

INSTALLATION AND OPERATING GUIDE



BASED ON FIRMWARE REV 370

Touchboards

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COMPLIANCE AND SAFETY

PROPRIETARY INFORMATION

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OPERATOR'S SAFETY SUMMARY

The general safety information in this summary is for operating personnel.

Read Instructions. Read and understand all safety and operating instructions before using this equipment. Keep the instructions handy.

Removal of the top cover may expose dangerous voltages. To avoid personal injury, disconnect all power sources before removing the top cover. Do not operate the unit with the cover removed.

Power Source:

This product is intended to operate from the power source detailed in the specification section of this manual. Do not use any other power source or exceed voltage limits.

Grounding the Product:

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals.

Use the Proper Power Cord Use only the power cord and connector specified for your product. Use only a power cord that is in good condition. Refer cord and connector changes to qualified service personnel.

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INTRODUCTION

The MAS-7000 is a multi-purpose Video Switcher/Scaler is ideal for boardroom and house of worship presentation systems. The MAS-7000 provides high quality scaling from Standard Definition, High Definition and Computer video sources to resolutions that match your projector, plasma or HD display.

The MAS-7000A adds a 4x1 stereo audio routing switcher with balanced output and adjustable delay to keep the audio and video in sync. A rear panel terminal block provides input and output access.

Both models have two Composite Video Inputs (BNC), two S-Video Inputs (4 pin Mini-DIN), one Component Video Input (3 RCA), one Computer /Component Input (HD-15) and one DVI-D Input on a DVI-I connector. Both NTSC and PAL are supported.

The units have one Computer/Component output on an HD-15 connector and one DVI-D output on a DVI-I connector. The scaled output is adjustable at any computer resolution up to 2048x2048 as well as all HDTV resolutions up to 1080p.

All settings are stored in non-volatile memory and are retained even when power is switched off. Ten user defined presets are also available to customize settings for various applications. A front panel LCD makes setup easy.

The MAS-7000 can be controlled in a variety of ways. The front panel along with an LCD display handle all set-up and switching features. The 7000 can also be remotely controlled from the FSR Room Navigator, an external control system via the RS-232 serial port or the IR Port.

To make IR control easy and painless, all IR codes are provided in a CCF format and are available on the FSR web site. These can be used in nearly any universal remote control or from any control system with IR output.

In addition to the standard scaling and switching capabilities, the MAS-7000 has pan, zoom and a host of other features normally found on much more expensive products. Variable Zoom to 10X enlarges any part of the computer screen to fill the entire video screen and position controls allow movement to any area desired. Variable Shrink to as little as 10% allows fitting the image onto most displays. The high sampling rate ensures crisp, clear images, while full bandwidth chroma sampling ensures faithfully reproduced, high resolution colors. Motion compensation, diagonal interpolation and a 3:2 Pull-down feature for NTSC significantly improve the image quality. Temporal interpolation greatly improves frame rate conversion by analyzing and merging successive frames. Pixel Level Motion Adaptive Diagonal Interpolation ensures high quality de-interlacing of PAL and NTSC signals.

FEATURES:

- Automatic Incoming Resolution Detection
- 2 Outputs: 1 Computer/Component, 1 DVI-I
- Inputs: 2 Composite; 2 S-Video; 1 Component; 1 Computer / Component; 1 DVI-I
- Computer Resolutions to 2048x2048
- HDTV Resolutions to 1080p
- Multiple Worldwide Television Standards
- RS-232 and IR Control
- Image Pan and Zoom
- All Input Types are Scaled
- Image Rotation and Automatic picture sizing
- 4x1 Stereo Audio Switcher with Balanced Output and adjustable delay (MAS-7000A)

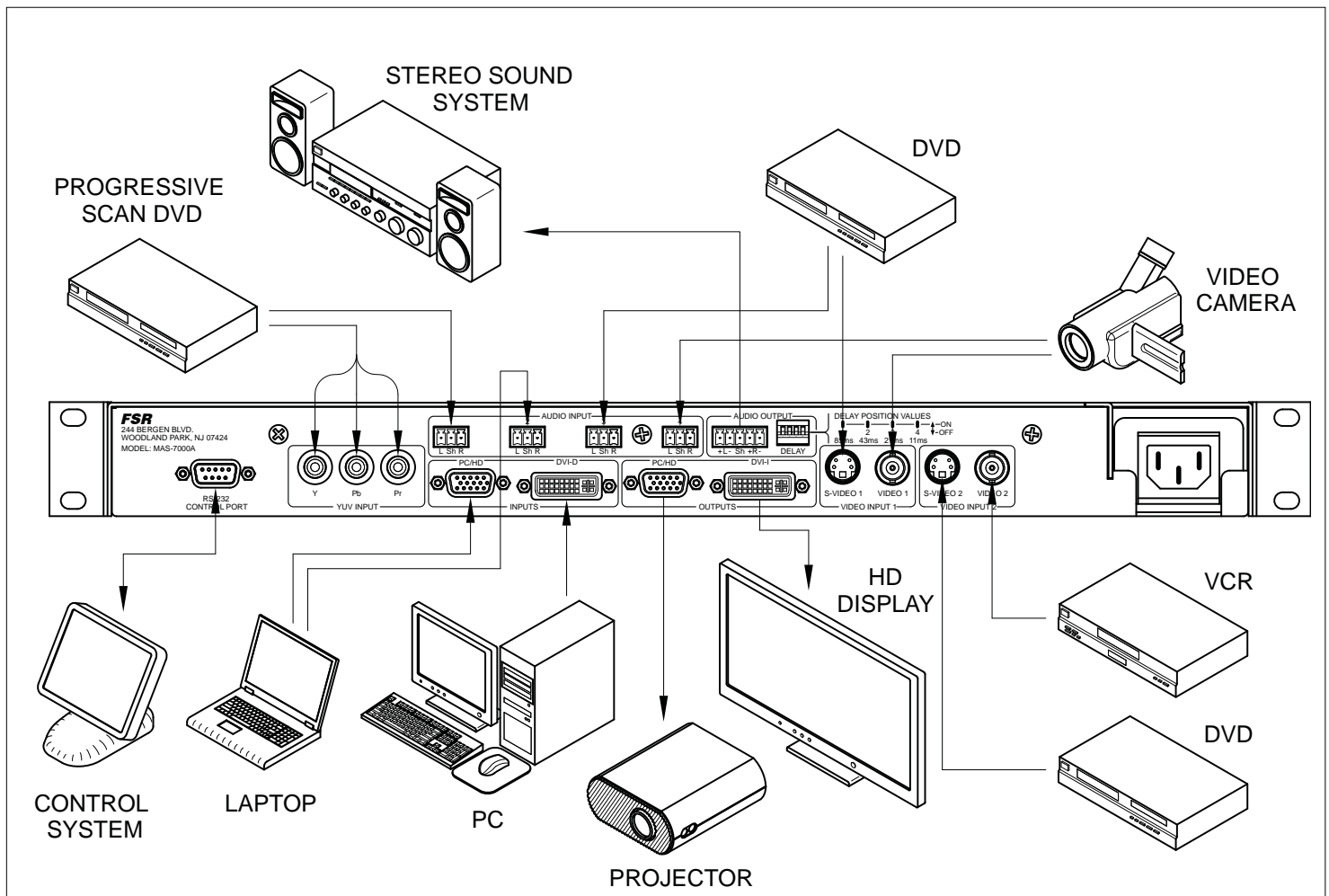
INSTALLATION

The MAS-7000 mounts easily into a standard 19" rack. It should be placed in an area where the user can easily access the front panel controls. The units are designed to be rack mounted and are supplied with front rack-mount hardware.

When rack mounting the unit, remember that the maximum ambient operating temperature for the unit is 40 degrees C. Leave at least one inch of space front and rear to make sure that the airflow is not restricted.

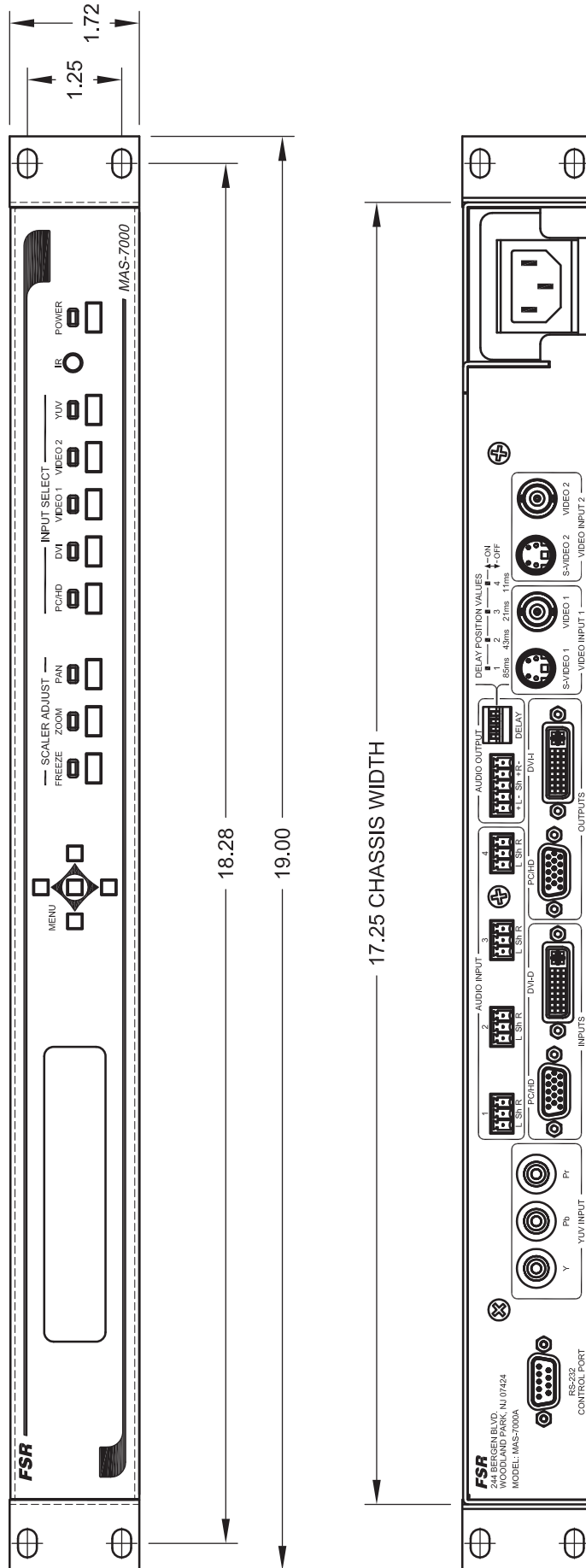
When installing equipment into a rack, distribute the units evenly to prevent hazardous conditions that may be created by uneven weight distribution. Connect the unit only to a properly rated supply circuit. Reliable grounding (earthing) of rack-mounted equipment should be maintained.

