BLACK BOX®
NETWORK SERVICES

March 2005
AC1033A

Projector Controller with Built-in VGA Splitter

CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S. 24 hours, 7 A.M. Monday to midnight Friday: **877-877-BBOX**
FREE technical support, 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mail order: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

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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 tested and found 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 designed 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 his own expense will be required to take whatever measures may be necessary to correct the interference.

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EUROPEAN UNION DECLARATION OF CONFORMITY

This product complies with the requirements of the European EMC directive 89/336/EEC

CE

Normas Oficiales Mexicanas (NOM)
Electrical Safety Statement
INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:

A: El cable de poder o el contacto ha sido dañado; u
B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
C: El aparato ha sido expuesto a la lluvia; o
D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
E: El aparato ha sido tirado o su cubierta ha sido dañada.

Contents

1. Introduction

1.1 General

The Black Box Model AC1033A is a VGA video splitter (1 in x 2 out) with Composite Video and S-Video Pass-through connectors. It has a RS-232 Serial Port that can be user programmed to send various commands to an external device such as a Projector or Plasma screen based on the condition of the 3 video inputs. For example it can detect the presence of video on any of its inputs and send a “Power-On” string to the projector. It can also prioritize the video input types and command the Projector to switch to the input with highest priority when video becomes available on that input.

The unit also detects the condition where there is no video on any input and after a programmed time period issue a “Power-Off” command to the projector.

Furthermore, the unit has a discrete (digital contact closure or TTL-level) input that can be externally connected to a user supplied switch for issuing additional serial commands on the low-to-high, and/or high-to-low transitions of this input. A discrete digital output is also provided that is activated when video is present on any of the inputs and is off if there is no video.

The commands sent to the projector can be any ASCII (or non-ASCII) data with programmable delays embedded in the string (useful for multiple command strings).

Included with the unit is a powerful Windows™ based application that is used to create the data files and upload it to the AC1033A.

Please refer to Figure 1 for a setup block diagram.

1.2 Features

- Wide bandwidth supports resolutions to 1600x1200
- Up to 8 user-programmable Command Strings
- Allows multiple instances of user-defined delays within each string
- Detects video on any input , or no video at all
- Digital (discrete) input and output on screw terminals
- Comes with Windows™™ software for programming

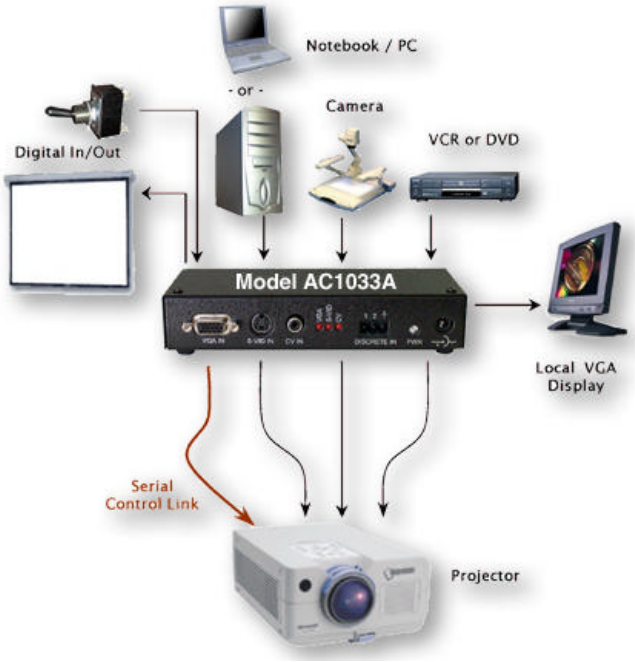

Figure 1 – Typical Setup Block Diagram

2. Installation

The AC1033A comes with a Universal Power Supply, a 6 ft cross-over serial cable, and a CD-ROM with software for unit programming. Please refer to Section 3 for Programming the AC1033A; the cross-over serial cable is used for programming the device from a PC, but the same cable can also be used to connect it to a projector if your projector has the appropriate mating connector.

1. Connect the provided power supply to the power port on the back right side of the device.
2. Attach any VGA, Composite, and/or S-Video signals as necessary to the appropriate input jacks on the back of the device. You will have to supply your own cables for this or contact Black Box to order them as required.

