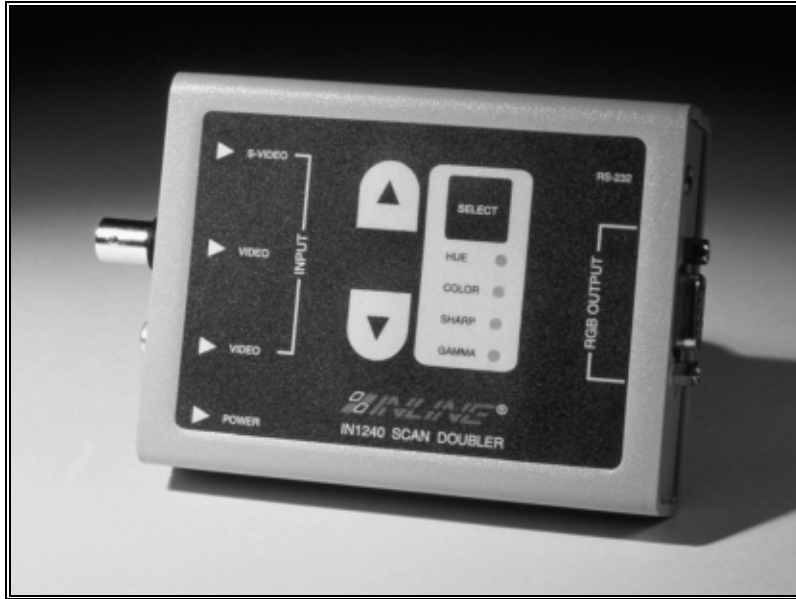


Operation Manual



IN1240 Scan Doubler IN1540 Universal Decoder



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INTRODUCTION

This manual covers the installation, operation, and specifications for the **IN1540** Universal Decoder and the **IN1240** Scan Doubler. The units are virtually identical in operation and functionality. The main difference between the two units is the output signal scan rate. In the **IN1540** decoder, the composite or S-video input signal is decoded and output as an RGB interlaced video signal at the same frequency as the original signal. The **IN1240** scan doubler first decodes the input signal using the same circuitry as the **IN1540** and then doubles the scan lines. The **IN1240** outputs a non-interlaced RGB video signal at twice the horizontal scan rate of the original input signal. Functions which apply to the **IN1240** but not the **IN1540** will be designated in this manual as *IN1240 only*.

DESCRIPTION

IN1540 and **IN1240** are compact units offering advanced decoding and scan doubling (*IN1240 only*) capabilities and the following features:

- ◆ Universal digital decoding for NTSC, PAL, or SECAM
- ◆ Digital scan doubling (*IN1240 only*) improves video signals by doubling the number of scan lines, resulting in a non-interlaced video image output at twice the input signal's horizontal scan frequency. Benefits of scan doubling include elimination of visible scan lines, resulting in a solid, film-like image. Additional benefits include a marked reduction of line flicker and cross-color interference.
- ◆ 3 Video Inputs - BNC and RCA connectors for composite video, Mini DIN connector for S-video
- ◆ Dual mode switcher:
 - Automatic mode - unit searches for active input(s). Users can manually select an input via front panel or RS-232 control.
 - Channel lock mode - Unit will always lock to a user selected channel.
- ◆ RS-232 control of all parameters
- ◆ Hue, Color, Sharpness/Contrast controls are provided to adjust signal parameters.
- ◆ Gamma Correction - 7 different gamma curves allow compensation for display device characteristics
- ◆ STORE SETTINGS function allows users to store different signal parameters for each input
- ◆ Selectable output sync configuration: RsGsBs, RGSB, or RGBH&V
- ◆ Horizontal position control (available through RS-232 control only)
- ◆ Disable scan doubling (*IN1240 only*) allows unit to function as a decoder only.

COMPATIBILITY

INPUT

The **IN1240/IN1540** will operate with NTSC, PAL, or SECAM input signals in composite or S-video format. For a complete listing of compatible input video standards see Page 15.

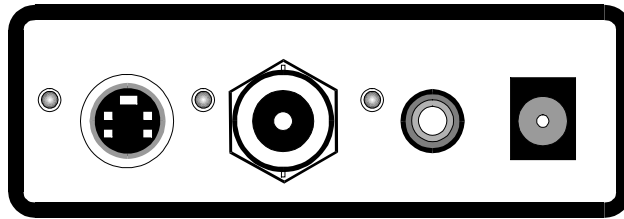
OUTPUT

The **IN1540** and the **IN1240** in interlaced (non-doubling) mode are compatible with RGB monitors and video projectors with RGB inputs. They will also operate with many LCD projection panels. For compatibility information with specific LCD panel models please call the panel manufacturer or INLINE.

The **IN1240** in non-interlaced (doubling) mode outputs a signal very similar to VGA. RGB monitors, data projectors, and LCD panels capable of displaying a 31.5 KHz VGA signal (640 x 480 mode) can be used to display the output signal from the **IN1240** Scan Doubler.