TYPICAL APPLICATION



MECHANICAL DIMENSIONS

(MAS-7000A MODEL SHOWN)



DEPTH INSIDE RACK IS APPROXIMATELY 11.00"

FRONT AND REAR PANEL OPERATION

FRONT PANEL CONTROL BUTTONS

POWER ON OFF

Pressing the power button will power up the MAS-7000. The unit will run a brief diagnostic sequence and be operational in a few seconds. Pressing and holding the power button for two seconds and releasing will power down the unit.

INPUT SELECT

Press and release any of the five input select buttons to select and display the desired video source. An audio switch will follow if there is an audio input associated with the new video input selected. (MAS-7000A only). See “Audio Input Number” setting under Input Setup for details on audio input setup selection and muting.

TRANSITION CONTROL BUTTONS:

FREEZE

Press and release to freeze the current display. This does not affect the background image. A second press will unfreeze the display. This setting is also available through the on screen menu.

ZOOM

Press and release to enable ZOOM. The LCD display will show the zoom menu and allow adjustments

PAN

Press and release to enable PAN. The LCD display will show the pan menu and allow adjustments.

SPECIAL BUTTON COMBINATIONS AND THEIR FUNCTIONS

RESTORE LAST POWER UP SETTINGS

Press and hold the POWER and Center MENU button until one beep is heard. This returns the unit to the last saved “power up” default settings.

FACTORY RESET

Press and hold the POWER and Center MENU button until two beeps are heard. This will return the unit to the original factory default settings.

FRONT PANEL LOCKOUT

Press the power and reset buttons together until the Power LED flashes to disable the front panel buttons. A second push will restore front panel operation (steady Power LED).

REAR PANEL CONTROLS

AUDIO DELAY

A dip switch array is located on the rear panel and provides audio delay options which can be used to compensate for internal video processing delays and effectively synchronize the audio and video. The switches can be used in any combination to create the desired audio delay. The silk-screening lists the various time delay settings in milliseconds.

The dip switch values are 85ms, 43ms, 21ms, and 11ms. When a switch is moved to the “UP” position the delay is added to the audio.

ACCESSING AND USING THE ON SCREEN MENUS

MENU NAVIGATION BUTTONS

The ON SCREEN MENU is accessed via the five push-button array on the right of the front panel. Push the menu select button in the center to view the on screen display. The on screen display will remain visible for 10 seconds after the last button push before disappearing.

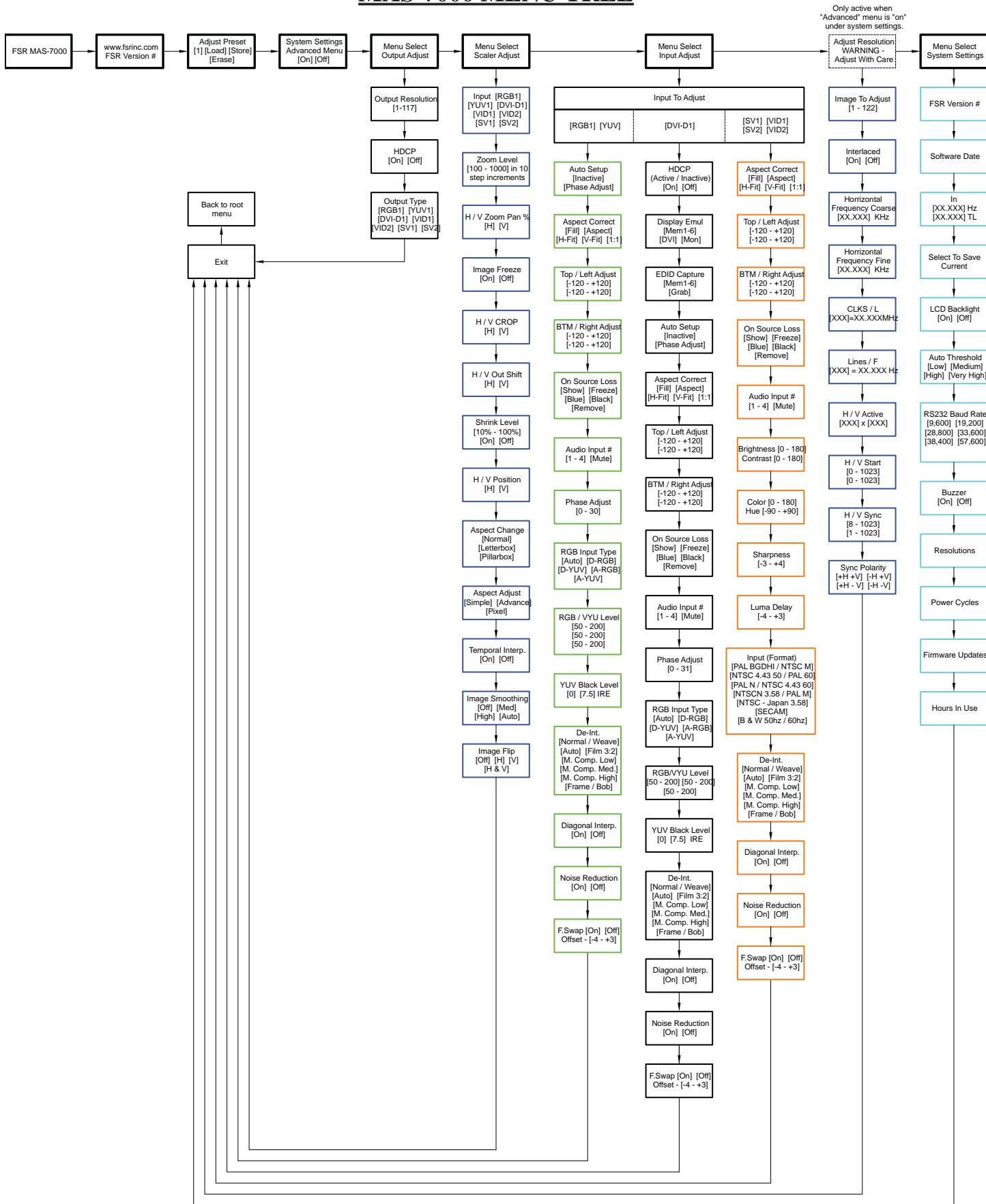
The ARROW UP, DOWN, LEFT and RIGHT are used to navigate through the on screen menus and change setting values. Specifically, the ARROW RIGHT button is used to move forward through the various menu headings or increment a value. The ARROW LEFT button is used to move backward or decrement a value.

Here are the eight root menu main group headings in the order they appear:

- MODEL DISPLAY (FSR MAS-7000)
- VIEW THE VERSION NUMBER
- ADJUST PRESETS
- SYSTEM SETTINGS ADVANCED MENUS (ON-OFF)
- OUTPUT ADJUST
- SCALER ADJUST
- INPUT ADJUST
- RESOLUTIONS ADJUST (only visible when “Advanced Menus” is set to “ON”).
- SYSTEM SETTINGS

When a root menu heading is visible, press the menu select button to view and further select additional sub menus under the main heading. Under each sub menu heading, changeable values will appear in brackets [] Pressing the menu select button will cause the brackets to flash. The setting value can be adjusted by pressing the LEFT and RIGHT ARROW KEYS Press the menu button again to store the setting value. The brackets will stop flashing and remain steady at this point. After the desired setting is made, push the right or left arrow key to navigate through and adjust additional sub menu settings. When finished, use the right arrow key to navigate to the EXIT menu heading. Push the MENU SELECT button to back out to the root menus shown above.

MAS-7000 MENU TREE



THE ROOT MENU STRUCTURE

Menus are arranged so that a particular general function has a menu name on the top line and beneath that either a sub-menu or one or more related individual settings are displayed.

In some cases the functionality is global – meaning it has an effect on the unit as a whole (such as changing the output resolution). In the majority of cases, the function is related to a specific operational area of the unit, detailed by the text in the top line.

There are two screens that appear before the Group Menus (sub-menus) are accessed. These screens are for informational purposes and are not adjustable

The first is the ‘welcome’ display shown above indicating the model of the unit.

The next menu item displays the firmware information screen (the numbers on your unit will be different to those shown).

At the end of all Group Menus will be an ‘Exit’ item. Simply select this to exit the existing menu structure and return to the previous one in the hierarchy.

ADJUST PRESET

Adjust Preset
[2] Load Store Erase

You can store up to ten presets using the adjust Preset menu. Stored Presets contain saved operating parameters and can be stored and recalled at any time. Select a preset number then choose either Load to call up a previously store Preset or Store to save current settings to a new preset. Storing over an existing Preset will over write the stored operating parameters with the current ones.

OUTPUT ADJUST GROUP

This menu group allows adjustments to be made that specifically affect the output of the unit, including output resolution and locking/overlaying onto a computer or video source.

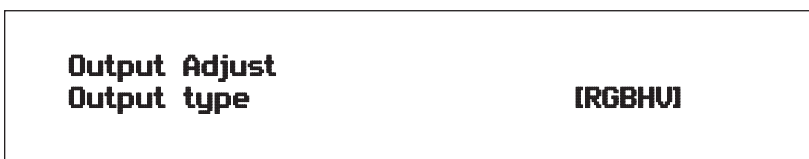
1024 x 768 60Hz
Output res. [61]

Your unit can handle a very wide array of inputs and convert them all to a single output signal with defined characteristics. This output resolution will remain in place until changed. The top line of the display will show the current output resolution selected.



