



KRAMER ELECTRONICS, Ltd.

USER MANUAL

SCAN CONVERTERS

Models:

VP-704SC, VP-705SC, VP-706SC

**IMPORTANT: Before proceeding, please read paragraph entitled
"Unpacking and Contents"**



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1 INTRODUCTION

Congratulations on your purchase of this Kramer Electronics Scan Converter. Since 1981, Kramer has been dedicated to the development and manufacture of high quality video/audio equipment. The Kramer line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the line, making the best even better. Kramer's line of professional video/audio electronics is one of the most versatile and complete available, and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the Kramer line of high quality Scan Converters, such as the one you have just purchased, Kramer also offers a full line of high quality video scalars, matrix switchers, distribution amplifiers, processors, interfaces, controllers and computer-related products. This manual includes configuration, operation and option information of the following Kramer Scan Converters for the video professional. These Scan Converters are similar in operation but differ in features.

VP-704SC	VP-705SC	VP-706SC
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1.1 A Word about Scan Converters

Kramer's Digital Scan Converters are designed to convert computer signals of varying resolutions and vertical refresh rates into standard NTSC and PAL video signals. NTSC and PAL television systems are much lower in resolution than typical computer signals. Computers can often output over three times as many horizontal lines as standard analog television resolutions. Scan Conversion is the process of fitting a higher number of lines of information into a lesser number of available spaces. Kramer Scan Converters are designed and manufactured to the highest possible performance standards and are capable of providing high resolution results, however, it is important to understand the overall process of scan conversion and its inherent limitations.

1.2 Factors Affecting Quality of Results

There are many factors affecting the quality of results when computer images are converted to standard video. An entire section of this manual entitled 'Getting the Most from your Scan Converter' goes into detail, but here are a few major points up front.

- **Beginning Resolution** – As a general rule, the less the conversion ratio, the better the results. Standard NTSC and PAL resolutions are near the computer's VGA resolution of 640x480, so generally, the nearer you begin to that resolution the better the results. The common mistake is to assume that the higher the beginning computer resolution, the better the NTSC or PAL results. The reverse of this is the actual fact. Sometimes a lower beginning computer resolution is not possible, but when it is possible, use it.
- **Output Display Device** – The S-Video or RGB output will provide a better final image, because unlike the Composite output, the luminance and color signals are kept separate. This results in less color smearing and a sharper image. When possible, use the S-Video or RGB output, rather than Composite.
- **Distance between the computer and Scan Converter** – This plays a major role in the final result and the distance should be kept to a minimum. The Scan Converter is supplied with a high quality 6' computer input cable. Longer distances are possible, but special measures should be taken in order to avoid cable losses. These include using high quality (coax-type) cables or adding line amplifiers.
- **Output connection cables** – Low quality cables are susceptible to interference. They degrade signal quality due to poor matching and cause elevated noise levels. Therefore, cables should be of the best quality.
- **Interference from neighboring electrical appliances** – These can have an adverse effect on signal quality. For example, an older computer monitor often emits very high electromagnetic fields that can interfere with the performance of video equipment in its proximity.



2 SPECIFICATIONS

	VP-704SC	VP-705SC	VP-706SC
Computer Input	RGB with HV Sync RGB with Composite Sync RGB with Sync on Green	RGB with HV Sync RGB with Composite Sync RGB with Sync on Green	RGB with HV Sync RGB with Composite Sync RGB with Sync on Green
Maximum Input Resolution	1600x1200	1280x1024	1600x1200
Maximum Vertical Refresh Rate	150Hz	150Hz	150Hz
Maximum Horizontal Scan Rate	100KHz	100KHz	100KHz
Computer Input Connection	HD15 Jack	HD15 Jack	HD15 Jack
Input Level	RGB @ 0.7V Peak Level H&V Sync @ TTL	RGB @ 0.7V H&V Sync @ TTL	RGB @ 0.7V H&V Sync @ TTL
Video Outputs	VGA Loop-thru Composite Video @ 1V P-P S-Video @ 1V P-P RGBS @ 0.7V P-P, TTL Sync RGBHV @ 0.7V P-P, TTL Sync YUV (Y,R-Y,B-Y)	VGA Loop-thru Composite Video @ 1V P-P S-Video @ 1V P-P RGBS @ 0.7V P-P, TTL Sync RGBHV @ 0.7V P-P, TTL Sync YUV (Y,R-Y,B-Y)	VGA Loop-thru Composite Video @ 1V P-P S-Video @ 1V P-P RGBS @ 0.7V P-P, TTL Sync RGBHV @ 0.7V P-P, TTL Sync YUV (Y,R-Y,B-Y)
Video Standard	NTSC/PAL Switchable	NTSC/PAL Switchable	NTSC/PAL Switchable
Output Connectors	Composite Video on BNC, S-Video on 4-Pin Mini-DIN RGBS on BNCs YUV (shares RGBS BNCs)	Composite Video on BNC S-Video on 4-Pin Mini-DIN, RGBS on BNCs YUV (shares RGBS BNCs)	Composite Video on BNC S-Video on 4-Pin Mini-DIN, RGBS on BNCs YUV (shares RGBS BNCs)
Genlock Signal	N/A	Composite or Blackburst 1V P-P	Composite or Blackburst 1V P-P
Genlock Connection	N/A	2 BNC (Loop-through)	2 BNC (Loop-through)
Image Scaling	Proprietary Method	Proprietary Method	Proprietary Method
AutoTrack™	Proprietary Automatic Image Sizing and Positioning	Proprietary Automatic Image Sizing and Positioning	Proprietary Automatic Image Sizing and Positioning
Zoom & Pan	2X	2X	2X
Flicker Reduction	2, 4 or 6-Line	2, 4 or 6-Line	2, 4 or 6-Line
Control Type	Manual Front Panel Buttons (with Front Panel LCD Display) RS-232 Serial Infrared Remote Control	Manual Front Panel Buttons (with Front Panel LCD Display) LCD Display RS-232 Serial Infrared Remote Control	Manual Front Panel Buttons (with Front Panel LCD Display) LCD Display RS-232 Serial Infrared Remote Control
Subcarrier Lock	Locked to Line Frequency	Locked to Line Frequency	Locked to Line Frequency
Weight	2.0 kg (4.4lbs.) Approx.	2.0 kg (4.4lbs.) Approx.	2.0 kg (4.4lbs.) Approx.
Dimensions (HxWxD)	19" x 7" x 1.75" (1RU) (482mm x 178mm x 44.5mm)	19" x 7" x 1.75" (1RU) (482mm x 178mm x 44.5mm)	19" x 7" x 1.75" (1RU) (482mm x 178mm x 44.5mm)
Power Source	100-240VAC, 50/60 Hz	100-240VAC, 50/60 Hz	100-240VAC, 50/60 Hz
Power Consumption	650mA	650mA	650mA

3 HOW DO I GET STARTED?

The fastest way to get started is to take your time and do everything right the first time. Taking 15 minutes to read the manual may save you a few hours later. You don't even have to read the whole manual - if a certain section doesn't apply to you, you don't have to spend your time reading it.

4 UNPACKING AND CONTENTS

The items contained in your Kramer accessory package are listed below. Please save the original box and packaging materials for possible future transportation and shipment of the unit.

- Scan Converter
- AC Power Cable
- VGA Input Cable
- Composite Video Output Cable
- S-Video Output Cable
- 75 Ohm Termination BNC Plug (VP-705SC and VP-706SC Only)
- Infrared Remote Control Unit
- Rackmount Screws (Qty 4) for EIA 19" Racks
- User Manual
- Kramer Concise CD ROM Product Catalog

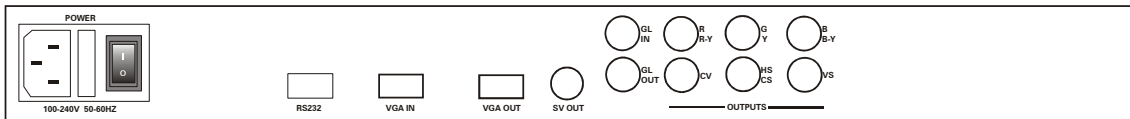
4.1 Optional Accessories

The following optional accessories, which are available from Kramer, can enhance implementation of your Scan Converter. For information regarding these accessories, contact your Kramer dealer.

- RGB Output Cable Assembly – 4 or 5 BNC Type
- YUV Output Cable Assembly – 3 BNC Type
- RS-232 Cable
- BNC Computer Input Adapter – HD15 to 5 BNCs

5 CONNECTING THE HARDWARE

The first step is to connect the Scan Converter and related hardware. Below is a drawing of the rear panel. (The VP-704SC does not have the GL IN and GL OUT connectors.)



5.1 Rack Mounting

Each of the Scan Converters described in this manual mount in a standard 19" (1RU) EIA rack assembly. These devices do not require spacing above or below the unit for ventilation. Four standard rackmounting screws are provided for each of the four corner holes in the rack ears.

