HALL RESEARCH

Video to PC/HDTV Switching Scaler
With Optional Audio

Component, S-Video, Composite, and PC Inputs

Scaled VGA or HDTV Component Output

Front Panel, IR Remote, & RS-232 Serial Control

Model TVB-400 & TVB-400A

UMA1132 Rev. E

TRADEMARKS USED IN THIS MANUAL

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FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been designed to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are intended to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at their own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

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Hall Research Inc.

Home of the Mini-Cat®

1. Introduction

1.1 General

The TVB-400 is a multiple format switching video scaler. It has 4 different types of video inputs and a scaled output that can be switched to any of the inputs.

Inputs are: Composite Video (NTSC or PAL), S-video (NTSC or PAL), Component Video (SD and HD from 480p to 1080i), and a PC (from VGA (640x480) to SXGA (1280x1024) for scaled output, or up to 1920x1440 for pass thru video).

The output format and resolution can be specified by the user as either PC (VGA (640x480) to SXGA (1280x1024)) or Component Video (YPbPr from 480p to 1080i - a VGA to 3 RCA adapter cable is included). The user can set the output to the optimal sweet-spot of your display and let the TVB-400 handle and convert various kinds of video inputs for your LCD.

The TVB-400A is the same as the TVB-400 but adds audio switching and volume control capabilities (for line level audio).

The Video Scaler can be controlled in many ways including: front panel lighted pushbuttons (with On-Screen Display menus), using the included IR remote control, or RS-232 Serial interface. The controls include: input switching, setting the output resolution, picture adjustment (tint, color, brightness, contrast, and sharpness), aspect ratio (Standard, 16:9 or 4:3), digital noise reduction, 3D comb filter On/Off, volume control and many other advanced features.

The TVB-400 is ideal for use with in boardrooms, classrooms, digital signage, and high end home-theater applications. Its output can be set for any LCD projector, PC LCD monitor, plasma, or HDTV displays.

The unit is shipped with all the required cables and adapters, IR remote, and also Windows® PC based RS-232 control software.

1.2 Features

- Professional Video Scaler and multi-format switcher

- 4 different inputs: Composite, S-video, YPbPr, and a PC (RGBHV – VGA (640x480) up to SXGA (1280x1024)) *

- Can provide RGBHV (PC) VGA, SVGA (800x600), XGA(1024x768), SXGA(1280x1024) outputs *

- Can also provide YPbPr HDTV outputs of 480p, 576p, 720p, 1080i

- RS-232 interface allows control from an external device

- OSD (On-Screen Display) with Blanking and Freeze functions

- Easy to use IR remote control

- State-of-the-art frame buffer (with time-base correction)

- Reverse 3:2/2:2 pull down provides clear and crisp de-interlacing of video originating from 24 fps film, such as DVD movies.

- Digital noise reduction

- Brightness, Color, Contrast, Sharpness and Tint adjustment

- Dynamic format 4:3 or 16:9 output

- Adaptive 3-D comb filter for composite input ensures jitter-free picture

- Compatible with NSTC, PAL, and SECAM video input

  * Pass Thru PC video resolutions up to 1920x1440.

TVB-400 Accessories

2. Installation

2.1 Connecting the Video inputs

The video scaler can accept a both TV and PC inputs and scale them to your desired high resolution format output. The TV inputs are composite video (BNC connector), S-Video (Mini-Din connector), and an YPbPr input (3 BNC connectors). BNC to RCA adapters are included for composite and component inputs. Both standard definition TV (SD) and High Definition (HDTV) are supported. The unit also provides a PC input that is also scaled for the output (note that PC input can also be directly bypassed to the output without scaling if desired). Refer to Figure 2.1 for a block diagram.

Rear Panel

S-Video: Use an S-Video cable to connect the S-Video output of the source video equipment to the connector labeled "S-Video" on the back of the Video Scaler. The format can be NTSC, PAL, or SECAM.

Composite Video: Use a Composite video cable to connect the composite video output of the source equipment to the connector labeled "Video" on the back of the Video Scaler. The format can be NTSC, PAL, or SECAM.

YPbPr input: Use a 3 RCA-to-3 BNC YPbPr cable to connect the YPbPr output of the source video equipment to the device. The format can be NTSC, PAL, or SECAM.

Computer RGB with H&V Sync: Connect the source computer's VGA output signal to the HD 15 connector labeled "PC In" on the Video Scaler.

