

## User's Manual



# *DDS 402*

## Digital Display Scaler

# Precautions

## Safety Instructions • English



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



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

### Caution

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

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

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

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

## Consignes de Sécurité • Français



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



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

### Attention

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

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

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

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

## Sicherheitsanleitungen • Deutsch



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



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

### Achtung

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

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

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

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

## Instrucciones de seguridad • Español



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



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

### Precaucion

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

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

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

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

### Warning

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

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

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

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

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

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

### Avertissement

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

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

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

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

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

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

### Vorsicht

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

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

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

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

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

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

### Advertencia

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

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

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

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

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

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

# Quick Start — DDS 402

## Installation

### Step 1

Turn off power to the DDS 402 and input and output devices, and remove power cords from them.

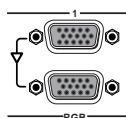
### Step 2

Install four rubber feet on the bottom of the DDS 402, or mount the DDS to furniture or in a rack (see figure on the bottom of this page).

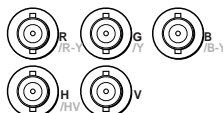
### Step 3

Attach input devices to the DDS.

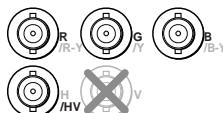
**Input 1:** RGB with buffered local monitor



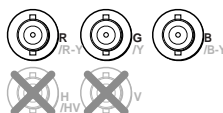
**Input 2:** RGB or component video



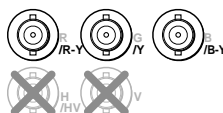
RGBHV video



RGBS video



RGSB video



Component video (R-Y, B-Y, Y)

### Step 4

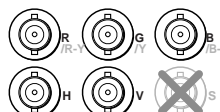
Attach output devices to the DDS 402.

### Rear panel video outputs

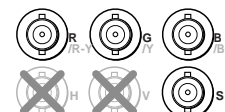
RGB or HDTV component video output (15HD)



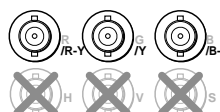
RGB or HDTV component video output (6 BNCs)



RGBHV video



RGBS video



Component video (R-Y, B-Y, Y)

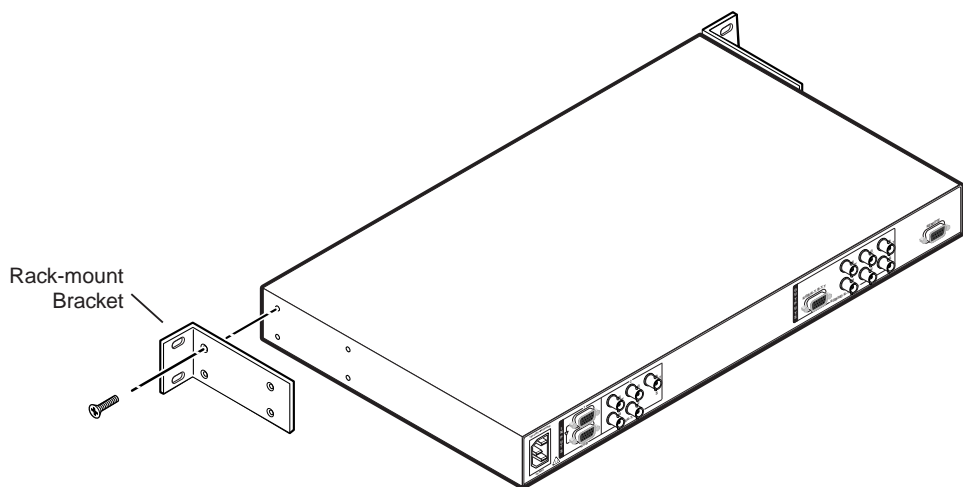
**NOTE** The two video output connectors, the 15HD connector and the five BNC connectors, both output the same video signal and the same sync format.

### Step 5

Plug the DDS 402 and input and output devices into a grounded AC source, and turn on the input and output devices. The figure on the following page shows a typical application.

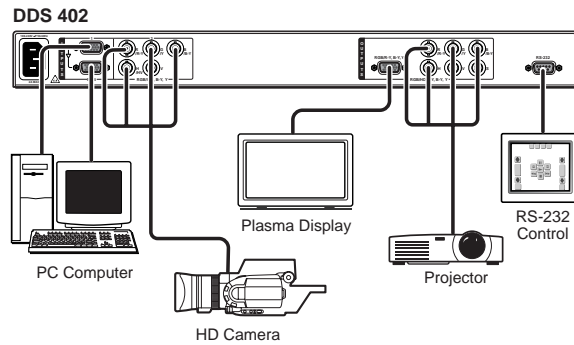
### Step 6

Use the LCD menu screens (see the next page) or RS-232 programming to configure the DDS 402. See chapter 2 for installation, chapter 3 for front panel operation, and chapters 4 and 5 for RS-232 operation.



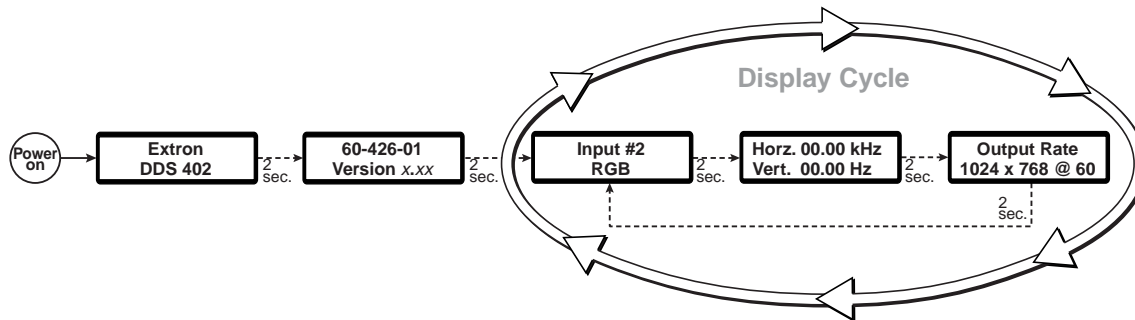
# Quick Start — DDS 402, cont'd

## Typical DDS 402 Application

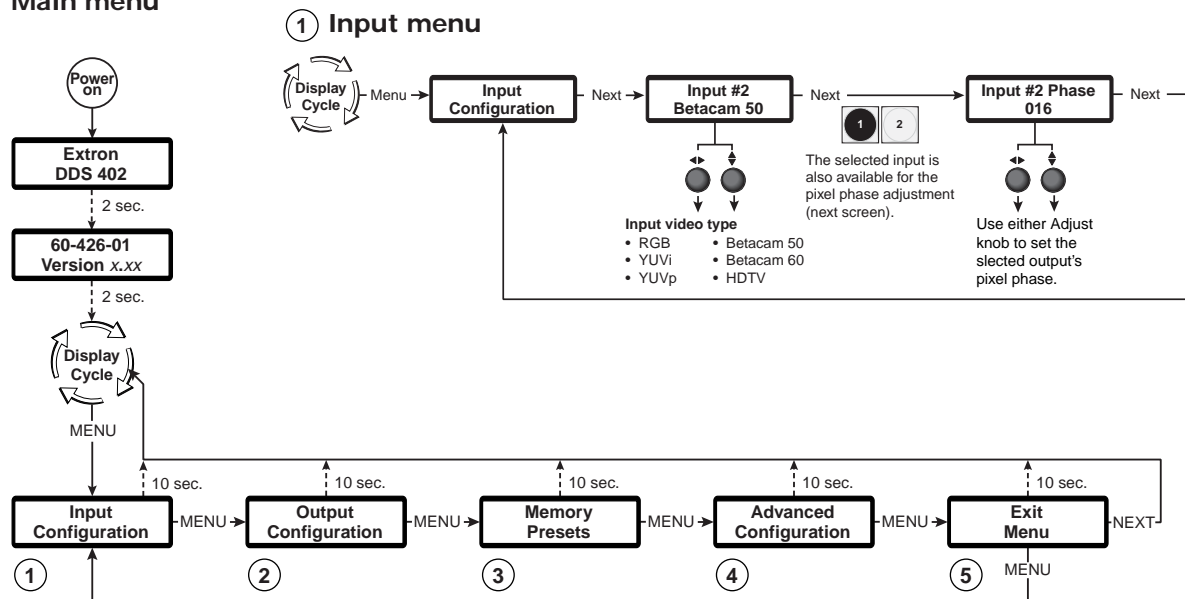


## DDS 402 Menu System

### Default display cycle

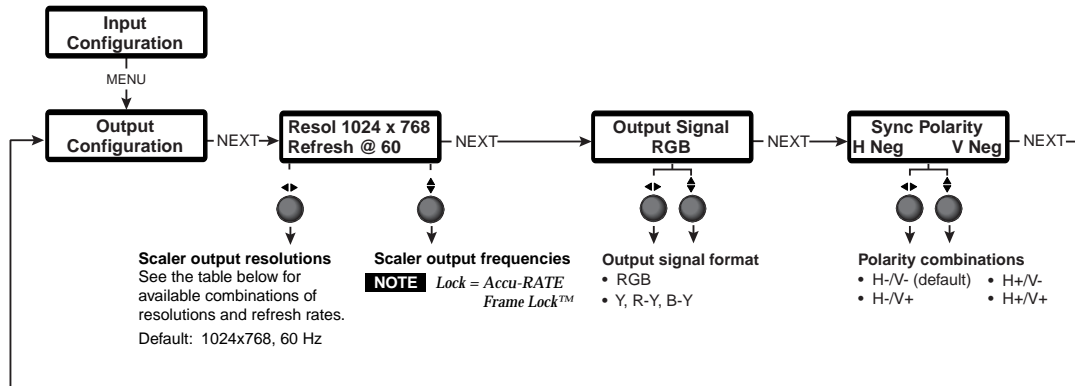


### Main menu



## Quick Start — DDS 402, cont'd

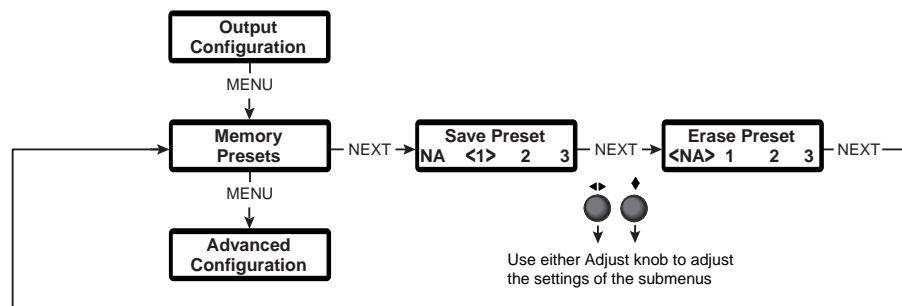
### ② Output menu



Resolution	50 Hz	56 Hz	60 Hz	75 Hz	85 Hz	Lock at 50/60 Hz*
640 x 480	X		X	X		X
800 x 600	X		X	X		X
832 x 624			X	X		X
848 x 480			X			X
852 x 480			X			X
1024 x 768	X		X	X	X	X
1280 x 768		X				X
1280 x 1024	X		X			X
1360 x 765			X			X
1365 x 1024			X			X
1400 x 1050	X		X			X
576p	X					X
720p	HDTV @ 60 Hz only		X			X
1080p	HDTV @ 60 Hz only		X			X
1080i	X		X			X

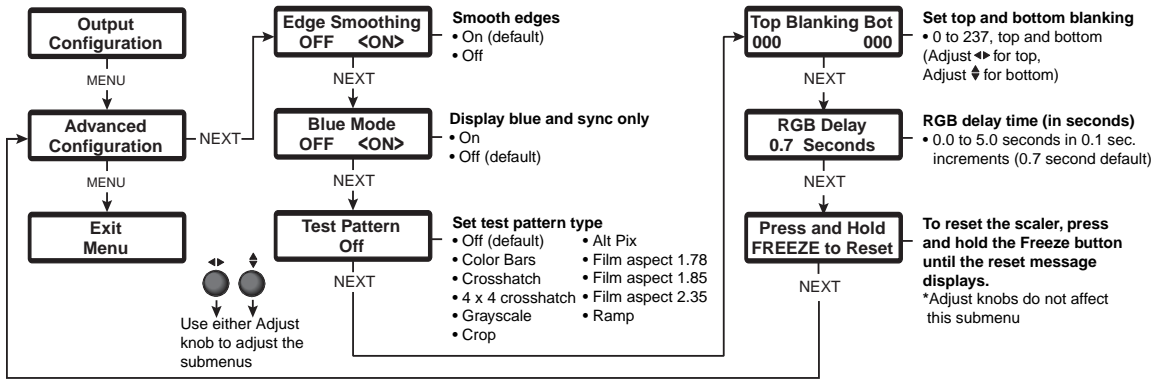
\* The output rate is auto-selected, based on the input.