5.2 Connecting the Scan Converter to a Computer and Monitor

Disconnect the computer monitor's input cable from the computer's VGA output connection. Connect this cable to the 'VGA OUT' connector on the back of the Scan Converter. Macintosh computers that do not have an HD15 type output connector may require an additional adapter. Next, use the VGA cable supplied to connect the VGA output connection from the computer to the 'VGA IN' connector on the back of the Scan Converter. After these connections are made and the computer and monitor are switched on, you will see the computer's output displayed on the computer monitor as before, even when there is no power to the Scan Converter.

5.3 Connecting the Video Outputs

The Scan Converter provides several different output types to allow connection to various video displays and other equipment. The choice of output type depends on what your equipment can accept.

- **Composite Video** - use the composite video cable provided to connect from the composite video output on the back of the Scan Converter (the BNC connector marked CV) to the composite video input of your target video equipment.
- **S-Video** - use the S-Video cable provided to connect from the S-Video output on the back of the Scan Converter to the S-Video input of your target video equipment. S-Video provides improved performance over Composite Video.
- **RGB with Composite Sync** - Use a 4xBNC to 4xBNC cable to link from the Red, Green, Blue, and HS/CS outputs to the video display. The Scan Converter defaults to outputting negative-going CS (Composite Sync) on the HS/CS connector, but if you encounter problems then it is likely that this has been changed - see 'Advanced Features' later in this manual. Please note that this output's horizontal scan rate is 15.75KHz and is not intended for connection to a computer monitor.
- **RGB with H&V Sync** - Use a 5xBNC to 5xBNC cable to link from the Red, Green, Blue, HS/CS and VS outputs to the video display. Since the Scan Converter defaults to outputting CS (Composite Sync) on the HS/CS and VS connectors, so you must see 'Advanced Features' later in this manual in order to change this to the required separate H&V Syncs. It is recommended that another output be used, until operation of the unit is understood.
- **YUV Component (Y,R-Y,B-Y)**- Use a 3xBNC to 3xBNC cable to link from the Y, R-Y and B-Y outputs to the video display. If the Scan Converter is set to output RGB mode (this is the default) it will be necessary to switch to YUV. See the section on switching between RGB and YUV modes in the Advanced Features section of this manual. It is recommended that another output be used, until operation of the unit is understood, because in the YUV Mode, no other video output signals are present.

5.4 Optional Connection of an External Reference Signal (N/A on VP-704SC)

The VP-705SC and VP-706SC have the ability to synchronize their video output with a master Reference Signal, in the form of a Composite Video or Blackburst source. This is done by connecting the Reference Signal to the BNC connector marked 'GL IN'. A loop-through output is available at the 'GL OUT' BNC connector for connection to other devices. **Note** - If no loop-through is required, you must connect the supplied 75 Ohm BNC termination plug to the 'GL OUT' connector instead; otherwise, the unit may not be able to maintain a lock on the Reference Signal.

Synchronization is not automatic; you need to enable it within the unit. You should also ensure that the Composite Video or Blackburst signal used is of the right standard (PAL or NTSC), and that it is a clean, stable, standard signal. Video signals from consumer VCRs and some non-standard equipment may not be suitable.

5.5 Connecting the Serial Cable

The Scan Converter can be controlled from a computer, and used as a remote Microsoft® serial mouse emulator by connecting its RS-232 port to a computer's RS-232 port. See the section on 'RS-232 Computer Control' later in this manual on how to use this control feature (RS-232 Control is the default, and merely requires connecting a suitable RS-232 cable).

5.6 Connecting the AC Power

The Scan Converter requires an AC input power source of 100-240VAC@50-60Hz. With the Power On/Off switch on the rear of the Scan Converter in the Off position, plug the AC Cable supplied into the AC Receptacle on the back of the unit and plug the AC Cable into the power outlet.

5.7 Turning the Scan Converter On

Make sure that all cables are connected and that all other equipment is turned on - your computer monitor should be functioning normally. The Scan Converter's AC Power Switch on the rear panel should be switched on. When using a multi-purpose TV-Monitor, be sure and select the correct line input (AUX or AV). The video monitor should now be displaying the same picture as is on the computer monitor.

When the Scan Converter is switched on, the green LED indicator on the front panel will illuminate. If there is a picture on the video monitor, but it is the wrong shape, position or color it may be necessary to alter some of the status settings before a good picture is displayed. For example, it may be necessary to switch to PAL or NTSC settings. Further details on selecting the correct settings for your displays follow in the Advanced Features section. If there is no picture on the video monitor, then go to the Troubleshooting section.

If there is no picture on the video monitor, go to the Troubleshooting section. One possible cause is that the YUV output is enabled, which will blank out all other video outputs. This is also covered in the Advanced Features section.

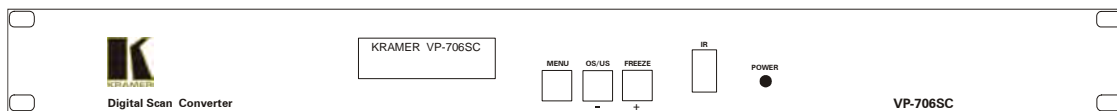
6 ABOUT THE SCAN CONVERTER

There are 3 ways to control the Scan Converter:

- By the Buttons on the Front Panel in conjunction with the LCD (Liquid Crystal Display).
- By the Infrared Remote Control unit.
- Directly from the computer via the RS-232 Serial Port.

Each control method has its own section of this manual to describe the operation.

Shown below is a diagram that indicates the main features of the front panel of the VP-706SC. All three Scan Converter models appear the same and their basic operation is identical.



- **LCD** - The top line of the liquid crystal display (LCD) always indicates the current mode of the Scan Converter. At power-up, this will be the 'Status' mode, but will change, depending on what the user wants the unit to do. The bottom line always indicates the value that is or will be adjusted by the various control methods
- **Power On LED** - When the Scan Converter is powered up, the button labeled POWER will illuminate green.
- **Menu Button** - This is used to initiate Front Panel control of the unit and select the various options and features to change.
- **OS/US (-) Button** - This is a dual-purpose button that will be described in a moment, but is normally used to decrease (or de-select) the currently displayed option or feature.
- **Freeze (+) Button** - This is another dual-purpose button, but normally used to increase (or set) the currently displayed option or feature.
- **Audible Indicator** - The internal sounder is used to confirm that a setting has changed, and to indicate that the Scan Converter is saving the settings to non-volatile memory. You will hear it regularly during normal use, but it can be disabled if needed.

6.1 Quick-Set Buttons

These are the dual-purpose buttons described earlier and only function when in Status mode (i.e. the top line of the LCD says 'Status'). They are provided for quick access to certain often-used functions - i.e. Toggling Underscan /Overscan and Freeze On/Off.

6.2 Special Button Usage on Power-up

Certain buttons can be held down when applying power to the unit, to perform certain functions:

- **Factory Reset** - Hold down both the OS/US and Freeze Buttons when turning the unit on. This will reset the unit to Factory Settings (and set the unit into NTSC video mode). It should only be used if the unit's settings give an invalid output that the user cannot exit from, as all user-settings will be lost. **Note**-use this procedure as a last resort.
- **Set to NTSC Mode** - This is done by holding the OS/US Button down when turning on the unit. This changes the non-volatile PAL/NTSC setting to NTSC, and will be remembered even when power is removed.
- **Set to PAL Mode** - This is done by holding the Freeze Button down when turning on the unit. This changes the non-volatile PAL/NTSC setting to PAL, and will be remembered even when power is removed.

6.3 Special Multi-Hold Buttons

Certain buttons can be held together when the unit is on to perform other functions.

- **Store Current Settings** - This is done by holding the MENU and FREEZE (+) Buttons in together for about 2 seconds and can be done at any time. This stores the current settings (e.g. Overscan, YUV Mode, etc.) in Non-Volatile Memory and cause the Scan Converter to come up in those modes the next time it is turned on.

This option will emit a high-pitched beep when complete to indicate that data has been successfully stored. If you manage to store an invalid setting, you may need to do a Factory Reset (see above).

If you hear high pitch beeps at other times, it indicates that other data is being stored into memory – e.g., information the Scan Converter has deduced about the graphics resolution coming from your computer, such as when you change your screen resolution.

7 MENU STRUCTURE AND FEATURE CONTROL

This section goes through the Main Menus available via the LCD and what control they provide over the Scan Converter. Internally, the Infrared and Serial control links change the features in the same way as the buttons, so this section is required reading whatever the final method of control is likely to be. Advanced features are covered in a later section of this manual.

7.1 Status Mode

In Status Mode, you are presented with a summary of some of the current settings. Almost all of these are repeated (and adjustable) elsewhere in the menu system, but some are not.

7.1.1 Overscan - Quick Set

This is called Quick Set because you don't have to scroll through menus to alter this option. The OS/US (-) Button toggles between Underscan and Overscan.