HDCP is a ‘High-bandwidth Digital Content Protection’ system, which can ensure that a high definition video signal cannot be received by units not equipped with a HDCP receiver. This menu lets you see the current status of the output and whether HDCP is supported or active, and also lets you turn off the output’s HDCP encryption system. Note, however, that turning HDCP off at the output will also prevent HDCP-encrypted signals from being received by the unit –see the table below. By default, HDCP on the output is turned On -so that if your attached DVI display is HDCP-compliant, then your output will be encrypted (regardless of whether the input to the scaler is encrypted). Note that you don’t have to attach a display to the output of the scaler –another unit can be connected instead, in which case that unit is known as a ‘repeater’. Please also see the HDCP menu item in ‘Input Adjust under DVI-D’, as this controls availability of HDCP at the DVI input. The status message given in brackets has the following meaning:

Status message	Description	Effect
No display	There is no display attached (HOTPLUG is low).	Nothing will be output on the DVI connector.
Unavailable	The device attached is not capable of supporting HDCP.	As the DVI output cannot be HDCP encrypted, then a HDCP-encrypted source cannot be selected for scaling.
Supported	The device attached is capable of HDCP, but the output is not currently encrypted.	As the DVI output is not HDCP encrypted, then a HDCP-encrypted source cannot be selected for scaling.
Active	The device attached is capable of HDCP, and the output from the unit is encrypted.	As the DVI output is HDCP encrypted, then a HDCP-encrypted source can be selected for scaling. Note that no other output connector (SDI, CV, YC, YUV or RGBHV) will function – since they are not encrypted.
Rep. supprt	The repeater unit (e.g. scaler) attached is capable of HDCP, but the output is not currently encrypted.	As the DVI output is not HDCP encrypted, then a HDCP-encrypted source cannot be selected for scaling.
Rep. active	The repeater unit (e.g. scaler) attached is capable of HDCP, and the output from the unit is encrypted.	As the DVI output is HDCP encrypted, then a HDCP-encrypted source can be selected for scaling. Note that no other output connector (SDI, CV, YC, YUV or RGBHV) will function – since they are not encrypted.



This menu item allows you to select the type of signal output your unit will provide. Types of output vary

depending on the resolution selected and include various types of component signals Y/R-Y/B-Y or YPbPr, the full range of RGB type signals RGBHV, RGSB and RGSB (Sync on green).

Output Adjust AUDIO EMB.	[MUTE]	[RGB1]
---	---------------	---------------

The audio can be de-embedded from the video signal and sent to a compatible output. 'On' enables this to happen, and allows the audio source to be selected. 'WinA' sets the audio source to follow that of the main window's video source.

SCALER ADJUST GROUP

This menu group allows adjustment to be made to window specific parameters such as the window source, position, size and zoom level.

NTSC / 60Hz Input	[YC1]
------------------------------------	---------------

The Input display screen allows the input source for the currently selected window to be changed. The top line of the display shows the detected characteristics of the signal. Valid Input sources match input select buttons on the front of the unit

Scaler Adjust Zoom level %	[100]
---	---------------

Changing this option, sets the amount of picture magnification you wish to use for the window Source. You are provided with the options to zoom the image from 100% to 1000% (10x zoom).

Scaler adjust H/V zoom %	[100] [100]1,333
---	-------------------------

When parameter 'Aspect Adjust' later in this sub-menu is set to 'Advanced', this display is made accessible. It allows the independent setting of the horizontal and vertical zoom values. The third number (1.333 in the example) is the Aspect Ratio resulting from the adjustments, which is automatically calculated for you based on the incoming resolution and the H & V Zoom values.

Most resolutions are 4:3 ratio, thus the third number will be 1.333 (4 divided by 3). Another common aspect ratio is 16:9 (16 divided by 9 = 1.777). PAL and NTSC inputs are physically 4:3 on your video monitor, but their actual pixel/line ratios are different and so will not display as 1.333.

Scaler Adjust H/V zoom pan %	[50] [50]
---	--------------------

Once an image has been 'zoomed', this control allows the image to be positioned within the window so that any portion can be seen, not just the middle.

Scaler Adjust Image freeze	[Off]
---	--------------

This menu item allows the image to be frozen or unfrozen – thus keeping a single image on screen indefinitely. Note that images are not stored when power is removed from the unit.

Scaler Adjust H/V CROP %	[0] [0]
---	------------------

This allows the scaled image to be cropped at the top/bottom edges, or at the sides. Typically, this is used when performing a picture-in-picture (PIP) function (only available on certain models), where the incoming video signal has a letter box or pillar box size (i.e. it has black areas at the top/bottom or sides).

By adjusting the H/V values, you can crop out the black areas to correct the size on the final output screen. Note that cropping does not change the shape or aspect ratio of the image –but just removes the parts of the image that are not required.

Scaler Adjust H/V out shift [01] [01]
--

This positions the selected Window horizontally and vertically on the monitor. This should only be used for ‘fine tuning’ and should not normally require adjustment – use the Shrink H/V adjustment when your image is less than 100% Shrink value.

Scaler Adjust Shrink level* [50] [On]
--

Shrink Level determines the percentage of the monitor’s total available screen space that the selected Window image occupies. Adjustment is provided for a reduction down to 10% of the overall output size. In most cases, this feature is used for picture-in-picture (PIP) when a background image is being used (for units with overlay abilities).

Note that this feature is ‘Off’ by default, so that the full image size of 100% is used. It can be adjusted by using the “U.SCAN” (under-scan) command on RS-232 port or the infrared remote control input.

Scaler Adjust Shrink H/V * [100] [100] 1.333

When parameter ‘Aspect Adjust’ in the System Menu structure is set to ‘Advanced’, this display is made accessible. It allows the setting of different Horizontal and Vertical ‘shrink’ sizes. The third number (1.333 in the example) is the Aspect Ratio resulting from the adjustments, which is automatically calculated for you based on the output resolution (the actual pixels & lines, not your physical screen size) and the H & V Shrink values.

Most resolutions are 4:3 ratio, thus the third number will be 1.333 (4 divided by 3). Another common aspect ratio is 16:9 (16 divided by 9 = 1.777). Therefore, to convert your 4:3 output into a 16:9 output, reduce the vertical (V) Shrink value to 75% and this will simulate a 16:9 output. PAL and NTSC inputs are physically 4:3 on your video monitor, but their actual pixel/line ratios are different and so will not display as 1.333.

Scaler Adjust H/V position * [100] [50]
--

This menu option determines the position of the shrunken image on the monitor screen. This will move an image that is less than the full screen size left/right or up/down within the monitor’s available screen space. It will not let you move the image off the screen, so certain values will appear to have no effect (unless you use a

very low Shrink value like 10%).

Scaler Adjust Aspect change
--

[Normal]

With this menu, the images' aspect ratio can be set to properly match the display. The choices are Normal, Letter box and Pillar box.

Scaler Adjust Aspect adjust(Simple)
--

This parameter is used in conjunction with the Zoom and Shrink functions. When set to “Advanced”, it allows the horizontal (H) and vertical (V) components of the Zoom and Shrink functions to be adjusted independently, thus allowing custom aspect ratios to be created, or to convert from one aspect ratio to another. When left as “Simple”, the H/V components of Zoom and Shrink are adjusted equally i.e. H is equal to V.

The ‘Aspect adjust’ parameter is used to change the way that scaling of windows is controlled. By default it is set to ‘Simple’ which allows basic control of the window zoom and shrink sizes and positions –enough for simple tasks. In ‘Advanced’ mode, it allows the horizontal (H) and vertical (V) components of the Zoom and Shrink functions to be adjusted independently, thus allowing custom aspect ratios to be created, or to convert from one aspect ratio to another. In ‘Pixel’ mode, the user has direct access to pixel and line-accurate scaling functions. This lets the user specify the exact co-ordinates and size of the source image (within the video source), and the position and size of where this is placed in the output video signal. The table below summarizes the different menu items in the different modes –the ‘Simple’ items have already been described earlier in this section, so only the ‘Advanced’ and ‘Pixel’ ones that are different (highlighted in bold) will be detailed here table needed

Scaler Adjust Temporal interp.

[Off]

This is a feature only present in advanced units only. It greatly improves the method of frame-rate conversion, by allowing the unit to merge frames together during the process. When ‘Off’, the unit will use frame-repetition when converting 50Hz to 60Hz (i.e. it has to duplicate every 5th frame), or frame-dropping when converting 60Hz to 50Hz (i.e. it has to drop every 6th frame). When ‘On’, smooth blending is applied so that frames are not lost, but blended together at the appropriate times.

Scaler Adjust Image smoothing
--

[Auto]

Image smoothing reduces the jagged-edges sometimes seen within an output image by softening it. It typically improves the quality of a scaled image greatly. There are four possible settings for this adjustment: “Off”, “Med.”, “High”, and “Auto”. The “Auto” setting is generally thought to be most desirable and will vary the smoothing process according to the amount of zoom taking place.



Occasionally, it’s necessary to cause the output image to be flipped Vertically, Horizontally or both – most commonly when a video projector is ceiling mounted, or for special effects.

INPUT ADJUST GROUP

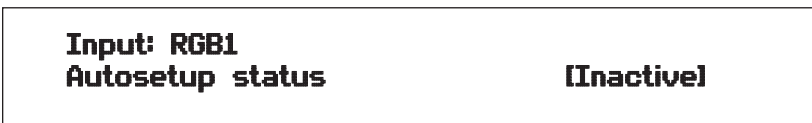
The Input Adjust menu group accesses the parameters associated with the processing amplifiers used for each input (RGB, CV, YC, etc.). They allow you to fine-tune an incoming signal to optimize its color, brightness or even sharpness. Not all settings are available for all input type. It is recommended that you Store your settings once you’re happy with them in readiness for future use.



This menu item selects the input connection for which you want to make adjustments to. As in the image above, changes will only be made to the source connected to RGB1. Once the selection has been made, all changes made using the following operating parameters will only apply to the selected input.

NOTE: Selection of a CV/YC input will reveal different menu items that allow adjustments beyond those used for RGB inputs. The menu discussions that follow relate first to RGB inputs, then to CV / YC type inputs.

RGB / YUV INPUT SUB MENU ITEMS



Once the Autsetup sense setting has been made, this menu item is accessed and activated. The Autsetup sense

utility will then correct the pixel phase and then position the Top Left portion of the image and the Bottom Right portion of the image. Once complete it then resume inactive status.

Input: RGB1 Aspect correct	[Fill]
---	---------------

This menu item will be used to correct the aspect ratio of the video source when converted into the final output resolution. The following table details what happens in the available modes

Setting	Result
Fill (default)	The source is stretched to fill the output.
Aspect	The source's aspect ratio is maintained on the output.
H-fit	The source is stretched to fill the horizontal dimension of the output, with the vertical dimension stretched by the same amount (and possibly clipped).
V-fit	The source is stretched to fill the vertical dimension of the output, with the horizontal dimension stretched by the same amount (and possibly clipped).
1:1	Each source pixel is represented by a single output pixel – no scaling will be performed. If the input resolution is higher than the output, then only part of the source will be seen. If the input resolution is lower than the output, then a black border will be present.

Input: RGB1 Top/Left Adj.	[0] [0]
--	------------------

This menu item allows manual positioning of the Top and Left portion of the image. It is used to ensure that the input signal is captured correctly, eliminating any black borders. These settings are often used to correct the position of a PC signal on an input, or to eliminate any undesired noise at the top or bottom of a PAL or NTSC video input.

