VOPEX® Series

VOPEX-C5USBVA-4 /-8

VOPEX-C5USBVUA-4 /-8

VGA Video/Audio
Splitter/Extender

Installation and Operation Manual

VOPEX-C5USBVUA-8 (Front and Rear View)

TRADEMARK

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CHANGES

The material in this guide is for information only and is subject to change without notice. Network Technologies Inc reserves the right to make changes in the product design without reservation and without notification to its users.

⚠️ ***WARNING: Never connect a VOPEX Series VOPEX-C5USBV(A)-4 Extender/Splitter to an Ethernet card, Ethernet router, hub or switch or other Ethernet RJ45 connector of an Ethernet device. Damage to devices connected to the Ethernet may result.***

Note: CATx connection cable used between NTI VOPEX Series Splitter and XTENDEX Series Remote or any XTENDEX Series products should not be run underground, outdoors or between buildings.

⚠️ ***WARNING: Outdoor or underground runs of CATx cable could be dangerous and will void the warranty.***

GROUNDING

This product is equipped with grounding hardware to prevent interference from sources of electrical noise that could interfere with the normal operation of the VOPEX or damage it. Use either the crimp-on lug or solder terminal to secure a properly grounded wire to the VOPEX.
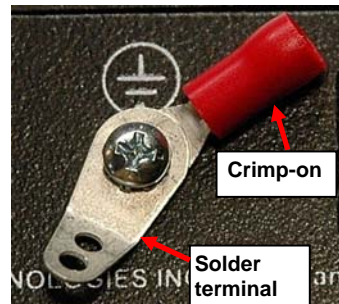

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INTRODUCTION

The VOPEX® VGA USB KVM Splitter with built-in USB hub extends one USB computer (PC, SUN, MAC) to up to four users (four USB keyboards, mice and VGA monitors) connected to XTENDEX Series Remote Units.

Options:
For support for up to eight users, order VOPEX-C5USBVA-**8**.
For support for USB touch screen monitor, CAC card reader, or interactive whiteboard, add a "U" to the part number (order VOPEX-C5USBV**U**A-x (x= 4 or 8))

Remote video and audio devices can be located as much as 1000 feet away from the source via Category 5e/6/6A/7 unshielded or shielded (see chart on page 18) twisted-pair cable. The VOPEX can optionally supply video and audio to devices located near the source and provides support for any USB 2.0 full speed device connected to its ports.

The VOPEX Series VGA Splitter/Extender is extremely simple to install and has been thoroughly tested to insure reliable performance. Through the use of CATx unshielded twisted-pair cable it is possible to economically increase the flexibility of a computer system.   Here are some of the features and ways this can benefit the user:

- Allows the placement of monitors, USB devices and self-powered stereo speakers/amplifiers in different remote locations where only these parts are needed.

- Provides crisp and clear resolution up to 1080p

- Video quality adjustment is automatic for varying lengths of CATx cable

- Digital transmission of audio signals reduces any loss in quality.

- Audio can be broadcast to self-powered stereo speakers at each remote location and to the local unit.

MATERIALS

Materials Included with this kit:
➢ VOPEX-C5USBV(U)A-x (x= 4 or 8 for number of CATx ports)
➢ 120VAC or 240VAC at 50 or 60Hz-5VDC/2.0A AC Adapter (4 Port) **or** 3.0A AC Adapter (8 Port)
➢ VEXT-3 3 Foot VGA Male-Female Video Cable
➢ USB2-AB-1M-5T 1 Meter USB Male Type A-Male Type B cable
➢ SA-3-MM 3 Foot 3.5mm male-male stereo plug -stereo plug cable
➢ DB9F-RJ45F- Adapter (CT6182) (VOPEX-C5USBV**U**(A)-4/-8 models only)
➢ 5 Foot CAT5 Patch Cable   (VOPEX-C5USBV**U**(A)-4/-8 models only)
➢ CD with a pdf file of this manual

Additional materials not supplied but are required:
➢ CAT5/5e/6 Solid UTP/STP EIA/TIA 568B cable(s) terminated with RJ45 connectors wired straight thru- pin 1 to pin 1, etc. (see page 19 for proper EIA/TIA 568B wiring method) (see also limitations on page 4 and resolution chart on page 18)

➢ One or more of the following XTENDEX Remote Units:

Compatible Splitter	Remote Unit	Supported Features
VOPEX-C5USBVA-x	ST-C5USBV-R-1000S	USB KVM
	ST-C5USBVA-R-1000S	USB KVM + Audio
VOPEX-C5USBVUA-x	ST-C5USBVU-R-1000S	USB KVM + Additional USB Port + Firmware Upgradable
	ST-C5USBVUA-R-1000S	USB KVM + Additional USB Port + Audio+Firmware Upgradable

Contact your nearest NTI distributor or NTI directly for all of your KVM needs at 800-RGB-TECH (800-742-8324) in US & Canada or 330-562-7070 (Worldwide) or at our website at www.networktechinc.com and we will be happy to be of assistance.