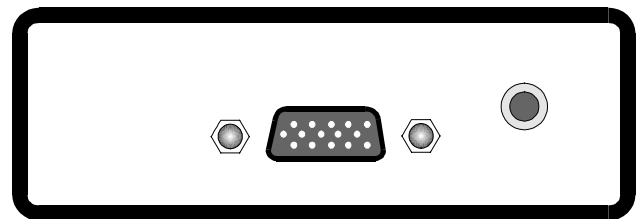
INSTALLATION

Diagram 1 - INPUT CONNECTORS



S-VIDEO COMPOSITE POWER
Mini DIN BNC RCA

Diagram 2 - OUTPUT CONNECTOR

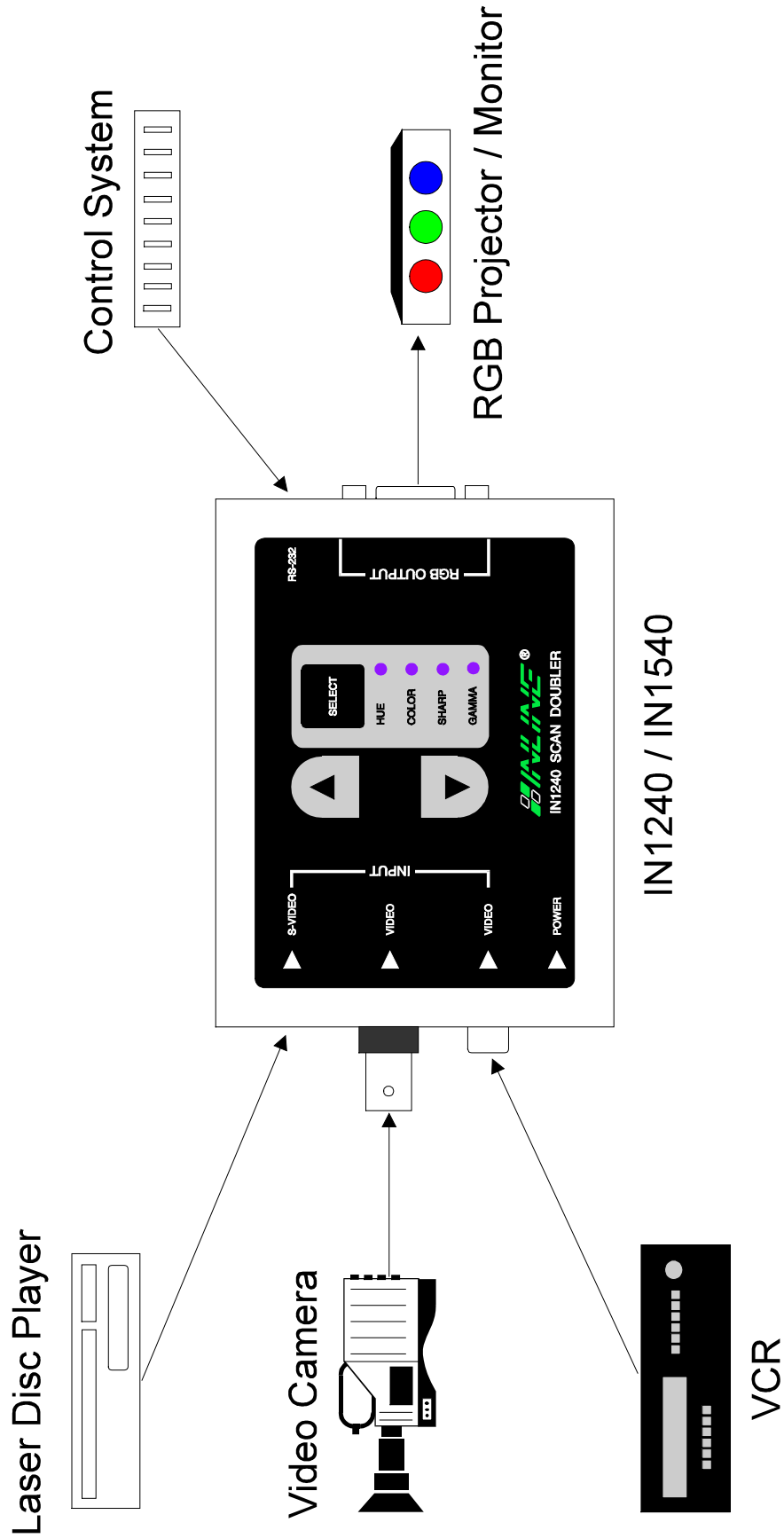


RGB OUTPUT CONTROL
15 Pin HD 3.5mm Stereo Mini

This section offers step-by-step instructions for installing and optimizing the **IN1240** and **IN1540**. A detailed application drawing showing all equipment connections is included on Page 3.

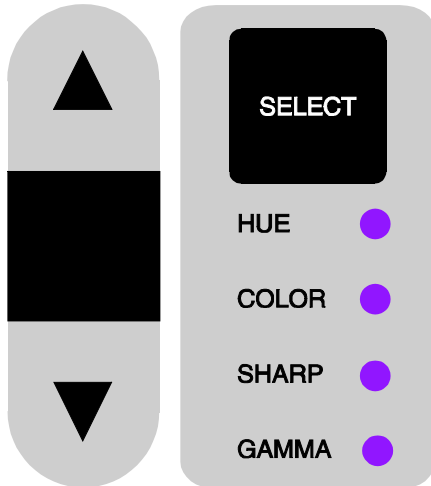
1. Connect input source(s) to the appropriate input connector(s) as shown in Diagram 1. The mini DIN connector is for S-video sources. Composite video sources may be connected to the BNC and/or RCA connector. Up to three video sources (one S-Video and two composite) may be connected simultaneously to the unit.
2. Connect the output signal cable between the **IN1240/IN1540** RGB OUTPUT (Diagram 2) and the display device RGB input. The **IN9045** and **IN8000** series cables are ideally suited for this purpose. Switch the input selector on the display device to the "RGB" setting. Pin out information for the RGB output connector is listed on Page 14.
3. If you are using an external control system to control the unit with RS-232 commands, attach an **IN9098** control adapter cable between the **IN1240/IN1540** CONTROL port and the control system serial port. The 3.5mm stereo mini plug should be connected to the **IN1240/IN1540** and the 9 pin connector to the control system serial port. Pin out information for this port is found on Page 14.
4. Connect the round connector on the power supply cable to the POWER connector. Plug the other end into an A/C wall outlet.
5. Using the Power On settings (see Page 7 - 8), adjust the output sync format, doubling disable/enable (**IN1240 only**), and SECAM enable/disable as needed to match installation requirements.
6. Using the front panel controls or RS-232 commands (see Page 4 - 6), adjust and store the video parameters for each input source. For best results, the following order is suggested:
 - Select Gamma Curve
 - Adjust Sharpness/Contrast
 - Adjust Hue
 - Adjust Color saturation
 - Store Settings for that input channel

IN1240/IN1540 Application Diagram



USING THE FRONT PANEL CONTROL BUTTONS

The front panel control buttons labeled SELECT, UP, and DOWN are used in conjunction with the four LED indicators to control the **IN1240 / IN1540**. To adjust Hue, Color, Sharpness, Gamma or select input channels, follow the three steps listed below.