- Underscan Mode (sometimes know as Compress mode) will leave a border around the image.
- Overscan Mode has no border and the displayed image, when set correctly, is larger than the video monitor screen.
- If Underscan and Overscan don't give you the image sizes you expect (for example, Overscan still shows a border), then make sure you perform the AutoTrack™ function, which is described later in this section of the manual.
- Both the Underscan and Overscan sizes are user-adjustable and the method of doing so will be described later under the 'Screen Size...' section.

7.1.2 Freeze - Quick Set

This is another Quick Set button, labelled 'FREEZE'. When pressed the first time, the unit will enter a special mode where the video image and all other features are frozen.

- Freeze will remain active until disabled by pressing 'FREEZE' again, and the whole unit will remain frozen until this happens.
- No other features are accessible while in Freeze Mode, except the RESET button on the Remote Control unit.

7.1.3 Total Lines - Information

This is for information only and will appear when in Status Mode to show how many scan lines are in the incoming computer picture. It includes blanked lines that are not normally viewable, so a 1024x768 image might actually have a total of 806 lines in it, with 38 of them used for vertical blanking.

7.1.4 Vert Freq - Information

Again, this is just for information and shows the Vertical Refresh rate of the incoming computer signal. Multiply this by the 'Total Lines' value to give the Horizontal Scan Rate. While high refresh rates are generally more acceptable when displayed on computer monitors, Scan Converters prefers a low refresh rate so that their capture circuitry has more time to capture more pixels, thus giving a clearer picture.

7.2 Adjust... Menu

You can enter the 'Adjust...' Menu directly from the Status Mode by pressing the MENU Button once. This enters the beginning of a number of Menus that allow complete control over the Scan Converter's features. All Menus time-out after about 25 seconds of inactivity and return you to the Status Mode. Alternatively, you can press the + Button when 'Exit' is displayed at the end of each Menu list to return to the previous Menu.

The various options from the 'Adjust...' Menu are all selected by pressing the MENU Button repeatedly:

7.2.1 Flicker Reduction

The unit defaults to the 4-Line Flicker Filter Mode, which is best for 800x600 and 1024x768 resolutions. Pressing the + or – Buttons when this option is displayed will change this to 2-Line or 6-Line.

- **2-line Mode** is not advisable, unless the vertical image softening that is present because of higher flicker reduction modes needs to be avoided. Line dropping will be common at this setting.
- **4-line Mode** is best for resolutions around 800x600 and 1024x768, but is subject to personal taste and the exact nature of the graphics or text being displayed. Thin horizontal lines cause the most flicker, and if this is seen, then the highest flicker reduction setting should be used.
- **6-line Mode** offers the maximum amount of flicker reduction and allows images, even CAD wire-frame drawings, at resolutions above 1024x768 to be displayed without line dropping. This mode may not be suitable for low resolutions, because of excessive vertical softening of the image, but this is a matter of personal preference.

7.2.2 AutoTrack™

AutoTrack™ is Kramer's unique auto setup routine that automatically sizes, shifts and centers the computer image onto the video monitor. Once activated, this feature will scan the incoming computer image to determine its size and position and optimize it for display on the desired video display.

When the Scan Converter first encounters a new screen resolution or refresh rate, it will estimate how to best display this on the video monitor. Sometimes this estimate needs refining and the AutoTrack™ function allows the unit to search for the image edges to improve on this.

- Before running the AutoTrack™ function, set the computer so that it is displaying a light colored background or wallpaper with defined edges in full screen mode. If you have a Windows operating system, make sure it is maximized to use the full screen. Black or very dark colors along the edge of the image may cause AutoTrack™ to misread the source image's size.
- If you are running MS DOS, it is only recommended to use this function when the full DOS screen is being used by a fairly bright color or shade of white.
- Only use this feature when the full area of the computer screen is being used - this will ensure that the unit 'sees' the edges correctly, and performs its task without errors.
- Pressing the + Button when AutoTrack™ is displayed on the LCD will start this routine and it will take about 15 seconds. During this time the image on the video monitor will move around, but at the end of this the image should be stable and correctly sized and centered.
- If you encounter problems when running AutoTrack™, you can adjust the level at which it works - see the LEVEL button described later.
- Once complete, the AutoTrack™ routine will remember this particular resolution and refresh rate so that you should not need to re-do this function next time. The only exceptions are if you change the computer's screen resolution, do a Factory Reset or use this unit with a different computer.
- If the AutoTrack™ feature does not look like it is finding the edges of the display correctly, then you can press RESET to stop it going any further.

Note - A high-pitched beep will be heard when the AutoTrack™ function is complete.

7.3 Studio Gen... Mode (Genlock not available on the VP-704SC)

This is a Sub-Menu and selected by pressing the + Button when 'Studio Gen...' is displayed on the lower line of the LCD display. Within this Sub-Menu, you can define the Scan Converter's Studio Genlock features - i.e. whether Synchronization Mode is On or Off, Subcarrier Phase, etc. All these settings can be stored in non-volatile memory by using the STORE feature (i.e. hold the Menu and the + Button together or press the STORE button on the Remote Control).

7.3.1 Genlock - Locking to an External Reference Signal

This option lets you turn the Studio Genlock feature On and Off.

- In the Off condition the Scan Converter functions using its own internal sync generator.
- In the On condition the Scan Converter will synchronize itself to the external reference signal fed into the GL IN BNC connector on the rear of the unit. If no signal (or a poor signal) is present, you may get erratic results from the unit, or no picture at all.

7.3.2 SC Ph. (Phase) Shift - Coarse Subcarrier Phase Adjustment

The Scan Converter has a full 360 degree phase adjustment range when locking to an external source, but this is broken down into a Coarse Adjustment (with two settings) and a Fine Adjustment (SC Phase - see next menu option).

- With SC Ph. Shift set to 0, the SC Phase setting allows adjustment from -150 to +150 degrees relative to the incoming reference signal. This is the normal setting.
- With SC Ph. Shift set to 180, the SC Phase values from -150 to +150 are all offset by 180 degrees, giving an effective SC phase adjustment from +30 to +180 through to -180 to -30.
- Use the setting of '0' when you need a phase shift nearer 0 degrees.
- Use the setting of '180' when you need a phase shift nearer +/- 180 degrees.

7.3.3 SC Phase - Fine Subcarrier Phase Adjustment

This value, ranging from -150 to +150 degrees will fine-adjust the phase of the Scan Converter's subcarrier signal, relative to the incoming reference signal. This is added to the SC Ph. Shift 'coarse' value detailed above.

- With SC Ph. Shift set to 0, and with SC Phase set to a value of 0 degrees, the output signal should be directly in-phase with the incoming reference signal.
- This value can be adjusted to allow for different delays, such as cable lengths, between the unit and a video switcher.
- Phase jitter is at a minimum when SC Phase is nearest 0 degrees.
- A poor incoming signal may reduce the range of SC Phase values that the unit can still achieve a lock with.
- Phase adjustment is most accurate, and has the least jitter, when SC Phase is set nearest to 0 degrees.

7.3.4 H Phase - Horizontal Sync Phase Adjustment

This value will adjust the relative difference between the Scan Converter's horizontal synchronization signal, and the incoming reference signal. Therefore, during Genlock Mode, it will also adjust the unit's SC/H phase, i.e. the timing relation between the horizontal sync and the subcarrier.

- At a value of 0, both should be in phase with each other - this is the default setting.
- A negative value will delay the Scan Converter's output relative to the reference signal.
- A positive value will advance the Scan Converter's output relative to the reference signal.
- Each step adjusts the phase by 1/8 of the NTSC or PAL subcarrier period (i.e. 45 degrees), up to a maximum of around 500ns advanced or delayed.
- Ideally, SC Phase will first be adjusted to correct delays in the subcarrier signal. Then H Phase will be adjusted to correct the SC/H phase.
- If you have an unreliable color lock, it is advisable to adjust this setting (using an oscilloscope), to ensure that the reference subcarrier burst, and the Scan Converter's subcarrier burst, are aligned together. If they are too far off-alignment, you will not get a reliable color subcarrier lock.

7.4 Screen Size... Mode

This is a Sub-Menu selected by pressing the + Button when the 'Screen Size...' message is displayed on the lower line of the LCD. It displays a number of values that can be used to adjust the Scan Converter's output to suit your video display device. You should have ideally already performed the AutoTrack™ function, so that the unit knows what area of the computer image actually contains the display you want converted to video, otherwise you may have to repeat the adjustments for different screen resolutions.

- The values shown depend on whether you are in Underscan or Overscan mode, so make sure you have the appropriate one selected before proceeding to change the values.
- The values are also separately stored for NTSC and PAL outputs - adjusting one will not affect the other.