FEATURES AND FUNCTIONS

VOPEX-C5USBVUA-4

Front View   Rear View
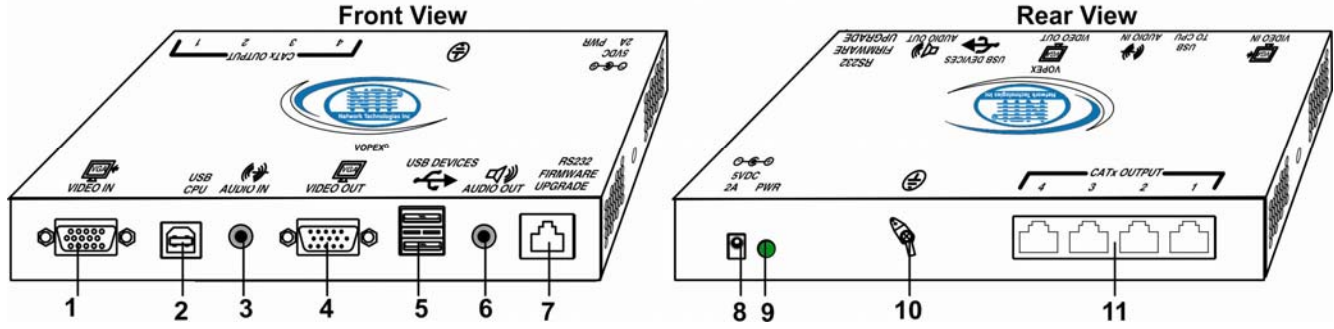
VOPEX

#	LABEL	CONNECTOR	DESCRIPTION
1	Video In	15HD male video connector	for connecting a VGA cable between the VOPEX and the PC
2	USB CPU	USB Type B female	for connecting a USB cable between the VOPEX and the PC
3	Audio In	3.5mm Stereo jack	for connecting to stereo audio source
4	Video Out	15HD female video connector	for connecting the local display device
5	USB Devices	USB Type A female	for connecting any USB 2.0 full speed devices
6	Audio Out	3.5mm Stereo jack	for connecting self-powered stereo speakers
7	RS232 Firmware Upgrade	RJ45 connector	for connecting RS232 communication cable between the VOPEX and the RS232 port of a terminal (VOPEX-C5USBVUA-4/-8 only)
8	5VDC 2A	Power Jack	connection jack for the AC adapter ("3A" for 8-port model)
9	Pwr	Green LED	Illuminates when power has been applied to the VOPEX
10	Ground	Crimp and solder terminals	for connecting to earth ground
11	CATx Output 1-4	RJ45 connector	for connecting the CATx cable between the VOPEX and Remote units

XTENDEX Remote Unit (Sold Separately)

#	LABEL	CONNECTOR	DESCRIPTION
12	**MAC Mode**	Green LED	for visual indication that the Local Unit is configured for connection to a MAC CPU
13	**SUPPORTED USB DEVICES**	USB Type A female	for connection of remote user USB device(s)
14		USB Type A female	extra USB port present in ST-C5USBVUA-R-1000S and ST-C5USBVU-R-1000S remotes only. When present, support is also present for touch screen monitor, CAC reader, or SMART Board™ (for connection to any one of the 3 USB Type A ports).
15	**5VDC 3A**	Power Jack	for connecting AC adapter to Remote Unit
16	**Audio Out**	3.5mm Stereo Jack	for remote connection of self-powered stereo speakers
17	**CATx**	RJ45 Female	for connecting the CATx cable between the VOPEX and Remote unit
17a	**Yellow LED**	--	**traffic indicator**- illuminates when there is communication between the VOPEX and Remote Units.
17b	**Green LED**	--	**power indicator**- illuminates when power has been supplied to the unit
18	**Video Out**	15HD female video connector	for connecting the remote display device

LIMITATIONS

- The audio input of the VOPEX-C5USBVA-4 / -8 is compatible with the following standard CPU audio outputs:

    - Line out - typically lime green in color
    - Speaker out- typically orange in color
    - Headphone out- typically located on the CD-ROM

- The audio outputs of the VOPEX and the XTENDEX Remote Unit are compatible with self-powered stereo speakers.

PREPARATION FOR INSTALLATION

- Locations should be chosen for the monitors and speakers that also have space to connect the VOPEX and XTENDEX Remote Units within the distance provided by the cables.   If extension cables are needed, contact NTI for the cables required.

- The CATx cables must be run to the locations where the VOPEX and XTENDEX Remote Units will be connected.   Be careful to route the cables away from any sources of magnetic fields or electrical interference that might reduce the quality of the video signal (i.e. AC motors, welding equipment, etc.). **NOTE**: If CAT5 cable is already installed in the wall and there are RJ45 wall outlets, it will be necessary to obtain male-to-male straight through connection cables long enough to reach from the wall outlets to the connection locations of the VOPEX and XTENDEX Remote Units.

- A properly grounded, polarized, and preferably surge-protected 120V or 240V electrical outlet (depending on the AC adapter being used) must be installed close enough to the connection location of the VOPEX and XTENDEX Remote Units, monitors, stereo speakers, and CPU to plug them into.

- All cables should be installed in such a way that they do not cause stress on their connections to the equipment. Extended lengths of cable hanging from a connection may interfere with the quality of that connection.   Secure cables as needed to minimize this.

- Properly shut down and disconnect the power from all devices to be separated.   If other equipment is involved whose connections are being interrupted, be sure to refer to the instruction manuals for that equipment for proper disconnection and re-connection procedures before proceeding.

Note: CAT5 connection cable used between NTI XTENDEX Series Local and Remote or any XTENDEX Series products should not be run underground, outdoors or between buildings.

