]	Set the input treble to the default.
View treble level	[TRE?]	[X23] ↵	View the treble level for the selected input.
Balance			
Set balance	[BAL X24]	[OK] ←	Set balance for the selected input.
Increase balance **right**	[BALR]	[OK] ↵	Move balance right for the selected input.
Increase balance **left**	[BALL]	[OK] ↵	Move balance left for the selected input.
Set balance level to **default (center)**	[BAL@]	[OK]	Set the input balance to the center.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Balance (continued)			
View balance level	[BAL?]	[X24]↵	View the balance level for the selected input.
Audio mute			
Audio **mute on**	[MUTE1]	[OK]←	Mute the audio output.
Audio **mute off**	[MUTE0]	[OK]←	Unmute.
Toggle audio **mute**	[MUTE]	[OK]←	Change the state of audio mute (off to on or on to off).
View **mute**	[MUTE?]	[X2]←	View the status of the mute setting.
Disable front panel			
Enable front panel	[FP0]	[OK]←	Unlock the front panel.
Disable front panel	[FP1]	[OK]←	Lock the front panel.
Toggle front panel mode	[FP]	[OK]←	Change the state of front panel (enabled to disabled or disabled to enabled).
View front panel mode	[FP?]	[X2]←	View the status of front panel (enabled or disabled).
Information requests			
Query firmware version number	[INFO?]	[X25]←	Show the scaler firmware version.
Resets			
Partial reset to factory defaults	[RESX26]	[OK]←	Reset all X26 settings to factory defaults.
Example:	[RES4]	[OK]←	Reset all output settings.
Complete reset to factory defaults	[RES000]	[Please Wait]←	Reset all video, balance, input, output, and RS-232 settings to the factory default.
RS-232 settings			
	NOTE *The scaler and the computer, PDA, or control system must communicate at the same baud rate. If you change the scaler's baud rate, you will lose communications between the computer, PDA, or control system and the scaler until you set the controller to match the scaler's baud rate.*		
Set baud rate	[ACIX27]	[OK]←	Set the communications rate to X27.
View baud rate	[ACI?]	[X27]←	Read the scaler's baud rate.
	NOTE *The scaler and the computer, PDA, or control system must use the same deliminators to communicate. If you change the scaler's baud deliminators, you will lose communications between the computer, PDA, or control system and the scaler until you set the controller to match the scaler's deliminators.*		
Set delimitors	[CMDCDX28]	[OK]←	Set the leading and end codes to X28.
View delimitors	[CMDCD?]	[X28]←	Read the scaler's leading and end codes.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Front panel buttons			
Menu button	[MENU]	[OK]	The same as pushing the front panel Menu button. The on-screen display shows the menu system.
Left button	[LEFT]	[OK]	The same as pushing the front panel ◄ button.
Up button	[UP]	[OK]	The same as pushing the front panel ▲ (Menu ▲, not volume ◄).
Down button	[DOWN]	[OK]	The same as pushing the front panel ▼ (Menu ▼, not volume ▼).
Right button	[RIGHT]	[OK]	The same as pushing the front panel ► button.
Enter button	[ENTER]	[OK]	The same as pushing the front panel Enter button. Any highlighted or changed on-screen display parameters are saved.
	NOTE *The rest of the RS-232 commands are a complex set of adjustments to optimize the scaler for non-standard video inputs. Most users will not encounter such signals. Extron recommends that only knowledgeable and qualified video technicians make changes to these settings.*		
Active area			
	NOTE *The active pixels and total pixels adjustments are interactive. Setting one of these variables may require adjusting the other.*		