Input: RGB1 Btm/Rt Adj.	[0] [0]
--	------------------

This menu item allows manual positioning of the Bottom and Right portion of the image. These settings are often used to correct the position of a PC signal on an input, or to eliminate any undesired noise at the top or bottom of a PAL or NTSC video input.

Input: RGB1
On Source Loss

[Blue]

This setting determines output behavior when a poor video source or loss of video occurs and how the display will look.

The choices are:

- SHOW- leaves the image and shows all the image noise and breakup
- FREEZE- displays a still frame of the last good image
- BLUE- displays the typical blue screen on video loss
- BLACK- same as BLUE except for a black display.
- REMOVE- removes video information including sync from the output. The output appearance will depend on how the display handles a video loss or poor signal.

Input: RGB1
Audio input Number

[1]

This menu item selects the desired Audio input for use with the active video source, allowing an audio-follow-video function. This is only functional with the MAS-7000A.

The default for the first 4 video inputs is to assign each video input an audio input from 1 to 4. For example, video input 1 receives audio input 1, video input 2 receives audio input 2 etc. However this can be easily changed. You could have all video inputs using the same audio input by setting the 'Audio input' value for all video inputs to the desired audio input value.

Input: RGB1
Phase Adjust

[16]

Since an image pixel is a very small element of the total image, it's possible for your unit's Analog to Digital converters to wrongly sample the picture on the edge of each pixel thereby losing image resolution and creating image noise. The Input pixel phase adjustment allows you to change the position (from 0 to 31) where the pixels are sampled, relative to the horizontal sync signal.

To make this adjustment, select an RGB input and then provide an image from that source with fine detail, preferably with very sharp vertical lines. Adjust this value until you see the sharpest image. Alternately, adjust this value to give the worst (noisiest/softest) image, and then add or subtract 16 to get the optimum value.

Note that the AUTOSSET function (for RGB inputs only) will attempt to automatically work out the best value for this setting.

Input: RGB1 RGB input type	[Auto]
---	---------------

There are several types of signals that are called RGB signals as a generic term. Each has slightly different characteristics that set it apart from similar RGB signals, such as how the synchronization signal is sent. This menu item lets you set the input type to use. Available options let you select whether the input is standard RGB or YUV (including YPbPr signals with a tri-level sync). For some units, it also allows selection of break-out BNC connectors to be used instead of the normal connector (signified by B- in front of the signal type).

Input: RGB1 RGB / YUV Level	[100] [100] [100]
--	--------------------------

This menu item lets you adjust the individual RGB or YUV/YPbPr signals, in case one component is at a different contrast to other, or if they all need to be boosted or lowered.

Input: RGB1 YUV Black Level	[0] [7,5] IRE
--	----------------------

The YUV Black level changes the setup level for the incoming video signal. Traditionally, NTSC video required setup to be at 7.5 IRE while most HD video has setup at 0 IRE. Selecting the incorrect value may result in blacks that can look washed out or too dark. Also, when set to 0 IRE, colorspace conversion for YPbPr signals is based off of ITU-R BT.709 standard used for HD video, as opposed to the ITU-R BT.601 standard used for SD video when the black level is set to 7.5 IRE.

Input : RGB1 De-int	[M,comp med]
--------------------------------------	---------------------

An interlaced input consists of two fields separated in time. Both fields are required in order to make up the full resolution input image, but since they are sent one after the other, a moving image will have “motion artifacts” if the two fields are simply combined together. The most common artifact is a blurring at the point of maximum movement within an image. Your unit provides some tools to minimize the effects of de-interlacing of an image.

The following options are available for this menu item:

Mode	Function
Normal	The two interlaced fields are simply combined together. This will often show artifacts on moving images, but can be used when the input is known to be still.
Auto	Automatically selects Film 3:2 or Medium Range Motion Compensation (M. Comp Med.) depending on whether Film Mode is detected or not. For 1080i sources, a special de-interlacing mode is selected to eliminate combing effects.
Film 3:2	Enables 3:2 pull down conversion of the incoming NTSC video. (This option is ignored if the source is not NTSC video).
M.Comp Low M.Comp Med. M. Comp High	Enables Pixel Adaptive Motion Compensation. Three levels are available with 'Low' providing the least compensation for Motion and 'High' providing the most compensation.
Frame/bob	The two fields are shown consecutively

Input: RGB1 Diagonal Interp	[ON] [OFF]
--	-------------------

This menu item allows the user to specify whether the source has diagonal interpolation applied to it when de-interlacing occurs. This reduces 'jagged' artifacts on moving images, however is not suitable for noisy sources where the noise could be mis-interpreted as a diagonal or sloping element of the picture..

Input: RGB1 Noise Reduction	[ON] [OFF]
--	-------------------

This menu item allows the user to specify whether the source has noise reduction applied to it. This is performed by averaging the video signal over a number of fields – but ignoring areas where motion has occurred. If motion blurring is seen, it is recommended to turn this setting off.

Input: RGB1 F. swap	[Off] Offset [-4-+3]
--------------------------------------	-----------------------------

This menu item is only available when "Advanced menus" in the System Settings Group is turned on. It can correct for an interlaced source with abnormal odd/even field characteristics. With F. swap "ON", the odd and

even fields will be swapped. The “OFFSET” adjusts the video line offset for the odd field relative to the even field. These setting options may be useful with certain graphics cards where odd and even fields are swapped.

Normal video sources will not require the use of this adjustment and should be left “OFF”.

DVI-D SUB MENU ITEMS

There are three menu items that are specific to the DVI-D Input Sub menu. All other items are previously described in the previous in the RGB / YUV Input Sub menu.

Input: DVI-D HDCP	(Inactive) [ON]
------------------------------	------------------------

HDCP is supported on certain units only - and only on the DVI input connector. This menu item lets you change whether HDCP is active on this particular DV input. If turned 'Off', then a source that requires HDCP encryption will not send a video signal to your unit. If turned 'On', and a HDCP-compliant display or device is attached to your unit's DVI output, then HDCP encrypted sources can be used.

The following table summarizes the message given in brackets:

Status message	Description	Effect
Inactive	HDCP is not active at the DVI connector.	HDCP-encrypted material cannot be received by the unit.
Active	HDCP is active at the DVI connector.	HDCP-encrypted material can be received by the unit, but only if a HDCP-compliant display or device is attached to the unit's output.

Input: DVI-D Display Emul.	EDID [DVI]
---------------------------------------	-------------------

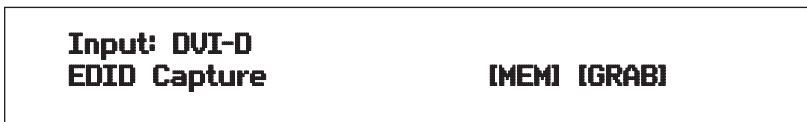
This feature is used with the next menu item to form a simple 'EDID Manager' EDID is an information packet retrieved by a PC graphic card over a DVI link from your unit, it tells the graphic card what resolutions are compatible with it by emulating a display The above menu lets the user select which of 8 EDID data blocks are 'shown' to PC or other DVI/HDMI source. (It does not affect any other input.) Note that some graphic cards will usually only read the EDID data when the cable is first connected, or on power-up. See the chart on the following page).

The 8 EDID blocks are as follows:

EDID	USAGE
Mem 1	User definable (see “EDID Capture”)
Mem 2	
Mem 3	
Mem 4	
3D	Default 3d EDID data for your unit
HDMI	Default HDMI EDID data for your unit
DVI	Default DVI EDID data for your unit
Mon	The attached monitor’s EDID data

If you change this value, you’ll need to store your settings and then re-boot the unit at least once to ensure that the source sees that the EDID data has changed.

It should also be noted that some graphic cards will require your PC to be re-booted before they see that a change has occurred. If your unit allows ‘HDMI’ to be selected, this can also enable certain audio features depending on the abilities of your unit.



This menu provides a simple way of capturing EDID data from an attached DVI or HDMI monitor and storing it in one of the user-definable EDID memory data blocks (Mem1 to Mem6) – see previous menu.

To capture a different display’s EDID, perform the following

1. Connect that display to the DVI output of the unit - the unit will then read it automatically and store it in the ‘Mon’ EDID entry.
2. Select which EDID memory (Mem1 to Mem6) to copy this information to.
3. Select ‘Grab’ and click on it - this will copy the current monitor’s information to that EDID memory.
4. Change ‘EDID to use’ to that memory location (Mem1 to Mem4).
5. Store your unit’s settings (see earlier in this manual on how to do this).
6. Re-boot (turn off and on again) the unit to ensure that the graphic card uses this new EDID data (you may need to re-boot your computer as well).

Using the above, up to 4 custom EDID settings can be stored in the unit, ready for recall later. This is useful to simulate another display being attached to a graphic card.

CV & YC INPUT SUB MENU ITEMS

Of the above Input Menu items, the Autoset sense and Autoset status functions, RGB type and Pixel phase are specific to RGB signals only. The rest of the Input menu items function with RGB, CV or YC type signals. In addition, there are four additional Menu items that are only used with CV or YC type signals and these are explained below:

Input: YC1 Bright [100]	Contrast [100]
--	-----------------------

Adjusts the Brightness and Contrast of the image to your requirement.

Input: YC1 Color [100]	Hue [0]
---	----------------

Color is the amount of color saturation present in the image. Hue is the color “tint” parameter and the adjustment range is +90 degrees through to -90 degrees with 0 being the default.

Input: YC1 Sharpness	[0]
---------------------------------------	------------

Within limits, you can enhance or soften the appearance of detail within an image. The Sharpness values go both negative and positive, with 0 being the default. Note that over-enhancing an image has the side effect of making it appear to be noisy and under-enhancing an image gives the appearance of poor video quality.

Input: YC1 Luma delay	[0]
--	-------------

On occasion, a video input will have the color portion of the signal offset from the luminance portion. If you’ve ever seen a poor quality comic book that has the outline of the cartoon character’s head in one place on the page but the flesh tones for the head offset slightly, you are seeing the print equivalent of Luminance to Chrominance Phase Delay. Fortunately, your unit provides a way for you to make the two signals occur at the same time on the selected image. The adjustment range provides both positive and negative levels of delay with 0 being the default.

Input: YC1
[PAL / NTSC 4,43 60]

Used to select the input format type such as NTSC, SECAM PAL etc.

ADJUST RESOLUTIONS GROUP

NOTE: The Adjust Resolutions Menu Group only appears when the Advanced Menus function is turned on within the System Menu Group. To turn it on, go to the System Menu Group and then proceed to the item that says “Advanced Menus”. Turn the function ‘On”, exit the Systems menu and return to this menu structure.

