Extron® Electronics

INTERFACING, SWITCHING AND DISTRIBUTION

User's Manual

IN1402

Video Scaler

68-1019-01
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.

Table of Contents

Product Overview

Description

The IN1402 is a full featured video scaler that combines quad standard video recording, advanced video scaling/line multiplication and a 3-input video switcher into a single product. The IN1402 Video Scaler is recommended for display system applications requiring superb video scaling for composite video and S-video signals.

Features

- **Superb Video Scaling Technology** — Employing sophisticated video de-interlacing, scaling and filtering techniques, the IN1402 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 IN1402 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 IN1402 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 input signals.
- **Pick the Perfect Resolution** — The IN1402 offers several output resolutions to match the optimum or native resolution for most display devices. The IN1402 provides a progressive scan output signal at standard resolutions, ensuring optimal image quality with a wide range of CRT, LCD, DMD, D-ILA/LCOS, and plasma display devices.
- **3-Input Video Switcher** — The IN1402 provides multiple inputs and flexible switching capability to accommodate a variety of applications. The unit has inputs for two composite video signals and one S-video signal.
- **Memory** — The IN1402 can recall previously stored settings with the push of a single button. All 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.
- **On-Screen Menus** — Provide easy control of 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** — Is 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 Aspect Ratio Controls** — with individual horizontal and vertical image adjustments make it easy to precisely fit the active video image to the display area. Comprehensive aspect ratio controls adjust the vertical and horizontal image size to accommodate various input signal and display device aspect ratios.
- **RS-232 Serial Control** — Is provided for all scaler functions including input selection, image adjustments and output settings. The IN1402's comprehensive RS-232 control capacity facilitates complete system integration and effortless control when combined with a third party control system.
- **Rack Mountable** — Two IN1402 scalers can be mounted side-by-side using the optional Universal 1U Rack Shelf (Extron part #60-190-01). This shelf can also be used for a single unit, or the Basic Rack False Faceplate Kit (Extron part #70-339-01) can be used.

Compatibility

Input

The IN1402 Video Scaler accepts composite video signals (on Inputs 1 and 2) and S-video signals (on Input 3) in the NTSC, PAL, SECAM, and NTSC 4.43 video standards. The unit automatically senses the video standard of the input signal and decodes it appropriately.

Output

The IN1402 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, 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 the same as the input signal. Therefore, the output refresh rate is 59.94 Hz for NTSC input signals and 50 Hz for PAL and SECAM input signals.

Installation

This section offers step-by-step instructions for installing the IN1402 Video Scaler. An application diagram is provided on the following page.

NOTE *Read the instructions carefully before initiating the installation procedure. Make sure that there is no power connected to the IN1402, and that the power button is off.*

1. Place or install the IN1402 in the desired location. Make sure that the unit is seated on a flat surface or is securely installed in a standard 19" equipment rack. Two IN1402 scalers can be mounted side-by-side using the optional Universal 1U Rack Shelf (Extron part #60-190-01). This shelf can also be used for a single unit or the Basic Rack False Faceplate Kit (Extron part # 70-339-01) can be used.
2. Connect the video sources to the IN1402 input(s). Inputs 1 and 2 accept a composite video signal (on an RCA male and BNC female connector, respectively), while Input 3 accepts an S-video signal (4-pin mini DIN female).
3. The IN1402 features a 15-Pin HD female output. VGA display devices can be connected directly to the IN1402 output port using a standard male-to-male VGA cable.
4. Connect a control system, computer, or other source for serial commands to the RS-232 remote connector (if applicable). For more information about remote control of the IN1402, see the *Remote Operation* section on page 16.
5. Connect power to the IN1402 using the IEC power cable (included).
6. Turn on the audiovisual source, the IN1402, and the display device.
7. Using the front panel controls or RS-232 commands, adjust and store the parameters for each input source. Refer to the *Input menu* section on page 9.
8. Set the Output Resolution to match your display device. Refer to the *Output menu* on page 12 for details.