### ③ Memory Presets menu

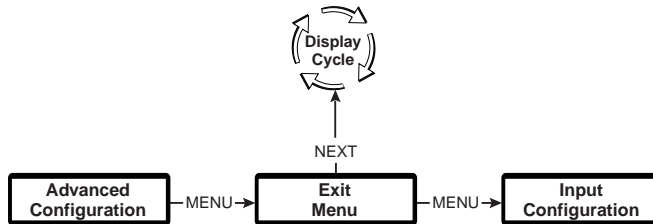


# Quick Start — DDS 402, cont'd

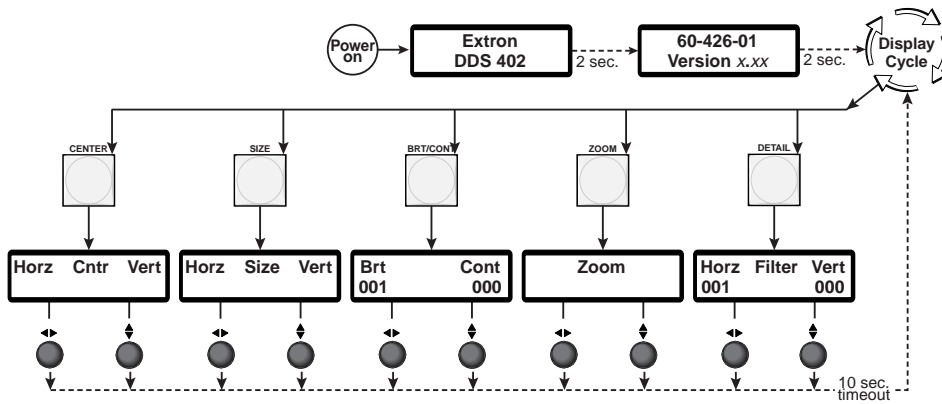
## 4 Advanced Configuration menu



## 5 Exit menu

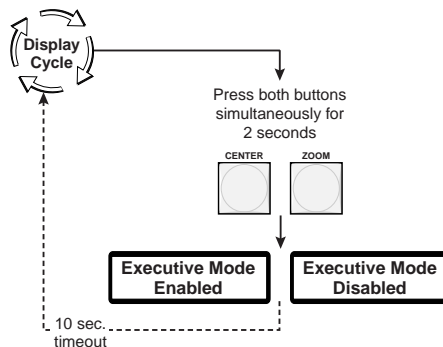


## Picture Adjustments menu



**NOTE** The Adjust  $\leftrightarrow$  knob and the Adjust  $\updownarrow$  knob are used to adjust the image settings on the left and right sides of the LCD screen, respectively.

## Executive Mode menu



# Table of Contents

---

<b>Chapter 1 • Introduction</b> .....	1-1
<b>About this Manual</b> .....	1-2
<b>About the Scaler</b> .....	1-2
<b>Features</b> .....	1-3
<b>Chapter 2 • Installation</b> .....	2-1
<b>Installation Overview</b> .....	2-2
<b>Mounting the Scaler</b> .....	2-2
Table use .....	2-2
Rack mounting .....	2-2
<b>Cabling and Rear Panel Views</b> .....	2-2
Video input connections .....	2-3
Video output connections .....	2-3
RS-232 connection .....	2-4
Contact closure connection .....	2-4
Power connection .....	2-4
<b>Configuration</b> .....	2-4
<b>Chapter 3 • Operation</b> .....	3-1
<b>Front Panel Controls and Indicators</b> .....	3-2
Freeze button .....	3-2
Input buttons .....	3-2
Selecting an input .....	3-2
Recalling presets .....	3-2
Picture adjustment buttons .....	3-3
LCD display .....	3-3
Menu control buttons .....	3-3
Adjustment knobs .....	3-3
Button icons .....	3-4
<b>Front Panel Operations</b> .....	3-4
Power .....	3-4
Menu system overview .....	3-4
Configuration .....	3-5
Input Configuration menu .....	3-5
Input #2 submenu .....	3-6
Pixel Phase submenu .....	3-6
Output Configuration menu .....	3-6
Resolution and refresh rates submenu .....	3-7
Output signal submenu .....	3-7
Sync Polarity submenu .....	3-7
Memory Presets menu .....	3-8
Save Presets submenu .....	3-8
Erase Presets submenu .....	3-8

## Table of Contents, cont'd

---

Advanced Configuration menu .....	3-9
Edge Smoothing submenu .....	3-9
Blue Mode submenu .....	3-9
Test Pattern submenu .....	3-9
Blanking submenu .....	3-9
RGB Delay submenu .....	3-9
Reset submenu .....	3-10
Exit menu .....	3-10
Picture adjustments .....	3-10
Front panel security lockout (executive mode) .....	3-11
<b>Optimizing the Video .....</b>	<b>3-12</b>
Setting up a DVD source .....	3-12
<b>Chapter 4 • Programmer's Guide .....</b>	<b>4-1</b>
<b>Symbols .....</b>	<b>4-2</b>
<b>Scaler-Initiated Messages .....</b>	<b>4-3</b>
Any time .....	4-3
Power up .....	4-3
Input selection .....	4-3
Input and output video type .....	4-3
Freeze .....	4-3
Picture adjustments .....	4-3
RGB delay .....	4-4
Test pattern .....	4-4
Presets .....	4-4
<b>Host-to-Scaler Instructions .....</b>	<b>4-5</b>
<b>Scaler Error Responses .....</b>	<b>4-5</b>
<b>Using the Command/Response Table .....</b>	<b>4-5</b>
Command/response table for SIS commands .....	4-6
Command/response table for special function SIS commands .....	4-9
<b>Chapter 5 • Scaler Software .....</b>	<b>5-1</b>
<b>Control Software for Windows .....</b>	<b>5-2</b>
Installing the software .....	5-2
Using the control program .....	5-2
Using the help program .....	5-3
<b>Button-Label Generator .....</b>	<b>5-4</b>
Installing the software .....	5-4
Using the software .....	5-4



---

<b>Appendix A • Reference Information</b> .....	A-1
<b>Specifications</b> .....	A-2
<b>Part Numbers</b> .....	A-3
Included parts .....	A-3
Suggested part .....	A-3
<b>Firmware Upgrade Installation</b> .....	A-4
<b>Button Labels</b> .....	A-6
Installing labels in the scaler's buttons .....	A-6

## Table of Contents, cont'd

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68-555-01 Rev. D  
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# Digital Display Scaler

# 1 Chapter One

## Introduction

About this Manual

About the Scaler

Features

# Introduction

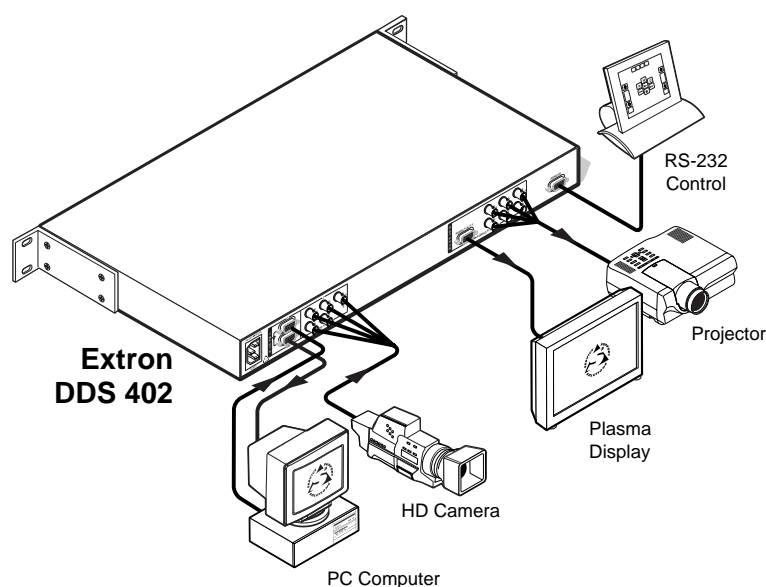
## About this Manual

This manual contains installation, configuration, and operating information for the Extron DDS 402 digital display scaler.

This chapter identifies the scaler's features. Chapter 2 details how to install the scaler. Chapter 3 describes how to operate the scaler and use all of its features. Chapter 4 provides information about programming the scaler under RS-232 control, such as from a PC or a host controller. Chapter 5 details the Extron control software for Windows, which allows you to operate the scaler from a PC in a graphical environment. Appendix A lists the scaler's specifications and pertinent part numbers and provides procedures for performing updates and repairs.

## About the Scaler

The DDS 402 is a two-input digital display scaler (figure 1-1). The scaler inputs high-resolution RGBHV/RGBS/RGsB video on a 15HD connector (Input 1) and either RGBHV/RGBS/RGsB video or component video signals on five BNC connectors (Input 2). Input 1 is buffered, looped through, and output on a 15HD connector for use by a local monitor. The DDS 402 scales the selected input up or down to any 1 of 41 output resolutions and rates and outputs the video as both RGBHV or RGBS video and HD component video, on five BNCs and a 15HD connector. Several of the output resolutions and rates include Extron's Accu-RATE Frame Lock™ (AFL™), a proprietary technology that locks the output frame rate to the input rate, solving the problems that result from different input and output rates. For home theaters, the DDS 402 features HDTV 720p, 1080p, and 1080i outputs.



**Figure 1-1 — DDS 402 digital display scaler**

For upscaling, the DDS 402 converts the horizontal and vertical sync timing and the number of lines of the lower-resolution RGB input to match the native resolution of the display. This produces an undistorted, brighter picture.

For downscaling, the DDS 402 accepts any computer resolution, up to 1600 x 1200, with horizontal scan rates up to 100 kHz and vertical scan rates up to 120 Hz, and converts the input to match the native resolution of the display.

The scaler is ideal for displaying images on projectors with limited display resolutions, such as liquid-crystal display (LCD) projectors, digital light processor (DLP) projectors, and plasma projectors.

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The scaler also features a zoom function, up to 200%, that maintains the original aspect ratio. The zoom function makes the scaler ideal for video wall applications using four displays and four DDS 402s zoomed to 200%.

The scaler features four levels of horizontal filters, which help prevent detail loss, and ten levels of vertical filtering, which reduce flicker.

Other picture controls that the DDS 402 provides are centering, size, brightness, and contrast adjustments. The scaler also has a top and bottom line blanking function.

The DDS 402 is housed in a rack-mountable, 1U high, 17.5" wide metal enclosure. With the included mounting brackets, the scaler can be rack mounted, or mounted under a desk or table, or against a wall or the side of a desk. The DDS 402 has an internal 100VAC to 240VAC, 50/60 Hz, 30 watts auto-switchable power supply that provides worldwide power compatibility.

## Features

**Inputs** — The DDS 402 switches between two inputs: Input 1 accepts computer video on a 15HD connector, Input 2 accepts high resolution RGBHV, RGBS, RGSB, or component video on five BNCs.

**Computer video loop-through connector** — The computer video input, Input 1, is buffered, looped through, and output for use on a local monitor on a 15HD connector.

**Outputs** — The DDS 402 scales images to the following output resolutions:

- 640 x 480 (VGA) at 50 Hz, 60 Hz, 75 Hz, and lock\*
- 800 x 600 (SVGA) at 50 Hz, 60 Hz, 75 Hz, and lock\*
- 832 x 624 (Macintosh) at 60 Hz and 75 Hz, and lock\*
- 848 x 480 (plasma) at 60 Hz and lock\*
- 852 x 480 (plasma) at 60 Hz and lock\*
- 1024 x 768 (XGA) at 50 Hz, 60 Hz, 75 Hz, 85 Hz, and lock\*
- 1280 x 768 (plasma) at 56 Hz and lock\*
- 1280 x 1024 (SXGA) at 50 Hz, 60 Hz, and lock\*
- 1360 x 765 (plasma) at 60 Hz and lock\*
- 1365 x 1024 (plasma) at 60 Hz and lock\*
- 1400 x 1050 (SXGA+) at 50 Hz, 60 Hz, and lock\*
- 576p (HDTV) at 50 Hz and lock\*
- 720p (HDTV) at 60 Hz and lock\*
- 1080p (HDTV) at 60 Hz and lock\*
- 1080i (HDTV) at 50 Hz, 60 Hz, and lock\*

\* See Accu-RATE Frame Lock (patent pending) below.

**Operational flexibility** — Operations such as input and scaling selection, picture controls, and saving and recalling of presets can be performed on the front panel or over the RS-232 link. The RS-232 link allows remote control via a PC or control system. Input selection is also available under contact closure control.

- **Front panel control** — The scaler front panel controller supports individual input selection. The front panel features large, positive touch, illuminated buttons that can be labeled with text or graphics, two rotary knobs for making adjustments or selecting menu options, and an LCD.
- **Windows-based control program** — Extron's Windows-based control program provides a versatile range of operational options with its graphical interface and drag-and-drop/point-and-click operation.
- **Simple Instruction Set (SIS™) control** — The remote control protocol uses Extron's SIS for easy programming and operation.
- **Contact closure control** — The operator can select either input via contact closure through the Remote port.

**Accu-RATE Frame Lock™ (AFL™)** — A technology exclusive to Extron that solves frame rate conversion issues experienced by video scalers. When video input and output refresh rates differ, occasionally the two rates cross over each other. The result is a glitch or image freeze on the display. AFL solves this problem by locking the output frame rate to the input frame rate.

**3:2 pulldown detection for NTSC video sources** — This advanced, patent pending, film mode processing feature helps maximize image detail and sharpness for video sources that originated from film. When film is converted to NTSC video, the film frame rate has to be matched to the video frame rate in a process called 3:2 pulldown. Jaggies and other image artifacts can result if conventional deinterlacing techniques are used on film-source video. The DDS 402's advanced film mode processing recognizes signals that originated from film. The DDS 402 then applies video processing algorithms that optimize the conversion of video that was made with the 3:2 pulldown process. This results in richly detailed images with sharply defined lines.