The Resolution Database is used by your unit to identify any incoming video signal and is also used to create an output resolution. It is therefore a very important part of the unit’s infrastructure.

IMPORTANT CAUTIONARY INFORMATION:

DO NOT ADJUST THESE ITEMS UNLESS YOU’RE CERTAIN YOU KNOW WHAT YOU’RE DOING! THE ONLY METHOD TO UNDO CERTAIN CHANGES IS TO UPDATE THE FIRMWARE.

TRY USING THE AUTOSET, SHRINK, SHRINK POS, TL & BR ADJUSTMENTS FIRST.

Making adjustments here risks creating a non-standard resolution that is not displayable on a monitor. The resolutions and values within the database are industry standards and should not normally be altered by the user. That said, there might be times when it is necessary to create a custom resolution with specific parameters. If circumstances require you to make such a change, please read the following specific notes:

1. Any changes made to this database take effect instantly and are also stored immediately in non-volatile memory.
2. Since this database is used for both input and output image processing, altering a resolution that is used for both (e.g. 1024x768 input and 1024x768 output) may give undesired effects.

800 x 600 60 Hz Image to adjust
--

[17]

Change the value to select resolution you want to alter.

NOTE: Typically, the image number currently being used for input or output would be already be selected otherwise immediate feedback to your changes will not be available via your monitor.

800 x 600 60 Hz Interlaced

Off]

This adjustment specifies whether the image is interlaced or progressive scan. It toggles simply On or Off, so there are no flashing brackets.

800 x 600 60 Hz H,freq,crse	[37,879] Khz
--	---------------------

The H freq.crse (Horizontal Sync Frequency - Course) adjustment provides the option for changing the Horizontal Sync timing Frequency in 100 Hz steps.

800 x 600 60 Hz H,freq,fine	[37,879] Khz
--	---------------------

The H.freq.fine (Horizontal Sync Frequency) adjustment provides the option for changing the Horizontal Sync timing Frequency in 1 Hz steps. Use this option to fine tune after using the course adjust. Please note that the internal sync generator may be unable to generate the exact frequency you want.

800 x 600 60 Hz Clks/l [1056] =	40,000Mhz
--	------------------

This option changes the total number of image pixels on one line of monitor video including the Horizontal sync pulse and blanking time. This is normally in a multiple of 8. It is very important to get this value correct, or many digital display devices, such as TFT monitors, will display an image with an odd moiré effect – such as soft vertical bands spread evenly across the image.

800 x 600 60 Hz Lines/f [628] =	60,317 Hz
---	------------------

This menu controls the total number of lines of video present in the image which includes the vertical Sync pulse, the blanking period and the active video. Changing this option affects the final vertical sync frequency.

800 x 600 60 Hz H/U active	[800] x 600
---	---------------------

A video frame includes both the active area, the portion of the image normally containing useful visual information, and a resolution value for a given display standard which only expresses the number of pixels visible in an image. The well-known 800 x 600 computer resolution standard simply means that there are 800 pixels/line visible horizontally and there are 600 lines visible vertically. This item provides a way to change the number of active pixels and lines.

800 x 600 60 Hz
H/V Start

[88] x 23

There is a period of time between the end of the Horizontal Sync pulse and the start of Active Video. This portion of the waveform signal is called the “Back Porch”, a term originating with the television broadcasting industry and its RS-170A specification. In practice, this will control where the video image starts on the left side of the monitor without changing the width of the sync pulse itself (another way to control where the image area starts). The two parameters control where the back porch is positioned and they interact to a degree.

NOTE: By adjusting these parameters, you control the start of the back porch (with respect to the trailing edge of Horizontal Sync) and also its width. The place where the Back Porch begins with respect to the Horizontal Sync pulse and the width of the Back Porch have a direct bearing on where the active (visible) portion of the image begins. Do not attempt this adjustment without monitoring the results with an oscilloscope.

800 x 600 60 Hz
H/V Sync

[128] x 4

There are standards for all current computer and broadcast resolutions that specify the correct width of both Vertical and Horizontal synchronizing pulses. If you are creating a special, non-standard resolution, you may wish to adjust the pulse width to fit your new requirements. The H/V Sync screen is where that is accomplished.

NOTE: Like the H/V Start adjustment, you must use an oscilloscope when making these adjustments so that you know exactly how many milliseconds or microseconds of pulse width you have created. The numbers shown are relative numbers and not an actual time measurement.

800 x 600 60 Hz
Sync polarity

[+H+V]

Sync can be either negative polarity or positive polarity. To further complicate things, it is possible that you may want to make the Horizontal Sync polarity different from the Vertical Polarity. This control allows you to make that change. There are four possible selections:

+H+V
-H+V
+H-V
-H-V

SYSTEM SETTINGS GROUP

The final Menu Group is for adjustments of System parameters. The “System” in this case means the unit’s functions that are generally unrelated to individual inputs, outputs or any of the various production features.

System Settings FSR version # xxx
--

This screen is an informational screen. Should you require technical assistance with your unit, the technical support personnel may request that you read the contents of this screen to them during the support call.

System Settings SW date: 2007-7-11

This is an information page showing when the currently installed software was released. The information is useful to the user as he or she compares the date to the support web site information describing the current software release.

NOTE: Normally, the user will examine the added features of each new software release and determine if an update is worth doing in their particular operation. The greater period of time between the current date, and the date shown for the currently installed software, the greater the likelihood that there are useful changes and improvements present in the new release.

System Settings IN# -1Hz -1TL +H+U
--

This is a diagnostics screen for the incoming video signal that has been added to the latest firmware releases. In the adjust Windows submenu under the Source selection screen, we list the detected incoming video signal based off of the closest resolution in our resolution table. The first number is the horizontal scan rate of the video signal. This is primarily what is used to compare against the resolution table as to what the signal is detected as. The second number is the total number of lines detected. The last bit is the horizontal and vertical sync polarity. This information helps one determine if the signal being sent to the scaler is actually what the video source claims it to be.

System Settings
Select to Save Current

This screen provides a quick and easy way to store all current operating parameters. The unit will remember the set up you are currently using at the time of data storage and also when you next apply power. To store the current settings, press and release the control button.

System Settings
LCD BACKLIGHT **[ON] [OFF]**

This setting allows the LED backlight to be turned on or off.

System Settings
Auto Threshold **[Medium]**

In order for Autoset to work properly, it needs a sufficiently bright full-screen image to examine. The sense level lets you change the brightness threshold for detection of the screen edge between Low, Medium, High and V.high. Medium is the default level, which is recommended for normal use (Windows-type images, etc.)

System Settings
RS232 baud rate **[57600]**

This menu item allows the adjustment of the serial baud rate used for RS-232 communications. The rate can be adjusted to 9600, 19200, 28800, 33600, 38800, 57600 and 115200. (This adjustment is provided for those instances where you wish to use the RS-232 control system for your own purposes.) The default baud rate is 57600.

System Settings
Buzzer **[On]**

The screen labelled 'Buzzer' is actually the control for turning the "Beep" "On" or "Off". Normally this is left in the "On" position to provide positive feedback that your data entries and parameter changes have been accepted.

System Settings Resolutions 88

This screen is an informational screen showing the total number of the defined resolutions in the resolution database. Future firmware releases may increase the total number of resolutions defined in the database.

System Settings Power cycles 41
--

Power Cycles refers to how many times the unit has been powered since it left the factory. This is an informational screen. No action is taken regardless of the value shown here, however some users have an equipment cleaning or specification audit procedure and this information may be useful to those users.

System Settings Firmware updates 11
--

Indicates the total number of times the firmware has been changed over the life of the unit. It is quite possible for this to be more than 1, as a unit undergoes numerous tests during production.

System Settings Hours in Use 877

This is another informational display for usage audit purposes. It displays the number of hours the unit has been in operation.

IR REMOTE CONTROL COMMANDS

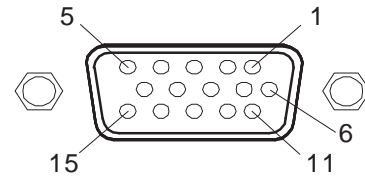
Files containing the CCF format IR command strings for this unit are available via download from the FSR website at www.fsrinc.com. They are available for use with a variety of universal remote control devices as well as AMX and Crestron Control systems. A pre-made template for FSR Room Navigator control of the MAS-7000 is also available on the FSR website along with serial commands.

The IR receiver port is located to the far right of the MAS-7000 front panel and is labeled “IR”.

PINOUTS AND CABLING

HD15 CONNECTOR

- 1.Red / Pr / R-Y
- 2.Green / Y
- 3.Blue / Pb / B-Y
- 4.ID2 (input & output linked)
- 5.GND
- 6.GND
- 7.GND
- 8.GND
- 9.No connection
- 10.GND
- 11.GND on input, pulled high on output (used for auto-termination)
- 12.SDA (input & output linked)
- 13.H sync (or composite sync for RGBS)
- 14.V sync
- 15.SCL (input & output linked)



HD-15 Input Connector Pinout
(as viewed from rear of unit)

4 PIN MINI-DIN S-VIDEO CONNECTOR (YC) INPUT

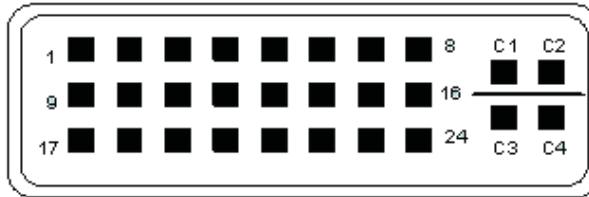


Cable Type: Standard 4 pin S-Video to two BNC male cable.