⚠ *WARNING: Outdoor or underground runs of CAT5 cable could be dangerous and will void the warranty.*

VOPEX INSTALLATION

VOPEX-C5USBVUA-x

1. Make connections between the VOPEX and the CPU. (See Fig. 1.)

    a) Connect the VEXT-3 (supplied) between the 15HD connector on the CPU and the 15HD male connector marked "Video In" on the VOPEX.

    b) Plug one 3.5mm stereo plug end of the SA-3-MM cable (supplied) into the 3.5mm female audio connector marked "line out", "spkr", or "headphones" on the audio source.

Notes:

   If all 3 connectors are available, use the connector marked "line out".

   The "line out" connector is typically lime green and may be marked with this symbol

   The "spkr" connector is typically orange, and may be marked with this symbol

   The "headphones" connector may be marked with this symbol

    c) Connect the other 3.5mm stereo plug end of the SA-3-MM cable into the 3.5mm female stereo audio connector marked "Audio In" on the VOPEX.

    e) Connect the USB2-AB-1M cable (supplied) between a USB Type A port on the CPU and the "USB CPU" USB Type B connector on the VOPEX.
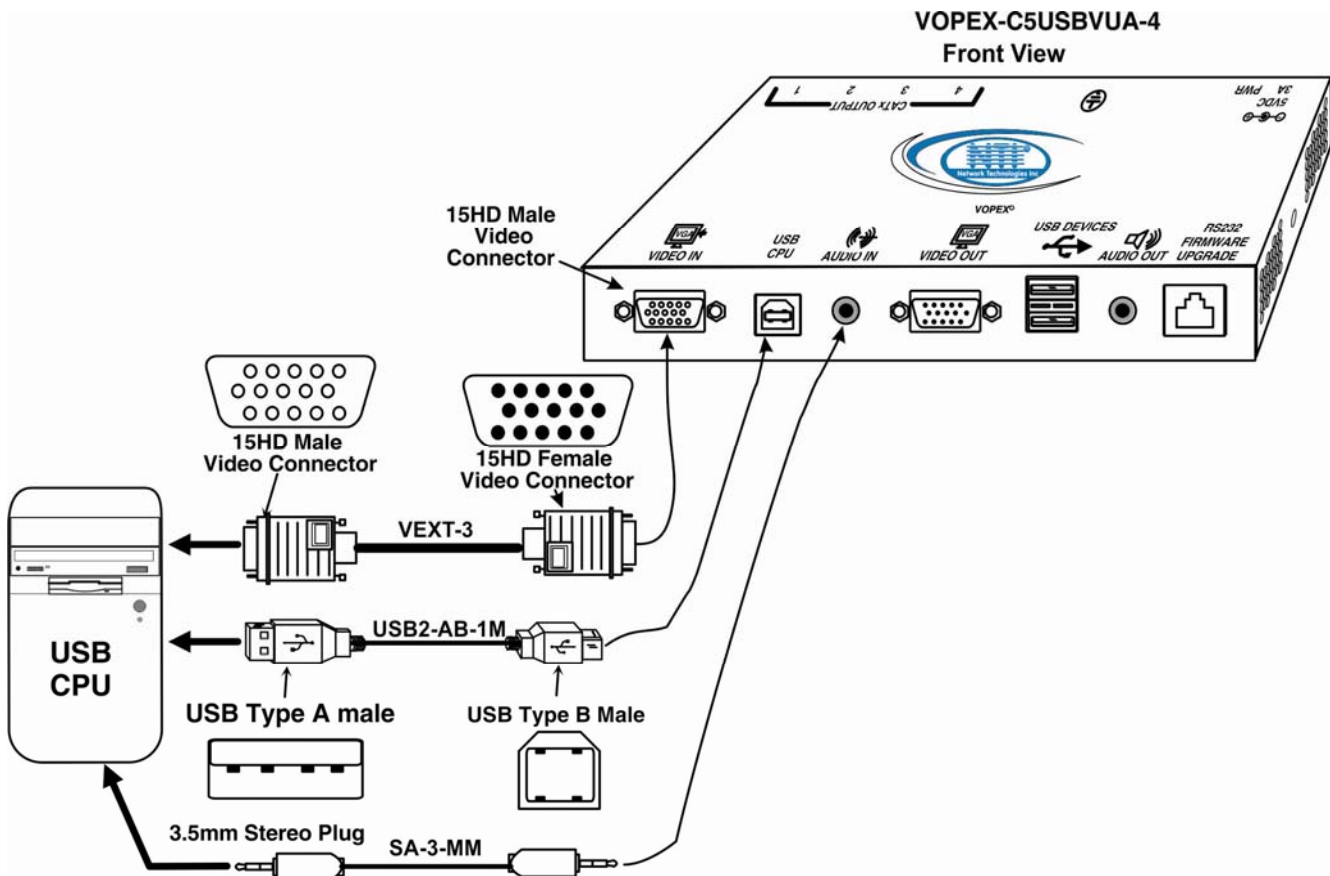
Figure 1- Connecting the VOPEX to a PC

Local Device Connections

If a VGA monitor and USB devices are to be located close to the VOPEX, connection ports are provided on the VOPEX to support them.

The connections labeled "USB DEVICES" will support the connection of any USB 2.0 Low Speed or Full Speed rated devices, not just the keyboard and mouse shown below.

