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User's Manual



IN1403

Video Scaler

68-1020-01
Rev. A
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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Product Overview

Description

The IN1403 is a full featured video scaler that combines digital video decoding, advanced video scaling/line multiplication and a 4-input A/V switcher into a single product.

Features

Superb Video Scaling Technology — Employing sophisticated video de-interlacing, scaling and filtering techniques, the IN1403 offers an output signal with outstanding image detail and enhanced brightness that is entirely free of visible scan lines. The scaler automatically senses the origin of the video source material and selects the optimum motion compensation formula to eliminate unwanted artifacts in the output image. The IN1403 employs high bandwidth digital signal processing and high speed digital to analog conversion, combined with effective filtering and sharpness circuitry to maintain and enhance image detail, even at the highest output resolutions.

Advanced Quad Standard Video Decoding — A high quality video decoder in the IN1403 provides accurate video decoding of composite video and S-video signals in the NTSC, PAL, SECAM and NTSC 4.43 video standards. The video decoder employs an advanced 3-line adaptive comb filter for composite video signals and greatly reduces cross-color interference and hanging dots, while maintaining maximum image bandwidth and detail.

Pick the Perfect Resolution — The IN1403 offers a wide range of output resolutions to match the optimum or native resolution of virtually any display device. The IN1403 provides a progressive scan output signal at standard resolutions and refresh rates, ensuring optimal compatibility and exceptional image quality with a wide range of CRT, LCD, DMD, ILA, D-ILA, and plasma display devices.

Selectable Refresh Rate — The IN1403 output vertical refresh rate is adjustable from 60 Hz to 120 Hz By converting PAL (25 Hz) and NTSC (30 Hz) input signals to higher, more ergonomic refresh rates, the IN1403 makes it possible to display a remarkably solid, flicker-free image when using CRT monitors and projectors. The chart on page 18 indicates the output resolutions and refresh rates available on the IN1403.

4-Input Video/Audio Switcher — The IN1403 provides multiple inputs and flexible switching capability to accommodate a variety of applications. Inputs 1, 2, and 3 can each accept a composite video or S-video signal. Input 4 is a 15-pin HD VGA pass-through connector for a computer video signal (passive, no scaling). Stereo audio-follow-video switching is provided for all four inputs.

Memory — The IN1403 can recall previously stored settings with the push of a single button. All audio, video, input and output settings, for each input and each output mode, are stored internally (in memory). Once optimized, all adjustments are automatically recalled every time an input is selected.

Digital Freeze Frame — Provides a high quality still image, useful for applications that require close examination of a specific video frame. Freeze Frame can be enabled/disabled using the front panel **FREEZE FRAME** button or an RS-232 serial command. Freeze is functional for Inputs 1, 2, and 3. It has no effect on Input 4, which is a passive input.

Video Blank button — Located adjacent to the input selector buttons, the **BLANK** button allows the video image to be suppressed. When blank is engaged, the output signals go to black but the sync signals continue, ensuring that the data display device retains sync lock. When the **BLANK** button is pressed a second time, the previously selected input is once again displayed. The blank feature can also be engaged or disengaged using the RS-232 serial command. Video blank is functional for Inputs 1, 2, and 3. It has no effect on Input 4, which is a passive input.

On Screen Menus — Provides easy control over video adjustments including hue, color, contrast, brightness, gamma, sharpness, image size, image position, and edge blanking. Unique 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, RS-232 control options, and reset to factory default.

System Info — A handy menu option that uses the on-screen display to show comprehensive information about the input and output signals and scaler settings.

Image Size, Position and Edge Blanking Controls — Individual horizontal and vertical image adjustments make it easy to precisely fit the active video image to the display area and provide for multiple aspect ratios.

Comprehensive Input Adjustment Controls — These input signal adjustments include signal format, aspect ratio and horizontal tracking. Once adjustments are made to optimize input signals, these settings are stored and automatically recalled when the same input source is selected again.

Blue Screen Feature — Provides a full screen blue image for setup and testing purposes. The blue screen output signal (activated via the on-screen menu) is always available, even when the input signal is missing or the input settings are incorrectly adjusted. Blue screen acts as a test signal and is ideal for setting up the output resolution, refresh rate and position settings, and to verify connection to the output display device.

RS-232 Serial Control — Provided for all scaler functions including input selections, image adjustments and output settings. The IN1403's comprehensive RS-232 control capacity facilitates complete system integration and effortless control when combined with a third party control system.

Dual Outputs — The IN1403 features a 5-BNC output and a 15-pin HD output. Since both are active simultaneously, the IN1403 can directly drive two separate display devices.

Rack Mountable — The IN1403 can be mounted in a 1U rack space using the provided mounting brackets (Extron part # 70-391-01).

Compatibility

Input

The IN1403 Video Scaler accepts composite and S-video signals in the NTSC, PAL, SECAM, and NTSC 4.43 video standards on inputs 1, 2, and 3. The unit automatically senses NTSC, PAL, and SECAM video standards and decodes the signal appropriately. You must select composite video or S-video mode as appropriate for each of these inputs. Input 4 is a passive input (no decoding or scaling) designed to accept a VGA computer video signal.

The IN1403 has stereo audio-follow-video capability. All four stereo audio inputs are compatible with unbalanced line level signals from a computer audio card, CD player, laser disc player, or any other audio device that delivers a stereo line level signal.

Output

The IN1403 features selectable output resolutions (ranging from 640 x 480 up to 1365 x 1024) to match the optimum or native resolution of virtually any display device. The unit provides a progressive output signal at standard resolutions and refresh rates, ensuring optimal compatibility and exceptional image quality with a wide range of CRT, LCD, DMD, D-ILA/LCOS, and plasma display devices.

The output refresh rate is also selectable as desired. When used with LCD, DMD, or LCOS displays, the 60 Hz output setting is recommended. Higher output refresh rates may be selected for use on CRT-type displays in order to reduce flicker and provide enhanced ergonomics. The chart on page 18 indicates the available output resolutions and refresh rates.

The stereo audio output provides an unbalanced line level signal, identical to the input signal. This output can drive any line level compatible audio unit, or a local device such as a set of powered speakers.

Installation

This section offers step-by-step instructions for installing the IN1403 Video Scaler. An application diagram is provided on page 5.

CAUTION *Read the instructions carefully before initiating the installation procedure. Make sure that there is no power connected to the IN1403, and that the power button is off.*

1. Place or install the IN1403 at the desired location. Make sure that the unit is seated on a flat surface or is securely installed in a standard 19" equipment rack. The IN1403 is exactly 1U high *without* the feet. If other equipment will be located in the space directly below the scaler, the rubber feet on the bottom of the unit must be removed before you mount it in the equipment rack.
2. Connect the video sources to the IN1403 input(s). Inputs 1, 2, and 3 can accept either a composite video signal (BNC female) or an S-video signal (4-pin mini DIN female). Input 4 is a 15-pin HD VGA pass-through connector for a computer video signal.

CAUTION *The input signals must be connected to only the composite video or the S-video connector on any one input. Do not connect composite video and S-video signals simultaneously on the same input!*

3. Connect the audio sources to the IN1403 stereo audio inputs (dual RCA female jacks). A computer sound card can be connected using an optional 3.5 mm stereo mini male to 2 RCA male cable.
4. The IN1403 features a 5-BNC output and a 15-pin HD output, providing easy connections for a variety of data monitors, data projectors and other data-grade displays.
   - VGA display devices can be connected directly to the IN1403 output port using a standard male-to-male VGA cable.
   - Data output devices that feature an RGB video input can be connected directly to the IN1403 using three, four, or five BNC cables (for RGsB, RGBS, or RGBHV, respectively) or a multi-conductor RGBHV, RGBS, or RGB "snake." While making connections, take care to ensure that the red output is connected to the red input, green output is connected to the green input, etc.