Maximum Recommended Length: 35 ft

Pin	Name	Description
1	GND	Ground (Y)
2	GND	Ground (C)
3	Y	Intensity (Luminance)
4	C	Color (Chrominance)

DVI-I CONNECTOR PINOUT



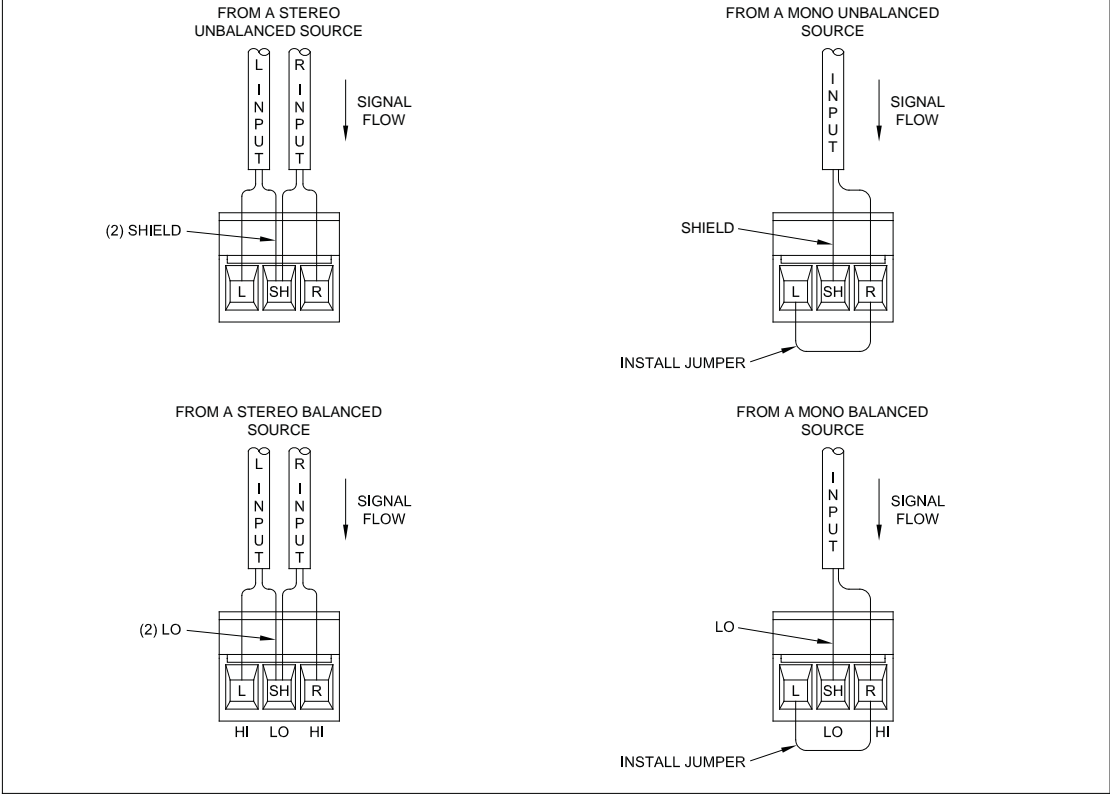
29-Pin DVI Connector

29 pin DVI Connector PinOut and Signal Names

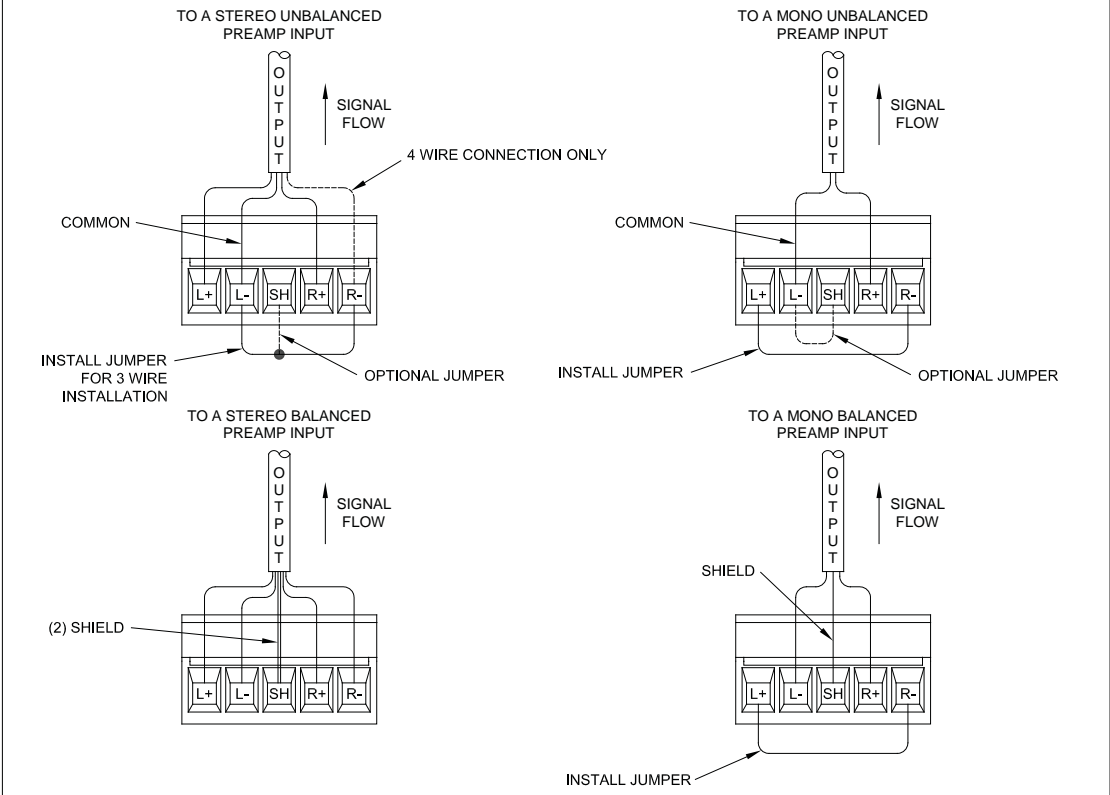
Pin #	Signal Name	Pin #	Signal Name	Pin #	Signal Name
1	TMDS Data2-	9	TMDS Data1-	17	TMDS Data0-
2	TMDS Data2+	10	TMDS Data1+	18	TMDSData0+
3	TMDS Data2/4 Shield	11	TMDS Data1/3 Shield	19	TMDS Data0/5 Shield
4	TMDS Data4-	12	TMDS Data3-	20	TMDS Data5-
5	TMDS Data4+	13	TMDS Data3+	21	TMDS Data5+
6	DDC Clock [SCL]	14	+5 V Power	22	TMDS Clock Shield
7	DDC Data [SDA]	15	Ground (for +5 V)	23	TMDS Clock +
8	Analog vertical sync	16	Hot Plug Detect	24	TMDS Clock -
C1	Analog Red	-	--	-	--
C2	Analog Green	-	--	-	--
C3	Analog Blue	-	--	-	--
C4	Analog Horizontal Sync	-	--	-	--
C5	Analog GND Return: (analog R, G, B)	-	--	-	--

AUDIO WIRING

MAS-7000 AUDIO INPUT CONNECTOR WIRING



MAS-7000 AUDIO OUTPUT CONNECTOR WIRING



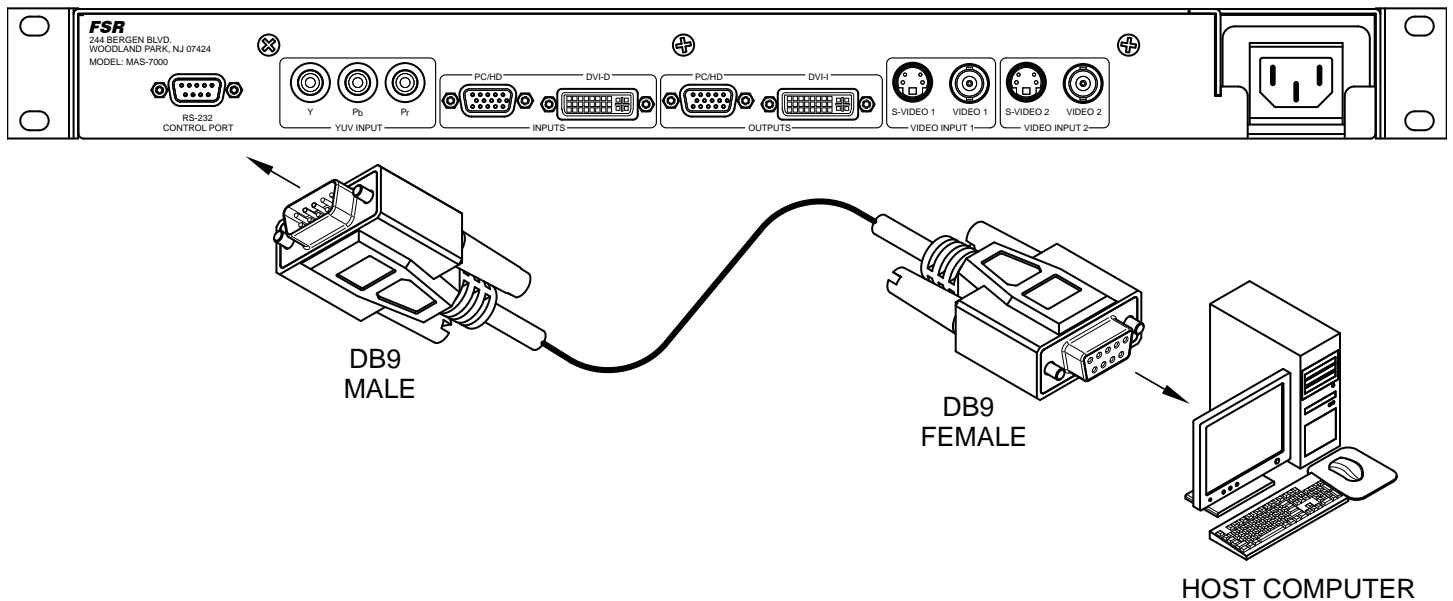
DB9 CONNECTOR

Please see the MAS-7000 serial protocol manual included with the product for serial commands and other details on RS-232 control.

RS232 / D9 socket

- 1.N/C**
- 2.TX (Transmit data)**
- 3.RX (Receive data)**
- 4.N/C**
- 5.GND (Signal return)**
- 6.N/C**
- 7.CTS (Clear to send)**
- 8.RTS (Request to send)**
- 9.N/C**

RS-232 HARDWARE CONFIGURATION	
BAUD RATE	57600
DATA BITS	8
STOP BITS	1
PARITY	NONE
FLOW CONTROL	NONE



MAS-7000 RS232 CONTROL SPECIFICATION

This section outlines how to control a unit via an RS232 or Ethernet link, using ASCII-based commands. It details how to send and receive serial data to perform many of the functions that a user has access to on the unit.

COMMUNICATION PROTOCOL BASICS

Packets of ASCII data containing hexadecimal numbers are exchanged between the unit and controller via an RS232 or IP link (you cannot use both at the same time).

The RS232 standard is 57600 baud, 8 bits, no parity and 1 stop bit, although this can be changed by the user.

No flow control is used - however all control packets start with an ASCII 'F', end with carriage-return (13 decimal, 0x0D hex) and all such packets sent to the unit will be acknowledged (thereby providing software handshaking). Note that a line-feed (LF 10 decimal, 0x00A hex) should not be sent.

It may take around 30ms (0.03 seconds) for an RS232 command to be actioned and acknowledged.