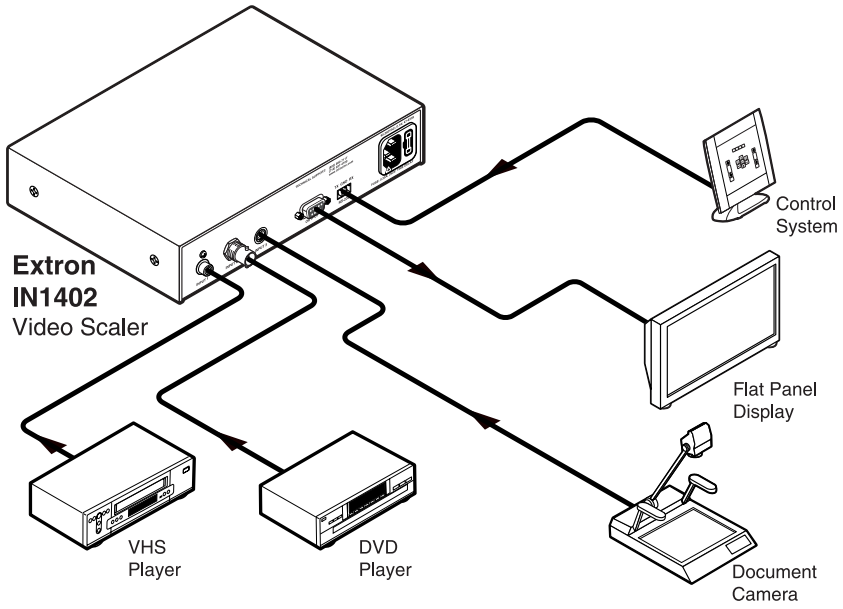


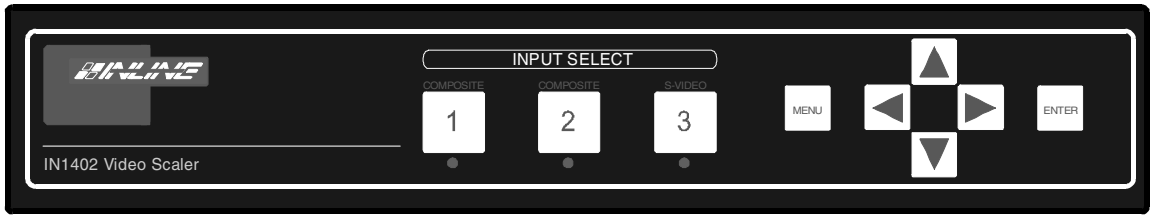
Figure 1 — IN1402 application diagram

Operation

This section focuses on operating the IN1402 using the front panel controls and commands. All video adjustments, set-up functions, and switching operations can be performed through the front panel or via RS-232 serial controls. RS-232 control information can be found on page 16.

Front Panel Controls

IN1402 FRONT VIEW



Input Select: The large buttons labeled **INPUT 1**, **INPUT 2**, **and INPUT 3** are used to select the desired video source. After turning on the IN1402, press and release the desired **INPUT SELECT** button. A green LED will light underneath the button to indicate the selected input. All video settings for each input are stored internally (in memory) so the adjustment(s) will not have to be repeated after the setting(s) have been 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.*

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

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 exit (out of the menu). All settings for each input 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