   Since both outputs are active simultaneously, the IN1403 can directly drive two separate display devices.
5. Connect the IN1403 stereo audio output to the audio system's input (mixer, amplifier, powered speakers, etc.).
6. Connect a control system, computer, or other source for serial commands to the RS-232 remote connector if desired. For more information about remote control of the IN1403, see the *Remote Operation* section on page 19.
7. Connect power to the IN1403 using the included power cable.
8. Turn on the video sources, the IN1403, the display device, and the audio output equipment (if applicable).
9. Using the front panel controls or RS-232 commands, adjust and store the parameters for each input source.

NOTE *It is very important that you set each input for composite video or S-video operation as appropriate to match the format of the input signal (see page 11 for details).*

10. Set the output resolution and refresh rate to match the optimum or native resolution of your display device as described in *Output menu* on page 14. If you need assistance selecting the appropriate resolution and refresh rate for your display, see *Choosing the Optimal Output Resolution and Refresh Rate* section on page 15.

IN1403 application diagram

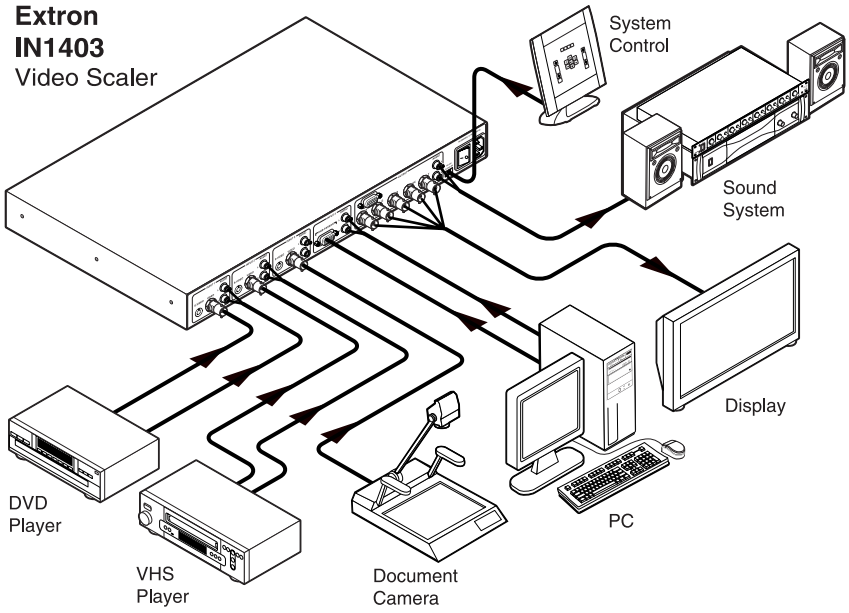
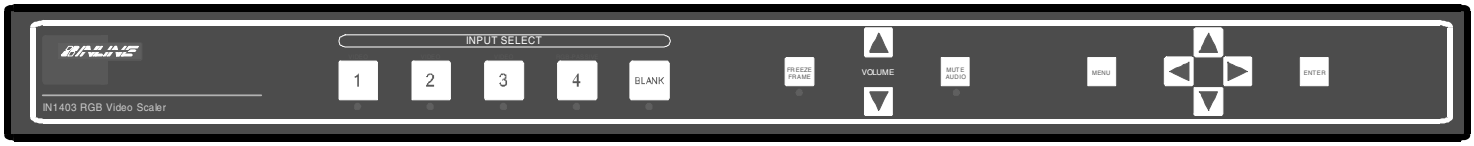


Figure 1 — IN1403 application diagram

Operation

This section focuses on operating the IN1403 using the front panel controls and commands. All video and audio adjustments, setup functions and switching operations can be performed through the front panel or via RS-232 serial controls (see page 19)



Front Panel Controls

Input Select: The large buttons in the Input Select section, labeled **INPUT 1**, **INPUT 2**, **INPUT 3** and **INPUT 4** are used to select the desired input. After turning on the IN1403, press and release the desired Input Select button. A green LED will light underneath the button to indicate the selected input. The stereo audio signal associated with the input will automatically be selected at the same time. All audio, video, and input settings for each input are stored internally (in memory) so the adjustment(s) will not have to be repeated after they are optimized. To switch to another input, simply press and release another numbered Input Select button.

NOTE *When powered up, the scaler automatically returns to the last configuration, including the last input selected.*

Blank: The **BLANK** button can be used at any time to show a blank screen on the display device. When blank is engaged, the output setting goes to black but the sync signals continue, ensuring that the data display device retains sync lock. Simply press and release the button to engage blanking (the green LED underneath the button will illuminate), and press and release it again to disengage. The **BLANK** button has no effect on input 4, which is a passive input.

Freeze Frame: Allows users to freeze the video signal and display a still image. Simply press and release the button to engage the function (the green LED below the button will illuminate), then press and release it again to disengage. The **FREEZE FRAME** button has no effect on input 4, which is a passive input.

Volume: The **VOLUME** buttons regulate the level of the audio signals routed through the scaler. Use the ⮝ / ⮟ volume buttons to increase or 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 IN1403 saves the volume levels for each input automatically.

Audio Mute: Mutes the audio for the selected input. Press the button to engage (the green LED below the button will illuminate), and press again to disengage.

Menu buttons: The remaining buttons on the front panel (**MENU**, ⮝, ⮟, ⮞, ⮜ and **ENTER)** are used to access and adjust the on-screen menu displays.

On-screen menu

To access the main menu, press the **MENU** or **ENTER** button. Use the arrow buttons to maneuver around within the menu display. Press **ENTER** to select and save a command, or press **MENU** to escape to the previous menu or to clear the menu display. All audio, video, input, and output settings for each input and each output mode are stored internally (in memory) so the adjustments will not have to be repeated after they are optimized.

The Main Menu commands and their functions are:

Video: Changes input signal video parameters.

Audio: Changes input signal audio parameters.

Input: Changes input signal timing format parameters.

Output: Changes output signal resolution and format parameters.

Advanced: Displays advanced options.

An illustration of the on-screen display menu system is provided on the next page.

IN1403 on-screen display menu system

Main Menu
Video
Audio
Input
Output
Advanced

Video
Brightness
Contrast
Color
Hue
Sharpness
Gamma
Noise Filter
Comb/Trap*
Reset Video

Comb/Trap
Comb Filter On
Trap Filter On

Audio
Bass
Treble
Balance
Reset Audio

Input
Signal Format
Aspect Ratio
Hz Tracking
Reset Input

Signal Format
Input 1
Input 2
Input 3
Input 4

Aspect Ratio
Standard
Anamorphic
Wide screen
Wider screen
Expand

Hz Tracking
Very Fast
Fast
Normal
Slow

Output
Resolution
Refresh Rate
Size
Position
Sync Format
Blue Screen
Reset Output

Resolution
640 x 480
800 x 600
852 x 480
1024 x 768
1152 x 864
1280 x 720
1280 x 1024
1365 x 768
1365 x 1024

Refresh Rate**
56
60
65
72
75
85
96
100
120

Size
H-Size
V-Size

Position
H-Position
V-Position

Sync Format
RGBHV--
RGBHV++
RGBS A
RGBS B
RGsB A
RGsB B

Blue Screen
On/Off

Advanced
Factory Reset
Baud Rate
Delimiters
System Info
Reset RS-232

Factory Reset
Yes
No

Baud Rate
1200
2400
4800
9600
19,200
38,400
57,600

Delimiters
Parentheses ( )
Brackets [ ]
Braces { }
Slashes \ /
Less & Greater < >
Signs ! #

System Info
Input
Standard
Horizontal
Vertical
Output
Horizontal
Vertical
Sync
Version

*Available only on composite video.

Menu Commands

Video Menu

The IN1402 allows you to manually adjust the brightness, contrast, color, hue, sharpness, gamma, noise filter, and comb/trap filter settings.