**Test patterns** — The switcher features built-in test patterns to aid in monitor or projector set-up and evaluation.

**Blue mode** — The switcher can be set to output the blue video signal only, to help installers calibrate the monitor or projector.

**Triple-Action Switching™ (RGB delay)** — RGB delay blanks the screen when the scaler switches between inputs. The new sync signals precede the RGB signals, so that a noise-filled scramble is not shown during the transition. The time delay between the RGB and sync signals is user adjustable up to five seconds on the front panel and under RS-232 control.

**Horizontal and vertical detail** — The DDS 402 offers four levels of horizontal detail and eight levels of vertical detail. Horizontal and vertical detail minimize the loss of picture fidelity.

**Picture controls** — Horizontal and vertical centering, horizontal and vertical sizing, brightness, contrast, zoom, and detail controls are available for fine picture adjustments.

**Top and bottom line blanking** — Extron's exclusive variable horizontal blanking feature allows the operator to add black lines at the top and bottom edges of the image to mask the top and bottom each image.

---

**Freeze mode** — Locks the output display to the selected image. Once an input is frozen, the input can be removed without losing the output image. This feature lets the DDS 402 function as a still store.

**Auto memories** — The two inputs support 32 auto-recall memories each, based on the incoming frequency. Information on sizing, centering, detail, contrast, and brightness is saved.

**Front panel security lockout** — Locks out all front panel functions except the input selection and centering controls. When the front panel is locked, all functions are still available via RS-232 commands.

**Mounting flexibility** — Mounting brackets make the 1U high scaler mountable in any conventional 19" wide rack, or under or through a desk or other furniture.

**Power** — The 100VAC to 240VAC, auto-switchable, internal power supply of the DDS 402 provides worldwide power compatibility.

## Introduction, cont'd

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## Digital Display Scaler

# Chapter Two

## Installation

Installation Overview

Mounting the Scaler

Cabling and Rear Panel Views

Configuration

# Installation

---

## Installation Overview

To install and set up a DDS 402 Digital Display Scaler for operation, perform the following steps:

- 1 Disconnect power from all of the equipment, including the video source(s), and the devices that will receive the scaled video signal.
- 2 Rack mount the scaler, if desired. See *Mounting the Scaler* in this chapter.
- 3 Connect the digital input and loop-through cables. See *Video input connections* in this chapter.
- 4 Connect the digital output cables. See *Video output connections* in this chapter.
- 5 If desired, connect the RS-232 cable. See *RS-232 connection* and *Contact closure connection* in this chapter.
- 6 Connect the AC power cable. See *Power connection* in this chapter.

## Mounting the Scaler

The DDS 402 comes with rubber feet and a set of rack mounting brackets.

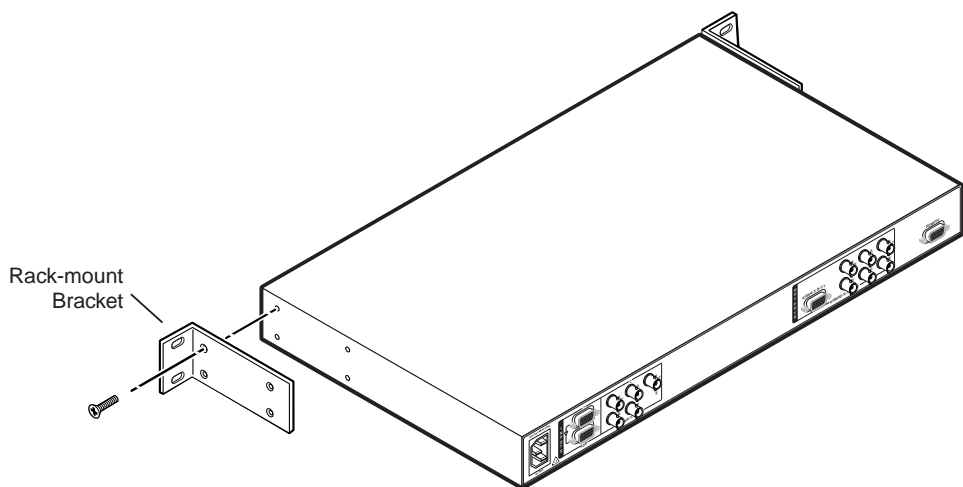
### Tabletop use

For tabletop use, attach a self-adhesive rubber foot to each corner of the bottom of the DDS 402 scaler.

### Rack mounting

Rack mount the scaler as follows:

1. Attach the rack mount brackets to the scaler with eight #8 machine screws, provided (figure 2-1).
2. Insert the scaler into the rack, align the holes in the mounting bracket with those of the rack.



**Figure 2-1 — Mounting the digital display scaler**

3. Secure the scaler to the rack using the supplied machine screws.

## Cabling and Rear Panel Views

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

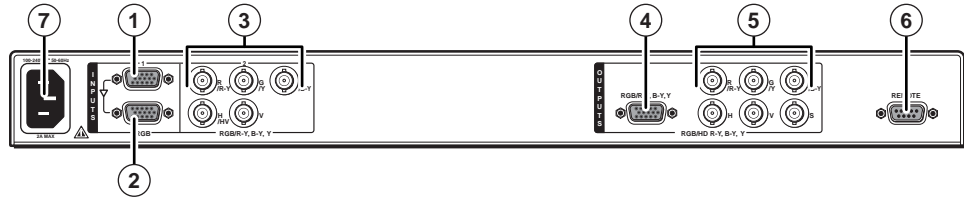
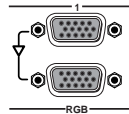


Figure 2-2 — DDS 402 rear panel connectors

## Video input connections

- ① **Input 1 (computer video) input (top) connector** — Connect computer or RGB video to this female 15HD connector.



- ② **Input 1 (computer video) loop-through (bottom) connector** — Connect a local monitor to this female 15HD connector. The scaler buffers the computer video input and loops it on this connector.

**NOTE** The Digital Display Scaler buffers the computer video input signal before passing it to the loop-through connector. Beyond that, it does not alter the loop-through video in any way. The loop through output is the same resolution and frequency as the computer video input.

- ③ **Input 2 (RGB or component video) connectors** — Connect RGBHV, RGBS, RGsB, or component video (R-Y, Y, B-Y for YUVi or YUVp, or Betacam) to these female BNC connectors (figure 2-3).

**NOTE** Ensure that the correct Input 2 video format is selected from the front panel menu, see Input #2 submenu, in chapter 3, Operation, or via the RS-232 port, see chapter 4, Programmer's Guide, and chapter 5, Scaler Software.

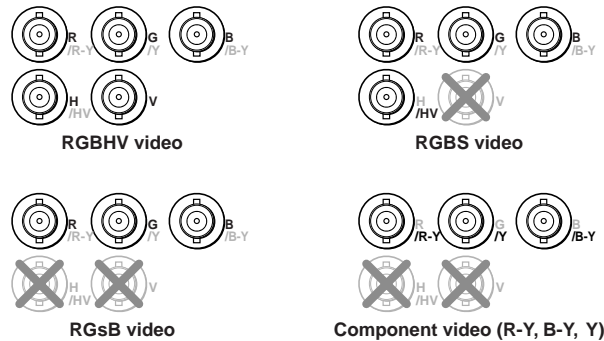


Figure 2-3 — Input 2 connections for RGBHV, RGBS, RGsB and component video

**For RGBHV video** — Connect to five BNC connectors.

**For RGBS video** — Connect to four BNC connectors.

**For RGsB and component video** — Connect to three BNC connectors.

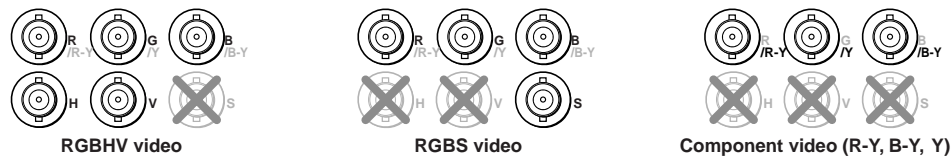
## Video output connections

**NOTE** The two video output connectors, the 15HD connector and the five BNC connectors, both output the same video signal. The 15HD connector outputs RGBHV only, not RGBS.

- ④ **RGB/HD R-Y, B-Y, Y Output 15HD connector** — Connect an RGB video or HD component video display to this female 15HD connector.

## Installation, cont'd

- ⑤ **RGB/HD R-Y, B-Y, Y Output BNC connectors** — Connect an RGB video or HD component video display to these female BNC connectors (figure 2-4).



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

**For RGBHV video** — Connect to five BNC connectors.

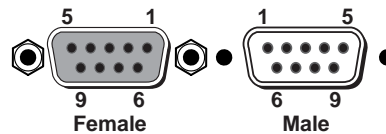
**For RGBS video** — Connect to four BNC connectors.

**For component video** — Connect to three BNC connectors.

### RS-232 connection

- ⑥ **Remote port** — Connect a host device, such as a computer or touch panel control, to the Digital Display Scaler via this 9-pin D connector for serial RS-232 control (figure 2-5).

Pin	RS-232	Function
1	—	Contact closure, input #1
2	TX	Transmit data
3	RX	Receive data
4	—	Contact closure, input # 2
5	Gnd	Signal ground
6	—	Not used
7	—	Not used
8	—	Not used
9	—	Not used



**Figure 2-5 — Remote port pin assignments**

See chapter 4, *Programmer's Guide*, for definitions of the SIS commands and chapter 5, *Scaler Software* to install and use the control software.

### Contact closure connection

- ⑥ **Remote port** — The Remote connector also provides a way to select an input using a remote contact closure device. Contact closure control uses pins on the Remote connector that are not used by the RS-232 interface (figure 2-5).

To select a different input number using a contact closure device, momentarily short the pin for the desired input number to logic ground (pin 5). To force one of the inputs to be always selected, leave the short to logic ground in place. The short overrides front panel input selections.

### Power connection

- ⑦ **AC power connector** — Plug a standard IEC power cord into this connector to connect the scaler to a 100 to 240VAC, 50 Hz or 60 Hz power source. The front panel control and input selection buttons light in sequence during power-up, the LCD displays the product name and then cycles through the default messages.

## Configuration

DDS 402 can be configured using either the front panel controls, the SIS, or the Windows Control program. See chapter 3, *Operation*, chapter 4, *Programmer's Guide*, and chapter 5, *Scaler Software* for more information.



# Chapter Three

## Operation

Front Panel Controls and Indicators

Front Panel Operations

Optimizing the Video

# Operation

## Front Panel Controls and Indicators

All of the Digital Display Scaler's controls and indicators are on the front panel (figure 3-1). The large, positive-touch, illuminated push buttons can be labeled with text and/or graphics. The buttons are fully illuminated green, amber, or red when selected. The 16x2 LCD display indicates the switcher status, and displays menu selections, the data rate, and the status of additional system features.

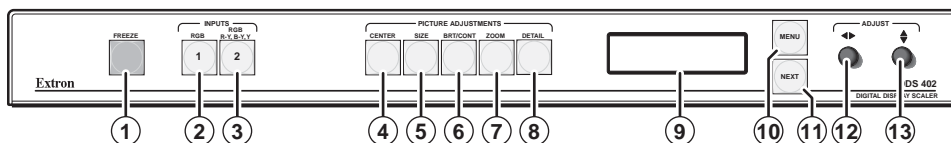


Figure 3-1 — Front panel, digital display scaler

### Freeze button

- ① **Freeze button** — The Freeze button locks the output display to the current image being input. When the freeze function is enabled, the button is lit. To unfreeze the image, press the Freeze button again.

When the image is frozen, the Freeze button lights red. When the freeze function is deselected, the Freeze button returns to unlit.

When an input is frozen, the video input can be removed without losing the display image.

If the other input is then selected, the switching action deselects the Freeze function, the frozen image is lost, and the Freeze button returns to its unlit state.

### Input buttons

Each input button selects an input to scale and output. The buttons also select memory presets. The presets, up to three for each input, are stored values of the user-selectable centering and sizing settings.

**NOTE** *The Input 2 video format, resolution, and frequency must be identified using either the front panel menus, the SIS, or the Windows Control program. See Front Panel Operations in this chapter, chapter 4, Programmer's Guide, and chapter 5, Scaler Software, for more information.*

### Selecting an input

- ② **Input 1 button** — The Input 1 button selects RGB computer video from input 1 (the 15HD input connector).
- ③ **Input 2 button** — The Input 2 button selects RGB video, YUVi, YUVp, Betacam 50, Betacam 60, or HDTV component video from input 2 (the 5 BNC input connectors).

### Recalling presets

As a secondary function the Input 1 and Input 2 buttons, ② and ③, select one of up to three memory presets to recall for the selected input. To recall an input 1 preset, with input 1 already selected, press the Input 1 button repeatedly to select the desired preset. The available presets are selected sequentially in a loop: {press} preset 1, {press} preset 2, {press} input 3, {press} input 1, and so on. Select an input 2 preset by pushing the Input 2 button repeatedly.

Memory presets are created using the Memory Presets menu. See *Memory Presets menu* in this chapter for instructions on creating a preset.

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Memory presets with no values saved in them are not included in the loop; if preset 2 is empty, the loop sequences from preset 1 to preset 3 when the Input button is pressed.

As each preset is recalled, the LCD displays the message Input *x* Memory *y*, where *x* is the input (1 or 2) and *y* is the preset (1, 2, or 3).