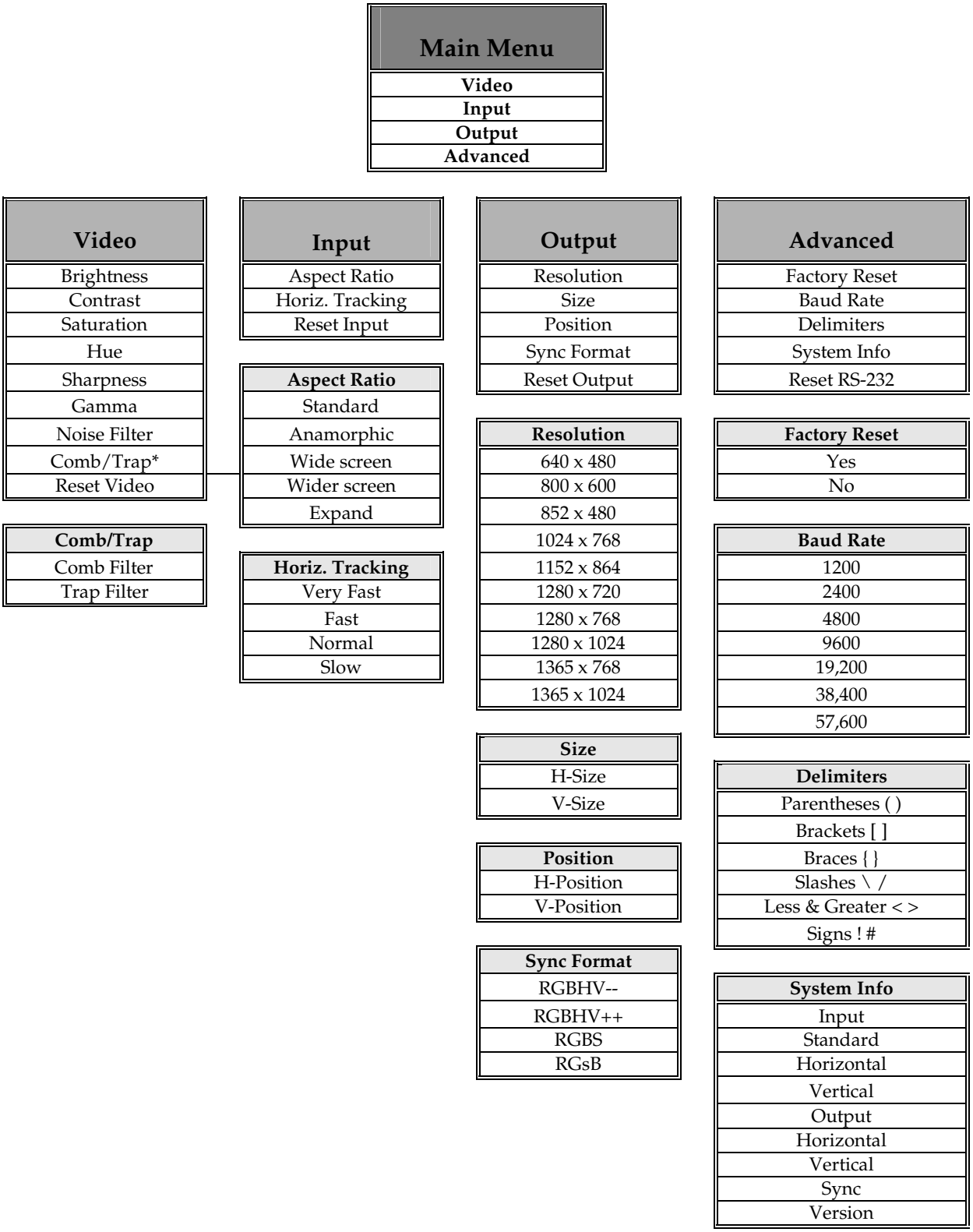
Input: Changes input signal-timing parameters

Output: Changes output signal-timing parameters

Advanced: Displays advanced options

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

IN1401 on-screen display menu system



*Only available 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.

NOTE *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 16.

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.

The minimum setting displays at about the same brightness (very grayish). The maximum setting displays a noticeable difference between the darkest and lightest parts of the screen.

***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 IN1402 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, pressing the **MENU** button allows you to leave the menu system safely 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 IN1402 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 are suggested:

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

2. Adjust Gamma as desired.

3. Adjust brightness and contrast to fine tune the image.

***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*

Noise Filter changes the input signal noise filter.

NOTE *Increasing the noise filter setting gives the effect that the picture sharpness setting is decreasing. Refer to the sharpness setting 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. Generally speaking, 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).

Input menu

To access the input 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 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.