To access the video adjustment menu via the front panel control buttons

1. Press the desired Input Select button.
2. Press **MENU**.
3. Press the ⮟ or ⮝ button (if necessary) to reach the video menu.
4. Press **ENTER**.
5. Use the ⮝ and ⮟ buttons and the **ENTER** key to select the setting you wish to adjust.
6. After selecting a setting, use the ⮞ and ⮜ buttons to make the adjustments.
7. Press and release a button to move one step in either direction.
8. Press and hold a button to move continuously through the adjustment range.
9. Press **ENTER** to save when the input is optimized.

CAUTION *It is critical that you save the setting before proceeding to another input or another menu function, otherwise your new adjustment will be lost.*

The following video adjustment parameters can be controlled via the on-screen menu system (front panel buttons). Remote operation instructions can be found on page 19.

Brightness Setting adjusts the input signal brightness.

***Range*:** 0 to 255

***Factory default setting*:** 128

***Operation*:**
Press ⮞ button to increase the brightness.

Press ⮜ button to decrease the brightness.

Contrast adjusts the difference between the input signal's brightest and darkest settings. At the minimum setting the screen picture displays at about the same brightness (very grayish). The maximum setting displays a noticeable difference between the darkest and lightest parts of the screen picture.

***Range*:** 0 to 255

Factory default setting: 128

***Operation*:**
Press ⮞ button to increase the contrast.

Press ⮜ button to decrease the contrast.

Color adjusts the color saturation of the picture over a wide range. Setting this control to 0 removes most of the color.

***Range*:** 0 to 255

Factory default setting: 140

***Operation*:**
Press ⮞ button to increase the color.

Press ⮜ button to decrease the color.

Hue (NTSC signals only) adjusts the picture's color towards red or green.

***Range*:** 0 to 40

***Factory default setting*:** 20

***Operation*:**
Press ➢ button to increase the green.

Press ➢ button to increase the red.

Sharpness uses variable filtering to affect input picture detail and definition.

NOTE *Increasing the sharpness setting gives the visual effect that the noise filter setting is decreasing. Although the sharpness and noise filter settings seem to offset each other, they are actually two different adjustments that affect two different sets of circuitry. Operators should adjust both settings until optimal picture quality is achieved.*

***Range*:** 0 to 7

***Factory default setting*:** 3

***Operation*:**
Press ➢ button to increase the sharpness.

Press ➢ button to decrease the sharpness.

NOTE *If the following settings seem confusing, we recommend that you experiment with the **MENU**, ➢, ➢, ➢, ➢ and **ENTER** buttons until you familiarize yourself with the IN1403 front panel control operations. It's a good idea to get comfortable using these buttons to navigate through the on-screen menu system before moving on to other sections of this manual. If you get lost, enter unfamiliar territory or are afraid of making an improper selection, press the **MENU** button to safely leave the menu system without making any changes. We also recommend that, unless you're a qualified audiovisual technician, you avoid the Advanced menu.*

Gamma: The 30 active gamma correction curves programmed into the IN1403 are used to compensate for the non-linear response of many display devices. Since Gamma, Brightness and Contrast controls interact with each other, the following order of adjustments is suggested:

1. Set the brightness and contrast controls to factory default positions.

2. Adjust Gamma as desired.

***Range*:** 1 to 30

***Factory default setting*:** 10*

***Operation*:**
Press ➢ button to step to higher numbered gamma curves.

Press ➢ button to step to lower numbered gamma curves.

** The factory default setting of 10 refers to a gamma correction curve of 1.0.*

3. Adjust brightness and contrast to fine tune the image (see page 8 for procedures).

Noise Filter changes the input signal noise filter.

NOTE *Increasing the noise filter setting makes the picture sharpness appear to decrease. Refer to the* Sharpness *section at the top of the page.*

***Range*:** 0 to 47

***Factory default setting*:** 5

***Operation*:**
Press ➢ button to increase noise filter.

Press ➢ button to decrease noise filter.

Comb/Trap Filter selects either the comb or trap filter (only available with composite video). The comb filter electronically provides excellent Luma/Chroma separation (separates the color from the picture signal). This greatly reduces cross-color interference and hanging dots while maintaining image bandwidth and detail.

The trap filter extracts luminance from the picture. The trap filter is usually the preferred setting when you are running signals from a VCR (as composite video). You may wish to compare both settings to determine which is best for your application.

NOTE *Neither filter has any effect on S-video signals.*

Reset Video resets all video settings to factory default (for current input only).

Audio menu

The IN1403 allows you to manually adjust the bass, treble, and balance settings. To do so

1. Press the desired Input Select button.
2. Press MENU.
3. Press the ⮟ or ⮝ button (if necessary) to reach the input menu.
4. Press **ENTER**.
5. Use the ⮝ and ⮟ buttons and the **ENTER** key to select the setting you wish to adjust.
6. Press **ENTER** to save once you've optimized the setting for the current input.

The following audio adjustment parameters can be controlled via the on-screen menu system (front panel buttons). RS-232 serial control instructions can be found on page 19.

NOTE *While on-screen menus are not displayed for Input 4, all audio functions are still available for this input.*

Bass increases/decreases the lower frequencies of the audio signal.

Range: 6 to 27

Factory Default Setting: 16 (0.0dB)

Operation:

Press ➢ button to increase the bass frequencies.

Press ➢ button to decrease the bass frequencies.

Treble increases/decreases the higher frequencies of the audio signal.

Range: 8 to 25

Factory Default Setting: 16 (0.0dB)

Operation:

Press ➢ button to increase the treble frequencies.

Press ➢ button to decrease the treble frequencies.

Balance shifts the audio balance toward the right or left audio channels.

Range: 0 to 31

Factory Default Setting: 16

Operation:

Press ➢ button to move the balance toward the right channel.

Press ➢ button to move the balance toward the left channel.

Reset Audio Settings reset *all* audio settings to factory default (for current input only)

Input menu

To access the input menu via the front panel control buttons

1. Press the desired Input Select button.
2. Press **MENU,** press the ⮟ or ⮝ button (if necessary) to reach the input menu.
3. Press **ENTER**.
4. Select the setting you wish to adjust by using the ⮝ and ⮟ buttons and pressing **ENTER**.
5. Press **ENTER** to save once you've optimized the setting for the current input.

Input Signal Format: Select the signal format for each input. The S-video and Composite Video connections are internally wired together. Therefore, only S-video or composite video can be connected to each input, but not both at the same time. Input 4 is fixed as RGB passive.

To configure the Inputs 1 - 3 for either a composite video or S-video format:

1. Press the **ENTER** or **MENU** button to access the main menu.
2. Highlight INPUT and press **ENTER** to access the input menu (use the ⮝ and ⮟ arrow buttons to highlight the appropriate menu command).
3. Highlight SIGNAL FORMAT and press **ENTER** to access the signal format menu.
4. Highlight the input you want to configure.
5. Select the format for each individual input (use the ⮞ and ⮜ buttons to toggle between composite and S-video). The IN1403 will save the format setting automatically.
6. Press **MENU** to exit.