## 2.2 Connecting the Optional Audio Inputs (TVB-400A Only)

Each of the Audio input jacks are matched to a correspondingly labeled video input connector. As each video input is switched, the audio input is also switched. Each audio input has an associated volume level that can be controlled from the front panel or via a RS232 command.

2.3 Connecting the Scaled Output

The output can be connected to any VGA compatible LCD, Projector, or Plasma display. It can also output HDTV compatible YPbPr in various formats as described below.

The same HD-15 connector is used to output VGA (RGBHV) output or HDTV/YPbPr output. When VGA (RGBHV) outputs are selected (VGA, SVGA, XGA, SXGA) use an HD-15 to HD-15 VGA cable to connect the output to the PC input of your display monitor.

When HDTV/YPbPr outputs (480p, 576p, 720p, 1080i) are selected, use a HD-15 to YPbPr 3 x RCA cable to connect the output to the YPbPr input of you HDTV display. Both cables are provided. Connect the Audio Output jack to the audio input of the display or sound system.

Figure 2.1
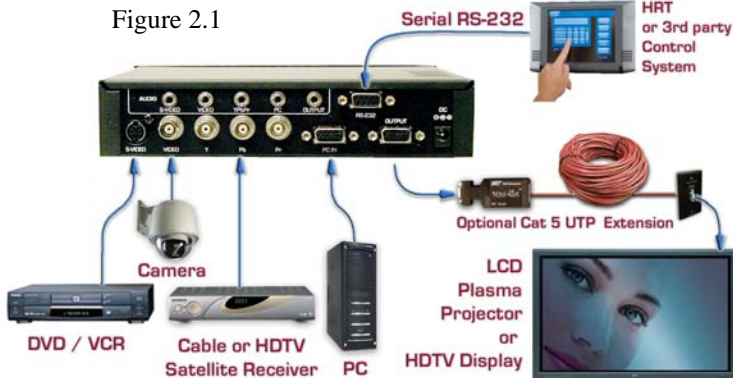
2.4 Other Connections

RS232: This 9-pin D-sub connector is for connecting to your PC or other serial control device for remote control of the TVB-400.

DC power jack: 5V 2A DC power input (center positive 2.1 mm jack). From provided Universal Power supply
NOTE: The range of power input is 5 to 12VDC.

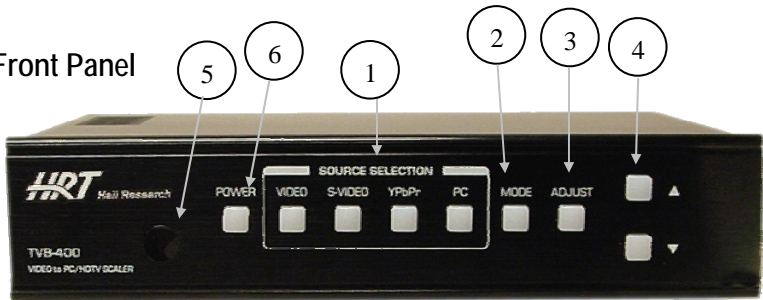# 3. Configuration & Operation

3.1 Front Panel

Figure 3.1

1. ***Source Selection:*** Press the appropriate button to display the video connected to the rear input connectors on the OSD (On-Screen Display).

2. ***Mode:*** Press the button repeatedly will toggle through the following adjustment controls:

Source > Resolution > Output > Aspect > 3D Enhance > Digital NR

Source mode: While in this mode, press ▲ or ▼ buttons to choose your desired input source from the Composite Video, S-Video, Component Video, PC inputs for scaling. If enabled, you can also BYPASS the PC input through the unit completely. The unit will bypass the PC in (RGBHV) signal to the output when the power is turned off. (With a TVB-400A, the audio is also bypassed from the PC audio input to the audio output connector at the last PC volume level selected). BYPASS is only displayed (by default) in the OSD if 'PC LOOP BYPASS' is enabled in the control software.

Resolution mode: If the output is set to a RGBHV PC resolution, press ▲or▼ buttons to choose from 640 x 480(VGA), 800 x 600 (SVGA), 1024 x 768(XGA), or 1280 x 1024(SXGA) PC output. If output is set to a HDTV YPbPr resolution, then press ▲or▼ to choose from 480p, 576p, 720p or 1080i HDTV output.

Output mode: Press ▲or▼ to select between a PC RGBHV output and the HDTV YPbPr output.

Aspect mode: Press ▲or▼ to choose between Standard, 4:3 aspect and 16:9 aspect ratios.

3D Enhance mode: To turn on or off the 3D comb filter function.