Step #1: Select a Parameter to Adjust

To select a specific parameter for adjustment, quickly press and release the SELECT button. The unit will step to the next parameter mode each time the SELECT button is pressed, sequencing through the five parameters in the following order:

- Channel Select
- Hue Adjust
- Color Saturation Adjust
- Sharpness / Contrast Adjust
- Gamma Curve Selection

An LED will light to indicate which of the parameters is currently being adjusted. Channel Select mode is indicated when all LEDs are off.

Step #2: Adjust the Parameter

Once a specific parameter has been chosen, use the UP and DOWN arrows as required to make the desired channel selection or signal parameter adjustments. Unless settings are stored (see Step #3) any changes made are temporary and will be lost if the unit is powered down or a different channel is selected.

Step #3: Store the Settings

In order to store any adjustments made in step #2, hold the SELECT button for 3 seconds. All LEDs will flash twice indicating that the new Hue, Color, Sharpness, and Gamma settings have been stored into memory for the current input channel. These settings *cannot* be stored while in the Channel Select mode. Please note: if the SELECT button is held continuously for three seconds, it does *not* make the unit step to the next parameter.

The **IN1240 / IN1540** have memory registers which can store a unique set of parameter adjustments for each of the three input channels. By storing the settings as described in Step #3 users can optimize the **IN1240 / IN1540** with different adjustments for each input. When the user switches to an input all settings are automatically recalled. The next section (Normal Operation) includes the "store settings" as the final step any time new adjustments have been made to any parameter. In order to save time, the user may first adjust the Gamma, Sharpness, Hue, and Color and then save the settings once. The Store Settings procedure listed in step #3 above stores all four of those settings into memory.

OPERATION

The **IN1240 / IN1540** have two primary ways of adjusting parameters; Normal Operation Controls and Power On Options. The next two sections offer detailed instructions on how to adjust each parameter and how to select various options.

NORMAL OPERATION

Five major control functions can be selected and adjusted using the front panel controls. These are the controls users will need to use the most frequently, and they are available any time the unit is operating. A flow chart diagramming these controls is located on Page 9.

Channel Select (No LEDs On)

The **IN1240 / IN1540** inputs can be selected in one of two channel select modes:
Automatic Mode (*default*)

The unit automatically searches for active input(s) in the following priority order; S-video, BNC, RCA. If the unit is powered up with no video inputs applied the user can observe the unit scanning continuously through the three inputs. The LEDs next to each input connector will light to indicate the currently selected input. As soon as video signals are applied to one or more of the inputs, the unit will switch to an active input using the priority listed above.

If more than one video input source is connected to the unit, the user may select the desired input in the following manner:

- Step #1 Press and release the SELECT button until no front panel LEDs are lit.
- Step #2 Press the UP or DOWN arrows as needed to select the desired input.

Channel Lock Mode

It is possible to lock the unit to a specific input channel. When the unit is turned on it will automatically switch to the pre-selected channel. If users attempt to change the channel after channel lock has been applied, the unit will not change channels. This feature may be useful if users want to insure that the unit remains switched to a specific channel.

- Step #1 Select the desired input channel as described in Steps #1 and #2 above.
- Step #2 Press and hold the SELECT button for three seconds. Channel lock will be engaged, locking the unit to that input.

To disable Channel Lock, press and hold the SELECT button for three seconds (in Channel Select mode) . The unit is now in the Automatic Mode.

Adjust Hue (HUE LED On) NTSC ONLY

- Step #1 Press and release the SELECT button until the HUE LED is lit.
- Step #2 Use the UP and DOWN arrows to adjust the hue setting. Pressing these buttons once will adjust the HUE by one click. To make a large adjustment quickly, press and hold the UP or DOWN button. The HUE LED will flash to indicate that adjustments are being made. If the LED stops flashing while the UP or DOWN buttons are being pressed, the unit has reached the upper or lower limit of the adjustment range.
- Step #3 To store the Hue adjustment for the current video input, press and hold the SELECT button for 3 seconds (LEDs will flash twice).

Adjust Color (COLOR LED On)

The unit employs an automatic color level circuit. The color saturation level can be adjusted over a limited range ($\pm 5\%$). This control will *not* reduce the color level to zero.

- Step #1 Press and release the SELECT button until the COLOR LED is lit.
- Step #2 Use the UP and DOWN arrow buttons to adjust the color saturation level. If the COLOR LED stops flashing while adjustments are being made, the color control has reached its extreme maximum or minimum position.
- Step #3 Store the color setting for the current video input by pressing and holding the SELECT button for 3 seconds (LEDs flash twice).

Adjust Sharpness & Contrast (SHARP LED On)

Along with the GAMMA control, the SHARP control is very critical for proper adjustment of the unit. The control labeled SHARP actually controls both sharpness *and* contrast. The **IN1240** and **IN1540** have been programmed with 32 sharpness / contrast settings. Every time an UP or DOWN arrow button is pushed the unit will change one "click" to the next setting.

The factory default setting is at the bottom of the range (contrast and sharpness set for flat gain). The higher contrast settings are located at the top of the adjustment range. It is recommended that users set the sharpness / contrast control to the extreme top position and move down one step at a time until a pleasing picture is attained. For most applications, the best image will occur with one of the 6 - 8 highest sharpness / contrast settings.

- Step #1 Press and release the SELECT button until the SHARP LED is lit.
- Step #2 Use the UP and DOWN arrow buttons to adjust the sharpness and contrast settings. If the SHARP LED stops flashing while adjustments are being made, the control has reached its extreme maximum or minimum position.
- Step #3 Store the sharpness / contrast setting for the current video input by pressing and holding the SELECT button for three seconds (top LEDs will flash twice).