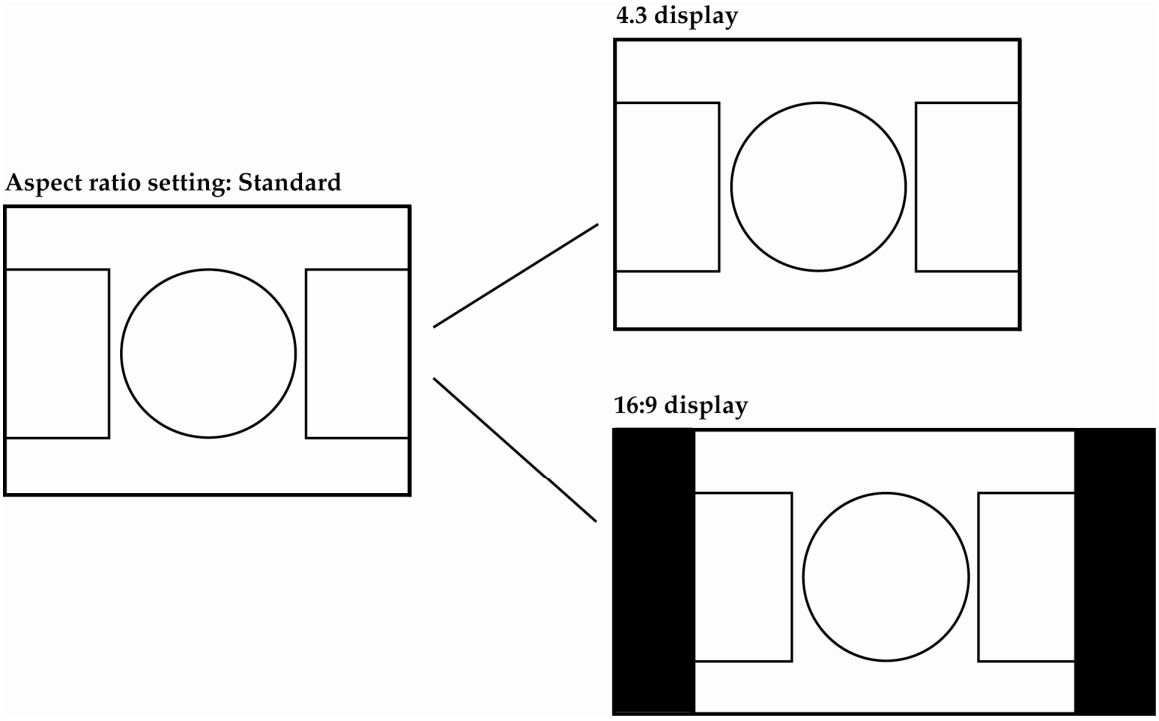
NOTE *It is critical that the composite/S-video status is selected properly for each input. Using the on-screen menu, you can set/change the input format at any time, even when another input signal is active. If the composite/S-video selection is set incorrectly, the decoder circuitry will not function properly and the IN1403 will display a distorted picture.*

Aspect Ratio: The aspect ratio controls vary the relative image width and height. They can be used to accommodate various input signal aspect ratios as well as output device aspect ratios. Select the output aspect ratio by choosing the appropriate resolution in the output menu (see the output resolution description on page 14).

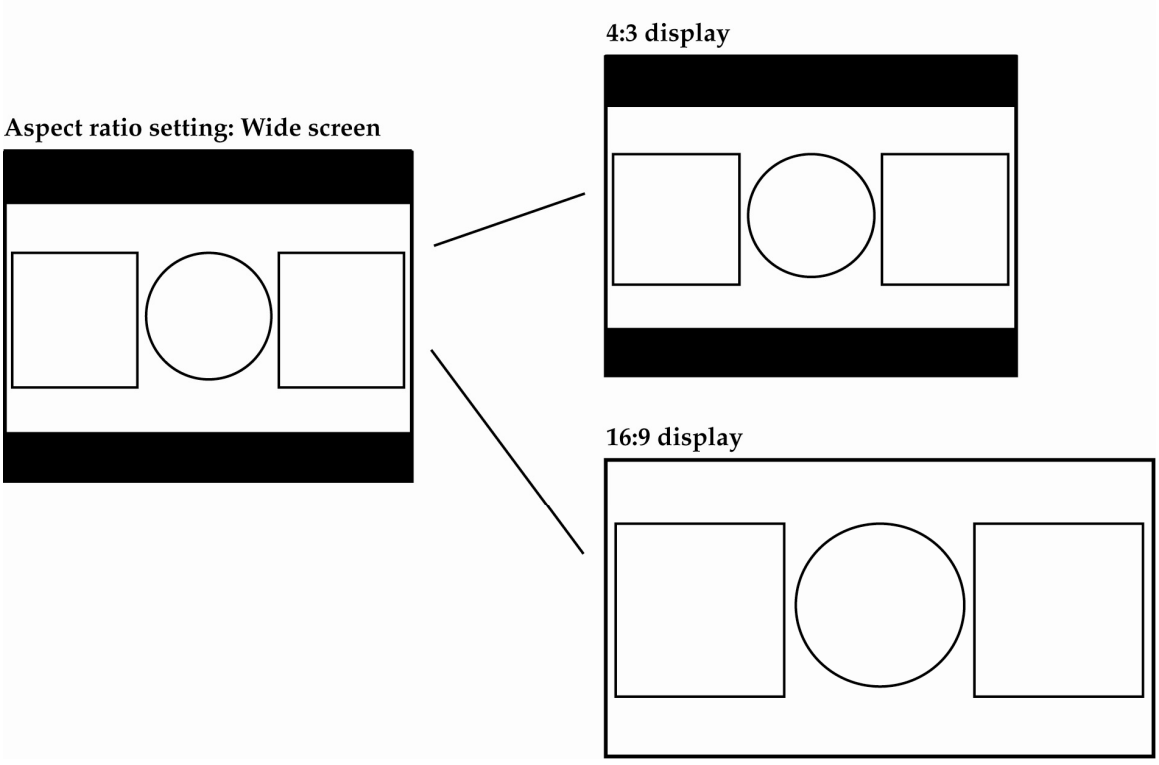
Standard:	For Standard 1.33 input signals (sometimes referred to as full screen)
Anamorphic:	This setting provides vertical image squeezing to accommodate anamorphically enhanced DVDs
Wide Screen:	For wide screen 1.78 input signals (letterbox)
Wider Screen:	For wider screen 2.35 input signals (narrow letterbox)
Tomarama:	Designed for wide screen (letterbox) signals viewed on 4:3 aspect ratio displays. Tomarama mode zooms in on the center of the image and crops the image vertically and horizontally so that the black bars above and below the image are removed. In this mode, some image is also lost on the right and left hand edges.

Most DVDs and VCRs and other video sources output a signal with an aspect ratio of 4:3. How this signal is filled with active video information determines its aspect ratio. In the following four examples, four different input aspect ratios are shown on the left as they would be displayed in their native 4:3 format. The same signals are shown on the right as they would appear on 4:3 and 16:9 display devices with the scaler set to various aspect ratios.

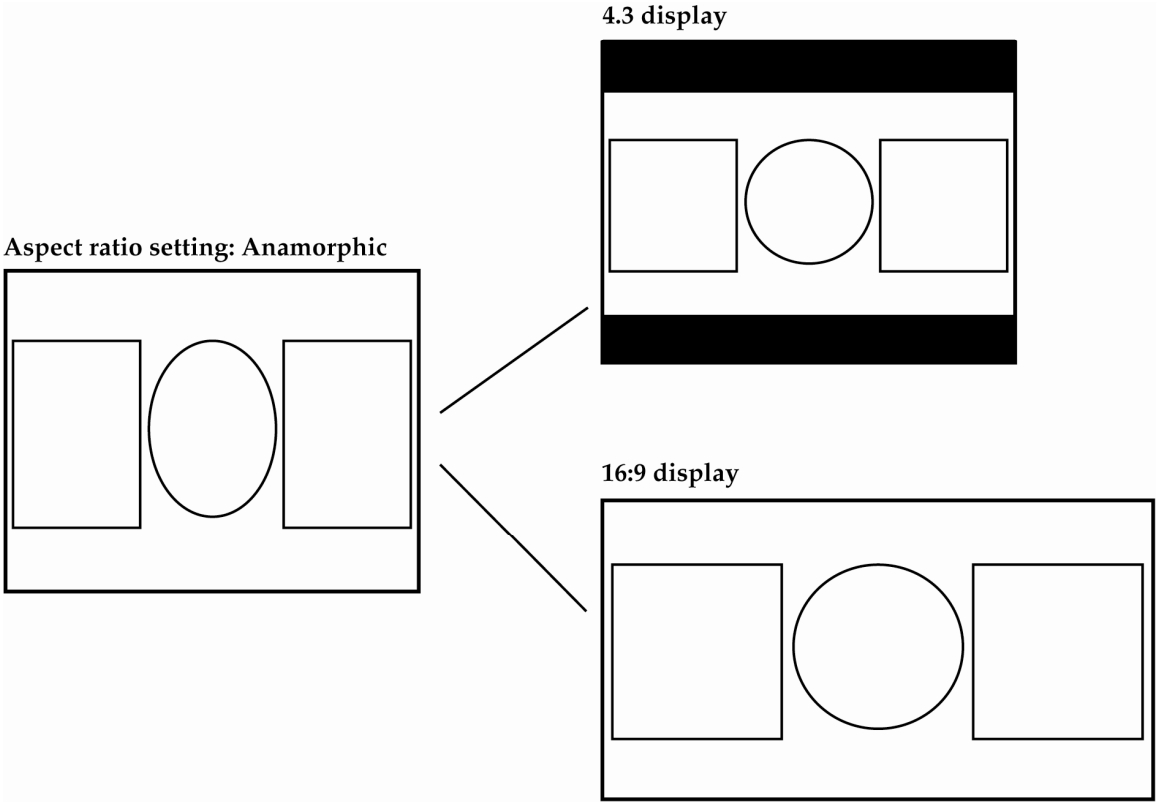
Example 1:



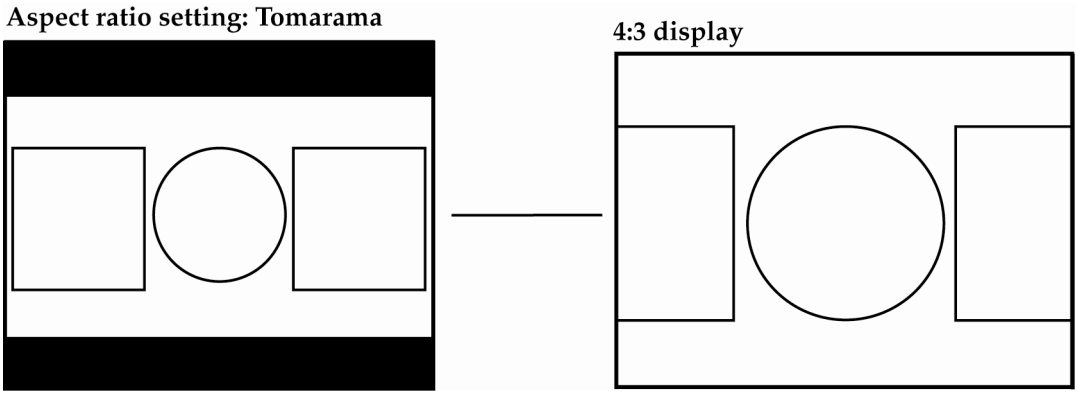
Example 2



Example 3



Example 4



Horizontal Tracking: This control adjusts horizontal sync tracking to prevent image bending (hooking) along the top of the video image. Various settings are available to compensate for different quality input signals:

Very Fast:	For poor quality video signals, such as from a VCR
Fast:	For normal quality video signals, such as from a TV
Normal:	For good quality video signals, such as from a DVD player
Slow:	For high quality video signals, such as broadcast video

Reset Input: Resets *all* input settings to factory default (for the current input only).

Output menu

To access the output menu via the front panel control buttons, do the following:

1. Press the desired Input Select button.
2. Press **MENU** (press the ⩛ or ⩓ button to reach the output menu, if necessary).
3. Press **ENTER**.
4. Use the ⩓ and ⩛ buttons and the **ENTER** key to select the setting you wish to adjust.
5. Press **ENTER** to save once you've optimized the setting for the current input.

Output Resolution: This control lets you select the appropriate resolution for your display device. The available resolutions are listed in the table under Output modes on page 18. Because the IN1403 only scales up, users must choose an output resolution that is greater than or equal to the input size. For instance, you may not select 640 x 480 output with PAL input signals since PAL has more than 480 lines of video.

NOTE *Of all the settings on the IN1403, perhaps the most critical adjustment is the output resolution. Setting the scaler to match the capabilities of your data display device will have an enormous impact on the image quality. To achieve the optimum image on your display device, refer to the Choosing the Optimal Output Resolution and Refresh Rate section on page 15.*

Refresh Rate: Allows you to choose the optimal refresh rate for your display device.

NOTE *Not all resolution and refresh rate combinations are available. Refer to the chart on page 18 for a complete listing.*

Size adjusts the output horizontal and vertical size. It shrinks the size to a percentage of the output resolution selected. The output size is automatically reset anytime a new input aspect ratio is selected. This setting is useful to manually reduce the height of the output signal when an anamorphic input signal is connected. The IN1403 only scales up; therefore the output size controls will stop at a certain point where the input and output resolution are equal.

Position situates the output image on the monitor. The output position is automatically reset anytime a new input aspect ratio is selected.

Sync Format: Select an output signal format that is compatible with your display.

RGBHV--:	RGB with negative horizontal and vertical sync (default)
RGBHV++:	RGB with positive horizontal and vertical sync
RGBS A:	RGB with composite sync (with serrations)
RGBS B:	RGB with composite sync (without serrations)
RGsB A:	RGB with sync on green (with serrations)
RGsB B :	RGB with sync on green (without serrations)

Blue Screen: Available anytime (even when the input settings are incorrectly adjusted or the input signal is missing entirely), the blue screen may be used as a test signal to adjust the output settings (resolution, refresh rate, size, position and sync format) and 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 may be turned off to adjust the video and input settings.

Reset Output Settings: Resets *all* output settings to factory default.

Advanced menu

To access the advanced menu via the front panel control buttons, press the desired Input Select button, press **MENU,** press the ⩛ or ⩓ button (if necessary) to reach the advanced menu, then press **ENTER**. Use the ⩓ and ⩛ buttons and the **ENTER** key to select the setting you wish to adjust. Once you've optimized the setting for the current input, press **ENTER** to save.

Factory Reset: Returns all video, audio, input, output and RS-232 settings for all inputs to factory default.

Baud Rate: Allows RS-232 remote users to select the baud rate that matches their remote control device system.

Delimiters: Use the on-screen menu to select the desired command code delimiters. Extron scalers can be set to recognize six sets of leading and end codes when you are using an RS-232 remote: **parentheses ( )**, **brackets [ ]**, **braces{ }**, **slashes \ /**, **less and greater than < >**, and **signs !#**. If desired, several products may be connected together on the same RS-232 serial control line with each device set for a different delimiter pair. Each unit will only respond to codes sent with the appropriate delimiters and will ignore all other codes.

System Info: This display shows a variety of information about the currently selected input signal and scaler output settings on a single screen. The System Info display may be useful for troubleshooting or to quickly verify various settings. The following information is included in the System Info display:

- Input Source
- Input Horizontal Scan Rate
- Output Resolution
- Output Vertical Refresh Rate
- Program Version Number
- Input Signal Standard and Format
- Input Vertical Refresh Rate
- Output Horizontal Scan Rate
- Output Sync Format

Reset RS-232 Settings: Resets all RS-232 settings to factory default.

Choosing the Optimal Output Resolution and Refresh Rate

Of all the settings on the IN1403, perhaps the most critical adjustment is the output resolution and output refresh rate. Every display device has an optimal or native resolution and an optimal refresh rate. This will vary depending on the type of display technology, if the display has a fixed number of display elements (native resolution), the size of the pixels, the size of the display or display screen, and even the distance of the viewer from the display screen. Setting the IN1403 to the output resolution and refresh rate to match this optimal resolution for your data display will have an enormous impact on the image quality.