Figure 2 – Front and Rear panel Connectors and Indicators

3. Connect the output from the video signals on the AC1033A to appropriate video input on your display device.
4. If you have a discrete input (for issuing commands upon state change) or want to use the discrete output from the AC1033A, to control external devices such as activating a motorized screen, then connect your discrete I/O to the screw terminal plug supplied with the AC1033A.
5. Connect the DB9-M Serial connector of the AC1033A to your Projector's Serial port. If your projector also has a male DB9 connector, you may be able to use the supplied "cross-Over" cable that is shipped with your unit. But in most cases you will find that projector manufacturers use different connector (such as mini-din,

or HD15-male) for their serial port. In that case you need to construct a cable to connect the AC1033A to the serial port of the Projector. The Pinout of the DB9 Male connector on the AC1033A is as follows:

Pin	Function	Pin	Function
1	Not Used	6	Not Used
2	Receive (input)	7	RTS (output, pulled high)
3	Transmit (output)	8	Not Used
4	DTR (output, pulled high)	9	Not Used
5	Ground		

NOTE

The discrete I/O is not designed to source or sink much current.

The input is pulled up by a 4.7K resistor. You can short the input to ground or open it (contact closure operation) You can also apply a voltage to this pin from 0 to 12 v max (a diode is provided to block current flow into the unit) any input higher than 1.5v is considered to be logic high and an input less than 0.5v is considered logic low. Make sure that this pin does not go negative, as a below zero voltage at this pin can damage the device.

The discrete output is directly driven from a CMOS source that can sink 25 ma, and source about 1 ma when high. We recommend that you use an external optical isolator or transistor to isolate and buffer this output from any external circuit that you may want to use it with.

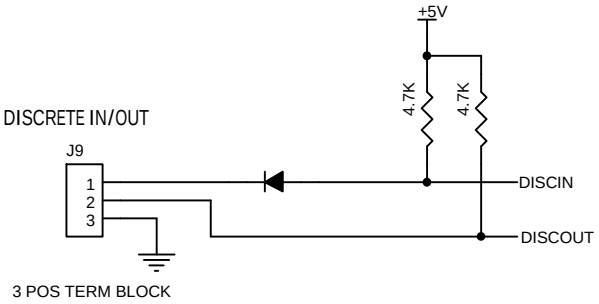

Figure 3 – Internal Circuit of Discrete I/O connector

3. Operation

The AC1033A is designed to send a string of commands that you create to a projector or other device via a serial interface anytime 1 of 8 events occurs. The following is a list of each event and the conditions necessary to facilitate each event:

- ✓ When any video is first detected, the discrete output will be pulled low and the Video First Detected string will be sent out.
- ✓ When Discrete Input transitions from a high to a low signal, the AC1033A will send the Discrete OFF string out the serial port.
- ✓ When Discrete Input transitions from a low to a high signal, the AC1033A will send the Discrete ON string out the serial port.
- ✓ When the VGA input becomes active, the unit will send the VGA Input Active string (if it has priority over selected video input).
- ✓ When the Composite video input becomes active, the unit will send the Composite Input Active string (if it has priority over selected video input).
- ✓ When the S-Video input becomes active, the unit will send the S-Video Input Active string (if it has priority over selected video input)..
- ✓ When no video inputs are active, the AC1033A will send the No Input Active string out the serial port and set the discrete output high (after a predetermined time of no video situation).

Each of these 8 strings can have a maximum of 30 characters and minimum of 0 characters. Within each string wait times can be inserted. Each wait can be a maximum wait time of 16 hrs, 59 min, 59 sec. Each wait takes up 3 characters. Non-printing control characters may also be inserted into the strings. The following is a list of the possible control characters and their corresponding hexadecimal values.

NULL - H00	BS - H08	SO - H0E	DC4 - H14	SUB - H1A
SOH - H01	HT - H09	SI - H0F	NAK - H15	ESC - H1B
STX - H02	LF - H0A	DLE - H10	SYN - H16	FS - H1C
ETX - H03	VT - H0B	DC1 - H11	ETB - H17	GS - H1D
EOT - H04	FF - H0C	DC2 - H12	CAN - H18	RS - H1E
ENQ - H05	CR - H0D	DC3 - H13	EM - H19	US - H1F
ACK - H06				
BEL - H07				

These strings can either be constructed directly in the *"AC1033A Programmer"* or by using a hex editor to create a file containing the desired string.