**NOTE** *The centering and sizing adjustments are tailored for the selected output rate. If you change the output rate and then recall a preset for the earlier rate, the adjustments recalled in the preset have no effect on the video output. However, if you then change back to the earlier output rate, the affects of the adjustments appear on the screen.*

## Picture adjustment buttons

The picture adjustment buttons select individual image adjustments that are adjusted using the Adjust ◀ (12) and Adjust ▶ (13) knobs. These buttons light when pressed.

- ④ **Center control button** — The Center button selects and deselects the display centering adjustment. See *Picture adjustments* in this chapter.
- ⑤ **Size control button** — The Size button selects and deselects the display size adjustment. See *Picture adjustments* in this chapter.
- ⑥ **Brightness/Contrast control button** — The Brightness/Contrast button selects and deselects the display brightness and contrast adjustments. The brightness adjustment range is from 0 to 127. The contrast adjustment range is from 0 to 255. See *Picture adjustments* in this chapter.
- ⑦ **Zoom control button** — The Zoom button selects and deselects the display zoom adjustment. Zoom works the centering and sizing functions simultaneously to enlarge a portion of the displayed image. Turning either Adjust knob clockwise zooms in on the image, and turning either knob counterclockwise zooms out from the image. See *Picture adjustments* in this chapter.
- ⑧ **Detail control button** — The Detail button selects and deselects the display image detail (sharpness) adjustment. The sharpness adjustment compensates for long cable runs. The Adjust ◀ knob controls the horizontal filter and the Adjust ▶ knob controls the vertical filter. The adjustment range for each filter is 0 to 7. See *Picture adjustments* in this chapter.

## LCD display

- ⑨ **Status display** — The 16-column by 2-line LCD displays configuration menus and status information. See *Front Panel Operations* in this chapter for details.

## Menu control buttons

- ⑩ **Menu button** — The Menu button enters and moves through the main menu system in the DDS 402. See *Front Panel Operations* in this chapter for details.
- ⑪ **Next button** — The Next button steps through the submenus in the DDS 402 menu system. See *Front Panel Operations* in this chapter for details.

## Adjustment knobs

- ⑫ **Adjust ◀ (horizontal) knob** — The Adjust ◀ knob changes settings when used in conjunction with the picture adjustment buttons or the menu system. Rotate this knob to change picture settings when one of the picture adjustment buttons is selected. In the menu system, rotate this knob to scroll through menu options and make adjustments.

## Operation, cont'd

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- ⑬ **Adjust ↕ (vertical) knob** — The Adjust ↕ knob changes settings when used in conjunction with the picture adjustment buttons or the menu system. Rotate this knob to change picture settings when one of the picture adjustment buttons is selected. In the menu system, rotate this knob to scroll through menu options and make adjustments.

### Button icons

The translucent covers on the push buttons can be removed and replaced to insert labels behind the covers.

Input and output labels can be created easily with Extron's Button Label Generator software, which ships with every Extron DDS 402. Each input and output can be labeled with names, alphanumeric characters, or even color bitmaps for easy and intuitive input and output selection (figure 3-2). See chapter 5, *Scaler Software*, for details on using the label software. See Appendix A, *Reference Information*, for blank labels and procedures for removing and replacing the translucent covers.

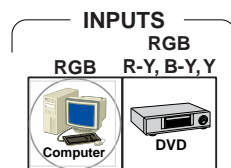


Figure 3-2 — Sample button icons

## Front Panel Operations

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

### Power

Power is automatically applied when the power cord is connected to an AC source. When AC power is applied, the scaler performs a self-test that lights all of the front panel button indicators and then defaults to the selected input (lit). The Menu and Next buttons also light. The self-test also displays the model name and the firmware version in the LCD display. After approximately 2 seconds, the LCD reverts to its default display, cycling through displays of the selected input, the input rate, and the selected output rate (figure 3-3). An error-free power up self-test sequence leaves all of the button indicators, with the exception of the selected input, Menu, and Next pushbuttons, unlit and the LCD displaying the default display cycle.

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

If an error occurs during the self-test, the switcher locks up and will not operate. If your switcher locks up on power-up, call the Extron S<sup>3</sup> Sales & Technical Support Hotline.

### Menu system overview

Figure 3-4 shows a flowchart of the main menus in the menu system.

**Menu button** — Press the Menu button to activate the menu system and to scroll through the five main menus.

**Next button** — Press the Next button to move between the submenus of a selected main menu and to activate one for viewing or configuration. Pressing the Next button while in the input configuration menu causes the current input's number and format type to be displayed on the LCD.



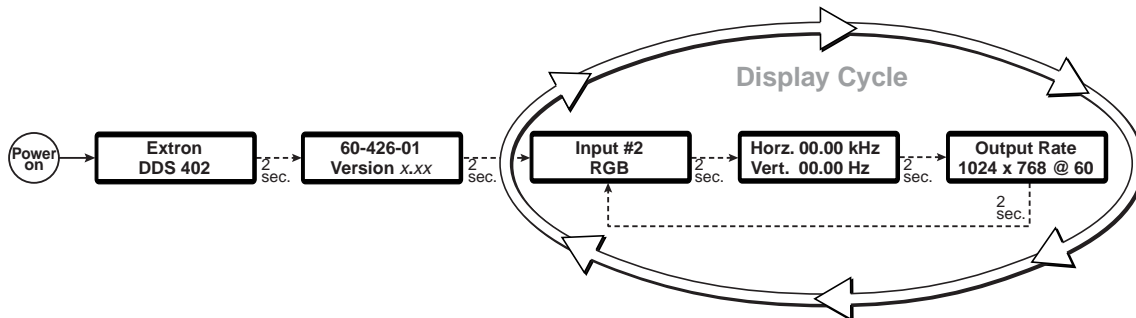


Figure 3-3 — LCD power up and default display cycle

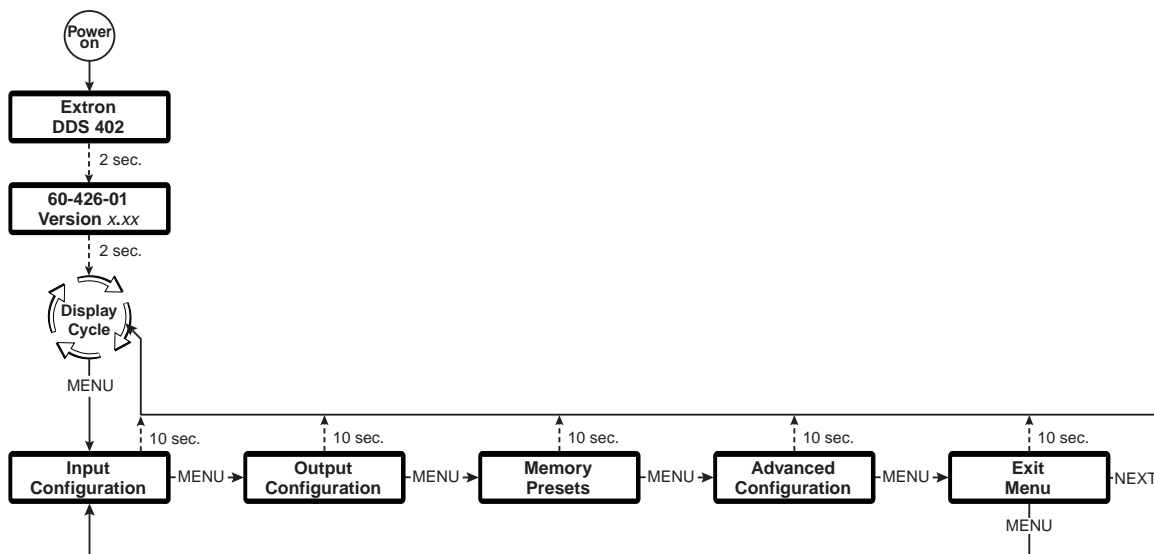


Figure 3-4 — Menu system flowchart

**Adjust**  $\blacktriangleleft$  and  $\blacktriangleright$  knobs — When in a submenu, rotate the Adjust  $\blacktriangleleft$  knob and Adjust  $\blacktriangleright$  knob to scroll through the submenu options and select a setting. Refer to the flowcharts in this chapter and to specific sections for explanations on knob adjustments.

**NOTE** From any menu or submenu, after ten seconds of inactivity, the DDS 402 saves all adjustment settings and times-out to the default LCD display cycle.

## Configuration

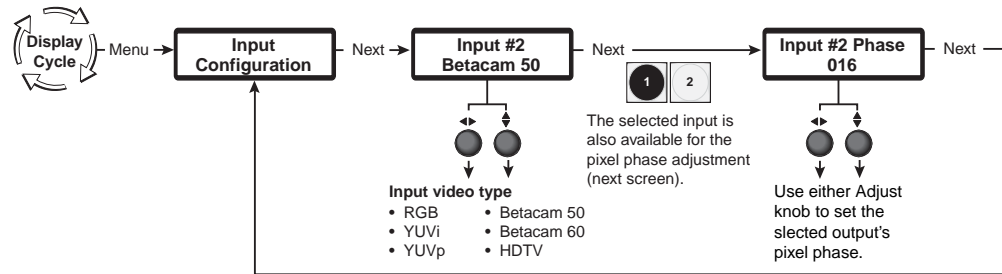
The DDS 402 can be configured using either the menu system and front panel controls, the SIS, or the Windows Control program. See chapter 4, *Programmer's Guide*, and chapter 5, *Scaler Software*.

Use the Menu button to scroll through and select the main menus. Use the Next button to scroll through the submenus of a main menu for viewing or configuration.

### Input Configuration menu

Figure 3-5 is a flowchart that shows an overview of the Input Configuration menu, the Input #2 submenu, and the available settings.

# Operation, cont'd



**Figure 3-5 — Input Configuration menu flowchart**

**NOTE** If you press the Menu button while a main menu or a submenu is active, the next main menu becomes active. For example, the display changes from the Input Configuration main menu or the Input #2 submenu to the Output Configuration main menu.

**NOTE** To return to the default screens, let the DDS 402 remain idle for 10 seconds until the selected screen times out, or press the Menu button until the Exit Menu appears, then press the Next button.

### Input #2 submenu

Rotate either the Adjust ◀▶ or the Adjust ⚡ knob while in the Input #2 submenu to select the correct video format (RGB, YUVi, YUVp, Betacam 50, Betacam 60, or HDTV) for input 2. The default for input 2 is Betacam 60.

### Pixel Phase submenu

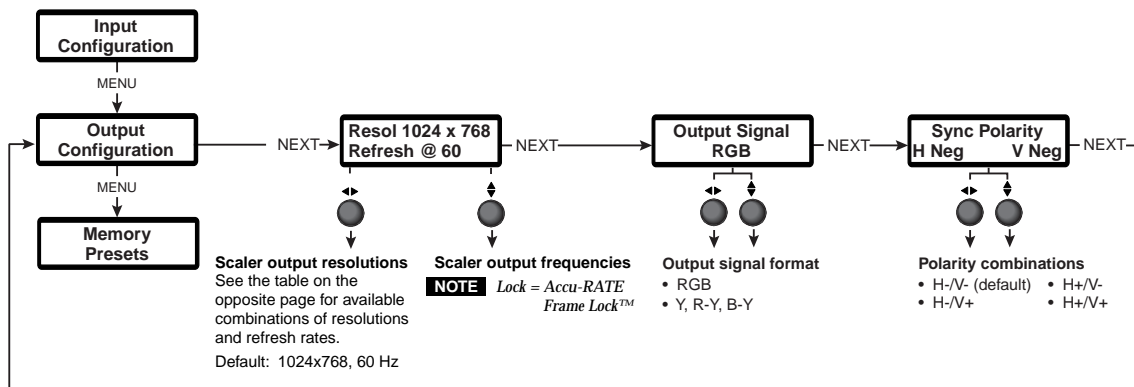
The Pixel Phase submenu displays and lets you set the pixel phase for the selected input. Pixels phase is the timing of the digital scaler's sampling. Sampling at the optimum pixel phase reduces noise and results in a clear and sharp image.

Rotate either the Adjust ◀▶ or the Adjust ⚡ knob to select the pixel phase for the selected input from 0 to 31. You can select the unselected input while this screen is active by pressing the desired Input button. The default is 16.

**NOTE** The pixel phase adjustment for input 2 is only available when the input type is set to RGB, YUVp, or HDTV.

### Output Configuration menu

Figure 3-6 is a flowchart that shows an overview of the Output Configuration menu, the submenus, and the available settings.



**Figure 3-6 — Output Configuration menu flowchart**

### Resolution and refresh rates submenu

Rotate the Adjust ◀ knob while in this submenu to select one of the available output resolutions.

Rotate the Adjust ⬆ knob while in this submenu to select one of the available refresh (vertical scanning) rates. Selecting Lock enables the Extron Accu-RATE Frame Lock (AFL™) feature. Accu-RATE Frame Lock eliminates image tearing and other artifacts of scaling motion video by eliminating frame rate conversion. It exactly matches the output rate of the DDS 402's scaler to the frame rate of the selected input. Select this feature if you will be using motion video sources with a display that is capable of a variety of refresh rates.

The default resolution and refresh rate is 640 x 480 @ 60 Hz.

Resolution	50 Hz	56 Hz	60 Hz	75 Hz	85 Hz	Lock at 50/60 Hz*
640 x 480	X		X	X		X
800 x 600	X		X	X		X
832 x 624			X	X		X
848 x 480			X			X
852 x 480			X			X
1024 x 768	X		X	X	X	X
1280 x 768		X				X
1280 x 1024	X		X			X
1360 x 765			X			X
1365 x 1024			X			X
1400 x 1050	X		X			X
576p	X					X
720p	HDTV @ 60 Hz only		X			X
1080p	HDTV @ 60 Hz only		X			X
1080i	X		X			X

\* The output rate is auto-selected, based on the input.