Please note that the ideal resolution must also lie within the compatible scan range of the display device. For example, some 27-36" presentation monitors are limited to input signals in the 30-50 kHz range. If the video scaler's output resolution and refresh rate settings are too high, the signal will not be viewable on the display. Before selecting the output resolution and refresh rate, you should check the specifications page in the operation manual for your display device to verify the compatible horizontal scan range and vertical refresh rates. The Large Screen Data projector list and Large Data Display list include signal compatibility information for current and obsolete models of data projectors, retro displays, presentation monitors and plasma displays.

CRT displays: Selecting the golden resolution

While CRT displays do not have a native resolution, they will have a "golden resolution," or sweet spot, for input signal resolution. When the video scaler is set to the golden resolution of the CRT display, the result is a sharp, detailed image without visible scan lines. If the video scaler is set below the golden resolution, the displayed image will have tiny black lines between the image lines. If the video scaler is set above the golden resolution, the lines will actually overlap and the image will appear soft and lose detail because there are more lines and pixels than the display can clearly resolve. When experimenting to find the golden resolution for your CRT display device, it is best to set the output refresh rate at 72 Hz and begin at the output resolution indicated in the chart on page 18. You can then try higher and lower resolutions until you achieve the setting that offers both a solid image and excellent picture detail.

CRT displays: Selecting the optimal refresh rate

CRT displays may tend to flicker at refresh rates below 70 Hz In order to achieve a solid, flicker-free image, an output refresh rate of 72 Hz or 75 Hz is recommended for most CRT displays. You should also experiment with even higher refresh rates to see if they create a better image. In some cases, you will find that the image suddenly appears better at a higher refresh rate, such as 85 Hz

Keep in mind that as the refresh rate is increased, the horizontal scan rate also increases. This places greater higher bandwidth demands on the video distribution system and the display device. If you select a refresh rate that is too high you will actually see a softer image because the signal is exceeding the bandwidth capabilities of the display device. Extremely high refresh rate settings may also create a compatibility problem because a very high refresh rate may result in a signal that is outside the compatible scan rate of the data display.

Fixed pixel displays: Selecting the optimal resolution and refresh rate

Display devices based on LCD, DMD, D-ILA/LCOS, or plasma technology have a specific number of display elements, or pixels. This is also referred to as the "native resolution" of the display device. These devices are usually capable of showing higher or lower resolution signals, but can only do this by scaling the image up or down to the native resolution. In order to avoid additional image scaling it is important to know the native resolution of your display device.

Check your operation manual or the chart on page 17 to determine the native resolution of your display device. The video scaler output should be set to match this native resolution. The video scaler output refresh rate should be set to 60 Hz with most LCD, DMD, LCOS, and plasma displays. Higher refresh rates are not recommended with these display technologies because they usually *do not* improve the image and may actually cause compatibility problems.

Display Type	Suggested Optimal / 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	
32 – 38″ HDTV Display (16:9)	1024 x 768 / 1280 x 720	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 Display with 9″ CRTs	1024 x 768 / 1280 x 1024	72 Hz – 85 Hz	
Projectors, Flat Panel and Plasma Display Devices			
DMD / DLP Projectors	800 x 600 / 1024 x 768 / 1280 x 720 / 1280 x 1024	60 Hz	Check Native Resolution of Display. For 848 x 600, set scaler to 800 x 600.
LCOS / D-ILA Projectors	1365 x 1024	60 Hz	
LCD Projectors	800 x 600 / 1024 x 768 / 1280 x 1024 / 1365 x 768	60 Hz	Check Projector'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 Display 40″ (4:3)	640 x 480	60 Hz	
Plasma Display 42″ (16:9)	852 x 480 / 1024 x 768 / 1280 x 768	60 Hz	Fujitsu / Sony 42″ Plasmas with 1024 x 1024: Set Scaler to 1024 x 768
Plasma Display 50″ / 60" (16:9) (Boxlight / Eizo / LG / Pioneer / Runco / Sharp / Viewsonic)	1280 x 768	56 / 60 / 65 Hz	Pioneer PDP-505HD: Use 56 Hz
Plasma Display 50″ / 60″ (16:9) (Fujitsu / JVC / Luce / Marantz / NEC / Panasonic / RCA / Runco / Samsung / Toshiba)	1365 x 768	60 Hz	NEC 50": Set Sync Format to RGBHV++

Advanced Operation

Pass-through RGB video

Input 4 is for passive RGB video. No scaling or video functions are available for this input. Only switching of the RGB signal is provided from the front panel or the RS-232 control. All color and sync signals are passed through an internal distribution amplifier and then to the output connectors. Blank, freeze, the on-screen menu, and other video functions are not available. Audio is an active function, and all audio functions are still available for Input 4, even though the menu cannot be displayed.

Output RGB connectors

The dual RGB outputs of the IN1403 are individually buffered (including signals from Input 4). They may both be connected simultaneously without degradation of the other output. Both are capable of transmitting the RGB signal over 100 feet or more through high quality coaxial cables.

Output modes

The IN1403 can be set to output any of the following output modes:

			Refresh Rate (Hz)								
Resolution	**Mode**	**Aspect Ratio***	**56**	**60**	**65**	**72**	**75**	**85**	**96**	**100**	**120**
640 x 480	VGA	4:3									
800 x 600	SVGA	4:3									
852 x 480	HDTV - 480p	16:9									
1024 x 768	XGA	4:3									
1152 x 864		4:3									
1280 x 720	HDTV – 720p	16:9									
1280 x 768		16:9									
1280 x 1024	SXGA	5:4									
1365 x 768	Wide XGA	16:9									
1365 x 1024		4:3									

*The length verses the height of the output image determines the output aspect ratio.

Power-on settings

Power-on settings let you adjust key IN1403 settings without using on-screen menus. This may be particularly helpful if the IN1403 has been accidentally set for a mode that is incompatible with the display device, preventing the viewing of the on-screen menus. To execute a Power-On setting, simply press and hold the desired front panel button (indicated in the chart below) while turning on the IN1403 power switch.

INPUT 1: Factory Reset

INPUT 2: Sets Output Sync Format to RGBHV--.

INPUT 3: Sets Output Sync Format to RGBHV++.

INPUT 4: Sets Output Sync Format to RGBS with serration pulses.

BLANK: Sets Output Sync Format to RGsB with serration pulses.

MENU: Sets Output Resolution/Refresh rate to 640 x 480 @ 60 Hz.

<: Sets Output Sync Format to 800 x 600 @ 60 Hz.

^: Sets Output Sync Format to 1024 x 768 @ 60 Hz.

v: Sets Output Sync Format to 1152 x 864 @ 60 Hz.

>: Sets Output Sync Format to 1280 x 1024 @ 60 Hz.

ENTER: Factory Reset returns all scaler input, output and serial control settings to factory defaults.

Output positioning

You can adjust the output position without entering the main menu sequence. Any time there are no menus showing on the screen, simply press one of the ^ v < > arrow keys to shift the image in the desired direction. Afterwards, press **ENTER** to save the output position, or press **MENU** to exit without saving the setting.

The output position simply 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 may be due to the image being incorrectly positioned on the monitor. The blue screen signal is available to adjust the output image on the monitor. It as available at any time, even when the input settings are incorrectly adjusted or the input signal is missing entirely. 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 settings may then be adjusted.

Remote Operation

RS-232 control

The IN1403 remote control port accepts serial commands from a control system, computer serial port, or any other device capable of sending out serial ASCII commands at compatible baud rates. All switching, adjustment and setup parameters can be controlled using RS-232 commands. A complete listing of RS-232 codes is included pages 21-23.

Baud Rate and Protocol:

- 1200-57600 baud
- 9600 baud (default)
- 8 data bits
- 1 stop bit
- no parity

Baud Rate Selection:

The IN1402 has a factory default baud rate of 9600 bps and can communicate at baud rates from 1200 up to 57,600. Baud rates can be specified by selecting Advanced Menu on the Main Menu.