The AC1033A will communicate with the projector at some baud rate specified in the user's manual of the projector. The *"AC1033A Programmer"* will allow the user to select that baud rate for the projector. The AC1033A will also allow the user to select which video input if any has priority over the others. The user also has the ability to delay the No Input Active string before it is sent out the serial port.

You will need to consult the manual or the manufacturer's data for how to construct the correct string for various functions of the projector. Since each manufacturer uses their own set of commands, Black Box . cannot help in obtaining this information for you.

4. Programming the AC1033A

4.1 Installation of Programming Software on a PC

To program your Projector Controller with the commands that you want, you must install the *"AC1033A Programmer"* software on the computer that is going to be used. Make sure that your computer has at least one serial port (male DB9 Connector). If it does not, either choose another computer or obtain a USB to Serial adapter.

The installation screen looks like this:

Figure 4

After hitting OK, you will get the screen as shown below:

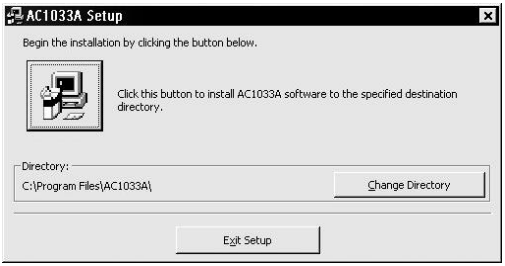

Figure 5

If you are happy with the default directory, click the install button.

4.2 Running the Programming Software

Connect the AC1033A to the computer and start the *"AC1033A Programmer"* software.

The first thing you have to do is to choose the COM port that you will be using. The port selection screen is shown below. The *"AC1033A Programmer"* supports COM1 thru COM5.

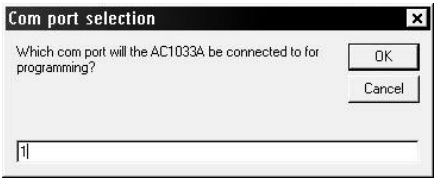

Figure 6

After selecting a COM port, you will need to decide if you want to edit an existing configuration file or create a new configuration file. A configuration file is all the information that will be uploaded to the AC1033A. It consists of the baud rate, the video priority, the delay of the No Input Active string and the 8 different strings. Configuration files will have the file extension of ".hrt" (Hexadecimal Reference Table). After this selection, you will see the main screen as shown below:

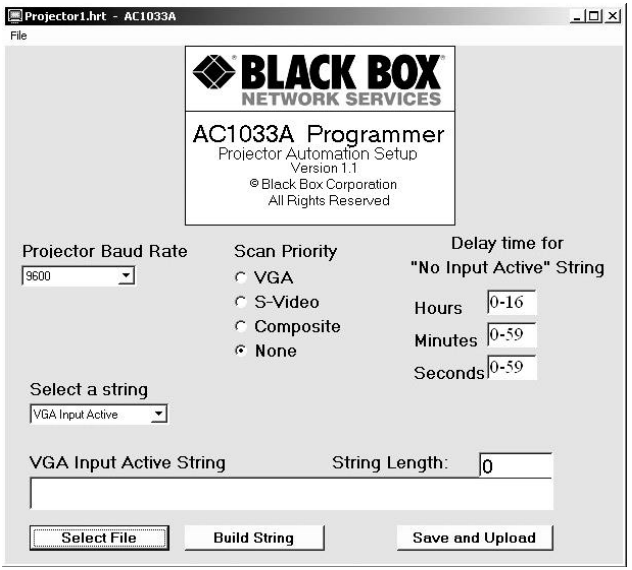

Figure 7 – Main Screen

Selecting the Baud Rate

Select the baud rate from the drop down menu labeled “Projector Baud Rate”. This is the baud rate that your projector is set to for sending and receiving serial commands. This will be found in your user’s manual for the projector or from the projector’s manufacturer.