An "AUDIO OUT" jack is provided for the connection of self-powered stereo speakers.
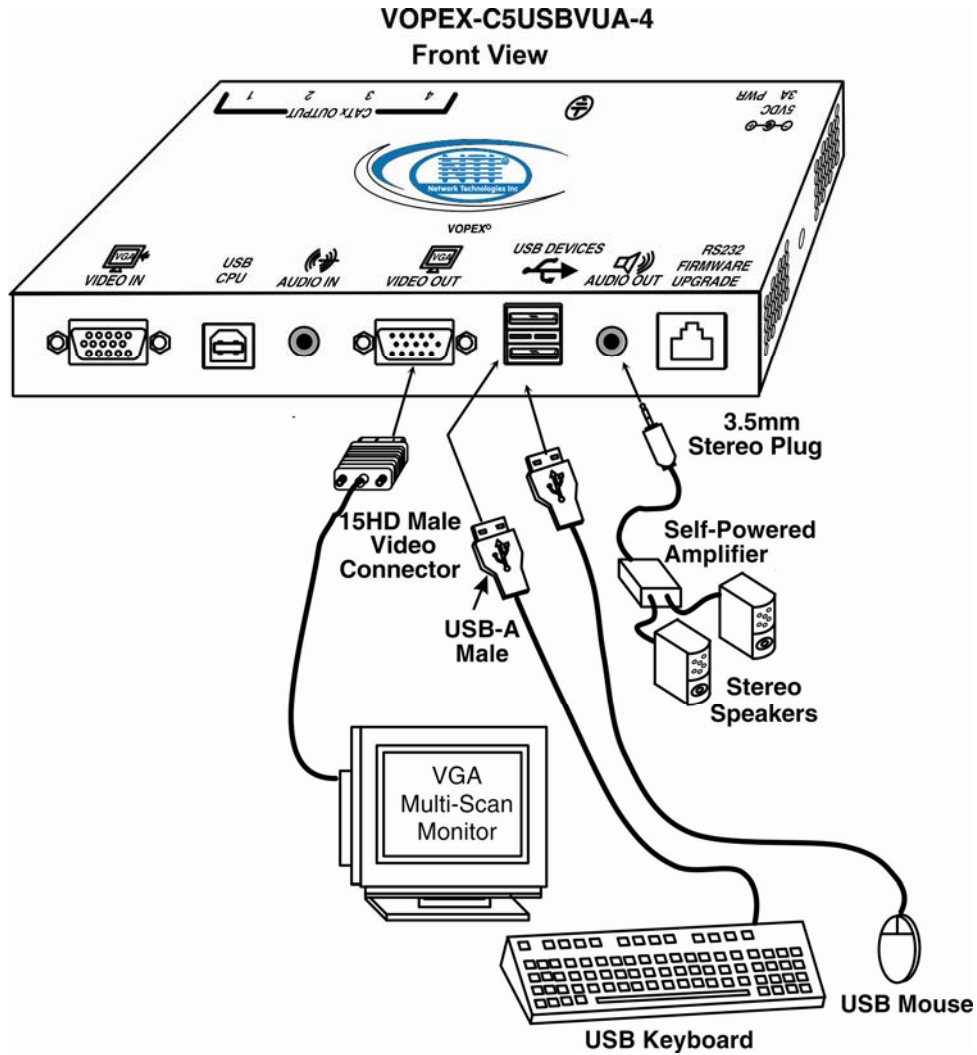
Figure 2- Connect local devices as needed

REMOTE UNIT INSTALLATION

ST-C5USBVUA-R-1000

1. Position a ST-C5USBVUA-R-1000 Remote Unit such that the CATx cable, the monitor cable, and speaker cable can each reach the Remote Unit comfortably.

2. Connect the remote user's monitor cable to the female 15HD video connector on the Remote Unit.

3. Connect the remote user's self-powered speakers (where applicable) to the 3.5mm female stereo connector on the Remote Unit.

4. If the monitor is a USB-connected touchscreen type, connect the USB cable from the monitor to one of the USB Type A connectors labeled "Supported USB Devices" on the Remote Unit. (Supported on XTENDEX Remote model ST-C5USBVUA-R-1000 or ST-C5USBVU-R-1000 only)