ASCII-hex data is used where a number is encoded into its hexadecimal equivalent with leading zeros – e.g. Where '00' is decimal value 0, '80' is decimal 128 and 'FF' is decimal 255. In other words, two characters are sent for each byte encoded.

Any gap of more than 1 second between the characters of a control command sent will cause a time-out - and previous characters sent will be lost.

Write packets (sending command functions to the unit) are always 20 characters long (including a carriage return at the end). The unit will respond with a full 20 character message indicating what has changed. This returned payload will reflect the actual value of the parameter changed. If the user requests a value out of bounds then the limit value is used, and the payload will then reflect the limited value used.

Read packets (sent to request information from the unit) are always 14 characters long (including a carriage return at the end), the response from the unit will be a 20 byte message with the Write flag (since it is 'writing' the value back to the host) and the ACK flag set.

The ACK flag will be returned as 0 if the command is invalid for some reason – for example a bad FUNCTION, WINDOW, OUTPUT or PAYLOAD value. An ACK=0 message will be otherwise identical to the one you sent, so you know exactly which message has the error.

Any changes made to the unit using the front panel controls will also cause the full 20 byte message to be sent indicating the change that has occurred, thus enabling a program to stay 'in-sync' with the unit. In some cases (such as the execution of a macro) multiple 20 bytes messages will be sent indicating all the parameters that have been changed.

Only one message should be sent to the unit, another message can't be sent until a specific response is received from the unit (the user should look for a message with the same WINDOW, OUTPUT and FUNCTION values as they sent). If no message is received back within 1 second, there is likely to be a hardware communication problem (or wrong baud rate, etc.).

If absolutely required, to simplify programming the user may send packets one after the other with around 100ms (100 milliseconds) between each one. However, this will not work for all packets (such as Zooming into Testcards or changing Logos) since this will cause the unit's micro-controller to be busy, so the user must

experiment and satisfy themselves that this is possible.

Checksums

The protocol requires checksums on all commands. The checksum is the sum of all previous bytes (excluding the SOP 'F' character). The checksum is calculated on the hex value of the two ASCII bytes. For example, the command "F0400410082000001C8" has the checksum of C8 (04+00+41+00+82+00+00+01=C8). A short-cut for debugging allows the checksum to be replaced by 2 question marks, so in the previous example you could send F0400410082000001??. Instead. This is purely for test and debugging - you should normally use a checksum to ensure data validity.

Carriage Returns

Each packet that is sent to or received from the MAS-7000 is terminated with a carriage return. Carriage return has a value of 13 decimal, but is sent as a hex byte 0x0D. It will be represented in this document as <CR>.

PACKET FORMAT

Read Packets

Below is a representation of data bytes in a single packet for a 'Read' to the unit to get a value:

SOP	CMD	CHA	WINDOW/FUNCTION	OUTPUT	FUNCTION	CS	EOP
-----	-----	-----	-----------------	--------	----------	----	-----

The table below details the function of each part of the packet:

Packet part	Function
SOP (Start of packet)	This is always the ASCII letter 'F' to indicate the packet start.
CMD (Command)	ASCII-hex byte to indicate the type of command being sent. Each bit in the byte has a different function. Bit 7 = Write (0) or Read (1) request. Messages from the unit are always Writes. Bit 6 = ACK bit. Should be set to 0 for messages to the unit. ACK=1 returned means message was okay. ACK=0 returned means an error was present in the message. Bit 5:3 = 0 Reserved for future use. Bit 2 = 1 This bit *must* be set. Bit 1:0 = 0 Reserved for future use.
SOURCE	This byte has multiple uses, and defaults to 0 unless used for: SOURCE Byte to indicate the source channel to be altered (if appropriate). 0x10 = RGB 0x11 = YUV 0x12 = DVI 0x30 = VIDEO1 0x31 = VIDEO2 0x40 = S-VID1 0x41 = S-VID2
WINDOW	Bit 7 = 0 (Reserved). Bit 6..0 = Window 'A' is sent as '41' since 0x41 is ASCII for 'A'.
OUTPUT & FUNCTION HIGH	Bit 7.4 = 0 Bit 3..2 = Reserved (set to 0). Bit 1..0 = Bits 9 & 8 of the function code. (Remainder of bits [7..0] are in FUNC LOW.) Example: If the function code is 0x234, then these bits are 0x02.
FUNCTION LOW	ASCII-hex byte to indicate the lowest 8 bits of the actual function to set or receive.. A later table details all the functions available.
CS	ASCII-hex, see above.
EOP	<CR>

Write Packets

Below is a representation of data bytes in a single packet for a 'Write' to the unit to set a value:

SOP	CMD	CHA	WINDOW	OUTPUT/FUNCTION	FUNCTION	PAYLOAD x 3	CS	EOP
-----	-----	-----	--------	-----------------	----------	-------------	----	-----

The table below details the function of each part of the packet:

Packet part	Function
SOP (Start of packet)	This is always the ASCII letter 'F' to indicate the packet start.
CMD (Command)	ASCII-hex byte to indicate the type of command being sent. Each bit in the byte has a different function Bit 7 = Write (0) or Read (1) request. Messages from the unit are always Writes. Bit 6 = ACK bit. Should be set to 0 for messages to the unit. ACK=1 returned means message was okay. ACK=0 returned means an error was present in the message. Bit 5..3 = 0 Reserved for future use. Bit 2 = 1 This bit *must* be set. Bit 1..0 = 0 Reserved for future use.
SOURCE	This byte has multiple uses, and defaults to 0 unless used for: SOURCE Byte to indicate the source channel to be altered (if appropriate). 0x10 = RGB1 0x11 = YUV 0x12 = DVI 0x30 = VIDEO1 0x31 = VIDEO2 0x40 = S-VID1 0x41 = S-VID2
WINDOW	Bit 7 = 0 (Reserved). Bit 6..0 = Window 'A' is sent as '41' since 0x41 is ASCII for 'A'
OUTPUT & FUNCTION HIGH	Bit 7..4 = 0 Bit 3..2 = Reserved (set to 0). Bit 1..0 = Bits 9 & 8 of the function code. (Remainder of bits [7..0] are in FUNC LOW.) Example: If the function code is 0x234, then these bits are 0x02
FUNCTION LOW	ASCII-hex byte to indicate the lowest 8 bits of the actual function to set or receive. A later table details all the functions available.
PAYLOAD x 3 bytes	A series of three ASCII-hex bytes carrying the data to send, MSB first. Example: '000001' is 1 in decimal, '010000' is 65536 in decimal, and 'FFFFFF0' is -16 in decimal.
CS	ASCII-hex, see above.
EOP	<CR>

FRONT PANEL BUTTON EXAMPLES

If the user is using the serial commands to simulate the front panel of the MAS-7000, the following commands are provided. They have been tested.

The commands are to be sent out in the following manner, with no spaces between the fields.

F4410410082000010??<CR>

Would switch the source to RGB.

Source = RGB

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	82	000010	D7	<CR>

Where:

CMD 04, Write command
CHA 00
WIN 41, Window "A"
OUT 00, Output 1
FUN 82, Change Program source
PAY 000010, Source RGB
CS ??, test checksum

Source = YUV

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	82	000011	D8	<CR>

Where:

CMD 04, Write command
CHA 00,
WIN 41, Window "A"
OUT 00, Output 1
FUN 82, Change Program source
PAY 000011, Source YUV
CS ??, test checksum

Source = DVI

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	82	000012	D8	<CR>

Where:

CMD 04, Write command
CHA 00,
WIN 41, Window "A"
OUT 00, Output 1
FUN 82, Change Program source
PAY 000012, Source DVI
CS ??, test checksum

Source = S-VID1

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	82	000040	07	<CR>

Where:

CMD 04, Write command
 CHA 00,
 WIN 41, Window "A"
 OUT 00, Output 1
 FUN 82, Change Program source
 PAY 000040, Source S-VID1
 CS ??, test checksum

Source = S-VID2

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	82	000041	08	<CR>

Where:

CMD 04, Write command
 CHA 00,
 WIN 41, Window "A"
 OUT 00, Output 1
 FUN 82, Change Program source
 PAY 000041, Source S-VID2
 CS ??, test checksum

Source = VIDEO1

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	82	000030	F7	<CR>

Where:

CMD 04, Write command
 CHA 00,
 WIN 41, Window "A"
 OUT 00, Output 1
 FUN 82, Change Program source
 PAY 000030, Source S-VID2
 CS ??, test checksum

Source = VIDEO2

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	82	000031	F8	<CR>

Where:

CMD 04, Write command
 CHA 00,
 WIN 41, Window "A"
 OUT 00, Output 1
 FUN 82, Change Program source
 PAY 000031, Source S-VID2
 CS ??, test checksum

FREEZE ON

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	9C	000001	??	<CR>

Where:

CMD 04, Write command
 CHA 00,
 WIN 41, Window "A"
 OUT 00, Output 1
 FUN 9C, Freeze
 PAY 000001, On
 CS ??, test checksum

FREEZE OFF

SOP	CMD	CHA	WIN	OUT	FUN	PAY	CS	EOP
F	04	00	41	00	9C	000000	??	<CR>

Where:

CMD 04, Write command
 CHA 00,
 WIN 41, Window "A"
 OUT 00, Output 1
 FUN 9C, Freeze
 PAY 000000, Off
 CS ??, test checksum

FUNCTION LIST

These are grouped together into their associated on-screen menus.

Your unit and this manual should be used to determine the actual function of each of the following, as only the menu text is listed here. Where an equivalent menu item does not exist on your unit, then that feature is not supported on.

Function codes are given in hexadecimal and adjustment range is in decimal (but always sent as hexadecimal!).

The following table is a list of all menu functions, their related function number and valid range of adjustment.