Selecting the Scan Priority

The scan priority can be used to give one video input priority over the other two. You may also choose to give none of the video inputs priority.

The way the AC1033A selects a video input is by cycling through each video input looking for active video. It will cycle in the order of VGA, S-Video, Composite, and then it will start again with VGA. As soon as a signal is detected on any of the inputs, that video input is selected. After an input is selected, no other input will be selected until the currently chosen input is unplugged or turned off. In addition, if you have assigned priority to a particular video input, if the video input with priority is turned on, the unit will switch to it, even if the currently chosen input has active video.

For example if S-Video had priority and no video inputs were selected then the AC1033A would just cycle through each input looking for a signal. If the first signal it finds is Composite then it would select composite and send the “Composite Input Active” string out the serial port. If it then found the VGA signal to be active, it would not select the VGA input since the VGA input does not have priority. If the Composite input were to be unplugged then the AC1033A would select the next active signal in order of scanning. In this case it would select VGA since VGA is the next signal in the scanning cycle that is active. If S-Video were to become active later while VGA was selected, S-Video would then become selected over VGA since S-Video has priority. Only 1 video input may have priority at any given time. By default, scan priority is given to none.

Selecting a delay for the No Input Active string

By default, the No Input Active string is sent out through the serial port as soon as there is no active video on any of the inputs. If you want to delay issuing the “No Input Active” and keep looking for video to come

back, then simply fill in the fields for the amount of wait you want to add. If, for example, you wanted to send out the No Input Active string 1 hour, 15 minutes and 30 seconds after the AC1033A had detected no active signals, then you would enter a 1, 15 and 30 in the respective fields. Typical commands to send in this situation might be to have the projector enter standby mode or to turn it off.

Selecting a string for each of the 7 events

To specify a string for any of the 7 events, first select the string you want to specify from the drop down menu labeled, Select a String.

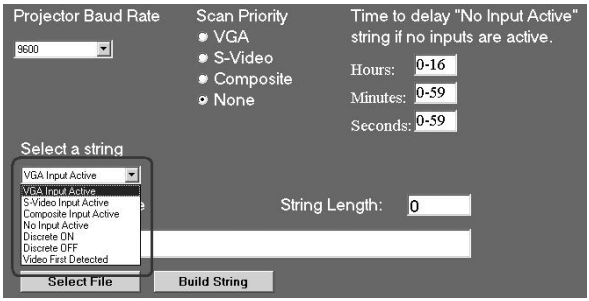

Figure 8

After you have selected the string you want to work with you then need to choose how you will input that string. You have two options for inputting the string. You may create the string in a third-party hexadecimal editor and then save that file with an ".str" extension and then click the "Select File" button to select the file you created. Or you can build the string directly in the editor built into the *"AC1033A Programmer"* by clicking on Build String. If you choose "Select File" only the name of the file containing the string will be displayed in the window directly above the "Select File" button. If you choose to build the string then the actual characters in the string will be displayed in the window above the "Build String" button.

How to Build a String with the "AC1033A Programmer"

To build your own string using the *"AC1033A Programmer"*, click on the "Build String" button.

To enter any characters from the keyboard, simply click in the window labeled “Enter Codes for <name of string>” and begin typing. If you need to enter any of the non-printing control characters, select them from the “Control Characters” menu and click the “Insert Control Character” button and that character will be inserted into the string. If you want to insert a wait in the string, fill in the appropriate time fields and click the “Insert Wait Time” button.

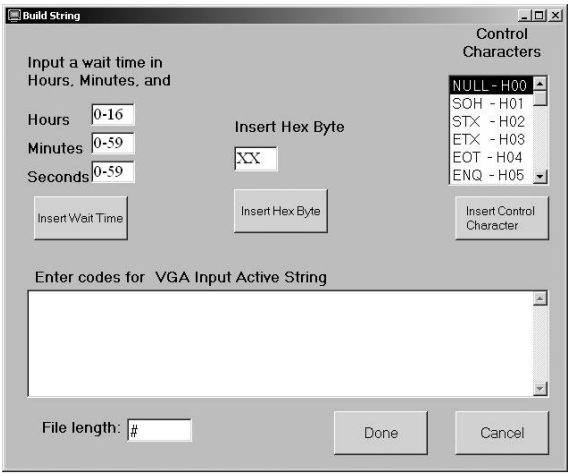

Figure 9

When you have finished building the string, click the “Done” button and you will see the string you just built in the main *“AC1033A Programmer”* screen. Below is an example of a string with several characters entered from the keyboard, then a wait time, then a control character, and then some more characters from the keyboard.