Note: The VOPEX must be model VOPEX-C5USBVUA-x to use an XTENDEX Remote Unit with touchscreen monitor, CAC reader, or interactive whiteboard support.
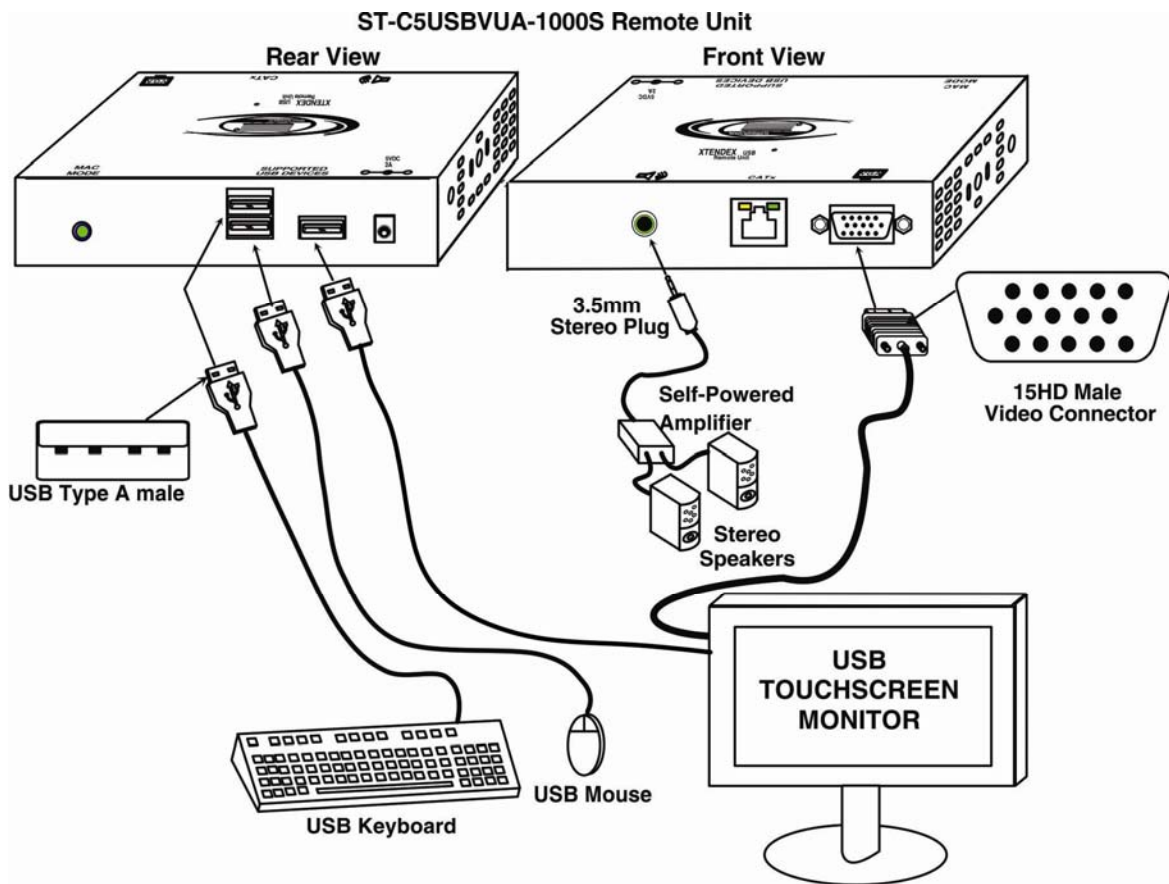
Figure 3- Connect the Extended Components to the ST-C5USBVUA-R-1000 Remote Unit

CONNECT THE CATX CABLE

Make sure the CATx cable has been installed in accordance with the "Preparation for Installation" instructions on page 4. Connect a CATx cable to one of the ports marked "CATx Output" on the VOPEX.   Connect the other end of that cable to the "Cat x" port on a Remote Unit. When properly inserted the CATx cable end should snap into place.

Repeat for each Remote Unit installed.

⚠ *WARNING: Never connect the VOPEX to an Ethernet card, Ethernet router, hub or switch or other Ethernet RJ45 connector of an Ethernet device.   Damage to devices connected to the Ethernet may result.*
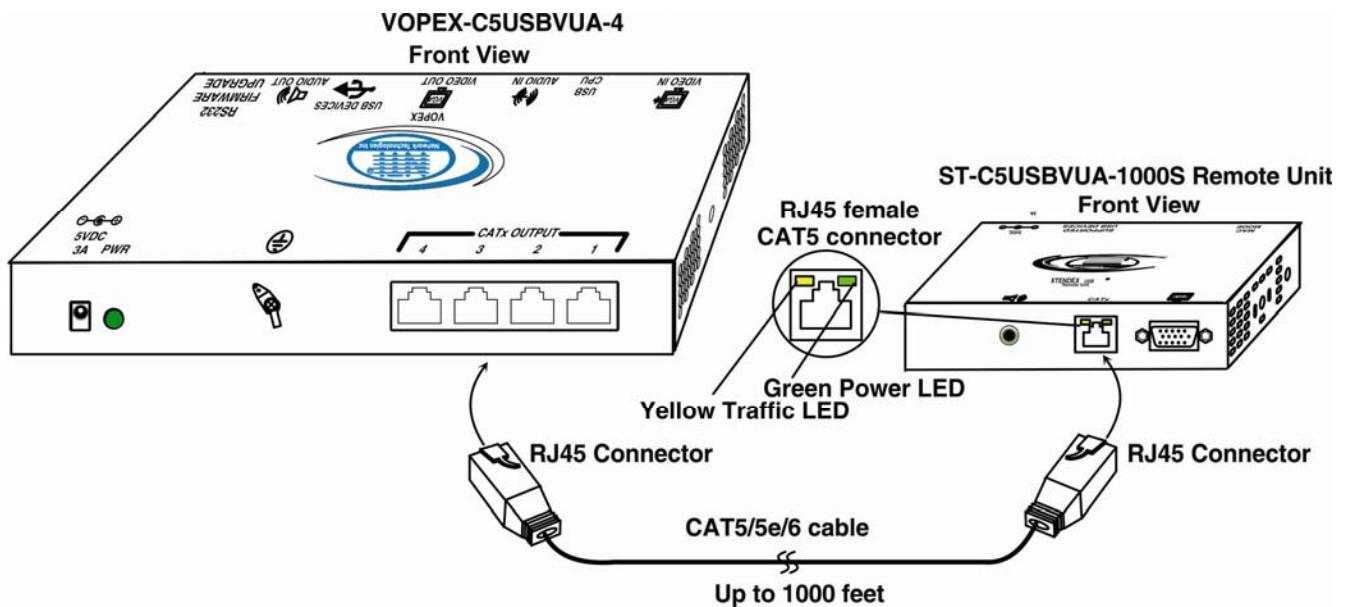
Figure 4- Connect a CATx cable between the VOPEX and each Remote Unit