### Output Signal submenu

Rotate the either Adjust ▶ or the Adjust ⬆ knob counter clockwise while in this submenu to select RGB video. Rotate the knob clockwise to select component (Y, R-Y, B-Y) video for output.

### Sync Polarity submenu

The display or projector may require a particular combination of horizontal (H) and vertical (V) sync signal polarities. Select the appropriate combination of positive or negative H and V sync by rotating either the Adjust ▶ or the Adjust ⬆ knob.

## Memory Presets menu

Figure 3-7 is a flowchart that shows an overview of the Memory Presets menu, the Save Presets and Erase Presets submenus, and the available settings.

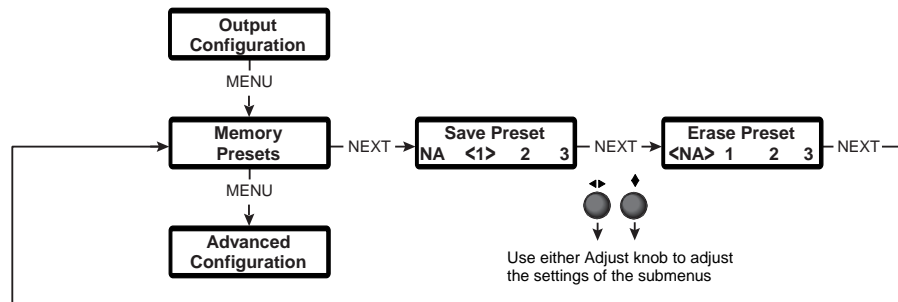


Figure 3-7 — Memory Presets menu flowchart

### Save Presets submenu

Rotate either the Adjust  $\blacktriangleleft$  or the Adjust  $\blacktriangleright$  knob while in the Save Presets submenu to select (< >) one of three memory presets for the selected input or no preset. Press the Next button to save the current settings to the selected preset. Select N/A and press the Next button to exit without saving the settings.

Presets, saved values of the current centering and sizing settings, are saved in non-volatile memory; when the DDS 402 is powered down and later powered back up, the settings are available for selection. Saving the settings to a preset overwrites the settings previously written to that preset.

**NOTE** *The centering and sizing adjustments are tailored for the selected output rate. If you change the output rate and then recall a preset for the earlier rate, the adjustments recalled in the preset have no effect on the video output. However, if you then change back to the earlier output rate, the affects of the adjustments appear on the screen.*

Memory presets are recalled using the Input buttons menu. See *Input buttons* in this chapter for instructions on recalling a preset.

### Erase Presets submenu

Rotate either the Adjust  $\blacktriangleleft$  or the Adjust  $\blacktriangleright$  knob while in the Erase Presets submenu to select (< >) one of three memory presets to erase. Press the Next button to erase the preset.

## Advanced Configuration menu

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

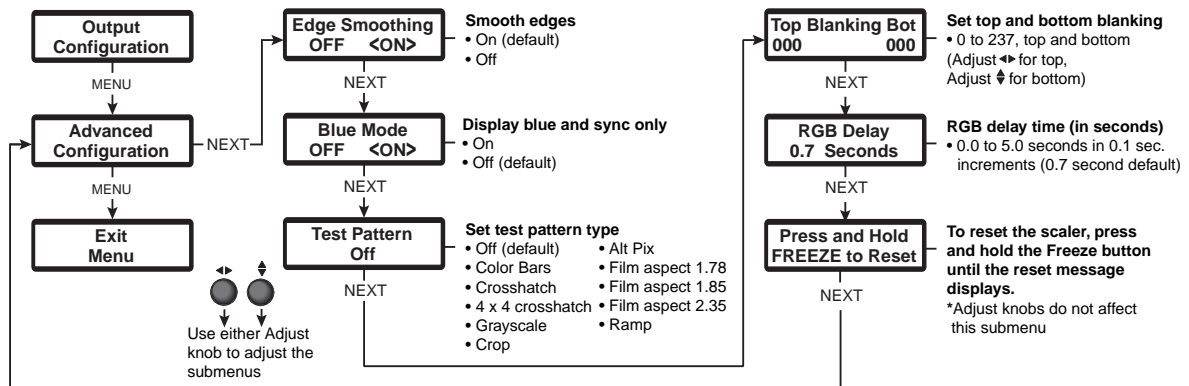


Figure 3-8 — Advanced Configuration menu flowchart

### Edge Smoothing submenu

The Edge Smoothing submenu turns the edge smoothing feature on and off. Edge smoothing smooths edges of a picture by minimizing the differences between pixels.

Use either the Adjust ◀▶ knob or the Adjust ⬆⬇ knob to select On (the default) or Off.

### Blue Mode submenu

The Blue Mode submenu turns the blue mode feature on and off. Blue mode is helpful in the setup of the connected displays' monitors. In the blue mode, only the sync and blue video signals are passed to the display.

Use either the Adjust ◀▶ knob or the Adjust ⬆⬇ knob to select On or Off (the default).

### Test Pattern submenu

The Test Pattern submenu selects from among several test patterns. The test patterns are helpful when adjusting the connected displays for color, convergence, focus, resolution, contrast, grayscale, and aspect ratio.

Use either the Adjust ◀▶ knob or the Adjust ⬆⬇ knob to select a test pattern. The options are: Off, Color Bars, Crosshatch, 4 x 4 Crosshatch, Grayscale, Crop, Alternating Pixels, Film Aspect Ratio 1.78, Film Aspect Ratio 1.85, Film Aspect Ratio 2.35, and Ramp. The default is Off.

### Blanking submenu

The Blanking submenu displays and sets the top and bottom line blanking.

Use the Adjust ◀▶ knob to adjust the top blanking and the Adjust ⬆⬇ knob to adjust the bottom blanking.

### RGB Delay submenu

The RGB Delay submenu displays and sets the RGB delay. With RGB delay, the DDS 402 switches to the new sync signal before switching RGB (video) signals. This allows a brief delay for the displays to adjust to the new sync timing before displaying the new picture, which will appear without glitches. RGB delay is also known as Triple-Action Switching or video mute switching.

Use either the Adjust ◀▶ knob or the Adjust ⬆⬇ knob to select the blanking period (RGB delay time) from 0 seconds to 5 seconds in 0.1 second steps. The default is 0.7 seconds.

## Operation, cont'd

### Reset submenu

The Reset submenu resets the DDS 402 to the default values. Reset the scaler by pressing and **holding** the Freeze button while this submenu is active. The LCD displays **Unit Reset to Factory Defaults** when the reset is complete. Release the Freeze button.

Unit Reset to Factory Defaults

### Exit menu

From the Exit menu (figure 3-9), press the Next button to return to the default display cycle, or press the Menu button to return to the Input Configuration menu.

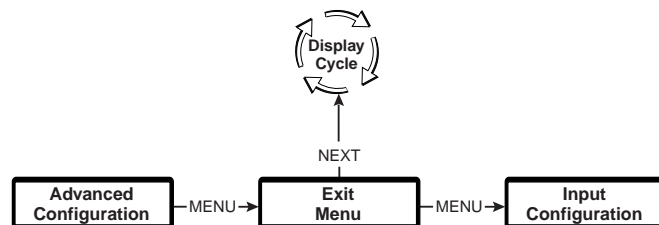
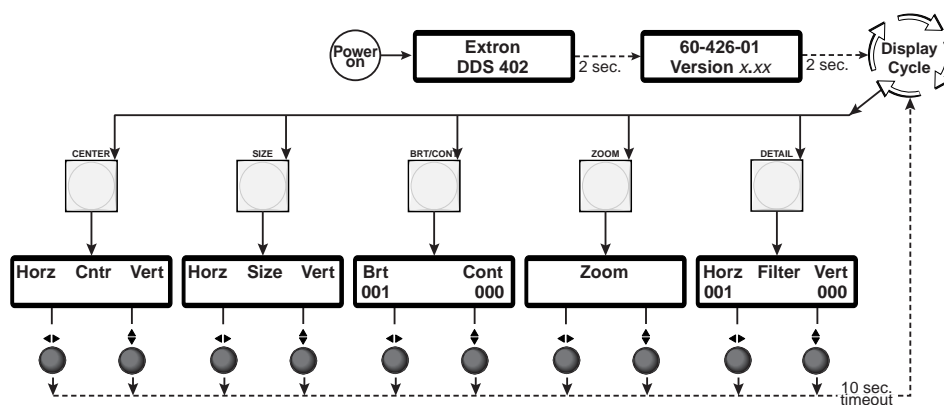


Figure 3-9 — Exit menu flowchart

### Picture adjustments

The picture adjustments allow you to fine tune the image quality of the selected input. When one of the Picture Adjustments buttons (Center, Size, Brightness and Contrast, Zoom, or Detail) is pressed, the corresponding image adjustment menu appears on the LCD screen. Adjustments can then be made by rotating the Adjust ◀ knob or the Adjust ▶ knob. Picture adjustment settings are stored in non-volatile memory; when the scaler is powered down and powered up, the settings are restored.

Adjust an image for centering, sizing, brightness, contrast, color, tint, zoom, or detail as follows (figure 3-10):



**NOTE** The Adjust ◀ knob and the Adjust ▶ knob are used to adjust the image settings on the left and right sides of the LCD screen, respectively.

Figure 3-10 — Picture adjustments flowchart

1. Press the appropriate picture adjustment button: centering (Center), sizing (Size), brightness and contrast (Brt/Cont), zoom, or detail. The LCD display shows the name of the adjustment and the value of the current setting.

2. Rotate the Adjust ◀ knob or Adjust ▲ knob to vary the settings within the following adjustment ranges:

**NOTE** *The Adjust knobs have no mechanical limits to their rotation.*

- **Center:** No ranges are displayed for the Center adjustments. Rather, observe the display and turn the Adjust ◀ knob to adjust horizontal centering and the Adjust ▲ knob to adjust vertical centering.
- **Size:** No ranges are displayed for the Size adjustments. Rather, observe the display and turn the Adjust ◀ knob to adjust horizontal size and the Adjust ▲ knob to adjust vertical size.
- **Brightness/Contrast:** Brightness adjusts from 0 to 64.  
Contrast adjusts from 0 to 255.
- **Zoom:** No ranges are displayed for the Zoom adjustments. Rather, observe the display and turn either Adjust knob clockwise (to zoom in) or counterclockwise (to zoom out). The image increases or decreases in size both the horizontal and vertical dimensions.
- **Detail:** Horizontal (Horz) adjusts from 0 to 7.  
Vertical (Vert) adjusts from 0 to 7.

The DDS 402 picture adjustment functions time-out after 10 seconds; the adjustments are activated and saved and the LCD returns to the default display cycle.

3. Repeat steps 1 and 2 for each image adjustment to be made for that input.

### Front panel security lockout (executive mode)

The front panel security lockout limits the operation of the Digital Display Scaler from the front panel. When the scaler's front panel is locked, all of the front panel functions are disabled except for Freeze and input selection.

To toggle the security lockout on or off, press and hold the Center and Zoom buttons simultaneously for approximately two seconds (figure 3-11). The LCD displays **Executive Mode Enabled** or **Executive Mode Disabled** to indicate the mode. Release the buttons. The LCD also displays **Executive Mode Enabled** if you push a locked out button when the scaler is locked.

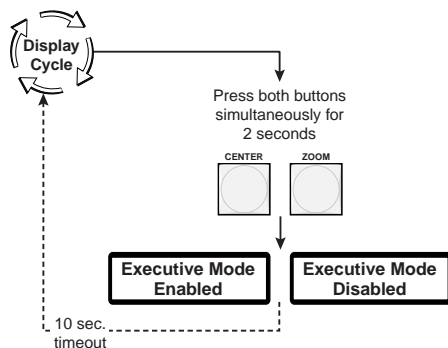


Figure 3-11 — Executive mode flowchart

### Optimizing the Video

Perform the following steps, in sequence, after you have installed the DDS. This procedure will help you to configure the scaler for the best settings for your display environment. In a multi-screen environment, perform this procedure for each display.

See *Advanced Configuration menu* earlier in this chapter to select and output a test pattern and to select and output blue only video.

See *Picture adjustments*, earlier in this chapter, to make adjustments to the picture quality.

See *Memory Presets menu*, earlier in this chapter to save presets.

1. **If you are using a digital display**, such as an LCD or DLP projector, use the alternating pixels test pattern as a reference to adjust the phase and dot clock on the display devices. Proceed to step 3.
2. **If you are using a CRT display**, use the cross hatch test pattern as a reference to converge the display.
3. Set the DDS to output either the crop test pattern for 4:3 video or the appropriate aspect ratio test pattern. Use the display's positioning controls to position the image so that you can see all sides of the test pattern on the display.

**NOTE** *Do not use the DSS's center controls to position the image.*

4. Select an input. Use the DSS's size and center functions to fill the crop or aspect ratio test pattern.

**NOTE** *If the input source is a DVD, set the DVD player to output a 16:9 aspect ratio, see Setting up a DVD source below, before sizing the image using the DSS's size function to correct the aspect ratio.*

**NOTE** *When sizing and centering a letterbox movie video source, increasing the brightness on the DDS makes it easier to see the top and bottom of the active video.*

5. If the input source is RGB, use the horizontal and vertical detail adjustments to increase the sharpness.
6. **For RGB video inputs**, set brightness and contrast levels. See *Color/Tint, Brightness/Contrast, Size, Center, and Detail adjustments*, earlier in this chapter.
7. Save this setting into one of the user memories using the DDS Memories menu.