Set a specific **active pixel** value	[AP X29]	[OK]←	Specify the active pixels adjustment.
Increment active pixels value	[AP+]	[OK]←	Increase the active pixels setting by one.
Decrement active pixels value	[AP-]	[OK]←	Decrease the active pixels setting by one.
Set active pixels value to **default**	[AP@]	[OK]←	Reset the active pixels setting to its factory default (9).
View the **active pixels** value	[AP?]	[X29]←	Show the active pixels setting.
Set a specific **active line** value	[BV X30]	[OK]←	Specify the active lines adjustment.
Increment active lines value	[BV+]	[OK]←	Increase the active lines setting by one.
Decrement active lines value	[BV-]	[OK]←	Decrease the active lines setting by one.
Set active lines value to **default**	[BV@]	[OK]←	Reset the active lines setting to its factory default (9).
View the **active lines** value	[BV?]	[X30]←	Show the active lines setting.
Blanking			
Set a specific **H blanking** value	[BH X31]	[OK]←	Specify the active pixels adjustment.
Increment H blanking value	[BH+]	[OK]←	Increase the horizontal blanking setting by one.
Decrement H blanking value	[BH-]	[OK]←	Decrease the horizontal blanking setting by one.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Blanking (continued)			
Set H blanking value to **default**	[BH@]	[OK]←	Reset the horizontal blanking setting to its factory default (9).
View the **H blanking** value	[BH?]	[X31]←	Show the horizontal blanking setting.
Set a specific **V blanking** value	[BV X32]	[OK]←	Specify the vertical blanking adjustment.
Increment V blanking value	[BV+]	[OK]←	Increase the vertical blanking setting by one.
Decrement V blanking value	[BV-]	[OK]←	Decrease the vertical blanking setting by one.
Set V blanking value to **default**	[BV@]	[OK]←	Reset the vertical blanking setting to its factory default (9).
View the **V blanking** value	[BV?]	[X32]←	Show the vertical blanking setting.
Total pixels			
NOTE *The total pixels and active pixels adjustments are interactive. Setting one of these variables may require adjusting the other.*			
Set a specific **total pixel** value	[TP X33]	[OK]←	Specify the total pixels adjustment.
Increment total pixels value	[TP+]	[OK]←	Increase the total pixels setting by one.
Decrement total pixels value	[TP-]	[OK]←	Decrease the total pixels setting by one.
Set total pixels value to **default**	[TP@]	[OK]←	Reset the total pixels setting to its factory default (9).
View the **total pixels** value	[TP?]	[X33]←	Show the total pixels setting.
Scan type			
NOTE *1. The scan type settings are available for RGBHV, RGBS, RGsB, and progressive component video inputs only.* *2. Three scan type options are available; one, two, or all three can be turned on simultaneously.*			
Toggle interlaced on or off	[ST 0]	[OK]←	Toggle the interlaced function on or off.
Toggle swapped fields on or off	[ST 1]	[OK]←	Toggle the swapped fields function on or off.
Toggle invert sync on or off	[ST 2]	[OK]←	Toggle the inverted sync function on or off.
View scan type value	[ST?]	[X34]←	View scan type settings.
Input mode			
NOTE *The input mode settings are available for RGBHV, RGBS, RGsB, and progressive component video inputs only.*			
Set input mode to **autodetect**	[ST 0]	[OK]←	Allows the scaler to automatically detect new input sampling rates and adjust itself accordingly.
Set input mode to **lockout changes**	[ST 1]	[OK]←	Prevents the scaler from switching back and forth between input sampling rates.