PLUG-IN AND BOOT UP

Proper Power-Up Sequence: 1) Power ON XTENDEX Remote Unit
2) Power ON VOPEX
3) Power ON CPU (See details below)

1.   Plug the power cord from each monitor and the power supply for each audio device into a power outlet.
2.   Connect the **5VDC 3.0A AC** adapter power connector to the power port on the XTENDEX Remote Unit.
3.   Plug the AC adapter into a power outlet.   The green LED on the XTENDEX should illuminate, indicating that a proper power connection has been made. (See Figure 5)
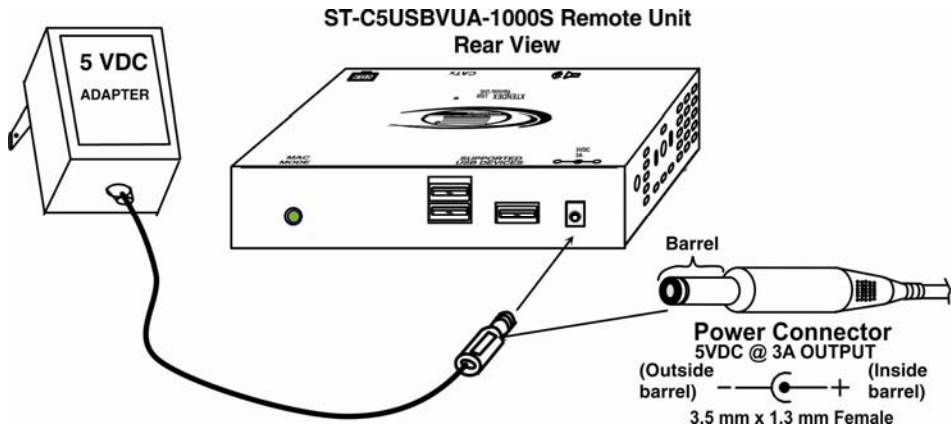
Figure 5- Connect the AC adapter to an XTENDEX Remote Unit

4.   Connect the **5VDC 2.0A AC** adapter power connector to the power port on the VOPEX (5VDC **3.0**A on 8-port model).
5.   Plug the AC adapter into a power outlet.   The green LED on the VOPEX should illuminate, indicating that a proper power connection has been made. (See Figure 6)

The 8-port model includes an AC adapter rated 5VDC 3.0A. .
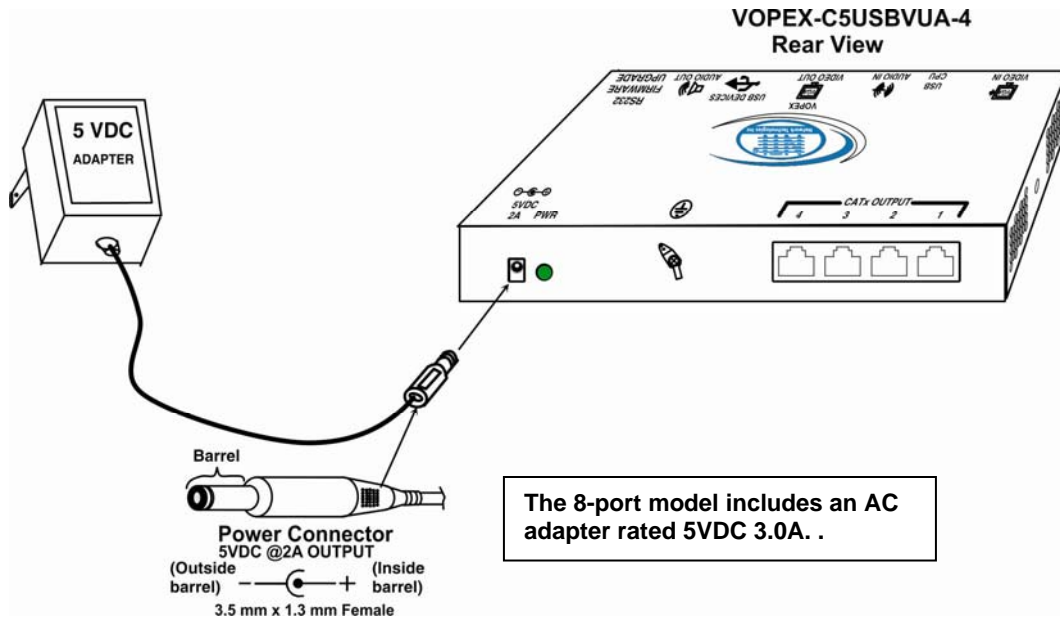
Figure 6- Connect the AC adapter to a VOPEX

6.   Turn ON the CPU, stereo speakers, and monitors.   They should react as if they were directly connected to each other.

Note: The yellow LED on the RJ45 connector of each XTENDEX Remote Unit will illuminate anytime data traffic is passing between the VOPEX and the XTENDEX, indicating proper CATX cable connection and communication. (See Figure 4)

CONFIGURATION AND COMMAND MODE

Command Mode

All models are enabled with a Command Mode feature to perform the following:

> ➢ fine adjustment of the general video quality
> ➢ fine adjustment of color skew (alignment of red, green, and blue signals on the monitor)
> ➢ update DDC information between the monitor(s) and CPU
> ➢ toggle between MAC mode and non-MAC mode

Command Mode can be enabled by pressing two keys <u>at the Remote Unit keyboard</u> at the same time; `<LEFT SHIFT>` +
`<RIGHT SHIFT>`.   Press `<Esc>` at any time to exit Command Mode.