### Setting up a DVD source

To get the best results when using a DVD as a video source, Extron recommends that the DVD player itself be set up to output an aspect ratio of 16:9 and not 4:3. Because all DVDs are mastered as 16:9, having them set up for anything else causes the player to internally scale and compress the signal.

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

To change the output aspect ratio of most DVD players:

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





# 4 Chapter Four

## Programmer's Guide

Symbols

Scaler-Initiated Messages

Host-to-Scaler Instructions

Scaler Error Responses

Using the Command/Response Table

Command/Response Table for SIS Commands

Command/Response Table for Special Function SIS Commands

# Programmer's Guide

The scaler's rear panel Remote 9-pin D female connector (figure 4-1) can be connected to the RS-232 serial port output of a host device such as a computer running the HyperTerminal utility or a control system. This connection makes software control of the scaler possible.

Pin	RS-232	Function
1	—	Contact closure, input #1
2	TX	Transmit data
3	RX	Receive data
4	—	Contact closure, input #2
5	Gnd	Signal ground
6	—	Not used
7	—	Not used
8	—	Not used
9	—	Not used

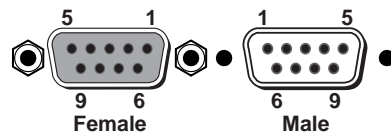


Figure 4-1 — Remote connector pin arrangement

The protocol is 9600 baud, 8-bit, 1 stop bit, no parity, and no flow control.

## Symbols

Symbols ( $\boxed{xn}$  values), defined below, are used throughout the discussions of the switcher-initiated messages that begin on the next page and the command/response table that begins on page 4-6. The symbols represent variables in the switcher-initiated messages and the command/response table fields.

↵ = CR/LF (carriage return/line feed) (hex 0D 0A)

← = Carriage return (no line feed)

• = Space

$\boxed{\text{Esc}}$  = Escape key

$\boxed{X1}$  = Input number (1 or 2)

$\boxed{X2}$  = Input video type:

0 = RGB	3 = Betacam 50
1 = YUVi	4 = Betacam 60
2 = YUVp	5 = HDTV

$\boxed{X3}$  = Scaler resolution:

00 = 640x480	08 = 1360x765
01 = 800x600	09 = 1365x1024
02 = 832x624	10 = 1400 x 1050
03 = 848x480	11 = 576p
04 = 852x480	12 = 720p
05 = 1024x768	13 = 1080p
06 = 1280x768	14 = 1080i
07 = 1280x1024	

$\boxed{X4}$  = Scaler refresh rate

00 = 50 Hz	03 = 75 Hz
01 = 56 Hz*	04 = 85 Hz
02 = 60 Hz	05 = Lock

\* 1280 x 768 only

**NOTE** Lock is Accu-RATE Frame Lock (AFL) — 50 Hz (PAL) or 59.94 Hz (NTSC)

$\boxed{X5}$  = Output video type:

00 = RGB	01 = Component (Y, R-y, B-y)
----------	------------------------------

$\boxed{X6}$  = Output sync polarity:

00 = H-/V-	02 = H+/V-
01 = H-/V+	03 = H+/V+

$\boxed{X7}$  = On/off status (0 = off, 1 = on)

$\boxed{X8}$  = Brightness value (000 thru 063)

$\boxed{X9}$  = Contrast value (000 thru 255)

$\boxed{X10}$  = Filter value (000 thru 007)

$\boxed{X11}$  = Blanking value (0 thru 237)

$\boxed{X12}$  = Pixel sampling phase (00 through 31)

$\boxed{X13}$  = RGB delay (00 to 50)

$\boxed{X14}$  = Test pattern type (1 through 10)

000 = off	006 = alternating pixels
001 = Color Bars	007 = film aspect ratio 1.78
002 = crosshatch	008 = film aspect ratio 1.85
003 = 4x4 crosshatch	009 = film aspect ratio 2.35
004 = grayscale	010 = ramp
005 = crop	

$\boxed{X15}$  = Input configuration preset (01 through 03)

$\boxed{X16}$  =  $nnn.nn$  where

Hrt = horizontal rate (kHz)

Vrt = vertical rate (Hz)

xxx.xx means signal out of range

$\boxed{X17}$  = Detected input signal standard (0 through 4)

0 = none	3 = NTSC 4.43
1 = NTSC 3.58	4 = SECAM
2 = PAL	- = not applicable

**NOTE** — occurs when the input is set for RGB, YUV, or progressive YUV.

---

## Scaler-Initiated Messages

When a local event such as power-up or a front panel operation occurs, the scaler responds by sending a message to the host. The scaler-initiated messages are listed in the following pages. The messages are underlined.

### Any time

Reconfig

The reconfig message is initiated by the scaler when a front panel operation has occurred or a memory preset has been recalled.

### Power-up

(c) Copyright 2002, Extron Electronics, DDS 402 Vx.xx

The copyright message is initiated by the scaler when it is first powered on. Vx.xx is the firmware version number.

### Input selection

In• $x_1$ All

A front panel video and audio switching operation has occurred.  $x_1$  is the input number.

### Input and output video type

Typ $x_2$

A front panel input 2 video type selection has occurred.  $x_2$  is the input video type.

Rte $x_3$ \* $x_4$

A front panel output video format selection has occurred.  $x_3$  is the output resolution and  $x_4$  is the output refresh rate.

Tpo $x_5$

A front panel output video type selection has occurred.  $x_5$  is the output video format (RGB or component [Y, R-y, B-y]).

Pol $x_6$

A front panel output video polarity selection has occurred.  $x_6$  is the output sync polarity.

### Freeze

Pol $x_7$

The freeze feature has been turned on or off from the front panel.  $x_7$  is the on/off status.

### Picture adjustments

Hph

A front panel horizontal centering adjustment has occurred.

Vph

A front panel vertical centering adjustment has occurred.

Hsz

A front panel horizontal size adjustment has occurred.

## Programmer's Guide, cont'd

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Vsz←

A front panel vertical size adjustment has occurred.

Br<sub>x8</sub>←

A front panel color brightness adjustment has occurred. x8 is the brightness variable.

Con<sub>x9</sub>←

A front panel contrast adjustment has occurred. x9 is the contrast variable.

Zom←

A front panel zoom adjustment has occurred.

Dhz<sub>x10</sub>←

A front panel horizontal detail filter adjustment has occurred. x10 is the filter variable.

Dvz<sub>x10</sub>←

A front panel vertical detail filter adjustment has occurred. x10 is the filter variable.

Bl<sub>t</sub><sub>x11</sub>←

A front panel top line blanking adjustment has occurred. x11 is the blanking variable.

Bl<sub>b</sub><sub>x11</sub>←

A front panel bottom line blanking adjustment has occurred. x11 is the blanking variable.

<sub>x1</sub>Phs<sub>x12</sub>←

A front panel pixel phase adjustment has occurred. x1 is the input number and x12 is the pixel phase variable.

Blu<sub>x7</sub>←

The blue-only mode has been turned on or off from the front panel. x7 is the on/off status.

Fil<sub>x7</sub>←

The edge enhancement mode has been turned on or off from the front panel. x7 is the on/off status.

### RGB delay

Dly<sub>x13</sub>←

A front panel RGB delay adjustment has occurred. RGB delay affects input selections. x13 is the delay value, in 0.01 second steps up to 50 = 5.0 seconds.

### Test pattern

Tst<sub>x14</sub>←

A test pattern has been turned on or off for one or both outputs from the front panel. x14 is the test pattern selected.

### Presets

Pre000←

A memory preset has been saved or deleted from the front panel.

## Host-to-Scaler Instructions

The scaler accepts SIS (Simple Instruction Set) commands through the Remote port. SIS commands consist of one or more characters per command field. They do not require any special characters to begin or end the command character sequence. Each scaler response to an SIS command ends with a carriage return and a line feed (CR/LF = ↵), which signals the end of the response character string. A string is one or more characters.

## Scaler Error Responses

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

- E01 — Invalid input channel number (too large)
- E10 — Invalid command
- E11 — Invalid preset number (too large)
- E13 — Invalid value (out of range)
- E17 — Illegal command for this signal type

## Using the Command/Response Table

The command/response table begins on the next page. Except for the horizontal and vertical filter settings, upper or lower case letters are acceptable in the command field. The table below shows the hexadecimal equivalent of each ASCII command. Symbols, defined on page 4-2, are used throughout the table to represent variables in the command/response fields. Command and response examples are shown throughout the table.

ASCII to HEX Conversion Table				Esc 1B	CR 0D	LF 0A		
Space 20	!	21	" 22	# 23	\$ 24	% 25	& 26	' 27
( 28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F	
0 30	1 31	2 32	3 33	4 34	5 35	6 36	7 37	
8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F	
@ 40	A 41	B 42	C 43	D 44	E 45	F 46	G 47	
H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F	
P 50	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	
X 58	Y 59	Z 5A	[ 5B	\ 5C	] 5D	^ 5E	_ 5F	
` 60	a 61	b 62	c 63	d 64	e 65	f 66	g 67	
h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F	
p 70	q 71	r 72	s 73	t 74	u 75	v 76	w 77	
x 78	y 79	z 7A	{ 7B	7C	} 7D	~ 7E	DEL 7F	

**NOTE** With the exception of the horizontal and vertical filtering (D and d) commands, the SIS commands are **not** case sensitive.

# Programmer's Guide, cont'd

## Command/response table for SIS commands

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
<b>Input selection</b>			
Select video input	[x1]!	In•[x1]All↵	Select video input [x1].
Example:	2!	In•2All↵	Select video input 2.
Select video input	[x1]&	In•[x1]Vid↵	Select video input [x1].
Read video input	!	[x1]↵	Video input [x1] is selected.
Read video input	&	[x1]↵	Video input [x1] is selected.
<b>Input 2 video type</b>			
Set video type, <b>input 2 only</b>	[x2]\	Typ[x2]↵	Specify input 2 video type.
Example:	3\	Typ3↵	Specify input 2 type as YUVp.
View video type	\	[x2]↵	Input 2 video type is [x2].
<b>Scaler output rate</b>			
Set the output rate	[x3]*[x4]=	Rte[x3]*[x4]↵	Select a scaler output scan rate.
View the output rate	=	[x3]*[x4]↵	Show the scaler output rate.
Example:	=	01*02↵	The scaler is outputting 800x600 at 60 Hz.
<b>Brightness</b>			
Set a specific value	[x8]Y	Br[t][x8]↵	Specify the brightness adjustment.
Increment	+Y	Br[t][x8]↵	Increase the brightness.
Decrement	-Y	Br[t][x8]↵	Decrease the brightness.
View the brightness value	Y	[x8]↵	Show the brightness setting.
<b>Contrast</b>			
Set a specific contrast value	[x9]^	Con[x9]↵	Specify the contrast adjustment.
Increment	+^	Con[x9]↵	Increase the contrast.
Decrement	-^	Con[x9]↵	Decrease the contrast.
View the contrast value	^	[x9]↵	Show the contrast setting.
<b>Zoom</b>			
Zoom in	+{	Zom↵	Zoom in.
Zoom out	-{	Zom↵	Zoom out.
<b>Horizontal centering</b>			
Increment	+H	Hph↵	Shift right.
Decrement	-H	Hph↵	Shift left.
<b>Vertical centering</b>			
Increment up	+*/	Vph↵	Shift up.
Increment down	-*/	Vph↵	Shift down.
<b>Horizontal size</b>			
Increase the horizontal size	+:	Hsz↵	Widen the picture.
Decrease the horizontal size	-:	Hsz↵	Make the picture narrower.
<b>Vertical size</b>			
Increase the vertical size	+	Vsz↵	Make the picture taller.
Decrease the vertical size	-;	Vsz↵	Make the picture shorter.