When VCR or non-standard video source is connected to the input the output picture may jitter. If this occurs, turn off the 3D Enhance function.

Digital NR mode: To turn on or turn off the digital noise reduction function.

Blanking mode: To turn on or turn off the video blanking function.

Freeze Video mode: To turn on or turn off the video freeze frame function.

3. *Adjust:* Press the button to toggle through the adjustment parameters as follows:

Hue > Detail > Contrast > Brightness > Color > Volume

Hue: Press ▲or▼ to adjust NTSC Hue level. The range of adjustment is 0~63. Factory defaults value is 31.

Detail: Press ▲or▼ to adjust the Detail level. The range of adjustment is 0~63. Factory defaults at 10.

Contrast: Press ▲or▼ to adjust the Contrast level. The range of adjustment is 0~63. Factory default value is 58.

Brightness: Press ▲or▼ to adjust the Brightness level. The range of adjustment is 0~63. Factory default value is 31.

Color: Press ▲or▼ to adjust the Color level. The range of adjustment is 0~63. Factory default value is 31.

Volume (TVB-400A only): Press ▲or▼ to adjust the Audio level. The range of adjustment is 0~63. Factory default value is 31. (TVB-400A Only). If the power is turned off, the volume level can still be adjusted by first pressing the 'ADJUST' button and then using the ▲or▼ buttons to adjust the Audio level.

4. ▲or▼: Press to toggle through various adjustment controls to alter the settings

_____ Note _____

In the picture adjust mode, pressing ▲ and ▼ simultaneously will revert the selected parameter back to factory preset value. Pressing both buttons for over 5 seconds will revert <u>all</u> picture parameters back to their factory preset values.

5. IR Sensor: Infrared remote control sensor.

6. Power and LED button: Press once to power on the unit, press again to turn off. *Note*: with power off the PC input is passed to the output.

Front Panel Lockout - Under certain circumstances it may be desirable to disable the front panel controls (e.g. to prevent unauthorized or accidental changes to the settings while the unit is in use). To disable the front panel controls you must use the RS-232 port (see Serial Control section for details)

It is still possible to remove the lockout from the front panel by performing a full factory default reset operation!

To reset all parameters back to factory preset value, press the "Mode" and "Adjust" buttons simultaneously for over 10 seconds. The Power led will turn off while the buttons are depressed and turn back on when the software reset occurs. The default video output selection is Composite Video at XGA (1024x768) output resolution will be selected.

3.2 Infra-Red Remote control (IR Remote)

1. Power: Power unit ON/OFF.

2. Display: To enable or disable the OSD of the resolution information.

3. C-Video: Select composite video as the source.

4. S-Video: Select S-Video as the source.

5. YPbPr: Select YPbPr as the source.

6. PC: Select PC input as the source.

7. VGA: Select 640 x 480 output resolution.

8. SVGA: Select 800 x 600 output resolution.

9. XGA: Select 1024 x 768 output resolution.

10. SXGA: Select 1280 x 1024 output resolution.

11. 480p: Select 852 x 480p output resolution.

12. 576p: Select 852 x 576p output resolution.

13. 720p: Select 1280 x 720p output resolution.

14. 1080i: Select 1920 x 1080i output resolution.

15. Aspect ratio: Switch between the standard, (4:3) and wide (16:9) aspect ratios.

16. IR-Set: When front panel is turned off by the RS-232, pressing this button for over 15 seconds will turn on the IR Sensor.

17. 3D: Press to turn ON/OFF the 3D enhance.

18. NR: Press to turn ON/OFF the digital noise reduction.

19. Mode: Same as "mode" button on front panel.

20. Picture: Same as picture button on front panel.

21. Reset: Press this button to revert the picture or audio characteristic back to factory preset while the selection is displayed.
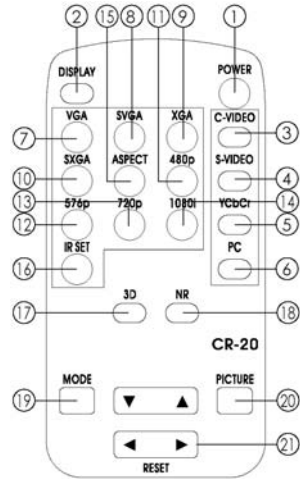
4. Serial Control

The video input selection and signal parameter settings for the TVB-400 can be controlled via an external control system by using the RS-232 port on the unit. A free Windows® control software is available that permits remote control of the unit from a PC via RS-232.