Select Gamma (GAMMA LED On or flashing)

Gamma correction is an effective tool used to compensate for the non-linear response of most display devices. The **IN1240 / IN1540** offer eight different gamma curve adjustments (seven active gamma curves plus no gamma). The default setting is no gamma correction. Along with the SHARP control, the GAMMA control setting is critical to proper adjustment and should generally be set first with all other controls set to the factory default position.

- Step #1 Press and release the SELECT button until the GAMMA LED is lit.
- Step #2 Use the UP and DOWN arrow buttons to select the best gamma curve for the display device. The GAMMA LED flashes continuously when any of the seven gamma correction curves is selected. The GAMMA LED will stay on continuously if the "no gamma correction" position is selected.
- Step #3 Store the gamma setting (hold SELECT for three seconds).

POWER ON OPTIONS

These options adjust the least commonly used parameters. These settings will generally be set by the installing technician when the unit is first installed and rarely changed. Power On Options are selected by holding down specific front panel button(s) while inserting the unit's power plug. Power On Options are *not* selectable when the unit is already powered up (except through RS-232 commands).

When a Power On Option has been selected all seven LEDs will flash twice to indicate that a Power On Option has been activated. The LEDs will *not* flash for Sync Format Selection. These settings are permanent until changed by another Power On sequence. The Power On Options are listed below and in Diagram 4 on Page 10.

Reset to Factory Default Settings

Hold the SELECT button while inserting the power cable. This will reset all video settings to factory default for the three video input channels. All LEDs will flash twice to verify a new setting. The following adjustments will *not* be reset: Sync format, SECAM enable/disable, Channel Lock enable/disable, Key Pad enable/disable, and Scan Double enable/disable.

Sync Format Selection

Hold the UP arrow button while inserting the power cable. In the Sync Format Selection mode one front panel LED will light to indicate the current sync setting:

HUE LED on:	H / V Sync, positive polarity.
COLOR LED on:	H / V Sync, negative polarity (<i>default</i>)
SHARP LED on:	Composite Sync, negative polarity.
GAMMA LED on:	Sync on Red, Green, and Blue.

In order to select a new sync format, press and release the SELECT button several times until the appropriate LED is lit. To store the new setting, press the SELECT button for three seconds. All LEDs will flash twice to indicate the change.

SECAM Decoder Enable/Disable

Hold the DOWN button while inserting the power cable. This procedure will toggle the unit between the SECAM Enable and the SECAM Disable modes:

SECAM Decoder Disable: Unit automatically decodes NTSC or PAL (*default*)

SECAM Decoder Enable: Unit will *only* decode SECAM signals.

All LEDs will flash twice to verify that a new mode has been selected.

Key Pad Enable / Disable

Hold both the UP and DOWN buttons while inserting the power cable. This will toggle between the Keypad Enable and Keypad Disable modes:

Keypad Enabled: Normal operation of front controls (*default*)

Keypad Disabled: Front panel controls are inoperative. The unit will only accept commands via RS-232 or the Power On selection for Keypad Enable.

All LEDs will flash twice to verify that a new mode has been selected.

**Scan Doubling
Enable / Disable
(IN1240 only)**

Hold both the SELECT and UP buttons while inserting the power cable. This toggles between the Scan Double Enable and Disable modes:

Enable Scan Doubling: Unit first decodes the signal to RGB and then doubles the horizontal scan rate, outputting a non-interlaced signal (*default*).

Disable Scan Doubling: Unit only decodes the signal to RGB. The output will be an interlaced video signal at the same horizontal scan rate as the original input signal.

The Power On selection for Scan Doubling enable / disable affects all three input channels. The only way to select Scan Doubling for one channel and Decode Only for another channel is to first select the channel and then send an RS-232 command (HSCAN0 or HSCAN1).

POWER ON IDENTIFICATION

Every time power is applied to an **IN1240 / IN1540**, the LEDs will flash on. Depending on which lights flash, the user can determine certain things about the current unit configuration. The LEDs are separated into two main groups: the Top LEDs are the four LEDs below the SELECT button.
the Input LEDs are the three LEDs located next to each input connector.

During power on, all seven LEDs will flash in the following manner:

IN1240	One short flash, one long flash (about two seconds).
IN1540	One long flash.

By observing the three Input LEDs during the long flash, the following settings can be confirmed:

All LEDs On Factory default settings. The unit is in NTSC/PAL mode and the Key Pad is enabled.

Only the S-Video LED Off The unit is in the SECAM mode.

Only the BNC LED Off The Key Pad is disabled.

Only the RCA LED On The unit is in the SECAM mode *and* the Key Pad is disabled.

Please note that when a Power On Option is used there will actually be a total of four flashes (3 flashes for the IN1540). The first two flashes verify that a Power On Option was changed. The third or fourth flashes are the long identification flashes as described above.

If the four Top LEDs are flashing continuously at power up there is an internal hardware problem. Please call INLINE for further assistance.