Command/Response Table for RS-232 Commands (Cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
Input mode (continued)			
Set input mode to **user defined**	[ST 2]	[OK] ←	All input sampling rates have the same user-definable settings. However, the inputs are restricted to values that are close to the sampling rate detected. If a full range of values is necessary, the user-defined mode can be manually selected.
Input mode (continued)			
NOTE *If the auto-detect mode cannot determine the input sampling rate, the user-defined mode is selected automatically.*			
Redetect the input mode	[ST 3]	*{none}*	Allows users to initiate a new detection sequence and reload the input/output settings
View scan type value	[ST?]	[X35] ←	View scan type settings.

Appendix A

Reference Information

Specifications

Part Numbers

Reference Information

Specifications

Video input

Number/signal type	2 RGBHV, RGBS, RGsB, RGBcvS, component video 4 S-video, composite video
Connectors	2 x 5 female BNC (inputs 3 and 4, all video formats) (2) 4-pin mini DIN (inputs 1 and 2, S-video) 2 female BNC (inputs 1 and 2, composite)
Nominal level	1V p-p for Y of component video and S-video, and for composite video 0.7V p-p for RGB 0.3V p-p for R-Y and B-Y of component video, and for C of S-video
Minimum/maximum levels	0V to 1.0V p-p with no offset
Impedance	75 ohms
Horizontal frequency	Autoscan 15 kHz to 60 kHz (RGB)
Vertical frequency	Autoscan 50 Hz to 120 Hz
Resolution range	Autoscan 720 x 525 to 1600 x 1200

Video processing

Decoder	8 bit digital
Digital sampling	24 bit, 8 bits per color
Colors	16.78 million

Video output

Number/signal type	2 RGBHV, RGBS, RGsB, scaled RGB 1 set of proprietary analog signals
Connectors	5 BNC female (1) 15-pin HD female 1 RJ-45 female
Nominal level	0.7V p-p
Minimum/maximum levels	0V to 0.7V p-p
Impedance	75 ohms
Scaled resolution	640x480[2,4,5,6,7,8,9], 800x600[2,4,5,6,7,8,9], 852x480[2,4,5,6,7,8,9], 1024x768[2,4,5,6,7,8], 1152x864[2,4,5,6,], 1280x720[2,4,5,6,7,8], 1280x768[1,2,3], 1280x1024[2,4,5,], 1365x768[2,4,5], 1365x1024[2] [1] = at 56 Hz [2] = at 60 Hz [3] = at 65 Hz [4] = at 72 Hz [5] = at 75 Hz [6] = at 85 Hz [7] = at 96 Hz [8] = at 100 Hz [9] = 120 Hz
Switching type	Seamless or RGB delayed switching

Sync

Input type	RGBHV, RGBS, RGsB
Output type	RGBHV, RGBS, RGsB
Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM
Input level	0V to 5.0V p-p
Output level	0V to 5.0V p-p
Input impedance	1 kohms
Output impedance	75 ohms
Max input voltage	5.0V p-p
Polarity	Positive or negative (selectable)

Audio

Gain	Unbalanced output: 0dB

Audio input

Number/signal type	4 stereo, unbalanced
Connectors	4x2 (left and right) RCA connectors

Audio output

Number/signal type	1 stereo, unbalanced
Connectors	1x2 (left and right) RCA connectors

NOTE *0dBu = 0.775 volts (RMS).*

Control/remote — switcher

Serial control port	RS-232, 3-pole captive screw connector
Baud rate and protocol	1200 to 57,600, 8-bit, 1 stop bit, no parity
Serial control pin configurations	1 = TX, 2 = GND, 3 = RX

General

Power	90VAC to 260VAC, 50/60 Hz, 60 watts, internal, auto-switchable
Temperature/humidity	Storage -40° to +158°F (-40° to +70°C) / 10% to 90%, non-condensing Operating +32° to +122°F (0° to +50°C) / 10% to 90%, non-condensing
Rack mount	Yes, with included rack mount kit IN9123B
Enclosure type	Metal
Enclosure dimensions	1.75" H x 17.0" W x 12.2" D (1U high, full rack width) 4.5 cm H x 43.2 cm W x 31.0 cm D (Depth excludes connectors.)
Product weight	3.5 lbs (1.6 kg)
Shipping weight	7 lbs (3.5 kg)
Vibration	ISTA/NSTA 1A in carton (International Safe Transit Association)
Listings	ETL (UL1950)
Compliances	CE
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE *Specifications are subject to change without notice.*

Part Numbers

Included parts

These items are included in each order for an IN1404XT:

Included parts	Part number
IN1404XT Video Scaler and Switcher	60-732-01
Rack mount ears for IN1403/1404//IN3600 Switchers (black)	70-391-01
Rubber feet (4)	
IEC power cord	
Tweeker (small screwdriver)	
IN1404XT User's Manual	

Optional accessoriess

Part	Part number
RCA-to-BNC adapter	10-264-01
SVHS - BNC adapter	26-353-01
Wall mount twisted pair RGBHV receiver - black	VTR001CM-1
Wall mount twisted pair RGBHV receiver - white	VTR001CM-2
Table top twisted pair RGBHV receiver - black	VTR001CM-3
TP R BNC A twisted pair RGBHV video and audio receiver	60-351-02
TP R 15HD A twisted pair RGBHV video and audio receiver	60-450-01
TP R BNC AV twisted pair RGB video, composite video and audio receiver (RGB receiver portion used only)	60-350-02

Cables

When using signals with a scanning frequency of 15-125 kHz and running distances of 100 feet or more, use high resolution BNC cables to achieve maximum performance.

VGA cable

Male-to-female VGA Cable	Part number
VGA 3′ MHR (molded) (0.9 m)	26-112-17
VGA 6′ MHR (molded) (1.8 m)	26-122-15
VGA 15′ MHR (molded) (4.6 m)	26-112-01
VGA 25′ MHR (molded) (7.6 m)	26-112-05
VGA 35′ MHR (10.7 m)	26-112-27
VGA 50′ MHR (15.25 m)	26-112-02
VGA 75′ MHR (22.9 m)	26-112-03
VGA 100′ MHR (30.5 m)	26-112-04
VGA 150′ MHR (45.7 m)	26-112-09
VGA 200′ MHR (61.0 m)	26-112-08
VGA 250′ MHR (76.2 m)	26-112-16

Male-to-male VGA Cable	
VGA M3′ MHR (molded) (0.9 m)	26-238-14
VGA M6′ MHR (molded) (1.8 m)	26-122-01
VGA M10′ MHR (molded) (4.6 m)	26-238-07
VGA M15′ MHR (molded) (4.6 m)	26-238-02
VGA M25′ MHR (molded) (7.6 m)	26-238-03
VGA M35′ MHR (10.7 m)	26-238-16
VGA M50′ MHR (15.25 m)	26-238-04
VGA M75′ MHR (22.9 m)	26-238-05
VGA M100′ MHR (30.5 m)	26-238-06
VGA M150′ MHR (45.7 m)	26-238-09
VGA M200′ MHR (61.0 m)	26-238-08
VGA M250′ MHR (76.2 m)	26-238-15

Pre-cut cables

BNC-4 Mini HR cable is used for RGBS cable runs, and BNC-5 Mini HR cable is used for RGBHV cable runs. Either type can also be used for composite video, S-video, or RGsB. All Extron BNC cables have male connectors on both ends. A plenum version of the BNC-5 Mini HR cable is also available.

BNC-4 Mini HR Cable	Part number
BNC-4-25′ MHR (25 feet/7.5 meters)	26-210-04
BNC-4-50′ MHR (50 feet/15.0 meters)	26-210-05
BNC-4-75′ MHR (75 feet/23.0 meters)	26-210-06
BNC-4-100′ MHR (100 feet/30.0 meters)	26-210-07
BNC-4-150′ MHR (150 feet/45.0 meters)	26-210-08
BNC-4-200′ MHR (200 feet/60.0 meters)	26-210-09
BNC-4-250′ MHR (250 feet/75.0 meters)	26-210-54
BNC-4-300′ MHR (300 feet/90.0 meters)	26-210-53