Use a straight thru M/F DB9 serial cable to connect the unit to the PC. Only the TX, RX and GND pins are implemented in the connector. The RS232 port operates at 9600 baud, no parity and 1 stop bit. Control codes are 3 bytes long. In the table shown below, the 1st 2 characters are ASCII and the 3rd argument is binary.
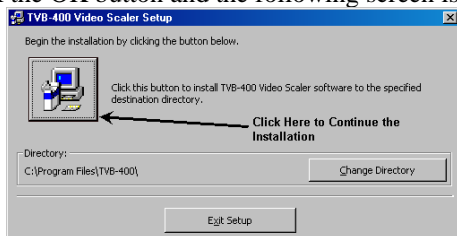
4.1 Control Software Installation

Ensure that any other software applications are closed before attempting to install the software. Install the control software by inserting the CD that comes with the unit into the CD drive.

- Run the "SETUP.EXE" program. The following screen is displayed:
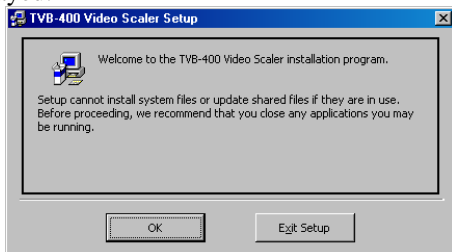
- Click the OK button and the following screen is displayed:

- Click the button to continue the installation into the default directory. The default directory may be changed from this screen if desired. The software installation will then copy all the files to the desired destination.

- The following screen is then displayed:

- Click the OK button

4.2 Using the Control Software
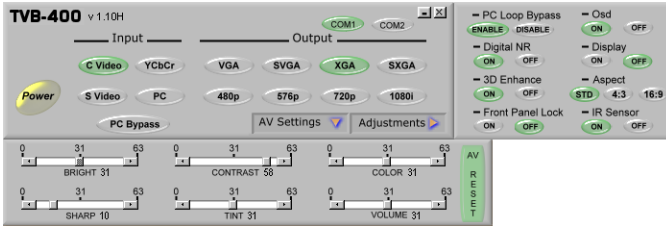
- The first time the application software is run, you must select the appropriate COM port that the unit is connected to. The software will retain this information when executed in the future.

- The AV Settings and Adjustment windows are by default not displayed. Click the button to open or close the panel.

- The 'PC Loop Bypass' must be enabled (which is the default setting) in order to bypass the PC IN signal to the OUT connector. When the 'PC Loop Bypass' is disabled, the 'PC BYPASS' button is grayed out and the selection disappears from the OSD.

- On the TVB-400A, when 'PC BYPASS' is selected, the only valid adjustment is 'VOLUME'.

- The software is broken down into 4 basic groups of controls:

  - **Input**
    - This is the Video Input source selection. PC Bypass is only available when 'PC LOOP BYPASS' is enabled in the 'adjustment' menu.

  - **Output**
    - This is where the video output should be directed.

  - **AV Settings**
    - These are the picture and audio volume control. Clicking the 'AV Reset' button will change all of these parameters back to there default settings.

  - **Adjustments**
    - These are the various settings that allow you to control 'Bypass', OSD, Digital NR, 3D enhancement, aspect ratio, Front Panel locking, Video blanking, Video freeze frame functions or if the Remote Control IR Sensor is enabled.

- As buttons are pressed on the unit, the control software will mirror the settings as they are executed. Also as 'buttons' are pressed in the control software, the OSD and units illuminated buttons will change when appropriate.