DIAGRAM 3 - IN1540 / IN1240 OPERATION FLOW

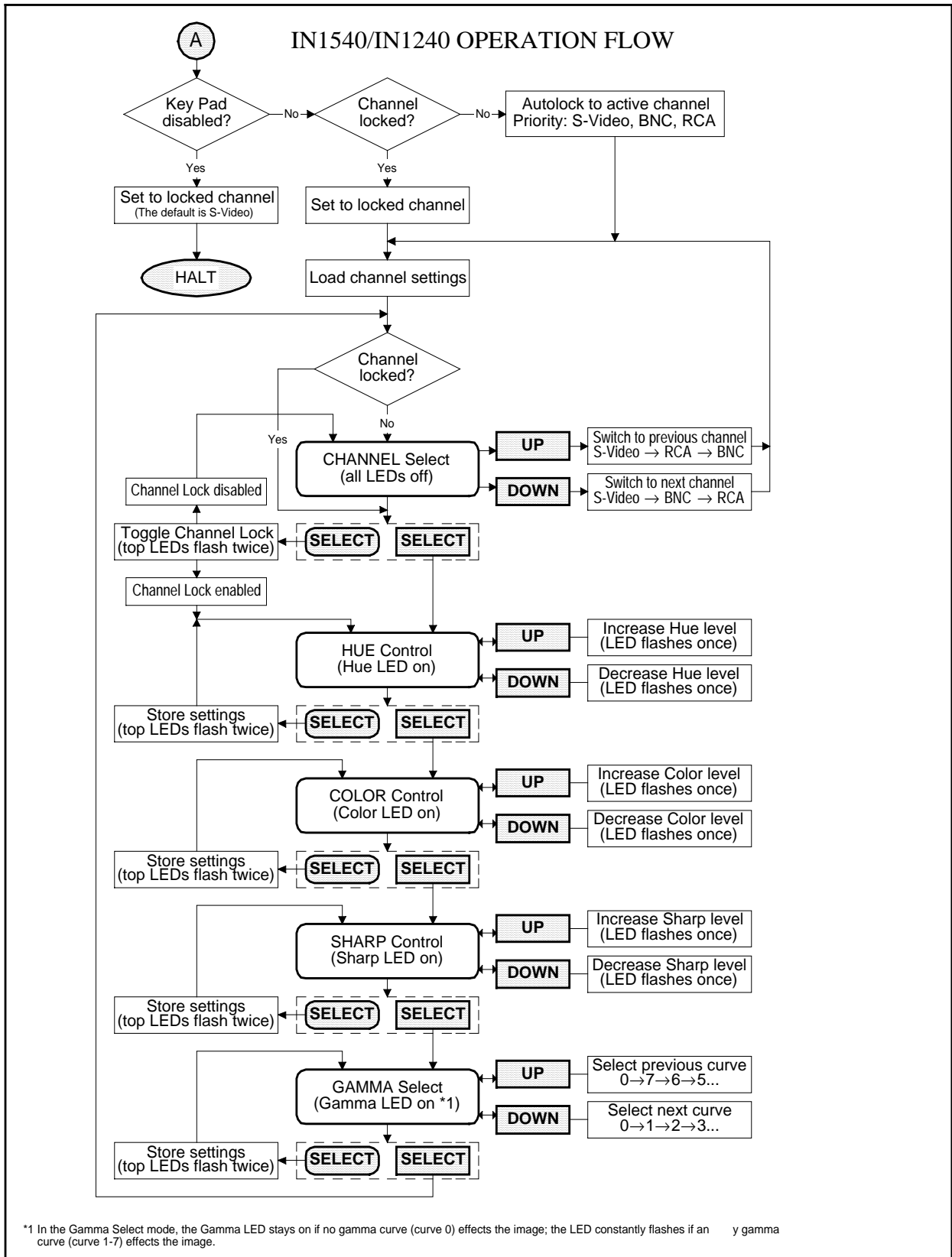
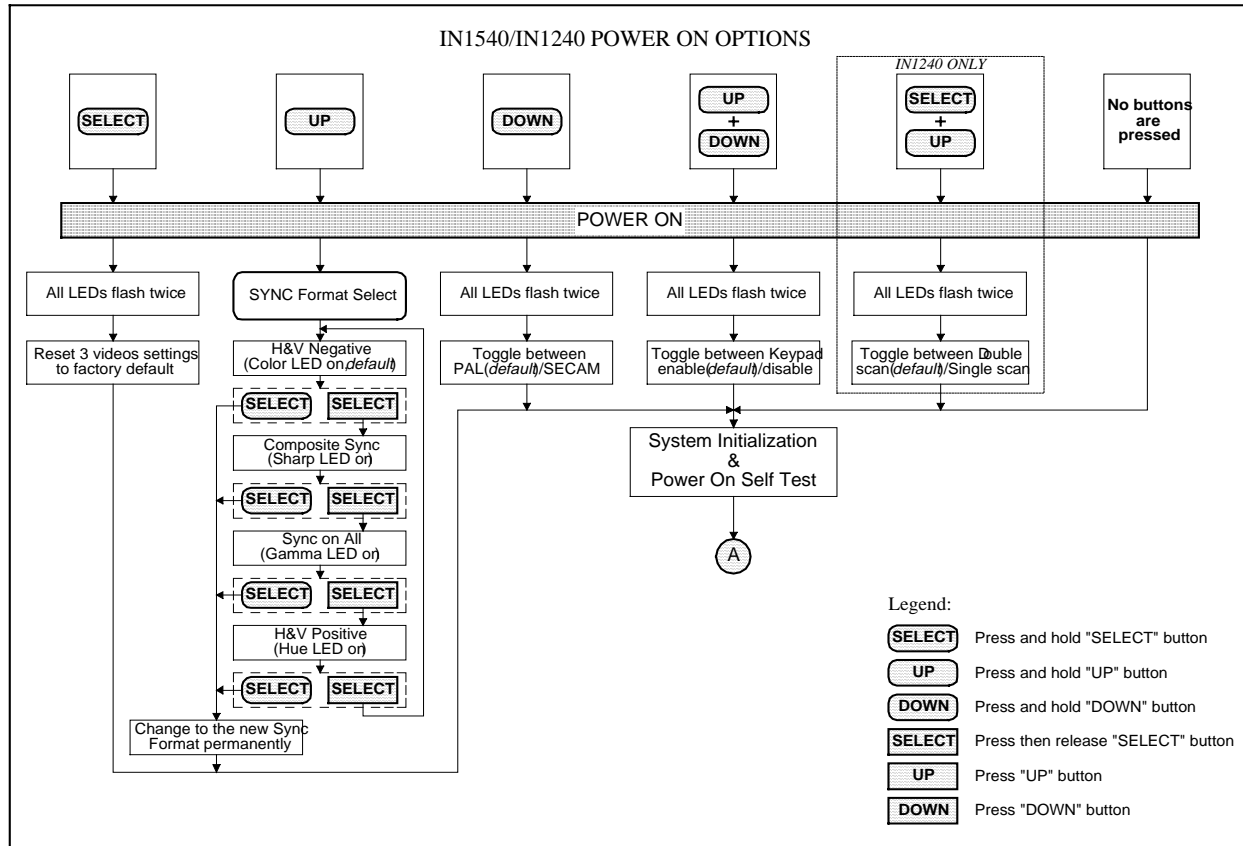


DIAGRAM 4 - IN1540 / IN1240 POWER ON OPTIONS



USING RS-232 COMMANDS

All Normal Operation controls and most Power On selections (except for *Reset to Factory Default* and *Keypad Enable / Disable*) are controllable through the RS-232 port. A special cable, **IN9098** has been designed as an input adapter cable to link the **IN1240 / IN1540** RS-232 control port to a control system.