The three keyboard LEDs (NumLock, CapsLock, and ScrollLock) will blink at the same time to indicate entrance into
Command Mode.

Commands available in Command Mode:

| Key press	Effect	Extra Control
`<Up Arrow>`	increases brightness	
`<Down Arrow>`	decreases brightness	
`<A>`	forces Auto Video Quality Adjustment	
`<Left Arrow>`	Decreases fine video adjustment	
`<Right Arrow>`	Increases fine video adjustment	
`<R>`	Enable <u>Red</u> Color Skew Adjustment Mode	Use <Left Arrow> or <Right Arrow> to adjust
`<G>`	Enable <u>Green</u> Color Skew Adjustment Mode	Use <Left Arrow> or <Right Arrow> to adjust
`<B>`	Enable <u>Blue</u> Color Skew Adjustment Mode	Use <Left Arrow> or <Right Arrow> to adjust
`<D>`	Enter DDC Update Mode	Use <Left Arrow> + <Right Arrow> to update (press simultaneously)
`<V>`	Returns to General Video Quality Adjustment Mode from DDC Update Mode or Color Skew Adjustment Modes	
`<M>`	Toggle MAC Mode On/Off	
`<Esc>`	Exits Command Mode	

Adjust Brightness

The brightness of the extended image can be increased or decreased by pressing the `<Up Arrow>` or `<Down Arrow>`
(respectively) while in Command Mode.   This adjustment is in addition to any adjustments made possible by controls on
your monitor.

Automatic Video Quality Adjustment

Video quality is broken down into "general video quality" for brightness and sharpness of the images, and "color skew" for
how the colors align with each other on the monitor.   Both general video quality and color skew adjustments are done
automatically any time the XTENDEX is powered ON or if the CATx cable is disconnected and then reconnected. These
adjustments can also be forced by pressing the `<A>` key while in Command Mode.

The automatic video adjustments are calibrated for unshielded twisted pair cable. For shielded cable fine adjustment may be
necessary and this can be done from keyboard keys using Command Mode.   Video Quality Adjustment settings are
automatically stored in the XTENDEX.   Settings will be restored each time the XTENDEX is powered-ON.   Test patterns for
color skew adjustment are provided on the CD.

*Note: If the cable is changed after making manual video adjustments, the XTENDEX will restore these settings to
factory default and fine adjustments with the new cable may be necessary.*

Fine Video Quality Adjustment

General Video Quality Adjustment

Command Mode opens into General Video Quality Adjustment mode.   To fine tune the general video quality, press the `<Left Arrow>` or `<Right Arrow>` keys until the desired improvement in the display has been achieved.

Color Skew Adjustment

If a specific color appears to be skewed and is in need of fine adjustment, the user can switch to Red, Green, or Blue Skew Adjustment mode by pressing `<R>`, `<G>` or `<B>` respectively. The keyboard LEDs will identify the mode as indicated in the table below.   Press the `<Left Arrow>` or `<Right Arrow>` keys until the desired improvement in the color alignment has been achieved.   Press `<V>` to return to General Video Quality Adjustment mode.

Test Patterns

To verify the need for and effect of color skew adjustment using a test pattern specifically designed for your display setting, browse the CD this manual was found on and click on the "test-pattern-nXm.pdf" file that matches your current video resolution.   Follow the instructions above to make adjustments as needed.

Note: For additional quality adjustment, it may be necessary to adjust the brightness and contrast settings of the monitor.

Keyboard LEDs Indications:

Adjustment Mode	NumLock	CapsLock	ScrollLock
Command Mode ON	Blink	Blink	Blink
Red Skew	Blink	Solid	Solid
Green Skew	Solid	Blink	Solid
Blue Skew	Solid	Solid	Blink
DDC Update	Off	Solid	Off
Command Mode OFF	Normal state	Normal state	Normal state

Update DDC

DDC information allows the CPU to automatically select the optimal resolution for your monitor.   The procedure to update DDC information (below) must be performed only once at initial setup through Command Mode (provided the monitor is not changed). Both the Local and Remote Units must be powered in order to update the DDC information.   The DDC information will be based on the monitors connected to the Remote Unit and locally at the VOPEX.

To update DDC information (from Command Mode);
1. press `<D>` to enter DDC Update mode.   (See chart above for LED indications.)
2. press the `<Left Arrow> + <Right Arrow>` keys simultaneously to cause DDC information to be updated
3. press `<V>` to return to General Video Quality Adjustment mode.
4. press <Esc> to exit Command Mode
5. Restart the CPU.

Note: It is recommended that the monitors connected to the Remote Units and VOPEX be able to support the same resolutions.

Attention: Some graphics cards will not send a video signal to the monitor until it has received the DDC information from the monitor.   In this case, the monitor may not display anything until the DDC information is read. This may occur if the monitor is being connected to the XTENDEX for the first time. The DDC information must be updated in the XTENDEX to achieve video using the procedure outlined above.

If the monitor is changed to a different model than was initially installed, the update procedure must be repeated through Command Mode.

DDC Mixing

To mix DDC information from multiple monitors (providing a table of resolutions that are common to each connected monitor), perform the update procedure above at each remote connected to a monitor that is to be added to the mix.   This will provide DDC information to the CPU that is common to all connected monitors.   If the resulting list of resolution options at the CPU is undesirable, to clear it and start over, power cycle the VOPEX and repeat the update procedure at the remote for each desired monitor.