- When you finish adjusting the values, press the + Button when you reach the 'Exit' message. This will return you to the 'Screen Size...' Menu option and you can continue on to any further Sub-Menus by pressing the Menu Button as before.

If you like the new settings, use the Multi-Button features described earlier to remember the settings in Non-Volatile Memory. Pressing and holding the appropriate button allows fast increasing and decreasing.

Out H-Center - altering the display's horizontal screen position

- Pressing the + Button moves the image to the right
- Pressing the - Button moves the image to the left.
- Adjust until the image is centered horizontally on the screen.

Out H-Width - altering the display's width

- Press the + Button to increase the width of the picture.
- Press the - Button to decrease the width of the picture.
- Adjust until the desired width of the image is obtained.

Out V-Center - altering the display's vertical screen position

- Press the - Button to move the picture up the screen.
- Press the + Button to move the picture down the screen.
- Adjust until the image is centered on the screen vertically.

Out V-Height - altering the display's height

- Press the + Button to increase the picture height.
- Press the - Button to decrease the picture height.
- Adjust until the desired height of the image is obtained.

Note – You can return to the previous menu by pressing the + Button when the 'Exit' message appears.

7.5 Zoom... Mode

Zoom allows you to view a section of the video picture at twice the normal size. Panning while in the Zoom Mode allows you to select exactly what part of the screen is displayed. Note that:

- Again, it is highly recommended that the user should have already run the AutoTrack™ routine, so that the unit knows exactly where the start and end of the computer image is within the incoming computer signal. Otherwise, the user may be able to Pan to areas of the computer image that are completely empty.
- The Panning settings are remembered when Zoom is subsequently turned off. This feature is useful in many training applications.
- It is possible to make the Scan Converter start up (from power on) in the Zoom Mode and in a particular Pan position. This may be useful for certain applications and is done by using the special Multi-Hold Buttons described earlier.
- Enter the Zoom... sub-menu by pressing the + button when this message appears.
- **Turning Zoom On and Off** – Press the + Button when 'Zoom Off' is displayed on the LCD to turn the Zoom On. Press the - Button to turn the Zoom Off again. Pressing the Menu Button will move to the options to alter the Panning position.
- **Pan X Pos** (adjusting the Horizontal Panning Position) – Press the - Button once to Pan Left one step (i.e. move the zoomed image to the left). Press the + Button once to Pan Right one step.
- **Pan Y Pos** – (adjusting the Vertical Panning Position) – Press the + Button once to Pan Down one step. Press the - Button once to Pan Up one step.
- **Exit** – Press the + Button when the 'Exit' message is displayed to leave this Sub-Menu. However, Zoom will still be active until disabled.

7.6 Manual Set... Mode

This Sub-Menu should only be needed when the AutoTrack™ has failed for some reason. See the notes on AutoTrack™ before manually adjusting these parameters, in case something else will solve the problem. Otherwise, you can 'teach' the Scan Converter the correct Horizontal and Vertical Position and Size of the computer's RGB output. This will ensure the Scan Converter will be able to capture this 'input window' and display it correctly on the video output. Whatever adjustments you make, the Scan Converter will continually try to fit the 'input window' to your preferred video output size and position setting.

Note - It is highly recommended that this mode is only used when in Underscan Mode, or you will not know if you've adjusted the values correctly as some parts of the output video picture will be off the screen.

Once adjusted, the 'VGA Store' option can be invoked to remember the new settings in Non-Volatile Memory, thus overwriting any previous setting for this screen resolution and refresh rate combination.

- **VGA Left (start of image capture)** – Increasing this value will move the left edge of the 'input window' further to the right - i.e. less of the computer image will be captured into internal memory. Increase this value until the computer image just starts to be cut off, and then decrease by one.
- **VGA Width (width of capture)** – Increasing this value will make the input window wider, thus capturing more pixels into the internal memory. Ideally, only capture just enough pixels to display the whole image.
- **VGA Top/4 (start line of capture)** – Similar to VGA Left, increasing this value will move the top of the 'input window' down, and start to cut off the computer's image. Decrease by one when this happens. The /4 appears because the value shown is the actual line number at which capture starts into the internal memory divided by 4.
- **VGA Bot/4 (end line of capture)** – Like VGA Top/4, this determines the last line captured. Decrease until the image just starts to be cut off, and then increase by one.
- **VGA Store (store new VGA settings)** – Press the + Button once to store your new settings. They will now be remembered even when the power is switched off.

8 ADVANCED MENUS & FEATURES

These features control the basic operation of the unit in order to comply with the operating environment - e.g. selecting PAL or NTSC video standards, adjusting LCD contrast, etc. They are accessed in the same way as the previous features, i.e. from the Status Mode, press the Menu Button repeatedly until the LCD displays the message 'Advanced...'. Then, press the + Button to select the Advanced Sub-Menu. Subsequent pressing of the Menu Button will select the next Advanced feature to alter. Any of these new settings can be stored using the 'Store Settings' Multi-Buttons (hold MENU and the + Button together for approximately 2 seconds).

8.1 Advanced... Menu

8.1.1 Video Standard - PAL/NTSC

The Scan Converter can switch between PAL and NTSC video standards with ease.

- Press the – Button to switch to NTSC Mode.
- Press the + Button to switch to PAL Mode.
- Screen Size settings are remembered separately for PAL and NTSC, so changing the Screen Size settings in NTSC will not affect the PAL settings.

Note - If you are using the Studio Genlock feature of the unit, make sure you select the correct Video Standard for the reference video signal being used - the two should be the same.

8.1.2 Output Signal - RGB/YUV

The Scan Converter is capable of producing either RGB or YUV outputs. The same three BNC connectors on the back of the unit supply both RGB and YUV and in order to output the correct format the Scan Converter must be switched to that setting. The default setting is in RGB Output Mode. The Scan Converter also has separate BNC connectors to provide Horizontal (HS) and Vertical (VS) Sync, should your video display equipment require it. This is covered later in this section.

- Press the – Button to switch to YUV Mode.
- Press the + Button to switch to RGB Mode.
- Having the wrong setting will give incorrect colors on the output from these connectors.

Note - When in the YUV Mode, the Composite Video and S-Video outputs are disabled!

8.1.3 H. Soften - Image Smoothing

Horizontal filtering (softening) enables the user to smooth pixels, text and lines in the horizontal direction, where flicker filtering only allows control over the vertical line flickering.

- This is used to improve the recordability of a video signal, i.e. to reduce its bandwidth.
- H.Soften is not active during Zoom mode - it is temporarily disabled.
- Press the + Button to switch the horizontal soften on
- Press the - Button to switch it off.

8.1.4 Sense - for AutoTrack™ Function

The Sense Level relates to how the AutoTrack™ routine views the video input from the computer. If running AutoTrack™ produces a resultant image that is too big for the video monitor, it may be because the image is too dark for the Scan Converter to correctly find the edges of the picture. Altering the Sense Level setting will change the brightness needed to find the edges satisfactorily.

- A setting of 1 will sense 30% brightness levels, 2 will sense 60%, and 3 will sense 90% (approximately). 1 is the default, and should be fine for almost all screen displays.
- Run the AutoTrack™ after changing the Sense setting to ensure a good image on the video monitor. If the image is still not good enough, it may be necessary to set the Scan Converter manually - see Manual Set.
- To increase the Sense value, press the + Button.
- To decrease the Sense value, press – Button.

8.1.5 IR (Infrared) - On/Off

This feature is useful when controlling multiple units installed nearby, so that only one unit will respond to Infrared Remote Control commands. It can also be used in situations where stray or random IR signals may be picked up or even to prevent others from remotely altering the unit's features.

- Press the – Button in order to disable the Infrared Remote Control.
- Press the + Button to restore control to the Infrared Remote Control.

8.1.6 RGB Term. – Computer Loop-Through Termination

This relates to whether or not the Scan Converter is terminating the computer monitor loop through connector on the back of the Scan Converter with a 75-Ohm termination.

- Usually the Scan Converter will set the termination automatically ('Auto' Mode) by sensing whether a computer monitor is connected to the back on the unit's VGA OUT connector.
- However, if necessary, it is possible to turn the termination off. For example, if the Scan Converter does not sense that the monitor is attached, this would result in 'double-termination' of the RGB signals and a very low video level.
- Press the – Button to turn the termination off
- Press the + Button to switch to the Automatic Mode.

8.1.7 RS-232 - Control/Mouse

This switches the use of the Scan Converter's RS-232 Serial Port between Computer Control and Microsoft® Serial Mouse emulation

- In order to use the Infrared Remote Control unit to emulate a Mouse, this RS-232 adjustment must be set to Mouse Mode. Similarly, to use a Serial link from the computer to control the Scan Converter, it must be set to RS-232 Control Mode.
- Press the – Button to switch to Mouse Mode.
- Press the + Button to switch to RS-232 Control Mode.

Note - the default is 'Control' mode - you must switch to 'Mouse' mode in order to enable the mouse emulation.