COMMAND CODE STRUCTURE

All commands sent to the unit must contain a leading code, the command code, and the ending code. Each command must be completely executed before the unit will accept a new command. When a command is completed, the unit provides a response code; "OK" indicates the command was received and executed, "ERR" indicates there is a problem with the code and the command was not executed.

The **IN1240 / IN1540** can be set to recognize one of four sets of leading codes and ending codes. These are: [] { } () < >. The factory default for leading / ending codes is []. The unit can only be set to a different command code by using an RS-232 command. By setting each unit to a different command code pair, up to four INLINE products can be controlled by a single RS-232 serial control port.

A complete command consists of:

```
[      The leading code
CH1  The command code. In this case CH1 would select the S-video input.
]      The ending code
```

Sample command codes:

```
[CH1]    Selects the S-video input
[GAM3]    Selects Gamma Correction curve 3
```

COMMUNICATION PROTOCOL

8 data bits
1 stop bit
No parity check
1200 baud (default)

BAUD RATE SELECTION

The **IN1240 / IN1540** have a factory default baud rate of 1200 and can communicate at baud rates from 1200 up to 19200. Baud rates can only be changed via RS-232 commands.

The **IN1240 / IN1540** revert back to a baud rate of 1200 each time the unit is turned off. If the unit will be turned on and off frequently and the control system is going to use one of the higher baud rates, then the "SAVE0" command (save global settings) should be used to save the appropriate baud rate and command code settings. Once the settings have been saved this way, the unit will recall the new baud rate and command codes at power up.

RS-232 ASCII CODES

The table below lists the ASCII control codes for the **IN1240 / IN1540**. These are virtually identical to the codes used with the **IN1222 / IN1510**, with new codes indicated by an asterisk (*).

COMMAND	DESCRIPTION
ACI0	Disable RS-232 control port
ACI3	Set ACI to 1200 baud rate <i>default</i>
ACI4	Set ACI to 2400 baud rate
ACI5	Set ACI to 4800 baud rate
ACI6	Set ACI to 9600 baud rate
ACI7	Set ACI to 19200 baud rate
APERx	* Aperture bandpass filter weights high frequency components of the luminance signal. x = 0 - 3. 0 disables filter, 3 is the greatest weight.
BPSSx	* Select different aperture bandpass filter for the luminance filter. x= 0 - 3
CMDCD0	Select command code "[" & "]" <i>default</i>
CMDCD1	Select command code "{" & "}"
CMDCD2	Select command code "(" & ")"
CMDCD3	Select command code "<" & ">"
CH1	Select S-Video input - mini DIN connector <i>default</i>
CH2	Select composite video input - BNC connector
CH3	Select composite video input - RCA connector
CON+	Increase CONTRAST level 1 step
CON-	Decrease CONTRAST level 1 step
CON,	Set CONTRAST level to normal setting
CONxxx	Set CONTRAST level to xxx value, xxx: 000-255
CORIx	* Coring range for high frequency components of the luminance signal. x=0-3
GAM0	Disable GAMMA Correction function <i>default</i>
GAM1	Select GAMMA Correction curve 1
GAM2	Select GAMMA Correction curve 2
GAM3	Select GAMMA Correction curve 3
GAM4	Select GAMMA Correction curve 4
GAM5	Select GAMMA Correction curve 5
GAM6	Select GAMMA Correction curve 6
GAM7	Select GAMMA Correction curve 7
HSCAN0	(IN1240 only) Set horizontal scan rate to single mode (15.75 kHz)
HSCAN1	(IN1240 only) Set horizontal scan rate to double mode (31.5 kHz) <i>default</i>
HUE+	Increase HUE phase 1 step
HUE-	Decrease HUE phase 1 step
HUE,	Set HUE phase to normal setting
HUExxx	Set HUE phase to xxx value, xxx: 000-255

COMMAND	DESCRIPTION
INFO **	Get the model number & firmware version
POSTL	Horizontal position adjustment - shift left (IN1540 only)
POSTR	Horizontal position adjustment - shift right (IN1540 only)
POSTH **	Get the horizontal position setting (IN1540 only)
POSTHxx	Horizontal position adjustment - set to xx (IN1540 only)
PREFx *	Pre-filter on/off for luminance filter. x=0 pre-filter off (<i>default</i>), x=1 pre-filter on
SAT+	Increase COLOR level 1 step
SAT-	Decrease COLOR level 1 step
SAT,	Set COLOR level to normal setting
SATxxx	Set COLOR level to xxx value, xxx: 000-255
SAVE	Save the current channel's settings (HUE, COLOR, SHARP, & GAMMA)
SAVE0	Save the global settings (baud rate, command code)
SEC0	Disable SECAM decoder <i>default</i>
SEC1	Enable SECAM decoder
SYNC0	Select H & V Output Sync, positive polarity
SYNC1	Select H & V Output Sync, negative polarity <i>default</i>
SYNC2	Select Composite Output Sync
SYNC4	Select Sync on RGB

*New codes for the IN1240/IN1540.

**These commands prompt the unit for specific feedback and will result in special response codes. For additional information on ASCII command codes and response codes, see the *IN1240 / IN1540 Programmer's Guide*.