NOTE *The baud rate transmitted must match the baud rate selected on the IN1403.*

Command Code Structure and Delimiters:

All commands sent to the unit must contain a leading code, the command code, and an ending code. Each command must be completely executed before the unit will accept a new command. When a command is completed, the unit provides a response code:

[OK] indicates that the command was received and executed.

[ERR] indicates that there is a problem with the code and the command was not executed.

The IN1403 can be set to recognize six sets of leading and end codes (delimiters). These are: **( )**, **[ ]**, **{ }**, **\ /**, **< >**, and **!#**. The factory default serial delimiters are **[ ]**. The unit may be set to a different delimiter pair from the Advanced Menu (see page 14). The IN1403 will ignore all commands that do not contain the appropriate delimiters.

A complete command consists of

[The leading code

CH4 The command code. In this case, CH4 would select Input 4.

] The ending code

Sample command codes:

[CH1] Select Input 1

[FRZ1] Activate Freeze Frame

Serial Cable Connection:

When controlling only one IN1403 unit, connect the RS-232 cable as follows:

Controller Transmit	to	IN1403 Receive
Controller Ground	to	IN1403 Ground
Controller Receive	to	IN1403 Transmit

When controlling multiple IN1403 units, connect the RS-232 cable as follows:

Controller Transmit	to	Each IN1403 Receive
Controller Ground	to	Each IN1403 Ground
Controller Receive	to	Only one IN1403 Transmit

NOTE *When controlling multiple units, the Controller Receiver Terminal and each IN1403 Transmit Terminal is left unconnected. Multiple IN1403 Transit Lines may not be connected together; otherwise signal contention from multiple units will result. Therefore, "receive" information is only available from one IN1403 in this configuration. Each unit must be set to different delimiters.*

IN1403 serial commands*

Command	Description
ACI3	set baud rate to 1200
ACI4	set baud rate to 2400
ACI5	set baud rate to 4800
ACI6	set baud rate to 9600**
ACI7	set baud rate to 19,200
ACI8	set baud rate to 38,400
ACI9	set baud rate to 57,600
ACI?	return current baud rate
ASP0	set aspect ratio to standard**
ASP1	set aspect ratio to anamorphic
ASP2	set aspect ratio to wide screen
ASP3	set aspect ratio to wider screen
ASP4	set aspect ratio to Tomarama
ASP?	return current aspect ratio
BALR	increase balance right
BALL	increase balance left
BAL@	set audio balance to center** (016)
BALxxx	set balance to absolute value (000-031)
BAL?	return current balance
BAS+	increase bass
BAS-	decrease bass
BAS@	set bass to normal (016)
BASxxx	set bass to absolute value (006 – 027)
BAS?	return current bass
BLANK	toggle blanking
BLANK0	disable blanking**
BLANK1	enable blanking
BLANK?	return current blank state
BRG+	increase brightness
BRG-	decrease brightness
BRG@	set brightness to normal** (128)
BRGxxx	set brightness to absolute value (000-255)

Command	Description
CMDCD2	set delimiters to parentheses ( )
CMDCD3	set delimiters to less and greater < >
CMDCD4	set delimiters to slashes \ /
CMDCD5	set delimiters to signs !#
CMDCD?	return current delimiters
CON+	increase contrast
CON-	decrease contrast
CON@	set contrast to normal** (128)
CONxxx	set contrast to absolute value (000-255)
CON?	return current contrast
CTF0	select comb filter**
CTF1	select trap filter
CTF?	return current comb / trap filter state
FMTx	toggle signal format of channel x (1,2,3)
FMTxy	set signal format of channel x (1,2,3) to composite / S-video y (0/1)
FMTx?	return current signal format from channel x
FP	toggle front panel controls
FP0	disable front panel controls
FP1	enable front panel controls**
FP?	return current front panel state
FRZ	toggle freeze frame
FRZ0	disable freeze frame**
FRZ1	enable freeze frame
FRZ?	return current freeze state
GAM+	increase gamma
GAM-	decrease gamma
GAM@	set gamma to normal**(010)
GAMxxx	set gamma to absolute value (001-030)
GAM?	return current gamma
HTK0	set horizontal tracking to very fast

Command	Description
BRG?	return current brightness
CH1	select channel 1
CH2	select channel 2
CH3	select channel 3
CH4	select channel 4
CH?	return current channel
CMDCD0	set delimiters to brackets [ ]**
CMDCD1	set delimiters to braces { }
HUE?	return current hue
INFO?	return unit version
MUTE	toggle mute
MUTE0	disable mute**
MUTE1	enable mute
MUTE?	return current mute state
NOISE+	increase noise filter
NOISE-	decrease noise filter
NOISE@	set noise filter to normal (009)
NOISExxx	set noise filter to absolute value (000-047)
NOISE?	return current noise filter
PH+	increase horizontal position
PH-	decrease horizontal position
PH@	set horizontal position to normal**♦
PHxxx	set horizontal position to absolute value♦
PH?	return current horizontal position
PV+	increase vertical position
PV-	decrease vertical position
PV@	set vertical position to normal** ♦
PVxxx	set vertical position to absolute value♦
PV?	return current horizontal position
REF0	set refresh rate to 60 Hz**
REF1	set refresh rate to 72 Hz

Command	Description
HTK1	set horizontal tracking to fast**
HTK2	set horizontal tracking to normal
HTK3	set horizontal tracking to slow
HTK?	return current horizontal tracking
HUE+	increase hue
HUE-	decrease hue
HUE@	set hue to normal** (020)
HUExxx	set hue to absolute value (000-040)
SCS1	set resolution to 800 x 600
SCS2	set resolution to 852 x 480
SCS3	set resolution to 1024 x 768
SCS4	set resolution to 1152 x 864
SCS5	set resolution to 1280 x 720
SCS6	Set resolution to 1280 x 768
SCS7	set resolution to 1280 x 1024
SCS8	set resolution to 1365 x 768
SCS9	set resolution to 1365 x 1024
SCS?	return current resolution
SH+	increase horizontal size
SH-	decrease horizontal size
SH@	set horizontal size to normal**(100)
SHxxx	set horizontal size to absolute value (♦-100)
SH?	return horizontal size
SHP+	increase sharpness
SHP-	decrease sharpness
SHP@	set sharpness to normal** (003)
SHPxxx	set sharpness to absolute value (000-008)
SHP?	return current sharpness
SV+	increase vertical size
SV-	decrease vertical size
SV@	set vertical size to normal**(100)

Command	Description
REF2	set refresh rate to 75 Hz
REF3	set refresh rate to 85 Hz
REF4	set refresh rate to 96 Hz
REF5	set refresh rate to 100 Hz
REF6	set refresh rate to 120 Hz
REF?	return current refresh rate
RES000	factory reset
RES1	reset video
RES2	reset audio
RES3	reset input
RES4	reset output
RES5	reset RS-232
SAT+	increase color
SAT-	decrease color
SAT@	set color to normal** (140)
SATxxx	set color to absolute value (000-255)
SAT?	return current color
SCS0	set resolution to 640 x 480**

Command	Description
SVxxx	set vertical position to absolute value (♦-100)
SV?	return vertical size
SYNC0	set output sync to RGBHV- -**
SYNC1	set output sync to RGBHV+ +
SYNC2	set output sync to RGBS A
SYNC3	set output sync to RGBS B
SYNC4	set output sync to RGsB A
SYNC5	set output sync to RGsB B
SYNC?	return current output sync
TRE+	increase treble
TRE-	decrease treble
TRE@	set treble to normal**(016)
TRExxx	set treble to absolute value (008-025)
TRE?	return current treble
VOL+	increase volume
VOL-	decrease volume
VOL@	set volume to normal**(043)
VOLxxx	set volume to absolute value (012-063)
VOL?	return current volume

* The commands are *not* case sensitive.

** Default values when factory reset is performed

♦ Normal and available values depend on the current output mode.