Code	Description	
'PW'+0 'PW'+1	Power	Power off (standby) Power on (normal)
'IN'+0 'IN'+1 'IN'+2 'IN'+3 'IN'+4	Input Selection	Composite video S video YPbPr Computer Bypass
'OU'+0 'OU'+1 'OU'+2 'OU'+3 'OU'+4 'OU'+5 'OU'+6 'OU'+7	Output Resolution	VGA 480p SVGA XGA SXGA 576p 720p 1080i
'OS'+0 'OS'+1	OSD	OSD OFF OSD ON
'DI'+0 'DI'+1	Display	Display OFF Display ON
'BR'+value 'CO'+value 'SA'+value 'SH'+value 'TI'+value	Brightness Contrast Saturation Sharpness Tint	Value = 0~63 (default 31) Value = 0~63 (default 58) Value = 0~63 (default 31) Value = 0~63 (default 10) Value = 0~63 (default 31)
'VO'+value	Volume	Value = 0~63 (default 31)
'IR'+0 'IR'+1	IR	IR sensor OFF IR sensor ON
'FP'+0 'FP'+1	Front Panel	Front panel lockout ON Front panel lockout OFF
'TD'+0 'TD'+1	3D Enhance	3 D enhance OFF 3 D enhance ON
'NR'+0 'NR'+1	Noise Reduction	Digital NR OFF Digital NR ON
'AS'+0 'AS'+1 'AS'+2	Aspect Ratio	Aspect 16:9 (letter box) Aspect Standard(full screen) Aspect 4:3 (pan & scan)
'BY'+0 'BY'+1	PC Bypass	Disabled Enabled
'BL'+0 'BL'+1	Video Blank	Disabled Enabled
'FR+0 'FR'+1	Video Freeze	Disabled Enabled
'RE'+0	Video and Audio Adjustment Reset	Contrast = 58, Brightness=31, Color=31, Hue=31, Detail=10, Audio = 32
'AL'+0	Retrieve the Video Scaler's Status (Each '?' below represents the settings value) 'PW'+? 'IN'+? 'OS'+? 'OU'+? 'DI'+? 'IR'+? 'FP'+? 'BR'+? 'CO'+? 'SA'+? 'SH'+? 'VO'+? 'TI'+? 'TD'+? 'NR'+? 'AS'+? 'BY'+?	

5. Troubleshooting

There are no field serviceable parts or circuits in the device. If you think that the device is malfunctioning, please first try to reset to factory default settings:

5.1 Resetting the TVB-400 to Factory Defaults

To reset all parameters back to the factory preset value, press the "Mode" and "Adjust" buttons simultaneously for over 10 seconds. The 'Power' led will turn off when the buttons are pressed and then turn on again when the reset has occurred.

5.2 Contacting Hall Research

If you determine that your scaler is malfunctioning, do not attempt to repair the unit. Contact the Hall Research Technical Support department at 714-641-6607.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description.

5.3 Shipping and Packaging

If you need to transport or ship your Scaler:

- Package it carefully. We recommend that you use the original container.
- Before you ship the units back to Hall Research for repair or return, contact us to get a Return Authorization (RMA) number.

6. Specifications

Computer Input (Pass Thru)	RGB with HV Sync		
Max Computer Input Resolution	1280x1024 (Scaled Output) 1920x1440 (Pass Thru)		
Computer Input Connector	HD-15 Female (DB-15)		
Computer Input Signal Level	RGB @ 0.7V Analog, H&V Sync TTL		
Video Inputs	Composite Video S-Video Y Pb Pr	1 Vp-p 75 ohm 1 Vp-p 75 ohm 1Vp-p 75 ohm 0.7 Vp-p 75 Ohm 0.7 Vp-p 75 Ohm	
(TVB-400A Only) Audio Inputs Audio Output	2 Vp-p max stereo line-level into a 10k impedance Line level output with volume adjustment		
Video Standard	PC: RGBHV - VGA(640x480) to UXGA(1600x1200) SDTV: NTSC 3.58, PAL, B/D/G/I, SECAM HDTV: 480i/p, 576i/p, 720p, 1080i/p		
Video Input Connectors	Composite Video on BNC S-Video on 4 pin Mini-DIN YPbPr on 3 BNC PC on VGA (HD15 Female)		

Scaled Output Resolutions		Pixels	Format	Scan
	PC	VGA 640x480 SVGA 800x600 XGA 1024x768 SXGA 1280x1024	RGBHV RGBHV RGBHV RGBHV	Progressive Progressive Progressive Progressive
	HDTV	16:9 1280x720p (720p) 16:9 1920x1080i (1080i) 852x480p (480p) 852x576p (576p)	YPbPr YPbPr YPbPr YPbPr	Progressive Interlaced Progressive Progressive

Scaled Output Horizontal & Vertical Refresh Rates	Output Resolution	Vertical (Hz)	Horizontal (Hz)
	VGA	59.94	31.469
	SVGA	60.320	37.880
	XGA	60.000	48.360
	SXGA	60.020	63.981
	480p	59.940	31.469
	576p	50	31.25
	720p	59.94	44.995
	1080i	59.94	33.716

Manual Control	Front Panel Buttons
RS-232 Control	Rear Panel DB-9 Female
IR Remote Control	YES
Adjustments	Brightness, Contrast, Color Saturation, Tint (NTSC), Sharpness, Volume (TVB-400A Only)
Weight	3 Lbs
Dimensions	8 inch (W) x 6 inch (D) x 1.83 inch (H)
Power Source	100-240 VAC to DC 5V/2A Desktop Switching Adapter

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