## Command/response table for SIS commands (cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
<b>Horizontal detail filter</b>			
Set a specific filter value	$\boxed{x10}D$	Dhz $\boxed{x10}$ ↵	Set the horizontal detail level.
Increment	+D	Dhz $\boxed{x10}$ ↵	Increase the horizontal detail.
Decrement	-D	Dhz $\boxed{x10}$ ↵	Decrease the horizontal detail.
View the horizontal filter value	D	$\boxed{x10}$ ↵	Show the horizontal detail level.
<b>Vertical detail filter</b>			
Set a specific filter value	$\boxed{x10}d$	Dvz $\boxed{x10}$ ↵	Set the vertical detail level.
Increment	+d	Dvz $\boxed{x10}$ ↵	Increase the vertical detail.
Decrement	-d	Dvz $\boxed{x10}$ ↵	Decrease the vertical detail.
View the vertical filter value	d	$\boxed{x10}$ ↵	Show the vertical detail level.
<b>Top blanking</b>			
Set a top blanking value	$\boxed{x11}($	Blt $\boxed{x11}$ ↵	
<i>Example:</i>	2(	Blt2 ↵	Blank top two lines.
Increment top blanking value	+(	Blt $\boxed{x11}$ ↵	Increase blanking value 1 line.
Decrement top blanking value	-(	Blt $\boxed{x11}$ ↵	Decrease blanking value 1 line.
View the top blanking value	(	$\boxed{x11}$ ↵	
<b>Bottom blanking</b>			
Set a bottom blanking value	$\boxed{x11})$	Blt $\boxed{x11}$ ↵	
<i>Example:</i>	5)	Blt5 ↵	Blank bottom five lines.
Increment bottom blanking value	+) )	Blt $\boxed{x11}$ ↵	Increase blanking value 1 line.
Decrement bottom blanking value	-) )	Blt $\boxed{x11}$ ↵	Decrease blanking value 1 line.
View the bottom blanking value	)	$\boxed{x11}$ ↵	
<b>Pixel phase</b>			
Set a specific pixel sampling phase	$\boxed{x11}*\boxed{x12}U$	$\boxed{x11}Phs\boxed{x12}$ ↵	Specify the pixel sampling phase.
<i>Example:</i>	1*11U	1Phs11 ↵	Set the sample phase value to 11 for input 1.
<b>Increment</b> sampling value	$\boxed{x11}+U$	$\boxed{x12}Phs\boxed{x12}$ ↵	Increase the phase value.
<b>Decrement</b> sampling value	$\boxed{x11}-U$	$\boxed{x12}Phs\boxed{x12}$ ↵	Decrease the phase value.
<b>View</b> the sampling value	$\boxed{x11}U$	$\boxed{x12}$ ↵	Show the pixel sampling phase.
<b>Freeze</b>			
Enable	1F	Frz1 ↵	Output a "frozen" video image.
Disable	0F	Frz0 ↵	Turn off freeze (output motion video).
View the freeze status	F	$\boxed{x7}$ ↵	Show the freeze status.
<i>Example:</i>	F	0 ↵	Freeze is off.
<b>Front panel security lockout (executive mode)</b>			
Disable	0X	Exe0 ↵	Adjustments and selections can be made from the front panel.
Enable (lock image adjustments)	1X	Exe1 ↵	Lock front panel adjustments; adjust image via RS-232 only.
View the executive mode status	X	$\boxed{x7}$ ↵	Show executive mode status.
<i>Example:</i>	X	1 ↵	The front panel is locked.

# Programmer's Guide, cont'd

## Command/response table for SIS commands (cont'd)

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
<b>Test pattern</b>			
Select test pattern	[X14]J	Tst[X14]↵	Select a test pattern.
View test pattern	J	[X14]↵	Show the test pattern.
<i>Example:</i>	J	0↵	Test pattern is off.
<b>Memory presets</b>			
Save current settings as a preset	[X15],	Spr[X15]↵	Command character is comma.
Recall a preset	[X15].	Rpr[X15]↵	Command character is period.
<b>Firmware version, part number &amp; information requests</b>			
Query firmware version number	Q	x.xx↵	Show the controller firmware version.
Request part number	N	60-426-01↵	Show the DDS 402's part #.
Request general information	I	(See below) Vid[X1]•Hrt[X16]•Vrt[X16]•Std[X17]•Pre $nnn$ ↵	Show the DDS 402's status.
<p><b>NOTE</b> In the response, the "Pre" field consists of three digits, each of which represents one of the three user presets. A one (1) in a digit indicates that a preset is saved to that location, a zero (0) indicates that no preset is saved to that location.</p>			
<b>Zap (reset to default settings)</b>			
Zap all DDS 402 settings	[Esc]zXXX↵	Zpx↵	Reset everything: all settings, and adjustments to the factory defaults.



## Command/response table for special function SIS commands

The syntax for setting a special function is  $\boxed{x?}*\boxed{xn}\#$  where  $\boxed{x?}$  is the function number (such as 3 for the “set RGB delay” command in the first example below),  $\boxed{xn}$  is the value or variable (such as 35 in the first example below), and # is the execute command. To view a function’s setting, use  $\boxed{x?}\#$  where  $\boxed{x?}$  is the function number. In the following table the values of the  $\boxed{x?}$  variable are different for each command/function. These values are given in the rightmost column.

Command	ASCII Command (host to scaler)	Response (scaler to host)	Additional description
<b>Delay times</b>			
RGB delay (Triple-Action Switching)	3* $\boxed{x13}\#$	Dly $\boxed{x13}$ ↵	Adjustable in 0.01 second steps up to 50 = 5.0 seconds. 0 = 0.0 seconds (default), 1 = 0.1 seconds, 2 = 0.2 seconds, and so on.
<i>Example:</i>	3*35#	Dly35 ↵	RGB delay set to 3.5 seconds.
<b>Scaler settings</b>			
Output signal	6* $\boxed{x5}\#$	Tpo $\boxed{x5}$ ↵	0 = RGB (default). 1 = Component (Y, R-y, B-y). RGB output signal.
<i>Example:</i>	6*1#	Tpo01 ↵	
Output polarity	7* $\boxed{x6}\#$	Pol $\boxed{x6}$ ↵	0 = H-/V- (default). 1 = H-/V+. 2 = H+/V-. 3 = H+/V+.
<i>Example:</i>	7*1#	Pol01 ↵	<i>Example:</i> H-/V+ output polarity.
<b>Blue screen</b>			
Blue screen (output blue and sync only)	8* $\boxed{x7}\#$	Blu $\boxed{x7}$ ↵	0 = off (normal output). 1 = on (blue video & sync output).
<i>Example:</i>	8*1#	Blu1 ↵	Blue & sync output as a tool for system setup.
<b>Edge smoothing</b>			
Edge enhancement	16* $\boxed{x7}\#$	Fil $\boxed{x7}$ ↵	0 = off 1 = on (default)
<i>Example:</i>	16*1#	Fil1 ↵	Enable edge smoothing.

# Programmer's Guide, cont'd

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Digital Display Scaler

# 5

## Chapter Five

### Scaler Software

Control Software for Windows

Button-Label Generator

# Scaler Software

## Control Software for Windows

Two software programs accompany the DDS 402:

- The Extron USPDDS Control Program, which communicates with the scaler via the Remote port, provides an easy way for you to control the scaler.
- The Extron Button-Label Generator, which allows you to design and print labels to insert in the scaler front panel buttons.

Both programs are compatible with Windows 95/98, Windows NT, Windows ME., Windows 2000, and Windows XP. Updates to these programs can be downloaded from the Extron Web site (<http://www.extron.com>).

## Installing the software

The programs are contained on a CD-ROM, and you should load and run the program from the hard drive.

To install the program from the CD-ROM to the hard drive, run SETUP.EXE from the CD-ROM and follow the instructions that appear on the screen. The program occupies approximately 2 Mb (megabytes) of hard-drive space.

By default the installation creates a C:\USPDDS directory, and it places three icons (USPDDS Control Pgm, USPDDS Help, and Button-Label Generator) into a group or folder named "Extron Electronics".

## Using the control program

Many items found in the USPDDS Control Program are also accessible via front panel controls and the LCD menus, see chapter three, *Operation*, and under SIS control, see chapter 4, *Programmer's Guide*. The USPDDS Help Program provides information on settings and on how to use the control program itself.

1. To run the control program, double-click on the USPDDS Control Pgm icon in the Extron Electronics group or folder. The Comm menu appears on the screen.
2. Click on the comm port that is connected to the DDS 402's Remote port.



The Extron USPDDS Control Program window (figure 5-1) appears.

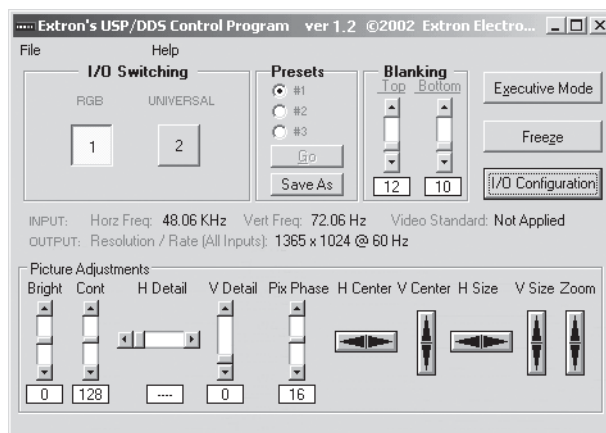
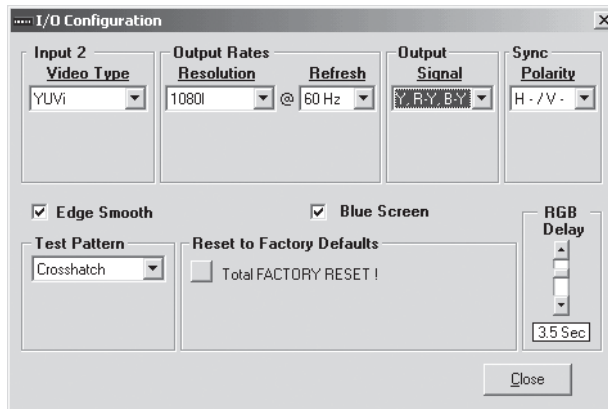


Figure 5-1 — Windows Control program window

3. Click on the *I/O Configuration* button to configure the inputs in the I/O configuration window (figure 5-2).



*Figure 5-2 — Control program I/O configuration window*

## Using the help program

For information on program features, press the F1 computer key, or click on the Help menu from within the USPDDS Control Program, or double-click on the USPDDS Help icon in the Extron Electronics group or folder.



For explanations of buttons or functions, click on the tabs in the help screen to reach the desired screen. Use a mouse or the Tab and Enter keys to select a button/function. A description and tips on using the program appear on screen.

## Button Label Generator

You may wish to customize the labeling of the DDS 402's front panel buttons. Blank templates for the DDS 402's button label windows are included in appendix A of this manual. However, you can easily create, customize, and print labels for the scaler's button label windows by using the Button-Label Generator software.

The program is included on the same CD-ROM as the DDS 402 control program, and it can also be downloaded from the Extron Web site (<http://www.extron.com>). This program creates and prints labels that can be inserted into the illuminated push buttons on the scaler.

## Installing the software

By default, the installation program installs the program in the C:\USPDDS directory, and the Button-Label Generator icon is placed in the "Extron Electronics" group or folder.

## Using the software

1. To run the Button-Label Generator program, double-click on the Button-Label Generator icon (shown at right) in the Extron Electronics group or folder, and click OK when prompted. The Extron's Button-Label Generator window appears (figure 5-3).
2. Under *System selection*, choose *System 7SC*. This selection creates the correctly sized labels for the DDS's buttons. The button label editing area changes to reflect the number and arrangement of buttons on the device.

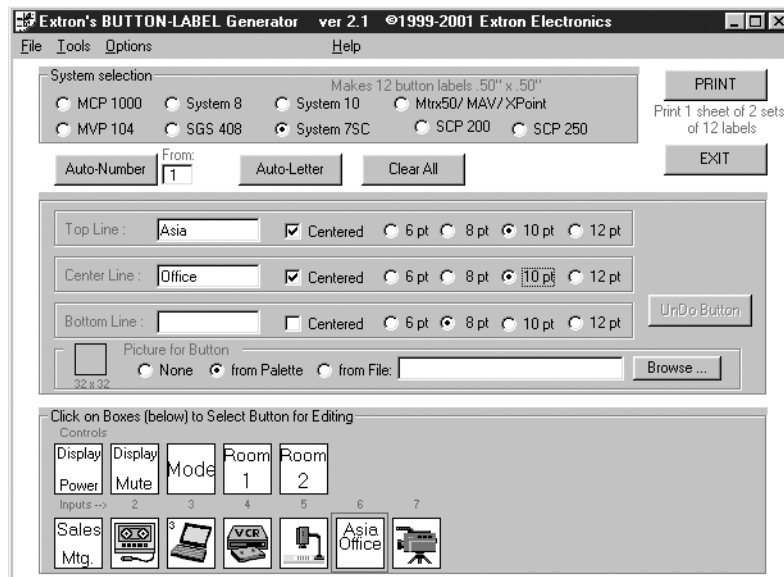


Figure 5-3 — Extron's Button-Label Generator window

3. Using normal Windows controls, you can create and print labels that can be cut out and placed in the label windows on the front panel of the USP.

For information about using the program, you can access a help file by clicking on the Help menu on the main screen and choosing *Show Help*.

You can also see an example of a completed Extron Button-Label Generator window by clicking on the Help menu on the main screen, choosing *Show Help*, and clicking on the Load Demo button.