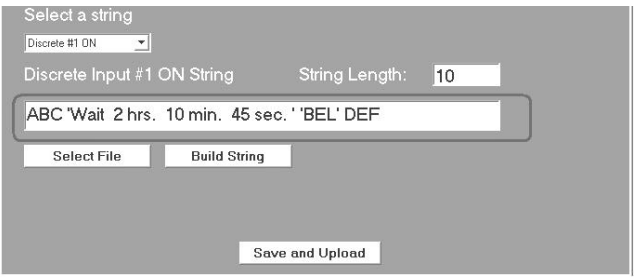

Figure 10

There are a few restrictions you need to be aware of when you are building your string. You may not backspace or delete as you are building the string. Doing so will delete the entire string you have constructed. You may not use the Windows™ "Paste" function to insert more than one character at a time. Doing so will result in the string being deleted. You may only insert a character at the end of the string. If you attempt to enter a string over 25 characters, your string will be deleted. This can be avoided by watching the "File length:" indicator at the bottom of the screen. Any character input from the keyboard will increment the File length by 1, same for a Control Character. A wait time will increment the File length by 3.

Uploading to the AC1033A

After you have selected a baud rate, priority, No Input Active string delay, and strings for each of the 7 strings, you can then click the "Save and Upload" button and this configuration will be saved to the configuration file you created or opened at the start and this configuration will be uploaded to the AC1033A. If you leave any of the strings blank then a 0 length string will be used meaning nothing will be sent out the serial port for that event. If you do not specify a delay for the No Input Active string then there will be no delay before that string is sent out the serial port. The upload procedure should take 4-7 seconds. When it is finished you will see a message indicating the success or failure of the upload procedure.

Loading or Saving Configurations

You can save or load a configuration file by clicking on the File menu and choosing the appropriate icon. You can also create a blank, new configuration file from the File menu.

5. Troubleshooting

5.1 FAQ

How to Verify Operation of the Serial Port…

Prior to connecting the serial output from the AC1033A to your projector it is a good idea to check its operation with a PC running a Terminal Emulation software such as Hyperterminal™. Choose the COM port, no Flow Control, and set the Baud Rate to that you have chosen for your projector. You can still use the "cross-over" serial cable that is included with the unit which was used to upload it from the PC. Plug a video input to the AC1033A and see if it sends the programmed commands to the Hyperterminal™. If your command strings contain special ASCII control codes, then the data may looks strange on the screen.

5.2 Calling Black Box

If you determine that your unit is malfunctioning, do not attempt to repair the unit. Contact Black Box Tech. Support at 724-746-5500.

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, including:

- The nature and duration of the problem;
- The components involved in the problem—that is, what type of cable, makes and models of computers and monitors, etc.
- The results of any testing you've already done.

5.3 Shipping and Packaging

If you need to transport or ship your AC1033A:

- Package it carefully. We recommend that you use the original container.
- Before you ship the unit back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

6. Specifications

Compliance CE; FCC Part 15 Subpart B Class A, IC Class

Interface types *Video:*
PC (RGBHV): VGA, SVGA, XGA, SXGA video.
S-Video (Y/C, S-VHS) NTSC, PAL, or SECAM
Composite Video NTSC, PAL, or SECAM
Serial:
EIA/TIA RS-232, pinned according to DTE

Connectors HD15 for VGA, RCA for CV, MD4 for S-VHS

Temperature Tolerance Operating: 32 to 122°F (0 to 50°C);
Storage: –40 to +185°F (–40 to +85°C)

Enclosure Steel

MTBF 120,000 hours (calculated estimate)

Power From utility-power (mains) outlet, through included external power supply. Output Voltage: 6v DC Center-Positive 1.5A, maximum

Size 6.4" W x 2.6" D x 1.3" H

Weight 1.2. lb box only; 2.5 lb shipping

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