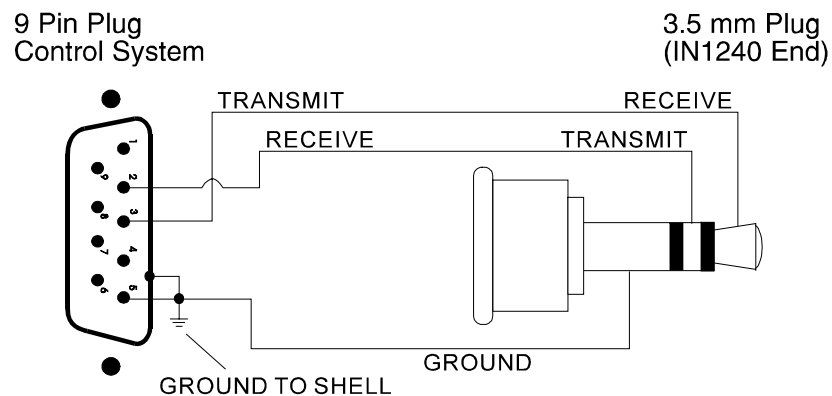
PIN OUT INFORMATION

RGB Output - 15 Pin HD Female Connector

Pin 1	Red Signal	Pin 9	No connection
Pin 2	Green Signal	Pin 10	Ground
Pin 3	Blue Signal	Pin 11	No connection
Pin 4	No connection	Pin 12	No connection
Pin 5	Ground	Pin 13	Horizontal Sync <i>or</i> Composite Sync Signal
Pin 6	Red ground	Pin 14	Vertical Sync Signal
Pin 7	Green ground	Pin 15	No connection
Pin 8	Blue ground		

RS-232 Control Port - IN9098 Adapter Cable Diagram

The diagram below shows pin out information on the optional **IN9098** RS-232 control port adapter cable. This information is included for installers who need to build their own custom control cable.



VIDEO SPECIFICATIONS

	IN1540	IN1240
Video Input Characteristics		
Input Ports	(1) S-Video on 4-pin Mini DIN (CH1) (1) Composite Video on BNC (CH2) (1) Composite Video on RCA (CH3)	
Input voltage (peak-to-peak)	0.6 - 1.4V	
Input impedance (terminated, f=6MHz)	75Ω	
Input capacitance (f=6MHz)	35 - 45pF	
Crosstalk between the 3 input channels	-60 - -55dB	
Digital Decoder		
NTSC standards ¹	NTSC -M	
PAL standards ¹	PAL -D, B, G, H, I, M, N	
SECAM standards ¹	SECAM -L, B, D, G, H, K1	
Video Control Characteristics		
Hue phase (Available for NTSC only)	-180.0° - +178.6°	
Color level (chroma gain)	±5%	
Sharpness / Contrast level ²	32 Pre-programmed settings	
RGB Output Characteristics (for inputs 1-3, 75Ω doubly terminated)		
Output port	(1) 15-pin female HD connector with VGA compatible pin out	
Input to output delay (referenced to the input signal) ³	60Hz : $\frac{138}{780}$ line or 11.245μS 50Hz : $\frac{138}{944}$ line or 9.356μS	<u>Single Scan Mode</u> 60Hz : $0.5 + \frac{137}{780}$ line or 42.941μS 50Hz : $0.5 + \frac{137}{944}$ line or 41.288μS <u>Double Scan Mode</u> 60Hz : $1 + \frac{137}{780}$ line or 74.720μS 50Hz : $1 + \frac{137}{944}$ line or 73.288μS
RGB output voltage (peak-to-peak value, without sync)	0.7 - 0.8V	
RGB output voltage (peak-to-peak value, with sync)	0.9 - 1.1V	
Sync output voltage HIGH	2.4V min.	
Sync output voltage LOW	0.5V max.	
Output impedance	75Ω	

Notes:

1. Video only, no teletext or closed-caption supported.
2. Refer to the *Programmer's Guide* for details.
3. For reference only. It is not recommended to use these timing figures for applications which require absolute timing accuracy. The actual delay is dependent on the quality of the input signal and will also be influenced by the position of the video adjustments (Hue, Color and Sharp controls).
The delay time is based on the 15.734kHz horizontal frequency for 60Hz NTSC and 15.625kHz horizontal frequency for 50Hz PAL/SECAM. The actual delay timing depends on the horizontal frequency of input signal.

VIDEO TIMING

	IN1540		IN1240	
			Single scan	Double scan
Input Signal Timing				
Horizontal frequency of input signal	fH Hz			
Vertical frequency of input signal	fV Hz			
RGB Output Horizontal Timing (NTSC mode)				
Pixel clock	780fH Hz		1560fH Hz	
Horizontal frequency (line rate)	fH Hz		2fH Hz	
Total pixels per line	780 pixels		780 pixels	
Active pixels per line	640 pixels		640 pixels	
Horizontal blanking interval	140 pixels		140 pixels	
Horizontal synchronization pulse	64 pixels		64 pixels	
Front porch	Adjustable (RS-232 Commands)		56 pixels	
Back porch	Adjustable (RS-232 Commands)		20 pixels	
RGB Output Vertical Timing (NTSC mode)				
Vertical frequency (field rate)	fV Hz		fV Hz	
Frame rate	$\frac{1}{2}fV$ Hz		fV Hz	
Total lines per field	262.5 lines	262.5 lines	525 lines	
Visible lines per field	241.5 lines	241 lines	481 lines	
Vertical blanking interval	21 lines	21.5 lines	44 lines	
Vertical synchronization pulse	6 lines ⁴	6 lines	12 lines	
Front porch	3.5 lines ⁴	3.5 lines (of) 3 lines (ef) ⁵	7 lines	
Back porch	11.5 lines ⁴	12.5 lines (of) 12 lines (ef) ⁵	25 lines	
RGB Output Horizontal Timing (PAL/SECAM mode)				
Dot clock	944fH Hz		1888fH Hz	
Horizontal frequency (line rate)	fH Hz		2fH Hz	
Total pixels per line	944 pixels		944 pixels	
Active pixels per line	768 pixels		768 pixels	
Horizontal blanking	176 pixels		176 pixels	
Horizontal synchronization pulse	64 pixels		64 pixels	
Front porch	Adjustable (RS-232 Commands)		88 pixels	
Back porch	Adjustable (RS-232 Commands)		24 pixels	
RGB Output Vertical Timing (PAL/SECAM mode)				
Vertical frequency (field rate)	fV Hz		fV Hz	
Frame rate	$\frac{1}{2}fV$ Hz		fV Hz	
Total lines per field	312.5 lines	312.5 lines	625 lines	
Visible lines per field	287.5 lines	287 lines	573 lines	
Vertical blanking	25 lines	25.5 lines	52 lines	
Vertical synchronization pulse	6 lines ⁴	6 lines	12 lines	
Front porch	3 lines ⁴	2.5 lines (of) 3 lines (ef) ⁵	5 lines	
Back porch	16 lines ⁴	16.5 lines (of) 17 lines (ef) ⁵	35 lines	