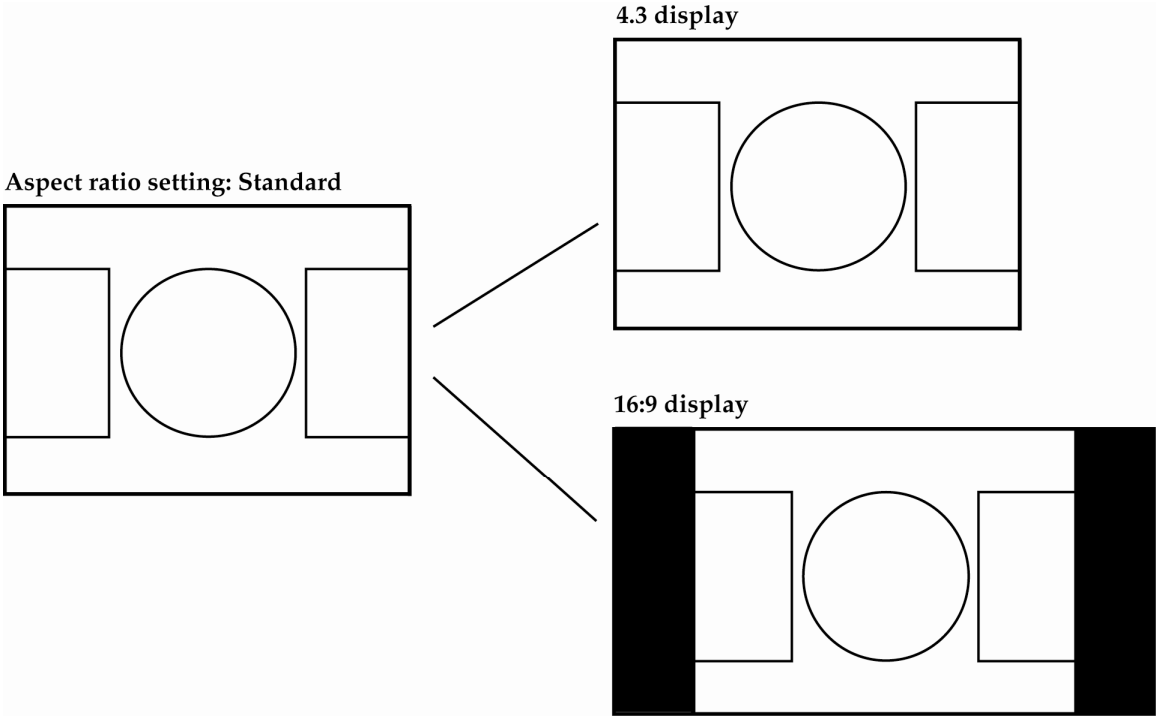
Aspect Ratio controls vary the relative image width and height. They can also accommodate various input signal aspect ratios as well as output device aspect ratios. The output aspect ratio is selected by choosing the appropriate resolution in the output menu (see *Choosing the Optimal Output Resolution* section on page 13).

NOTE *Input aspect ratio selection allows you to adjust/convert the shape of the incoming image. The Standard Aspect Ratio setting provides no conversion when used with 4:3 output (see output modes on page 15).*

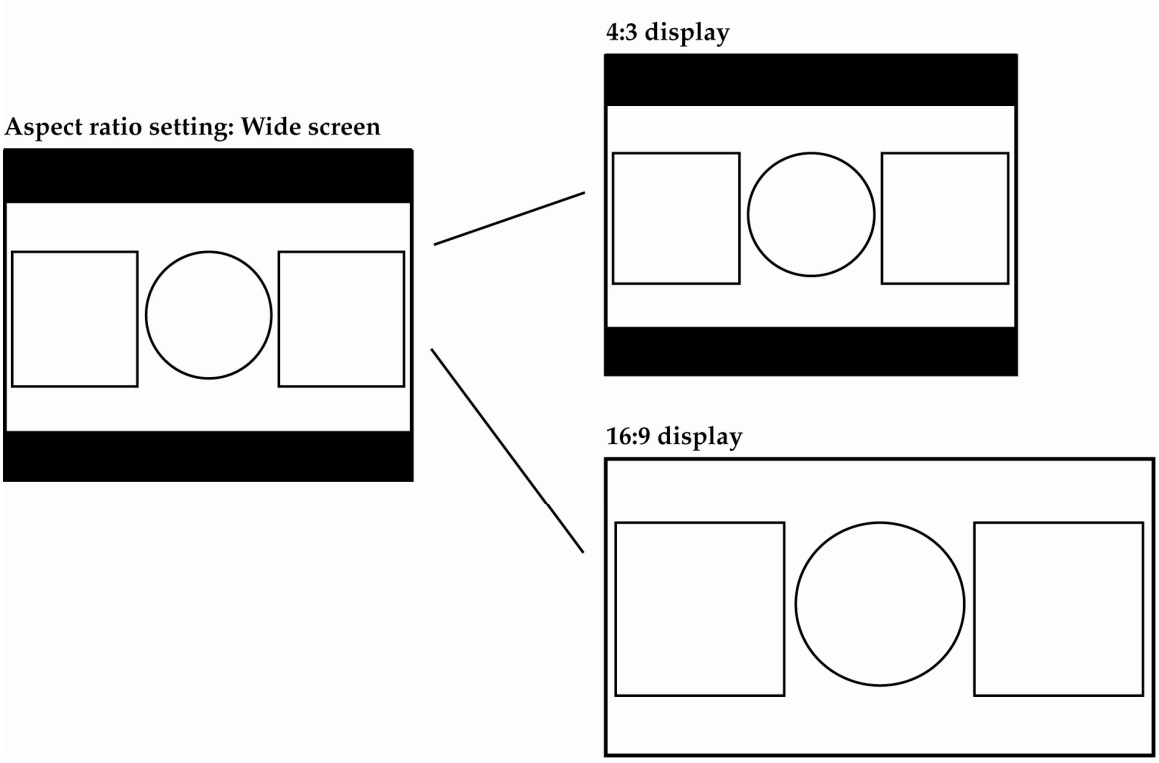
Standard:	Used for standard 1.33 input signals (sometimes referred to as full screen).*
Anamorphic:	Allows for vertical image squeezing to accommodate anamorphically enhanced DVDs.
Wide Screen:	Used for wide screen 1.78 input signals (letterbox).
Wider Screen:	Used for wider screen 2.35 input signals (narrow letterbox).
Expand:	Designed for wide screen signals viewed on 4:3 aspect ratio displays. Expand mode crops the image vertically and horizontally so that the black bars above and below the image are removed.