8.1.8 Baud Rate - For RS-232 Control

In order to control the Scan Converter from the computer, it is necessary to set the same Baud Rate for both the Scan Converter and the controlling computer.

- Press the + and – Buttons to change to the required number. The Scan Converter's LCD does not display the actual Baud Rate, but a number relating to it. The table in a later section of this manual on 'RS-232 Control' shows which Baud Rate each number represents. For example, to set the rate to 9600 Baud, the number must be 23.
- "9600,N,8,1" is the default setting - i.e. no parity is used, 8 data bits are required, and 1 stop bit.
- This number is only used in RS-232 Control Mode. Mouse Mode ignores this number, and always uses 1200 baud.

8.1.9 RS-232 ID

This ID code can be used where multiple Scan Converters are all linked via a serial cable to the same computer. The ID can be altered so that each unit's ID is unique, thus each unit could be adjustable by itself, from one serial port. This feature is described further in a later section.

8.1.10 Sound - On/Off

The internal audible indicator is used to give an indication of whether a variable has been changed or if the Scan Converter is saving the settings to Non-Volatile Memory. If you do not wish any audible indications to be present, the sounder can be switched off.

- Normal beeps indicate that a feature or value has been changed.
- High-tone beeps indicate that something has been written to the unit's Non-Volatile Memory. For example, when doing a Store Settings, Factory Reset, AutoTrack™, or when a new screen resolution/refresh rate combination has been detected.
- Press the – Button to turn the sound Off.
- Press the + Button to turn it on again.

8.1.11 Sync In - From 'VGA IN' Connector

The Scan Converter does not need to have separate Horizontal and Vertical Sync inputs provided by the computer. It can also accept Composite (Mixed) Sync or Sync-on-Green (see next option) signals. This ensures compatibility with as many different types of computers as possible.

- If your computer outputs a Composite Sync signal, it is necessary to switch the Scan Converter to accept it. (The default is to accept separate Horizontal and Vertical Sync).
- A Composite Sync signal can be fed into the unit in 3 different ways, corresponding to one of the options listed in the table below.
- Press the + Button to cycle forward through the options.
- Press the – Button to go back.

Sync In option	Description
VGA HV	Positive or Negative Horizontal Sync on Pin 13 and Positive or Negative Vertical Sync on Pin 14.
Grn+Sy	Negative Composite Sync present on Green.
Pin 13	Negative Composite Sync on Pin 13.
Pin 15	Negative Composite Sync on Pin 15.

8.1.12 CSync In Frq - Composite Sync Input Frequency

When using a Composite Sync signal on the VGA IN connection (either separate, or on the Green signal), you may need to adjust this setting to suit the scanning rate.

- The default of 70 should suit Horizontal Frequencies around 55KHz.
- Reduce it to around 50 for 75KHz inputs, and increase it to around 90 for 31KHz inputs.
- Reduce it below 50 to suit even higher frequencies.

Note - The Horizontal Scanning Frequency is the important thing, not the Vertical Frequency. (Multiply Vertical Frequency by the number of lines in the picture to approximate to the Horizontal Frequency.)

8.1.13 Sync Out - BNC Outputs Labeled CS/HS and VS

The Scan Converter can output either separate Horizontal (HS) and Vertical (VS) Sync signals, or two Composite Sync (CS) signals. These syncs can be either positive or negative going and are available from the BNC output connectors on the back of the unit. It is necessary to switch the Scan Converter to give the correct sync outputs for your display.

- By default, the HS/CS connection and VS connection both output negative-going composite sync signals.
- Press the + Button to cycle forward through the options.
- Press the – Button to go back.

Sync Out Option	CS/HS Output	VS Output
-CS-CS	Negative Composite Sync	Negative Composite Sync
+CS+CS	Positive Composite Sync	Positive Composite Sync
-HS-VS	Negative Horizontal Sync	Negative Vertical Sync
+HS+VS	Positive Horizontal Sync	Positive Vertical Sync

8.2 Engineering... Menu

Items in this section will alter the basic operation of the Scan Converter. The changes are generally of a highly technical nature and should only be made when they are understood. Please read each item in this section carefully before making any alterations.

- When the 'Engineering...' message appears, press and hold both the + and – Buttons simultaneously for approximately 2 seconds and then release both buttons.
- Settings changed in this mode can be stored in Non-Volatile Memory the same way as other settings.

Note – Great caution should be exercised before making any adjustments covered in this section.

8.2.1 ADC Ref. - Input RGB Level

The Scan Converter takes the RGB analog signal from the computer (destined for the computer monitor) and converts it to a digital signal in order to perform signal processing and scan conversion. The actual device that does this is an Analog-to-Digital converter (ADC) and changing the upper reference level to this is similar to a Brightness Control, but will also clip colors that are too bright to the maximum brightness level. If this is incorrectly set, then certain colors, such as yellow, may appear washed out or even come out as white. This adjustment is factory set and should not normally need altering.

- It is highly recommended that this value is only adjusted when problems arise. A Color Bar Test Pattern should be displayed on the computer screen. An oscilloscope must be connected to the unit's video output to allow precise monitoring of the adjustment's result.
- Pressing the + Button increases the voltage at the ADC reference input. This makes the sampled image darker and reduces 'clip' effects.
- Pressing the – Button decreases the voltage at the ADC reference input. This makes the image brighter, but at some point will start to 'clip' the RGB input.
- The factory setting allows for an input up to 0.8V, thus allowing for out-of-tolerance RGB inputs.

8.2.2 DAC Ref. - Output Video Level

The Digital-to-Analog Converter (DAC) changes the digital data output from the processing circuit into an analog form that can be displayed on a standard video monitor or TV. Altering the reference level has an effect similar to changing the Contrast of the output video signal.

- It is highly recommended that this value only be adjusted when problems arise. A Color Bar Test Pattern should be displayed on the computer screen. An oscilloscope must be connected to the unit's video output to allow precise monitoring of the adjustment's result.
- Pressing the + Button increases the voltage at the DAC reference input.
- Pressing the – Button decreases the voltage at the DAC reference input.

8.2.3 CV Filter - For Composite Video

The Scan Converter allows some control over the amount of filtering on the Composite Video output. Altering this may give a clearer image or reduce dot-crawl.

- In most circumstances, this should never need changing.
- Pressing the + Button increases the value, thus applying more filtering.
- Pressing the – Button decreases the value, thus applying less filtering.

8.2.4 Adj. Osc. - For Subcarrier Frequency Adjustment

This fine-adjusts the Scan Converter's internal oscillator, which is used to generate all timings when not in the Genlock Mode (In Genlock Mode on the VP-705SC and VP-706SC, the External Reference Signal is used instead). Specifically, it adjusts the Subcarrier Frequency of the PAL or NTSC signal being generated. This frequency is factory set, but may need adjusting under certain conditions.

- Press the – Button to reduce this value (from the 0 default) to lower the Subcarrier Frequency.
- Press the + Button to increase this value increase the Subcarrier Frequency.

8.2.5 SC/H Phase – For Video Output

This adjusts the Phase Delay between Subcarrier and Horizontal Sync signal.

- This adjustment has no effect when the Studio Genlock feature is active.
- This adjustment is normally only required for studio setups, where the actual phase relationship can be measured.
- The value of 4 is the default and corresponds to approximately 0 degrees shift. The remaining values are indicated in the following table:

Value	0	1	2	3	4	5	6	7
Phase	-180	-135	-90	-45	0	45	90	135

- This should enable SC/H phase adjustment to the nearest 22.5 degrees.
- Pressing the + Button increases the Phase value.
- Pressing the – Button decreases the Phase value.

8.2.6 Y/C delay - For Video Output

The Y/C delay setting allows control of the delay between the Luminance (Y) and Chrominance (C) parts of the S-Video signal.

- This affects ALL video outputs - composite video, S-video, RGB and YUV.
- Pressing the + button increases the delay (thus making any color smearing move left), the - button reduces it (making any color smearing move right).

The default of 1 should give correct luminance and chrominance line-up.

9 CONTROL AND SETUP USING THE INFRARED REMOTE CONTROL

9.1 Introduction

This Scan Converter has been designed for ease of use and you should find most of the controls simple to understand and apply. Some features, such as Brightness Control, require more than one button press on the Remote Control Unit (SC-RM), but this has only been done to reduce the number of buttons required to operate the unit.

If at any time you find that the Remote Control or Front Panel Buttons are not working, then you may have inadvertently pressed the LOCK Button on the Remote Control Unit. The continual flashing of the Power LED on the Front Panel indicates the Lock Mode. A description of how to turn this feature on and off is provided later in this manual.