BNC-5 Mini HR Cable	
BNC-5-25′ MHR (25 feet/7.5 meters)	26-260-03
BNC-5-50′ MHR (50 feet/15.0 meters)	26-260-04
BNC-5-75′ MHR (75 feet/23.0 meters)	26-260-16
BNC-5-100′ MHR (100 feet/30.0 meters)	26-260-05
BNC-5-150′ MHR (150 feet/45.0 meters)	26-260-12
BNC-5-200′ MHR (200 feet/60.0 meters)	26-260-06
BNC-5-250′ MHR (250 feet/75.0 meters)	26-260-18
BNC-5-300′ MHR (300 feet/90.0 meters)	26-260-14

Skew-free A/V cable	Part number

NOTE *Skew-Free A/V UTP cables are not recommended for Ethernet/LAN applications.*

3′ Skew-free A/V UTP	26-569-01
6′ Skew-free A/V UTP	26-569-02
12′ Skew-free A/V UTP	26-569-03
25′ Skew-free A/V UTP	26-569-04
35′ Skew-free A/V UTP	26-569-05
50′ Skew-free A/V UTP	26-569-06
75′ Skew-free A/V UTP	26-569-07
100′ Skew-free A/V UTP	26-569-08
150′ Skew-free A/V UTP	26-569-09
200′ Skew-free A/V UTP	26-569-10
250′ Skew-free A/V UTP	26-569-11
300′ Skew-free A/V UTP	26-569-12
25′ Skew-free Plenum	26-570-04
35′ Skew-free Plenum	26-570-05
50′ Skew-free Plenum	26-570-06
75′ Skew-free Plenum	26-570-07
100′ Skew-free Plenum	26-570-08
150′ Skew-free Plenum	26-570-09
200′ Skew-free Plenum	26-570-10
250′ Skew-free Plenum	26-570-11
300′ Skew-free Plenum	26-570-12

Bulk cable

Super High Resolution Cable	Part number
SHR-1 bulk , 500′	22-098-02
SHR-1 bulk , 1000′	22-098-03
SHR-4 bulk , 500′	22-099-02
SHR-5 bulk , 500′	22-100-02

BNC-4 Mini HR Cable	Part number
BNC-4 Mini HR bulk, 500′	22-032-02
BNC-4 Mini HR bulk, 1000′	22-032-03

BNC-5 Mini HR Cable	Part number
BNC-5 Mini HR bulk, 500′	22-020-02
BNC-5 Mini HR bulk, 1000′	22-020-03

Plenum BNC-5 Mini HR Cable	Part number
Plenum BNC-5 Mini HR bulk, 500′	22-103-02
Plenum BNC-5 Mini HR bulk, 1000′	22-103-03

NOTE *Bulk cable in lengths up to 5000′ (1524 meter) rolls is available with or without connectors.*

Skew-free A/V cable	Part number
Skew-free A/V UTP 1000′ (Bulk) (non-plenum)	22-141-03
Skew-free A/V UTP 1000′ (Bulk) (plenum)	22-142-03

Assorted connectors, cables, and adapters

Connectors	Part number
BNC Mini HR crimp connectors, qty. 50	100-074-51
SHR male crimp connectors, qty. 50	100-075-51
BNC bulkhead connectors, qty. 50 (for custom wall plates)	100-076-51
CAT 6 jack (black)	10-463-10

Assorted cables and adapters	Part number
SVHS 6′ (6 feet/1.8 meters)	26-316-02
SVHSM - BNCM-3′	26-353-03

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, and Central America:

Extron Electronics
1230 South Lewis Street
Anaheim, CA 92805, USA

Europe, Africa, and the Middle East:

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

Asia:

Extron Electronics, Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363

Japan:

Extron Electronics, Japan
Kyodo Building
16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions or non-Extron authorized modification to the product.

If it has been determined that the product is defective, please call Extron and ask for an Applications Engineer at (714) 491-1500 (USA), 31.33.453.4040 (Europe), 65.6383.4400 (Asia), or 81.3.3511.7655 (Japan) to receive an RA# (Return Authorization number). This will begin the repair process as quickly as possible.

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.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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