## Digital Display Scaler

# A

# Appendix A

## Reference Information

Specifications

Part Numbers

Firmware Upgrade Installation

Button Labels

# Reference Information

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## Specifications

### Video input

Number/signal type .....	1 RGBHV, RGBS, RGsB 1 RGBHV, RGBS, RGsB, component video
Connectors .....	(1) 15-pin HD female 5 BNC female
Nominal level .....	1 Vp-p for Y of component video 0.7 Vp-p for RGB for R-Y and B-Y of component video
Minimum/maximum levels .....	Analog: 0.0 V to 2.0 Vp-p with no offset
Impedance .....	75 ohms
Horizontal frequency	
RGB .....	Autoscan 24 kHz to 100 kHz
Video .....	PAL/NTSC 3.38/NTSC 4.43/SECAM
Vertical frequency .....	Autoscan 50 Hz to 120 Hz
Resolution range .....	Autoscan 560 x 384 to 1600 x 1200

### Video processing

Digital sampling .....	24 bit, 8 bits per color; 140 MHz standard, 200 MHz zoom
Colors .....	16.8 million
Horizontal filtering .....	4 levels
Vertical filtering .....	8 levels

### Video output

Number/signal type .....	2 identical outputs: 1 RGBHV, HD component (Y, R-Y, B-Y) (on 15-pin HD) 1 RGBHV, RGBS, HD component (Y, R-Y, B-Y) (on BNCs)
Connectors .....	(1) 15-pin HD female 6 BNC female (1) 15-pin HD female (buffered local monitor output)
Nominal level .....	1 Vp-p for Y of component video 0.7 Vp-p for RGB and for R-Y and B-Y of component video
Minimum/maximum levels .....	0.0 V to 1.0 Vp-p
Impedance .....	75 ohms
Scaled VGA resolution .....	640x480, 800x600, 832x624, 848x480, 852x480, 1024x768, 1280x768, 1280x1024, 1360x765, 1360x1024, 1400x1050, 576p, 720p, 1080p, and 1080i
DC offset .....	±50 mV (max) with input at 0 offset (for R, G, B, and for Y of component video) 350 ± 25 mV (max) with input at 0 offset (for R-Y, B-Y of component video)

### Sync

Input type .....	RGBHV, RGBS, RGsB
Output type .....	RGBHV, RGBS
Standards .....	NTSC 3.58, NTSC 4.43, PAL, SECAM
Input level .....	0.0 V to 5.0 Vp-p
Output level .....	0.0 V to 5.0 Vp-p
Input impedance .....	75 ohms
Output impedance .....	510 ohms
Max input voltage .....	5.0 Vp-p
Polarity .....	RGBS: negative RGBHV: user-selectable



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## Control/remote — video scaler/scan converter

Serial control port .....	RS-232, 9-pin female D connector
Baud rate and protocol .....	9600 baud, 8 data bits, 1 stop bit, no parity
Serial control pin configurations	2 = TX, 3 = RX, 5 = GND
Program control .....	Extron's control/configuration program for Windows® Extron's Simple Instruction Set (SIS™)

## General

Power .....	100 VAC to 240 VAC, 50/60 Hz, 30 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
Enclosure type .....	Metal
Enclosure dimensions .....	1.75" H x 17.5" W x 12" D (1U high, full rack wide) 4.4 cm H x 44.4 cm W x 30.5 cm D
Product weight .....	6.3 lbs (2.9 kg)
Shipping weight .....	11 lbs (5 kg)
Vibration .....	ISTA 1A in carton (International Safe Transit Association)
Listings .....	UL, CUL
Compliances .....	CE, FCC Class A
MTBF .....	30,000 hours
Warranty .....	3 years parts and labor

**NOTE** All nominal levels are at  $\pm 10\%$ .

**NOTE** Specifications are subject to change without notice.

## Part Numbers

### Included parts

These items are included in each order for a DDS 402:

Included parts	Part number
DDS 402	60-426-01
Rubber feet (self-adhesive) (4)	
Rack and through-desk mounting kit	70-077-03
IEC power cord	
Tweezer (small screwdriver)	
DDS 402 User's Manual	
USP 405/DDS 402 Windows-based control program	

### Suggested part

The following replacement part is available:

Included parts	Part number
Button and cap diffuser kit	70-352-01

### Firmware Upgrade Installation

In some cases the DDS 402's firmware may require replacement with an updated version. There are two user-replaceable firmware chips, U60 — the main microcontroller and U24, and one set of chips, U67 and U68. The chip set, U67 and U68, are replaced as a pair. The U-numbers are printed on the circuit board. We recommend that you send the unit in to Extron for service and updates.

**WARNING** *Changes to firmware must be performed by authorized service personnel only. Some DDS 402 firmware updates must be performed at the Extron factory.*

Replace firmware in the DDS 402 as follows:

1. Disconnect the AC power cord from the DDS 402 to remove power from the unit.

**WARNING** *To prevent electric shock, always unplug the DDS 402 from the AC power source before opening the enclosure.*

2. Remove the DDS 402 from the rack or furniture.
3. Remove the cover of the DDS (the top half of the enclosure) by removing the 13 screws, 7 on the top and 3 on each side, then lifting the cover straight up (figure A-1).

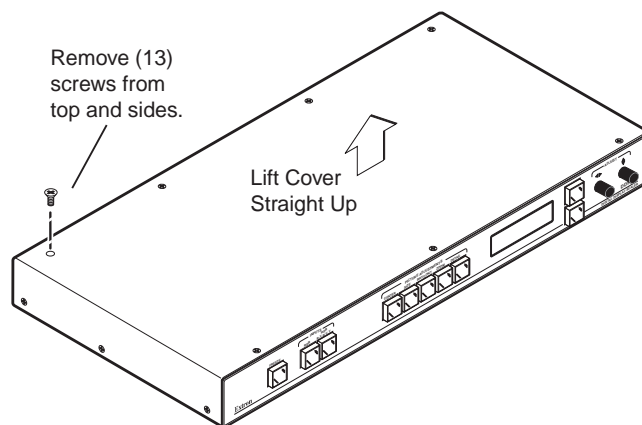
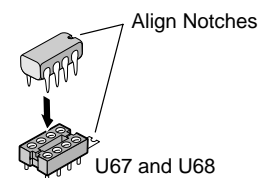
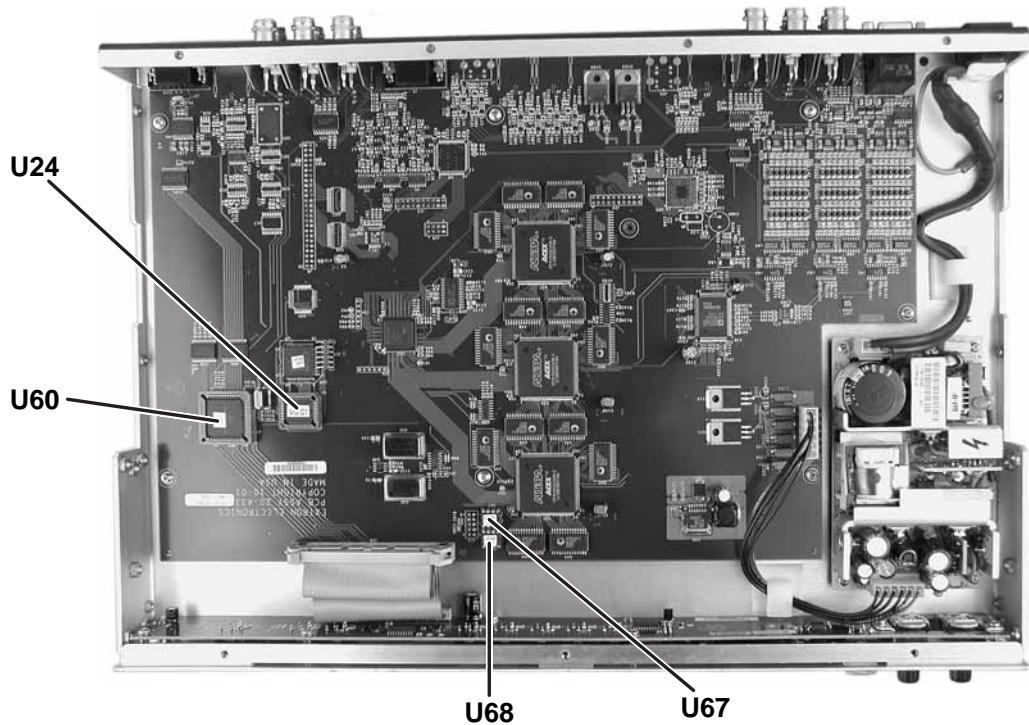


Figure A-1 — Removing the DDS 402 cover

**WARNING** *Do not touch any switches or other electronic components inside the DDS 402. Doing so could damage the scaler. Electrostatic discharge (ESD) can damage IC chips even though you cannot feel it. You must be electrically grounded before proceeding with firmware replacement. A grounding wrist strap is recommended.*

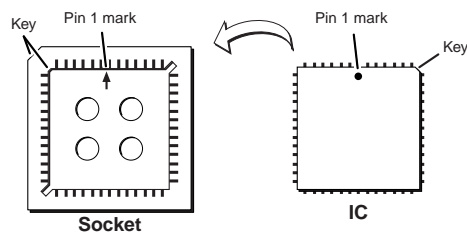
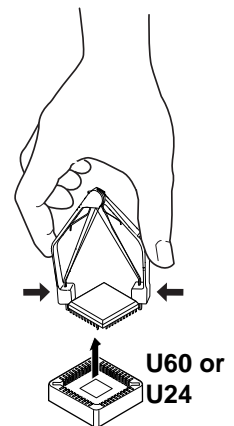
4. Locate the firmware chip(s) to be replaced on the circuit board (figure A-2).
5. **For U67 and U68**, after you are electrically grounded, remove the U67 and U68 IC chip set (which must be replaced as a pair) by grasping each chip firmly with your fingers and pulling it out, then continuing to step 9.





**Figure A-2 — Locating the four firmware IC chips**

6. For U60 or U24, align the hooks of a PLCC IC puller tool with the slots located in opposite ends of the firmware chip.
7. Insert the hooks into the slots, and squeeze the tool gently to grasp the chip.
8. Pull the chip straight out of the socket, and set it aside.
9. For U67 and U68, align the slots of the new firmware chip with the angled corners of the socket in the same orientation as the old chip. Gently, but firmly, press the chip into place in the socket.
10. For U60 or U24, note the key (angled corner) of the new firmware IC and the dot on the underside that indicates pin 1 (figure A-3). Orient the IC to match the key and pin 1 (indicated by arrow) on the socket, and gently, but firmly, press the IC into place.



**Figure A-3 — Key and pin 1 mark**

11. Replace the top cover on the DDS 402, and fasten it with the screws that were removed in step 3.
12. Rack/furniture mount the scaler, and reconnect the AC power cord.

## Button Labels

Figure A-4 provides blank button labels. If desired, photocopy them or cut them out of the manual, write button information in each button area as desired, and put them in the scaler's input buttons' windows.

### Installing labels in the scaler's buttons

Install new labels in the scaler's front panel input buttons as follows:

1. Make new labels using either the blanks in figure A-4 or the Button-Label Generator software (see the chapter 5, *Scaler Software*). Cut them out.
2. Remove the button from the scaler by grasping the button firmly and pulling it away from the front panel.
3. Use a Tweezer to gently lever the button cap off of the white backing plate.
4. Insert a button label into the cap and gently but firmly press the cap onto the white backing plate.
5. Press the button into place in the scaler.

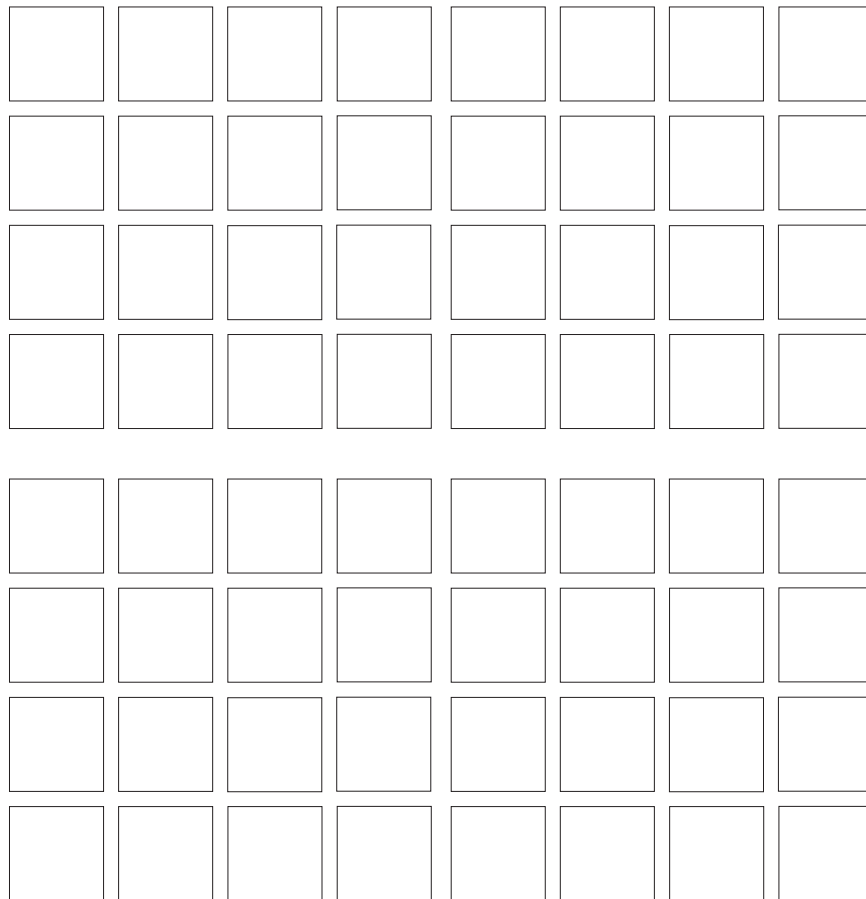
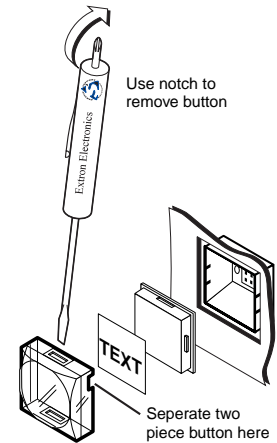


Figure A-4 — Button label blanks

## FCC Class A Notice

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

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

## Extron's Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three 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:

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and Central America:**

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1001 East Ball Road  
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  
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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.

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