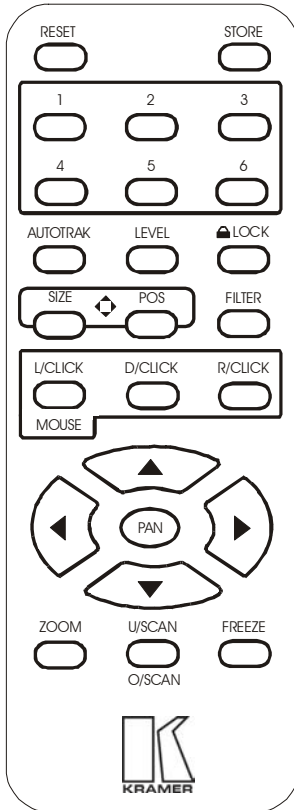
This section of the manual covers:

- All the Infrared Remote Control features of the Scan Converter.
- Setup and adjustments for the unit and the effect they have on the final image.
- Storing the settings so they are remembered by the unit the next time.

9.2 Functions of the SC-RM Infrared Remote Control Unit

This section will provide a brief overview of the individual functions of the buttons on the Remote Control Unit. More detailed information about these functions is available in the previous section of this manual.

Below is a drawing of the SC-RM



9.2.1 Reset Button

As its name implies, this resets the unit back to the last-saved user settings. It is useful if you want to clear any changes made to screen size or position. If you've saved an invalid setting to the non-volatile memory, you may want to do a Factory Reset - as described elsewhere in this manual.

9.2.2 Store Button

This button is used for saving new settings to the Scan Converter's memory and will be remembered even after the unit has been switched off. Just about all feature settings can be saved – e.g. Zoom Mode and Position.

9.2.3 U.Scan/O.Scan Button

Pressing this button will toggle between the Underscan and Overscan Modes.

9.2.4 Freeze Button

The Freeze function allows you to freeze the current image on the screen, and all the settings of the unit itself. Pressing the freeze button again will unfreeze the image.

9.2.5 AutoTrack™ Button

AutoTrack™ is Kramer's unique auto setup button that automatically sizes, shifts and centers the computer image onto the video monitor. The details of its operation are described earlier in this manual.

9.2.6 Filter Button

This button will toggle between 4-Line and 6-Line Flicker Reduction Modes.

9.2.7 Size and Pos (Position) Buttons

These buttons allow adjustment of the Size and Position of the image on the video monitor in both the Underscan and Overscan Modes, whichever is currently selected. You can then use the arrow keys to adjust the horizontal and vertical size or position of the image being displayed.

Note – Ideally, the AutoTrack™ function should be run before making these adjustments, so that the unit knows the precise size of the source image from the computer.

- Only Size or Pos (Position) is active at any one time, but you can easily switch from one to the other.
- Once adjusted, be sure and Store the setting for future use.

9.2.8 Zoom Button

The Zoom function allows you to view a section of the video image at twice the normal size. Enter this function by pressing the ZOOM Button. Pressing ZOOM again will return you to the normal viewing size.

- You can then 'Pan' around the image by using the Arrow Keys to slide the image around.
- It is possible to Store this setting to make the unit start in the Zoom mode when powered up and be at a particular pan position.
- Other settings can be adjusted while in Zoom mode.

Note - you may need to press the Pan button to restore control over the Zoom position, after adjusting other settings.

9.2.9 Lock Button

Pressing this button once will disable the Scan Converter's Front Panel Buttons. To re-enable them, simply press the LOCK Button again. This setting can be stored (STORE Button), to prevent people from adjusting the unit without the Remote Control.

Note - this feature is intended for use when other users should not disturb the settings of the unit.

9.2.10 Level Button

This button is not used on the Scan Converters covered in this manual.

9.2.11 Manual Set

This function should only be needed when the AutoTrack™ function has failed for some reason, or if the computer image has a dark background around the edges that will not allow AutoTrack™ to work properly. Please read the notes on AutoTrack™ and LEVEL adjustments in this section before adjusting the Manual Set parameters, in case something else will solve the problem.

These adjustments allow manual selection of the area of the computer's image that is to be captured by the Scan Converter and subsequently displayed on the video monitor. In effect, it is used to determine what goes into the Scan Converter's memory. This is not to be confused with the Size and Position adjustments mentioned earlier in this section, which vary the parameters coming out of the Scan Converter's memory. AutoTrack™ and Manual Set are used to get the image correct going into the memory. If the entire image is never stored in memory in the first place, it can never be read out.

Note - it is highly recommended that this method only be used when in the Underscan Mode or you will not know if you have adjusted the values correctly.

- Press AutoTrack™ on remote control twice (within 1.5s) - two 'beeps' will be heard.
- Adjust Top and Left edge by pressing the appropriate Arrow Keys.
- Press AutoTrack™ again.
- Adjust Bottom and Right edge by pressing the appropriate Arrow Keys.
- Press AutoTrack™ again - this will give a high beep to indicate that this has been saved.

Note - Manual Set Mode times out after 20 seconds, ignoring any changes made.

10 REMOTE MOUSE EMULATOR

10.1 Introduction

The Scan Converter has an RS-232 communications port that can be made to emulate a Microsoft® Serial Mouse, and all the computer's functions can be controlled from the Infrared Remote Control. This section details how to setup and use this feature

10.2 Hardware Connection

Setup of this feature requires the connection of an RS-232 Cable by either of these methods:

- Use a (Null Model) Serial Cable to connect the Scan Converter's RS-232 Connector to the first spare COM port on the computer (usually COM 2, but use COM 1 if it is available).
- Disconnect the Mouse from the computer and use an RS-232 Sharer Cable to connect the computer to the Scan Converter by plugging the Mouse back into the RS-232 Sharer Cable.

10.3 Scan Converter Setup

Make sure that RS-232 Mode is set to Mouse (and not 'Control') within the Advanced Menu of the On-screen Display. (This is the default.)

10.4 Using the Mouse Emulator

The Scan Converter uses the computer's standard mouse driver, saving the need to load additional software. Just turn your computer on with Scan Converter attached as described above.

If you are using an RS-232 Sharer Cable, both the existing Mouse and the Scan Converter's Remote Control will share the same COM port and software driver.

If you are using a separate COM port for the Scan Converter, the computer may recognize that a Mouse is attached when booting up. If it does not, run "Add New Hardware" from the computer's Control Panel to automatically install the "Standard Serial Mouse" driver.

- Use the Remote Control's four Arrow Buttons to move your mouse pointer around the screen.
- L.CLICK (left click) has the same function as a single left click of a standard mouse button.
- D.CLICK (double click) has the same function as a double left click of a standard mouse button.
- R.CLICK (right click) has the same function as a single right click of a standard mouse button.

10.5 Toggling Zoom/Pan and Mouse Modes

Both the Zoom's Pan feature and Mouse Emulation feature can be used at the same time. You can toggle the Arrow Key usage by pressing the Pan button on the Remote Control. If you find the Arrow Keys not controlling the Mouse pointer, simply press Pan once to deselect the Pan Mode. Similarly, to reactivate PAN Mode (to slide a zoomed image around the screen), press Pan again.

11 RS-232 COMPUTER CONTROL OF THE SCAN CONVERTER

11.1 Setup

All of the functions for the Scan Converter can also be controlled via a computer by using the RS-232 port on the unit, an RS-232 Serial Cable and a terminal emulation program on the computer. Alternatively, the Scan Converter can be controlled from your own custom software, provided that you have skills and resources to set up a serial communications port in the programming language you are using.

The Scan Converter uses the following settings on its communications port:

- 8 bit data, no parity, 1 stop bit
- No flow control
- Set the Baud rate on the computer and the Scan Converter to the same value (usually 9600).

Instruction on how to set the above port settings can be found within your own systems help file or the help file of the software you wish to use in sending commands. The following method is based on using a terminal emulation program.

11.2 Sending Commands

Commands are sent over the RS-232 in one of two ways:

- Send the 'adjust name' followed by = and a *number* (plus a carriage return) to alter any setting you see displayed on the lower line of the LCD display. For example, if you were using a terminal emulator program, you could type the following command to immediately set flicker reduction to 6-Lines:
Flicker Red = 6
- Send just the 'adjust name' (plus a carriage return) to retrieve back the current value for a setting. For example, typing the following returns the correct value back from the Scan Converter (e.g. '6'):
Flicker Red

11.3 Responses to Commands

The response from the Scan Converter can be one of three things:

- ? if something is not understood, e.g., an adjustment name is misspelled.
- > if the command has been executed.
- nnnnn (i.e., a five digit number from 0 to 99999, followed by a CR and LF) if a setting value is returned.

11.4 Notes on Sending Commands

- Settings that are one of two values (e.g. NTSC or PAL), have to be sent as 0 or 1. 0 corresponds to the Off or '-' state, and 1 corresponds to the On or '+' state.
- You only have to send a maximum of 4 characters in order for the command name to be recognized, e.g., "Flicker Red = 2" could be shortened to "Flic = 2".
- Spaces and line-feeds (ASCII code 10) are completely ignored.
- The case is ignored (i.e., you can use upper case or lower case).
- You must always send a carriage-return (ASCII code 13) at the end of your command or request.
- The Scan Converter response should at most be within 20ms of the receipt of the carriage-return character. Of course, delays due to slow baud rates will play a greater part than this.
- The Scan Converter input buffer is limited to 32 bytes, so do not send any more characters (including CR, LF, etc.) than this.
- For more information on controlling the different functions, see relevant sections of this manual.