Most DVDs and VCRs put out a 4:3 signal. The portion of the image area that is filled with active video 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 ratio settings.

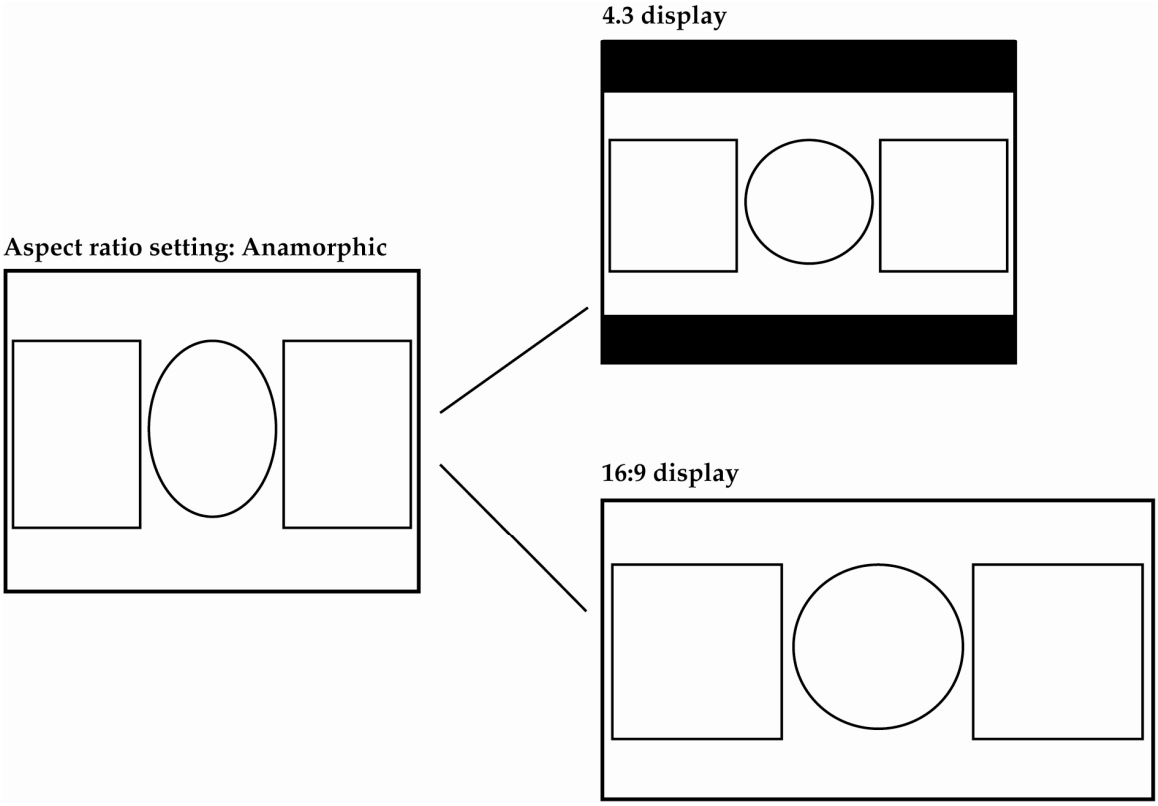
Example 1



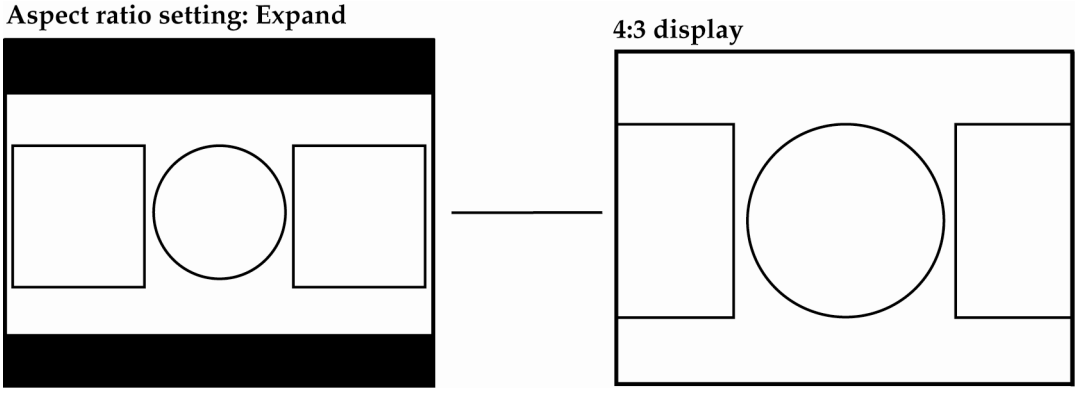
Example 2



Example 3



Example 4



Horizontal Tracking selects the amount of tracking on the horizontal sync 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

1. Press the desired **INPUT SELECT** button.
2. Press **MENU.**
3. Press the ⮟ or ⮝ button (if necessary) to reach the output 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.

Resolution: Because the IN1402 can only scale up, you must choose an output resolution that is greater than or equal to the input size, as well as one that is compatible with your monitor/display device. The available resolution rates are listed on the page 15. Choose the appropriate resolution and aspect ratio for your application.

NOTE *Of all the settings on the IN1402, 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 instructions in* Choosing the Optimal Output Resolution *on page 13.*

Size adjusts the output horizontal and vertical size. It shrinks the size to a percentage of the output resolution selected. The IN1402 only scales up; choose an output size that will result in an image that is *greater than or equal to* the input size (don't forget to save). This setting is useful to manually reduce the height of the output signal when an anamorphic input signal is connected. The output size is automatically reset anytime a new input aspect ratio is selected.

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

Sync Format:

RGBHV:--	RGB with negative horizontal and vertical sync
RGBHV:++	RGB with positive horizontal and vertical sync
RGBS:	RGB with composite sync (with serrations)
RGsB:	RGB with sync on green (with serrations)

Reset Output resets all output settings to factory default.

Advanced menu

To access the advanced 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 advanced 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.

Factory Reset returns all video and RS-232 settings for all inputs to their factory defaults.

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

Delimiters: INLINE scalers can be set to recognize six sets of leading and end codes when using an RS-232 remote: **parentheses ( )**, **brackets [ ]**, **braces{ }**, **slashes \ /**, **less and greater than < >**, **and signs !#**.

NOTE *Additional RS-232 products can be connected to different delimiters; however, only the unit matching the RS-232 delimiters transmitted from the remote controller will respond.*

System Info displays the following system information:

- 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

The IN1402 only detects the input video standard. The input horizontal scan rate and input vertical refresh rate only indicate the normal rate for the standard detected. All other values are simply repeated as defined by the input and output settings. Although the IN1402 detects the input video standard and adjusts automatically (for the detected input video standard and the selected output mode), the system will reflect any changes to these settings made by the user. This information may be useful for setting video parameters of other video equipment connected to the IN1402.

Reset RS-232 resets *all* RS-232 settings to factory default.