Menu text	CHA	FUNC (Hex)	Range of adjustment (decimal)
Adjust outputs			
Output resolution		083	1..1000
Output Enable		170	0 = Off, 1 = On
Output image type analogue		0E2	0 = RGBHV 2 = RGsB 3 = YUV
Output image type digital		16C	0 = RGBHV 3 = YUV 9 = Not available
Background Y		13B	16..235
Background U		13C	16..240
Background V		13D	16..240
CCIR Output Standard		101	0 = NTSC/PAL, 1 = PAL-M/PAL-N, 2 = SECAM
Output CV/YC IRE		133	-7.5..12.5
Output CV/YC Hue (degrees)		139	-22..22
Output SC/H Phase		085	-180..180
Output Luma Bandwidth		134	0,1,2 = Low, Medium, High
Output Chroma Bandwidth		135	0,1,2 = Low, Medium, High
Output Chroma delay		137	-4..3
PAL WSS		130	0 = Off 1 = 4:3 Full format 2 = 14:9 Letterbox centre 3 = 14:9 Letterbox top 4 = 16:9 Letterbox centre 5 = 16:9 Letterbox top 6 = >16:9 Letterbox centre 7 = 14:9 Full format 8 = 16:9 Full format
Take		11E	0->1 = Perform a Preview -> Program transition

Adjust Scalers			
Program source / Window source (connector)		082	0x10 = RGB 0x11 = YUV 0x12 = DVI 0x30 = VIDEO1 0x31 = VIDEO2 0x40 = S-VID1 0x41 = S-VID2
Window Enable		12B	0..1 = Off, On
Zoom level %		086	100..1000
Zoom level H %		103	100..1000 (only used in Advanced A/R mode)
Zoom level V %		105	100..1000 (only used in Advanced A/R mode)
Aspect ratio in		107	0.1:1..9.99:1
H/V zoom pan % (H)		09F	0..100
H/V zoom pan % (V)		0A0	0..100
Freeze		09C	0..1 = Off, On
H/V out shift (H)		0AD	-4096..4096
H/V out shift (V)		0AE	-4096..4096
Lock pixel offset		14A	-2047..2047
Lock line offset		14B	-2047..2047
Aspect Adjust		102	0..1 = Simple, Advanced
Aspect ratio		190	0..2 = Normal, Letter-box, Narrow
Flicker reduction		092	0..3 = Off, Low, Med, High
Image smoothing		0A1	0..2 = Off, Med, High
Image flip		095	0..3 = Off, Horiz., Vertical, H & V
Layer priority		144	0..5 = Layer priority
Headphone volume		0FD	-16..15 (-16=Mute)
Adjust sources			
Source to adjust		116	0x10 = RGB, 0x11 = YUV, 0x12 = DVI 0x30 = VIDEO1, 0x31 = VIDEO2 0x40 = S-VID1, 0x41 = S-VID2
Autoset	10..1F	FE	1= Start Autoset procedure
Autoset Sense	10..FF	FF	0..3 = Low, medium, high, v.high
Field swap	10..FF	C9	0..1 = Off, On (swaps odd/even fields)
Field Offset	10..FF	196	0..7 = -4..+3 (defaults to 4 = 0)
Testcard	F0..F1	0DC	0..10
TL pos. adj. (left)	10..FF	0B6	-100..100
TL pos. adj. (top)	10..FF	0B7	-100..100
BR size adj. (right)	10..5F	0DE	-100..100
BR size adj. (bottom)	10..5F	0DF	-100..100
Audio input	10..FF	0D0	0..3 = Channels 1 .. 4
Audio vol	10..FF	0CF	-16..15 (-16=Mute)
Bal	10..FF	0D1	-15..15
Input pixel phase	10..5F	091	0..31

RGB input type	10..1F	0C1	0 = Auto 1 = D-RGB 2 = D-YUV 3 = A-RGB 4 = A-YUV
RGB contr. (red)	10..1F	0C5	75..150
RGB contr. (green)	10..1F	0C6	75..150
RGB contr. (blue)	10..1F	0C7	75..150
De-int.	10..FF	0B8	0..5 = Normal, Auto, Film 3:2, M.comp.low, M.comp.med., M.comp.high
(Film mode detected)	10..FF	0E3	0..1 = Not detected, Detected
Bright	30..5F	0BB	0..180
Contrast	30..5F	0BC	0..180
Saturation	30..5F	0B9	0..180
Hue	30..5F	0BA	-180..180
Sharpness	30..5F	080	-7..+7
Luma delay	30..5F	0BD	-4..3
Adjust resolutions			
Note: You MUST set the 'Image to adjust' value to the correct value first, and only then change the other values - otherwise you may be adjusting the wrong entry. The user should not adjust the 'Image to adjust' entry using the front panel while also accessing it via RS232			
Image to adjust		081	1..1000
Interlaced		0CA	0..1 = Off, On
H.freq.crse		0BE	10000..200000
H.freq.fine		0BF	10000..200000
H/V active (H)		096	64..2047
H/V active (V)		097	64..2047
H/V start (H)		08B	0..1023
H/V start (V)		08C	0..1023
Clks/l		08D	64..4095
Lines/f		08E	64..2047
H/V sync (H)		08F	8..1023
H/V sync (V)		090	1..1023
Sync polarity		094	0..3 = ++, +-, -+, --
System			
SW (Software version)		0D2	Read only
PT (Product type)		0C4	Read only
BT (Board type)		0C2	Read only
Advanced menus		11D	0..1, Off, On
OSD on Power up		189	0..1, Off, On
Store		0C8	Set to 1 to store
Buzzer		0CB	0..1 = Off, On
Power cycles		0D6	Read only
Firmware updates		0DD	Read only
Hours in use		0D7	Read only
Resolutions		0D8	Read only
Number of Testcards		0D9	Read only

Board temp. (deg.C)		0CD	Read only
Air temp. (deg.C)		148	Read only
Regulators temp.(deg.C)		147	Read only
PLD temp. (deg.C)		111	Read only
Fan speed (rpm)		0CE	Read only
Led brightness		12C	0..100
RS232 Baud rate		0AB	0 = 9600 1 = 19200 2 = 28800 3 = 33600 4 = 38400 5 = 57600 6 = 115200
TAC number 0		15D	Read only
TAC number 1		15E	Read only
TAC number 2		15F	Read only
TAC number 3		160	Read only
TAC number 4		161	Read only
TAC number 5		162	Read only
Not part of menu system			
Front panel lock		0FC	0 = unlocked, 1 = locked

MAS-7000 SPECIFICATIONS

Video Inputs

Television Standards	NTSC, PAL, PAL-M, PAL-N, SECAM
Composite Video	2x via BNC
S-Video (YC)	2x via 4-Pin Mini-DIN Connector
YUV/YPbPr	1x via 3-RCA

DVI Input

DVI-D	DVI-I Connector
DVI Resolutions	Any up to 1920x1200, HD to 1080p/60

Computer Input

RGB/YPbPr	1x via HD15
Format - Analog	RGBHV, RGBS, RGSB, YPbPr
Sync TTL Level	10K Ω , Pos or Neg
Termination	Auto-terminating into 75 Ω
R-G-B Level Range	0.5-2.0 Vp-p
Scan Rate Detection	Automatic
PC Resolutions	Any up to 2048x2048
HDTV Resolutions	Any up to 1080p
Max Horiz Scan Rate	150KHz
Computer Compatibility	PC, Macintosh, Workstations

Computer Output

Format	Analog RGBHV, RGBS, RGSB, YPbPr
Connectors	1x HD-15 Female
R-G-B Level	0.7 Vp-p
PC Resolutions	Any up to 2048x2048
HDTV Resolutions	Any up to 1080p
Vertical Refresh Rate	to 250Hz

DVI Output

DVI-D	DVI-I Connector
DVI Resolutions	Any up to 1920x1200, HD to 1080p/60

General

Size and Position	Automatic or Manual
Image Size	User-Definable Presets
Image Freeze	One Video Frame
Settings Memory	Non-Volatile
Zoom Range	Variable to 10X Zoom
Shrink Range	Variable to 10%
Image Mirroring	Horizontal and/or Vertical
Horizontal Filtering	Full Digital
Conversion Technology	Proprietary
Color Resolution	24-bit (16.8 Million Colors)
Digital Sampling	24-bit, 4:4:4 format
Firmware Memory	Flash, Upgradeable via RS-232
Video Decoder	9-bit Digital
De-Interlacing (NTSC-PAL)	Pixel-level Motion Adaptive, 'Diagonal Interpolation

Comb Filter Decoding	Adaptive
Film Mode (NTSC)	3:2 Pulldown
Video Adjustments	Contrast, Brightness, Saturation, Hue (NTSC), R-G-B Levels

Audio Input/Output (MAS-7000A only)

Inputs	4x Unbalanced via Terminals
Input impedance	10K
Output impedance	50 Ω
Output	Balanced via Terminals
Audio delay	Adjustable

Control Methods

Local	via Front Panel Buttons
RS-232 Interface	via DB-9 Female Connector
Infrared Interface	Front Panel Sensor (Remote Not Supplied)

Warranty

Limited Warranty	3 Years Parts and Labor
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Regulatory Compliance

Main Units	FCC, CE, RoHS
Power Supplies	UL, CE, CSA, RoHS

Mechanical

Size	(H-W-D) 1.72" x 19" x 11" (43.5 x 482.6 x 279.4mm)
Weight (Net)	10 lbs (4.536 kg)

Environmental

Operating Temperature	+4° to +45° C (+40° to +113° F)
Operating Humidity	10% to 85%, Non-condensing
Storage Temperature	0° to +60° C (+32° to +140° F)
Storage Humidity	10% to 85%, Non-condensing

Power Requirement

Power	100-240VAC, 50-60Hz, 0.3A
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Product Item Numbers

MAS-7000 Video Switcher/Scaler
MAS-7000A Video Switcher (Audio Version)

WARRANTY AND RETURN INFO

WARRANTY POLICY

This product is warranted against failures due to defective parts or faulty workmanship for a period of three years after delivery to the original owner. During this period, FSR will make any necessary repairs or replace the unit without charge for parts or labor. Shipping charges to the factory or repair station must be prepaid by the owner, return-shipping charges, via UPS / FedEx ground, will be paid by FSR.

This warranty applies only to the original owner and is not transferable. In addition, it does not apply to repairs done by other than the FSR factory or Authorized Repair Stations.

This warranty shall be cancelable by FSR at its sole discretion if the unit has been subjected to physical abuse or has been modified in any way without written authorization from FSR. FSR's liability under this warranty is limited to repair or replacement of the defective unit.

FSR will not be responsible for incidental or consequential damages resulting from the use or misuse of its products. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Warranty claims should be accompanied by a copy of the original purchase invoice showing the purchase date (if a Warranty Registration Card was mailed in at the time of purchase, this is not necessary). Before returning any equipment for repair, please read the important information on service below.

SERVICE AND RETURN AUTHORIZATION

Before returning any equipment for repair, please be sure that it is adequately packed and cushioned against damage in shipment, and that it is insured. We suggest that you save the original packaging and use it to ship the product for servicing. Also, please enclose a note giving your name, address, phone number and a description of the problem.

NOTE: All equipment being returned for repair must have a Return Authorization (RMA) Number. To get a RMA Number, please call FSR Service Department (973-785-4347).

Please display your RMA Number prominently on the front of all packages.

CONTACT INFORMATION

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Woodland Park, NJ 07424

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