11.5 Restricting RS-232 Commands to Certain Units

If you have a number of units all connected to the same computer serial port, i.e., running in parallel, then you can use the RS-232 ID feature to restrict certain commands to go to only certain Scan Converters. The following points outline this method:

- Make each 'RS-232 ID' setting unique to each Scan Converter, unless you want multiple units to respond to the same commands (in which case, make them the same ID value). Default value is 0.
- Send the command 'ID Restrict nnn' where nnn is the number of the Scan Converter you wish to control (from 0 to 255).
- Follow this with the commands you wish to send. Units where 'RS-232 ID' is not identical to the 'ID Restrict' value will not respond to or acknowledge these commands.
- To disable this feature, you have to make the RS-232 ID the same on all units (recommended value 0), and of course set 'ID Restrict' to this value.

11.6 Changing Baud Rates

Details on how to change the Baud rate are in the Advanced Features section of this manual, but the relationship between number and baud rate is given in the table below. Any number up to 191 can be selected, but only certain Baud rates are generally used. The most common ones are outlined in the table below. For numbers not included in the table, the Baud rate associated with those numbers can be found by using the following equation:

$$Baud = \frac{223722}{Number + 1}$$

So to obtain the relevant number to be used:

$$Number = \left(\frac{223722}{Baud} \right) - 1$$

Table of commonly used baud rates

Baud Rate	No.	Baud Rate	No.
115200	1	14400	15
57600	3	9600*	22*
38400	5	4800	46
28800	7	2400	92
19200	11	1200	185

*22, Baud rate = 9600 is the default setting.

Table of all RS-232 commands available

Adjustment	Values*	Comment
ADC Ref.	100 to 200	Adjusts maximum input RGB voltage.
Adj. Osc.	-200 to 200	Fine-adjusts subcarrier frequency when not genlocking.
AutoTrack	0 or 1	Set to 1 to initiate AutoTrack
Baud Rate	0 to 191	Actual baud rate = $230400/(n+1)$
Buttons	Off, On	Off = disable front-panel
CSync In Frq	0 to 140	Alter to suit incoming sync frequency when using a composite sync input.
CV Filter	0 to 40	Applies a variable filter to Composite Video signals.
DAC Ref.	40 to 120	Brightness level
Flicker Red.	2, 4, 6	Lines of flicker reduction
Genlock	Off, On	On=Unit will synchronize its output with incoming reference video signal. (VP-705SC and VP-706SC)
H Phase	-18 to 18	Sets the unit's Horizontal phase, relative to reference signal. (VP-705SC and VP-706SC)
H. Soften	Off, On	On=Soften image horizontally.
ID Restrict	n	Restricts RS-232 control only to those units which have RS-232 ID already set to this value.
Image Freeze	Off, On	On=Image Frozen. Do not adjust any other settings when this is active.
Infra Red	Off, On	On=Infra red remote control is enabled.
Locked	Off, On	On=Disables all front-panel buttons and infra red remote control functions
Overscan	Off, On	On=Overscan
Out H-Center:	n	Adjusts image left/right position
Out H-Width:	n	Adjusts image width
Out V-Center:	n	Adjusts image up/down position
Out V-Height:	n	Adjusts image height
Output Sig	YUV, RGB	Selects appropriate output signal type.
Pan X Pos:	n	Adjusts Pan left/right position when in Zoom mode (higher value = Panned to the right).
Pan Y Pos:	n	Adjusts Pan up/down position when in Zoom mode (higher value = Panned to the bottom).
Reset	Off, On	On=does a reset to user settings. Automatically goes back to Off.
RGB Term.	Off, Auto	Auto=try to detect if monitor is attached, and terminate RGB appropriately.
RS-232	Mouse, Control	If you change this to Mouse, RS-232 commands no longer function!
RS-232 ID	0 to 255	Sets the unit's RS-232 identification, where multiple units are controlled from one serial port.

SC/H Phase	0 to 7	Selects subcarrier to H-sync phase when not genlocking.
SC Ph. Shift	0, 180	Coarse-adjusts the final subcarrier phase shift. (VP-705SC and VP-706SC)
SC Phase	-150 to 150	Fine-adjusts the unit's colour subcarrier phase relative to reference signal, when synchronizing to external source. (VP-705/6SC)
Sense	1 to 3	Adjusts the AutoTrack feature's sensing level
Sound	Off, On	Turns the internal speaker on or off.
Store Settings	-, *	Sets the current settings as the power-on default.
Sync In	0 to 3	0=VGA HV, 1=Grn+sy, 2=Pin 13, 3=Pin 15
Sync Out	0 to 3	0=-CS-CS, 1=+CS+CS, 2=-HS-VS, 3=+HS+VS
Total Lines	Read only	Returns number of lines in PC image, including vert blanking lines.
Vert. Freq	Read only	Returns vertical frequency of PC image (to nearest 1Hz).
VGA Bot/4:	n	Tells the unit where the bottom of the image is within the PC signal. (divided by 4).
VGA Left:	n	Tells the unit where the left-hand edge of the image is within the PC signal.
VGA Store	-, *	Stores the VGA settings, so they are used in the future.
VGA Top/4:	n	Tells the unit where the top of the image is within the PC signal. (divided by 4).
VGA Width:	n	Tells the unit how wide the image is within the PC signal.
Video Std	NTSC, PAL	Sets the video standard
Y/C Delay	0 to 3	Adjusts luminance delay relative to chrominance.
Zoom	Off, On	Turns zoom mode on and off

*Where two text values are given (e.g. Off, On), the first relates to the setting used when '0' is sent to the unit, and the second relates to the setting used when '1' is sent to the unit.

12 GETTING THE MOST FROM YOUR SCAN CONVERTER

These products are high quality scan converters with many functions and applications. The aim of this section is to help you exploit some of these applications and functions to get the best possible results.

Hints & Tips

1. Use S-Video in preference to Composite Video, if your equipment has such an input. S-Video keeps the color and brightness in a video signal separate, whereas Composite Video requires extra filters to separate them electronically - these filters degrade the image.
2. Don't forget the ZOOM. If you have problems reading the small text, then selecting the ZOOM Mode will make things much easier, especially if using the Composite Video output. This is particularly useful for presentations.
3. Zoom Modes may require a different Flicker Reduction setting. Lowering the Flicker Reduction value may help to increase legibility of small text.
4. The lower the graphics resolution and refresh rate, the better the image quality. All scan converters store the computer image to be converted to video in their own internal memory, and to do so the computer image has to be 'sampled' many times during each scan-line. Each sample stores one pixel of information in the memory. The number of samples taken is proportional to the image quality - i.e. the more samples the better. Higher graphic resolutions take less time to display each scan line than lower ones, so it means that there will be more samples per line for lower resolution modes because there's more time for more samples to be taken, therefore, a better image quality will result.
5. The lower the graphics resolution, the better the 'vertical' image quality. TV's have a fixed number of lines available for displaying pictures - for PAL it is 576, for NTSC it is 480, although some of these are off the top and bottom edges of the screen. So, the more scan lines a graphics resolution has (e.g.. an 800x600 resolution has 600 scan lines), the more difficult it is for your Scan Converter to squeeze all these lines into

the limited number available on the TV. So lowering your graphic resolution will help improve image quality. (Remember to run AutoTrack after you change the resolution).

6. If you experience line dropping, use a higher Flicker Reduction setting. For lower resolutions like 640x480, you may even need to reduce the Flicker Reduction setting to 2-Line. At very high resolutions like 1280x1024, you may wish to consider using a Scan Converter with 6-Line Flicker Reduction ability, like the VP-703SC.

7. Cables and Connectors. Using good quality cables and connectors like the ones supplied with your Scan Converter unit and ensure that all connectors are properly connected to help maintain a high picture quality.

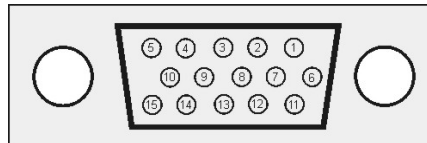
8. Designing your Display or Presentation. When setting up an image for display or putting together your presentation, keep in mind that people might have to view it from a distance. Using a font that is well defined, graphics and pictures that are uncluttered will all add to the legibility of your display or presentation. Try to make text well spaced and larger than you normally use. Think about the colors you are going to use. Colors that stand out from each other are better for viewing at a distance. As mentioned earlier, choosing the right screen resolution will also add to the clarity and quality of your display. It is worth spending some time experimenting with different screen resolution settings, which will optimize your Scan Converter to its full potential.