Choosing the Optimal Output Resolution

Of all the settings on the IN1402, perhaps the most critical adjustment is the output resolution. Every display device has an optimal or native resolution. 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 IN1402 to the output resolution 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 settings are too high, the signal will not be viewable on the display. Before selecting the output resolution, you should check the specifications page in the operation manual for your display device to verify the compatible horizontal scan range. The Large Screen Data projector list and Large Data Display list include signal compatibility information for both 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 begin at the output resolution indicated in the chart on the next page. You can then try higher and lower resolutions until you achieve the setting that offers both a solid image and excellent picture detail.

Fixed pixel displays: Selecting the optimal resolution

Display devices based on LCD, DLP, LCOS, and plasma display 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 the operation manual of your display device to determine its native resolution. The video scaler output should be set to match this native resolution.

Display Type	Suggested Optimal/ Native Resolution	Comments
15″ Data Monitor	800 x 600 / 1024 x 768	
17″ Data Monitor	1024 x 768	
19″ / 21″ Data Monitor	1024 x 768 / 1280 x 1024	
27″ – 42″ Presentation Monitor	800 x 600 / 1024 x 768	
32″ – 38″ HDTV Display (16:9)	1024 x 768 / 1280 x 720	
Data Projector or Retro Display with 7″ CRTs	800 x 600 / 1024 x 768	
Data Projector or Retro Display with 9″ CRTs	1024 x 768 / 1280 x 1024	
DMD / DLP Projectors	800 x 600 / 1024 x 768 / 1280 x 720 / 1280 x 1024	Check Native Resolution of Display. For 848 x 600, set scaler to 800 x 600.
LCOS / D-ILA Projectors	1365 x 1024	
LCD Projectors	800 x 600 / 1024 x 768 / 1280 x 1024 / 1365 x 768	Check Projector's Native Resolution. Very old units may be 640 x 480.
LCD 14″ / 15″ Flat Panel Display	1024 x 768	
LCD 18″ Flat Panel Display	1280 x 1024	
LCD 28" Flat Panel Display	1280 x 768	
Plasma Display 40″ (4:3)	640 x 480	
Plasma Display 42″ (16:9)	852 x 480 / 1024 x 768 / 1280 x 768	Fujitsu / Sony 42″ Plasmas with 1024x1024: Set Scaler to 1024 x 768
Plasma Display 50″ / 60" (16:9) (Boxlight / Eizo / LG / Pioneer / Runco / Sharp / Viewsonic)	1280 x 768	
Plasma Display 50″ / 60″ (16:9) (Fujitsu / JVC / Luce / Marantz / NEC / Panasonic / RCA / Runco / Samsung / Toshiba)	1365 x 768	NEC 50": Set Sync Format to RGBHV++

Advanced Operation

VGA output

The IN1402 features a 15-Pin HD connector. VGA display devices can be connected directly to the output port using a standard male-to-male VGA cable.

Output modes

The IN1402 supports the following Output Modes:

Resolution	Mode	Aspect Ratio*
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 versus the height of the output image determines the output aspect ratio.***

Default power-up buttons

Power-On settings let you adjust key IN1402 settings without using on-screen menus. This may be particularly helpful if the IN1402 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 connecting the power cable to the IN1402.

Input 1: Factory Reset

Input 2: RGBHV-- Output Sync

Input 3: RGBHV++ Output Sync

Input 2 & 3: RGBS Output Sync

Input 2 & ◁: RGsB Output Sync

Menu: 640 x 480 @ 60 Hz

◁: 800 x 600 @ 60 Hz

△: 1024 x 768 @ 60 Hz

▽: 1152 x 864 @ 60 Hz

▷: 1280 x 1024 @ 60 Hz

ENTER: Factory Reset

Output positioning

You can adjust output position without entering the main menu sequence. Pressing the arrow keys selects the output position controls any time the menu is not displayed. 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.

Remote Operation

Rs-232 control

The IN1402 RS-232 serial 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. A complete listing of RS-232 codes is included on the next two pages.

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 selected by selecting Advanced Menu on the Main Menu.

NOTE *The baud rate transmitted must match the baud rate selected on the IN1402.*

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.