Troubleshooting

Problem: There is no image on the display device.

- **Solution 1:** Make sure that the power cable is securely plugged into the unit and the A/C source.
- **Solution 2:** Make sure the A/C source is live.
- **Solution 3:** Verify that the power switch is turned on for the video source, the IN1403, and the monitor.
- **Solution 4:** Verify the connection to the output display device. Even with no input signal, the IN1403 menu can be displayed. Press **MENU** or **ENTER** to gain access to the menu screen.
- **Solution 5:** Select an output resolution and refresh rate compatible with the display device being used. Use the default power-up buttons to select an output mode without the menu present, and then turn on the blue screen to verify these settings.
- **Solution 6:** The output resolution must be less that the input (the IN1403 can only scale up). Select an output resolution that is greater than or equal to the input size.
- **Solution 7:** The display device may not accept certain sync formats. Verify the display device sync capability and select the IN1403 output sync using the power-up default buttons.

Problem: There is no audio output.

- **Solution 1:** Verify that power is present and that the power switch is turned on for the audio source, the IN1403, and the amplifier/speakers.
- **Solution 2:** Verify that the audio source is connected to the correct input and that the source volume has not been turned down or muted.
- **Solution 3:** The audio output of the IN1403 is line level audio *only*. It should be connected to a mixer/amplifier or to amplified "computer type" speakers.
- **Solution 4**: Increase the volume using the volume **UP** button.
- **Solution 5:** The mute may be activated. Press **MUTE** to deactivate the function.

Problem: The image on the display device is scrambled.

- **Solution:** Select an output resolution and refresh rate compatible with the display device being used. Use the default power-up buttons to select an output mode without the menu present, and then turn on the blue screen to verify these settings.

Problem: The image on the display device is cropped on the left side.

- **Solution 1:** Increase the output H-Position to line up the image on the display device. Use the blue screen.
- **Solution 2:** Adjust the monitor position or size controls to fit the image on the display device. Use the blue screen.

Problem: The image on the display device is cropped on the right side.

- **Solution 1:** Reduce the output H-Position to line up the image on the display device. Use the blue screen.
- **Solution 2:** Adjust the monitor position or size controls to fit the image on the display device. Use the blue screen.

Problem: The image on the display device is cropped on the top.

- **Solution 1:** Increase the output V-Position to line up the image on the display device. Use the blue screen.
- **Solution 2:** Adjust the monitor position or size controls to fit the image on the display device. Use the blue screen.

Problem: The image on the display device is cropped on the bottom.

- **Solution 1:** Reduce the output V-Position to line up the image on the display device. Use the blue screen.
- **Solution 2:** Adjust the monitor position or size control to fit the image on the display device. Use the blue screen.

Problem: The display device has a double image.

- **Solution:** The IN1403 cannot separate multiple signal formats. Make sure that only one signal is connected to each input.

Problem: The image on the display device is black & white (no color).

- **Solution:** Set the input signal format to match the input signal connected to the rear of the unit.

Problem: The picture on the display device has hooking along the top.

- **Solution 1:** Increase the input horizontal tracking to compensate for poor quality video signals, such as from a VCR.
- **Solution 2:** The display device may need different sync serrations. Choose a different output sync from the sync format menu.

Problem: The image is frozen.

- **Solution:** Freeze is activated. Press **FREEZE** to deactivate the freeze frame feature.

Problem: The image on the display device is the wrong shape.

- **Solution:** The input aspect ratio is set incorrectly. Adjust the input aspect ratio to match the input video signal.

Problem: The image on the display device appears fuzzy.

- **Solution 1:** Adjust the video sharpness until the image regains its detail.
- **Solution 2:** Adjust the video noise filter until the image is sharp.
- **Solution 3:** Change the comb or trap filter setting (applicable only in composite video mode).

Problem: The Output Resolution will not decrease.

- **Solution:** The IN1403 can *only* scale up. Resolutions that would result in scaling down are not available.

Problem: The desired Input Aspect Ratio cannot be selected.

- **Solution 1:** The IN1403 can *only* scale up. Increase the output resolution until the desired aspect ratio is available.
- **Solution 2:** Manually decrease the image size by using the output menu.
- **Solution 3:** Select a different available aspect ratio.

Problem: The output size will not decrease.

- **Solution:** The IN1403 can *only* scale up. Increase the output resolution, and then reduce the size of the output image.

Specifications

Video input

Number/signal type	3 S-video, 3 composite video
Connectors	S-video: 3 female 4-pin mini DIN Composite video: 3 female BNC, RGB pass through: 15-pin HD
Nominal level	1V p-p for Y of S-video, and for composite video 0.3 Vp-p for C of S-video
Minimum/maximum levels	Analog: 0.0 V to 1.0 V p-p with no offset
Impedance	75 ohms
Return loss	<-30dB @ 5 MHz
DC offset (max. allowable)	1.5 V

Video processing

Decoder	8 bit digital
Digital sampling	24 bit, 8 bits per color; 13.5 MHz standard
Colors	16.78 million

Video output

Number/signal type	1 scaled RGBHV, RGBS, or RGsB, 1 buffered output
Connectors	1 female 15-pin HD, 5 female BNC
Nominal level	0.7 Vp-p for RGB
Minimum/maximum levels	0.0 V to 0.7 Vp-p
Impedance	75 ohms
Scaled resolution	640 x 480, 800 x 600, 852 x 480, 1024 x 768, 1152 x 864, 1280 x 720 (HDTV 720p), 1280 x 768, 1280 x 1024, 1365 x 768, 1365 x 1024

Sync

Output type	RGBHV, RGBS, RGsB
Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM
Output level	TTL: 5.0V p-p, unterminated
Output impedance	75 ohms
Polarity	Positive or negative (selectable)

Control/remote — scaler

Serial control port	RS-232, 3.5 mm 5-pole captive screw connector
Baud rate and protocol	1200 to 38400 baud, 8 data bits, 1 stop bit, no parity
Serial control pin configurations	1 = TX, 2 = GND, 3 = RX
Program control	Extron Control Software

General

Power	100VAC to 240VAC, 50/60 Hz, 20 watts, internal, autoswitchable
Temperature/humidity	Storage -40° to +158°F (-40° to +70°C) / 10% to 90%, noncondensing Operating +32° to +122°F (0° to +50°C) / 10% to 90%, noncondensing

Rack mount	Yes, with optional mounting brackets
Enclosure type	Metal
Enclosure dimensions	1.7" H x 21" W x 11.5" D (1U high, full rack wide) 4.3 cm H x 21.6 cm W x 15.2 cm D (Depth excludes connectors.)
Product weight	2.5 lbs (1.1 kg)
Shipping weight	5 lbs (3 kg)
Vibration	ISTA 1A in carton (International Safe Transit Association)
Listings	ETL (UL1950)
Compliances	CE
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE *All nominal levels are at ±10%.*

NOTE *Specifications are subject to change without notice.*

Part Numbers

These items are included with the IN1403.

Included Parts	Part Numbers
IN1403-2 scaler	60-730-01
Rack ears	70-391-01
Rubber feet (4)	
IEC power cord	
Extron Tweeker	
IN1403 User's Manual	
3.8 mm captive screw connector, 3-pin	

Optional Accessories	Part Numbers
IU Basic Rack Shelf	60-601-01
1U Universal Rack Shelf Kit	60-190-01
Half rack width false faceplate kit	70-339-xx
Male to female VGA MHR cable	26-112-xx
Male to male VGA MHR cable	26-238-xx
BNC-5 Mini HR Bulk Cable	20-020-xx
Plenum BNC-5 Mini HR Bulk Cable	20-103-xx
3.5 mm stereo mini male to 2 RCA male	IN9107
Male to RCA to male RCA audio cables, 6'	IN8706
Male to RCA to male RCA audio cables, 10'	IN8710
Male to RCA to male RCA audio cables, 25'	IN8725

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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