9. Freeze function. This function is useful if you wish to change to another image or layout while maintaining an image on your video monitor. For example, when you wish to change from a program that is displaying text to a program that displays a graphic. Before you close the text display program, Freeze the image on the video screen that you are using. You are then free to change to the graphic image program. Once this is done, you can unfreeze the image on the video screen, which will then display your new image. People watching the video monitor would have only seen the text image followed by the graphics image and they would not have seen you close one program and open another.

13 TECHNICAL DATA

13.1 Computer Input

Input to the Scan Converter is via an HD-15 connector.



Pin	Use
1	Red 0.7v max. / 75 Ohms
2	Green 0.7v max. / 75 Ohms
3	Blue 0.7v max. / 75 Ohms
4	ID 2, passed to PC monitor pin 4
5	Ground
6	Red ground
7	Green ground
8	Blue ground

Pin	Use
9	Passed to PC monitor pin 9
10	Ground
11	Ground
12	ID 1, passed to PC monitor pin 12
13	Horizontal Sync TTL
14	Vertical Sync TTL
15	Passed to PC monitor pin 15

13.2 Fuse Replacement

The Scan Converter is double-fused for added protection. The main AC fuse is located next to the On/Off Switch on the rear panel and is easily accessible. There is also a DC fuse on the main circuit board inside the unit, however, this rarely needs replacing. If replacement is necessary of either fuse, be sure to use the same type and size as the original.

14 TROUBLESHOOTING

If the recommended actions still do not result in satisfactory operation, please consult your Kramer Dealer. Before seeking technical assistance, if the problem is image related, please try to find out the screen resolution and refresh rate being used from the computer and if the problem only affects one particular resolution.

Problem	Remedy
The picture on the video display is black and white.	<ol style="list-style-type: none"> 1. If you are using the S-Video or Composite outputs, then make sure that all these cables are connected correctly. 2. Make sure that the Scan Converter is adjusted to the right video standard PAL/NTSC (The procedure to change this is found elsewhere in this manual). 3. Ensure that the color controls on your TV or video monitor are all set correctly.
There is no picture on the video monitor.	<ol style="list-style-type: none"> 1. If you're using the unit with a laptop computer, make sure the laptop is set to enable an external display device. Some laptops automatically detect external video connections, but others will need setting up to do so. This is often accomplished by pressing two keys simultaneously on the keyboard. 2. If the Power LED on the Scan Converter is off, ensure that the proper AC Power is being supplied to the unit and check the fuse (The procedure located elsewhere in this manual). 3. If the Power LED is on: a) Check that the monitor output from the computer is connected to the Scan Converter's VGA IN connector, b) Check that the output you are using from the Scan Converter is also connected at the unit and the video monitor, and c) Check that your video monitor is switched on and set to the correct input (AUX or A/V is selected), also make sure that the Brightness and Contrast on the video monitor are set correctly. 4. Don't forget that when the Scan Converter is in the YUV Mode, all other video outputs will be blanked out.
There is no picture on the computer monitor.	<ol style="list-style-type: none"> 1. Check that the VGA output from the computer is connected to the Scan Converter's VGA IN connector. 2. Check that the computer monitor is connected to the VGA OUT connector on the back of the Scan Converter. 3. Check that your computer monitor is turned on and the Brightness and Contrast are set correctly.
The display on the TV has a huge border around it.	<ol style="list-style-type: none"> 1. This usually means that you are using a laptop computer at a resolution lower than the laptop's own screen. When this happens, the laptop fits the smaller resolution into the larger with a border around the edge. 2. Since the laptop's screen is of a fixed resolution, the only two solutions are: a) change the resolution you're running at to match the laptop's own internal screen, or b) disable the laptop's own screen, so you just see the image on the video monitor.
The unit does not respond to the Infrared remote control.	<ol style="list-style-type: none"> 1. Ensure that there are batteries in the Remote Control unit are correctly inserted and that they have enough charge left. 2. Make sure that there is no obstruction in front of the Scan Converter's Front Panel Infrared Window. 3. Ensure that the Scan Converter is set for control from the IR unit (The procedure to change this is found elsewhere in this manual).
There is excessive flicker on the TV.	<ol style="list-style-type: none"> 1. Try using a different Flicker Reduction Filter setting (The procedure to change this is found elsewhere in this manual). 2. Turning the contrast down and the brightness up on the video monitor can also have a large effect on flicker.

<p>The TV image is distorted.</p>	<ol style="list-style-type: none"> 1. This often occurs where some of the areas of the image are very dark and others are very bright. These extreme changes in the image are difficult for your video monitor to deal with. 2. Try adjusting the contrast and brightness settings on your video monitor to rectify the problem. On some older or very inexpensive TVs this effect is unavoidable, as they may not be designed with computer images in mind and, therefore, show 'bowing' at the sides for some graphic images. The only solution is to adjust the brightness and contrast on the TV - the Scan Converter is not at fault and cannot correct problems with these type TVs. 3. If the problem still persists it may be due to the screen size settings. Try adjusting the image and its position on the screen.
<p>Some colors come out wrong on the video monitor.</p>	<ol style="list-style-type: none"> 1. Try altering the color (saturation), hue (tint), contrast and brightness settings on your TV or video monitor. These are usually set up for viewing TV programs or video, which is very different from viewing computer graphics. 2. If you are using the RGB video output from the Scan Converter, make sure that the cable is correctly attached to both it and the video monitor.
<p>How can I reduce smearing?</p>	<ol style="list-style-type: none"> 1. Smearing usually occurs on Composite Video connections, and is generally unavoidable, unless you can switch to using S-Video or RGB connections (See connection details elsewhere in this manual). It occurs because the luminance and color information is combined as one signal and the two parts have to be 'bandwidth-limited' to avoid them interfering with each other. 2. Using good quality video cable will help towards reducing this affect.
<p>How do I use the unit with a VCR?</p>	<ol style="list-style-type: none"> 1. Connect one of the Scan Converter's video outputs to the VCR's input. You won't be connecting to the Antenna connector on the VCR, but rather, to one of the VCR's AUX (Auxiliary) inputs, so, therefore, you must elect the proper setting on the VCR's input selector (often it's channel 0, AUX 1, AUX 2, etc). 2. Follow the VCR's recording instructions.
<p>The recorded image is poor.</p>	<ol style="list-style-type: none"> 1. Standard VHS videos are not very good at recording the fine detail present in computer graphics. S-VHS decks offer much better quality, while professional decks will be even better. 2. Color smearing is usually the first thing that causes a problem, but this is because your VCR isn't capable of recording the picture in its full resolution. Try lowering the computer screen resolution; this will bring the image more in line with what your VCR is used to dealing with.
<p>The mouse emulation isn't working.</p>	<ol style="list-style-type: none"> 1. Check that the RS-232 cable is connected correctly to both the RS-232 port on the back of the Scan Converter and to the Serial Port that the computer uses for the mouse. 2. Check that the Scan Converter is setup for the Mouse and not Serial control. Check that the Infrared Remote Control has good batteries installed and that the Scan Converter is configured to work from the remote. 3. The Scan Converter uses the standard Microsoft® Serial Mouse driver. It will not work with other mouse drivers. If problems arise, it is recommended that the computer be started up with its normal mouse connected, once the computer has finished booting up and the mouse confirmed working, it can be swapped over with the Scan Converter's RS-232 cable.



15 LIMITED WARRANTY

Kramer Electronics (hereafter Kramer) warrants this product to be free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for three years from the date of the first customer purchase.

WHO IS PROTECTED

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:
 - a) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature.
 - b) Unauthorized product modification, or failure to follow instructions supplied with the product.
 - c) Repair or attempted repair by anyone not authorized by Kramer.
 - d) Any shipment of the product (claims must be presented to the carrier).
 - e) Removal or installation of the product.
 - f) Any other cause, which does not relate to a product defect.
 - g) Cartons, equipment enclosures, cables or accessories used in conjunction with the product.

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

Kramer's liability for any defective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

Note - All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

16 COMPLIANCE NOTICE

This equipment has been tested to determine compliance with the requirements of:

EN 55022	CE emissions standards, Class B
EN-50081	Generic Immunity standard for residential, commercial and light industrial)
CFR-47	FCC Rules and Regulations: Part 15- "Radio frequency devices: Subpart B- Unintentional radiators

CAUTION!

- ⊗ Servicing the Scan Converter can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ⊗ Please use recommended interconnect cables to connect the machine to other components.
- ⊗ When used, it is assumed that the unit is grounded by normal means (e.g. via the computer video input cable, rack-mount chassis ground, or video output cable to display device). Use of the equipment without any form of grounding may affect radiated emissions, but will not affect the product's safety.



The list of Kramer distributors appears on our web site:

www.kramerelectronics.com

From the web site it is also possible to e-mail factory headquarters.

We welcome your questions, comments and feedback.

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