INLINE scalers can be set to recognize six sets of leading and end codes (delimiters) when using an RS-232 remote: **parentheses ( )**, **brackets [ ]**, **braces { }**, **slashes \ /**, **less and greater than < >**, and **signs !#**. The factory default serial delimiters are [ ].

NOTE *Only the IN1402 that has the same delimiters as the remote controller will respond.*

A complete command consists of

[	The leading code
CH3	The command code
]	The ending code

Example: [CH3] sets the **IN1402** to select channel 3.

Serial Control Cable Wiring:

When controlling only one IN1402 unit, connect the RS-232 cable as follows:

- Controller Transmit to IN1402 Receive
- Controller Ground to IN1402 Ground
- Controller Receive to IN1402 Transmit

When controlling multiple IN1402 units, connect the RS-232 cable as follows:

- Controller Transmit to each IN1402 Receive
- Controller Ground to each IN1402 Ground
- Controller Receive to only one IN1402 Transmit

NOTE *When controlling multiple units, the Controller Receiver Terminal must connect to only one IN1402 Transmit Terminal. Multiple IN1402 Transit Lines may not be connected together; otherwise signal contention from multiple units will result. Therefore, "receive" information is only available from one IN1402 in this configuration. Each unit must be set to different delimiters.*

IN1402 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 expand
ASP?	return current aspect ratio
BRG+	increase brightness
BRG-	decrease brightness
BRG@	set brightness to normal** (128)
BRGxxx	set brightness to absolute value (000-255)
BRG?	return current brightness
CH1	select channel 1
CH2	select channel 2
CH3	select channel 3
CH?	return current channel
CMDCD0	set delimiters to brackets [ ]**
CMDCD1	set delimiters to braces { }
CMDCD2	set delimiters to parentheses ( )
CMDCD3	set delimiters to less and greater < >

Command	Description
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
FP	toggle front panel controls
FP0	disable front panel controls
FP1	enable front panel controls**
FP?	return current front panel 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
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)

* The commands are not case sensitive.

** Default values when factory reset is performed.

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

Command	Description
HUExxx	set hue to absolute value (000-040)
HUE?	return current hue
INFO?	return unit version
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
RES000	factory reset
RES1	reset video
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
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)
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
SYNC4	set output sync to RGsB
SYNC?	return current output sync

* 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 IN1402 and the monitor/display device.
- **Solution 4:** Verify the connection to the output display device. Even with no input signal, the IN1402 menu can be displayed. Press MENU or ENTER to gain access to the menu screen.
- **Solution 5:** Select an output resolution compatible with the display device being used. Use the default power-up buttons to select an output mode without the menu present.
- **Solution 6:** The output resolution must not be less that the input (the IN1402 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 IN1402 output sync using the power-up default buttons.

Problem: The image on the display device is scrambled.

- **Solution:** Select an output resolution compatible with the display device being used. Use the default power-up buttons to select an output mode without the menu present.

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

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

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.
- **Solution 2:** Adjust the monitor position or size controls to fit the image on the display device.

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.
- **Solution 2:** Adjust the monitor position or size controls to fit the image on the display device.

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.
- **Solution 2:** Adjust the monitor position or size control to fit the image on the display device.

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 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 (only applicable in composite video mode).

Problem: The output resolution will not decrease.

- **Solution:** The IN1402 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 IN1402 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 IN1402 can *only* scale up. Increase the output resolution, and then reduce the size of the output image.

Specifications

Video input

Number/signal type	1 S-video, 2 composite video
Connectors	S-video: 1 female 4-pin mini DIN Composite video: 1 female RCA jack, 1 female BNC
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
Connectors	1 female 15-pin HD
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 at 60 Hz if input is NTSC, at 50 Hz if input is PAL or SECAM

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 3-pole captive screw connector
Baud rate and protocol	1200 to 57600 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 rack shelf
Enclosure type	Metal
Enclosure dimensions	1.7" H x 8.5" W x 6.0" D (1U high, half 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 IN1402.

Included Parts	Part Numbers
IN1402 scaler	60-729-01
Rubber feet (4)	
IEC power cord	
Extron Tweeker	
IN1402 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 faceplace kit	70-339-xx
Male to female VGA MHR cable	26-112-xx
Male to male VGA MHR cable	26-238-xx
Male to male S-video cable	26-316-xx
Plenum Male to male S-video cable	26-543-xx

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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