Notes:

4. The number of lines may vary depending on the source of the input signal.
5. of: odd field, ef: even field.

GENERAL SPECIFICATIONS

	IN1540	IN1240
Remote control	RS-232C on 3.5mm stereo phone jack	
Power Supply		
Input port	2mm DC power jack	
Input voltage/current	DC 9V/500mA ±10%	DC 9V/1A ±10%
Power consumption	4W	6W
Environmental Capabilities		
Operating temperature	+5°C - +40°C	
Storage & transport temperature	-20°C - +60°C	
Operating relative humidity	20 - 90%	
Storage & transport relative humidity	5 - 95%	
Heat radiation	direct sunlight radiation not allowed	
Operating vibration	10-50Hz @ 2G	
Operating position	any position	
Safety and EMI Data		
Safety regulation	UL applying	
EMI regulation	complies with FCC Class A	
Dimensions	5.1" x 3.25" x 1.1"	
Weight	1 pound	

PARTS INCLUDED

- 1 - IN1240 Scan Doubler *or* 1 - IN1540 Universal Decoder
- 1 - DC Power supply
- 1 - Operations Manual

OPTIONAL ACCESSORIES

IN8000 Series Cables - 15 Pin HD Male to 15 Pin HD Female cables available in a variety of lengths from 6' to 100'

IN8200 Series Cables - 15 Pin HD Male to 9 Pin for use with NEC projector switchers, available in a variety of lengths from 12' to 100'

IN9045 Output Adapter Cable - 15 Pin HD Male to 5 Male BNC Cable - 12' Long

IN9098 Control Port Adapter Cable - 3.5mm Stereo Mini Male to 9 pin D Male, 12" long

Programmer's Guide - Provides detailed information useful for programmers writing code to control the **IN1240** and **IN1540** through the RS-232 control port.

TROUBLESHOOTING

The **IN1240** Scan Doubler and **IN1540** Universal Decoder are designed to offer problem free operation. There are no internal user adjustable or serviceable parts. This section lists a few potential symptoms of improper installation / adjustment and the most common solutions to these problems.

No picture is displayed on the monitor / video projector.

1. Verify all input cable connections.
2. Verify output cable connections.
3. Check the **IN1240 / IN1540** power supply connection at both ends.
4. Make sure the unit is set to an output sync format which is compatible with the display device.
5. Verify that the **IN1240 / IN1540** has been switched to an active input.
6. Check to see if the display device has been switched to its RGB input.

Two images are displayed side by side on the display screen. (IN1240 only)

The **IN1240** is probably being used in its scan doubling mode with an incompatible monitor or video projector. Either switch to the "Disable Doubling" mode (Page 8), or use an RGB display device which is capable of showing a 31.5 KHz (VGA type) video signal.

The front panel controls do not operate.

The unit may be in the "Disable Keypad" mode. To enable the keypad controls:

1. Remove the power supply cord.
2. Hold both the UP and DOWN arrow buttons while reinserting the power plug.

In the Channel selection mode, the UP and DOWN arrow buttons have no effect and the unit always stays on the same channel (all other adjustment modes are operating normally).

The Channel Lock mode has been engaged. To disable Channel Lock, press and hold the SELECT button for three seconds.

The unit does not respond to RS-232 commands.

1. Check the baud rate settings. The default is 1200 baud at power on (unless a different baud rate has been previously set and stored). In order to use a higher baud rate the unit must be set to that baud rate using an RS-232 command (Page 11 & 12).
2. Verify the command code settings. (Page 11)
3. Verify that all ASCII characters are in upper case and that there is no confusion between the letter O and number 0 (zero).
4. Check the control cable construction. If you built a custom control cable, did you remember to swap the transmit and receive so the units can communicate?

The video image on the screen is magenta colored and very noisy.

The unit may be set for "SECAM Enabled". Observe the Power On LED indicators (see Page 7) to verify that the unit is set to the proper decoder format. If the unit has been set to the "SECAM Enabled" mode and the input signals are NTSC or PAL, switch back to the "SECAM Disabled mode" (see Power On Options, Page 10).

When power is applied to the unit all four of the top LEDs flash continuously.

The unit has an internal hardware problem. Call your INLINE dealer to arrange for repairs.

If problems persist, contact your INLINE dealer for assistance or call the INLINE Technical Services Department at (800) 882-7117.

WARRANTY

- ◆ INLINE warrants the equipment it manufactures to be free from defects in materials and workmanship.
- ◆ If equipment fails because of such defects and INLINE is notified within two (2) years from the date of shipment, INLINE will, at its option, repair or replace the equipment at its plant, provided that the equipment has not been subjected to mechanical, electrical, or other abuse or modifications.
- ◆ Equipment that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of re-shipment to the Buyer.
- ◆ **This warranty is in lieu of all other warranties expressed or implied, including without limitation, any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.**

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