Note: The DDC information from the local monitor (connected to the VOPEX) will be added to the mix if it is connected during the update procedure.

Toggle MAC Mode

MAC Mode enables the user to connect the VOPEX to a MAC CPU.   MAC Mode configures the VOPEX for passing mouse information to the MAC CPU. This is useful when the user wants to use mouse drivers provided by the mouse vendor, which allows the use of programmable functions for each mouse button. The XTENDEX can be configured whenever necessary. Use the following procedure for each XTENDEX Remote Unit that requires the use of MAC Mode for the mouse connected to it.

In the default setting (non-MAC Mode), the VOPEX is configured for connection to a SUN or Windows CPU. To toggle between non-MAC Mode and MAC Mode, press `<M>` while in Command Mode. The "MAC Mode" LED on the Remote Unit will illuminate when the VOPEX is in MAC Mode.

NOTE: When the port is connected to a PC or SUN CPU, MAC Mode (and the MAC Mode LED) should be OFF.

To do this;
1. Enter Command Mode. (Simultaneously press the left and right `<Shift>` keys on the keyboard connected to the Remote Unit.   The keyboard LEDs will illuminate.)
2. If a MAC CPU is connected, press the `<M>` key. The keyboard LEDs will momentarily flash and the "MAC" LED on the Remote Unit will illuminate to indicate MAC Mode is ON.

To reconnect the VOPEX to a SUN or Windows CPU (the default setting), press the `<M>` key again and the "MAC" LED will go OFF.
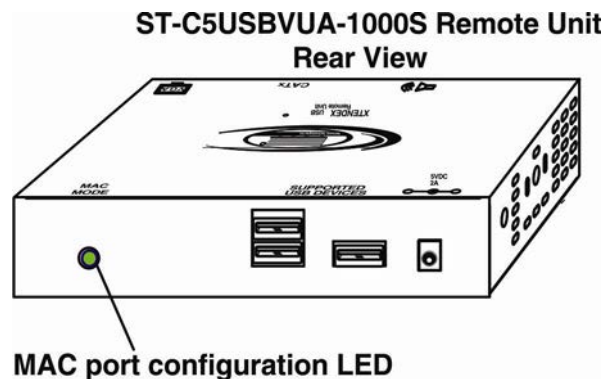
Figure 7- MAC Mode LED

Exit Command Mode

Press the `<Esc>` key to exit Command Mode and return to normal operation.   All keyboard LEDs will return to current keyboard LED state.

FYI: Video quality will be limited by several factors.   Some factors include the quality and type of CAT5 cable being used, the length of cable run, the quality of the monitor, the resolution setting of the monitor, and the quality of the video card used in the video source.   If the desired level of image clarity cannot be achieved by making the adjustments described in this section, consider the following possible adjustments that can be made:

- **Improve the quality of cable used -CAT5,5e,or 6 (CAT5e unshielded (UTP) cable will provide the best performance)**
- **Use unshielded cable (UTP) instead of shielded cable (STP)**
- **Shorten the length of the cable between the remote and local**
- **Reduce the resolution setting on the monitor used**
- **Use a higher quality video card in the video source**

FIRMWARE UPGRADE PROCEDURE

This procedure describes how to upgrade the firmware in this VOPEX **(Models VOPEX-C5USBVUA-4/-8 only)**. If you are not certain whether this VOPEX has the most up-to-date firmware available, simply download the latest version and follow the upgrade procedure.   All versions of firmware can be downloaded from http://www.networktechinc.com/download/d-kvm-splitter-cat5.html .

The VOPEX and XTENDEX combination includes 3 different firmware files,   two in the VOPEX (Local) and one in the XTENDEX (Remote):

1. Local Controller – the Local Controller will be upgraded with a binary file named **vc5usbv-cs*x-x*.bin. (where x-x is the rev number)**
2. Local Port Controller – the Local Port Controller will be upgraded with a hex file named **vc5usbv-cp*x-x*.hex.**
3. Remote Controller – the Remote Controller will be upgraded with a bin file named **c5usbvu-rcs*x-x*.bin**.

The VOPEX firmware has a bootloader which can be used for firmware upgrades. The bootloader resides in a protected area of Flash memory, so that if the upgrade fails for any reason, the bootloader will still be available to be used to re-program the entire unit.

Upgrades are made to the Local Controller, Local Port Controller, or Remote Controller separately.   Not all Controller firmware is updated with each revision, however it is highly recommended that if you upgrade one piece of firmware, you upgrade each controller segment to make sure your VOPEX and XTENDEX Remote Unit(s) are all at current versions.

Requirements

➢   CAT5 Patch Cable (supplied)

➢   RJ45-DB9 Adapter (supplied)

➢   Computer with a Terminal Console (for example, HyperTerminal in Windows, or any similar program able to send files using Xmodem protocol)

➢   Firmware files for the VOPEX on the computer with the Terminal Console.

Prepare to Upgrade the Firmware
Models VOPEX-C5USBVUA-4/-8 only

With the power to the PC and VOPEX OFF, connect a PC to the VOPEX using the supplied 5 foot patch cable and 9DB-to-RJ45 adapter. Connect the patch cable to the "RS232 FIRMWARE UPGRADE" port on the VOPEX, attach the supplied 9DB-to-RJ45 adapter to the patch cable, and connect the 9DB adapter to an available serial COM port on the PC.
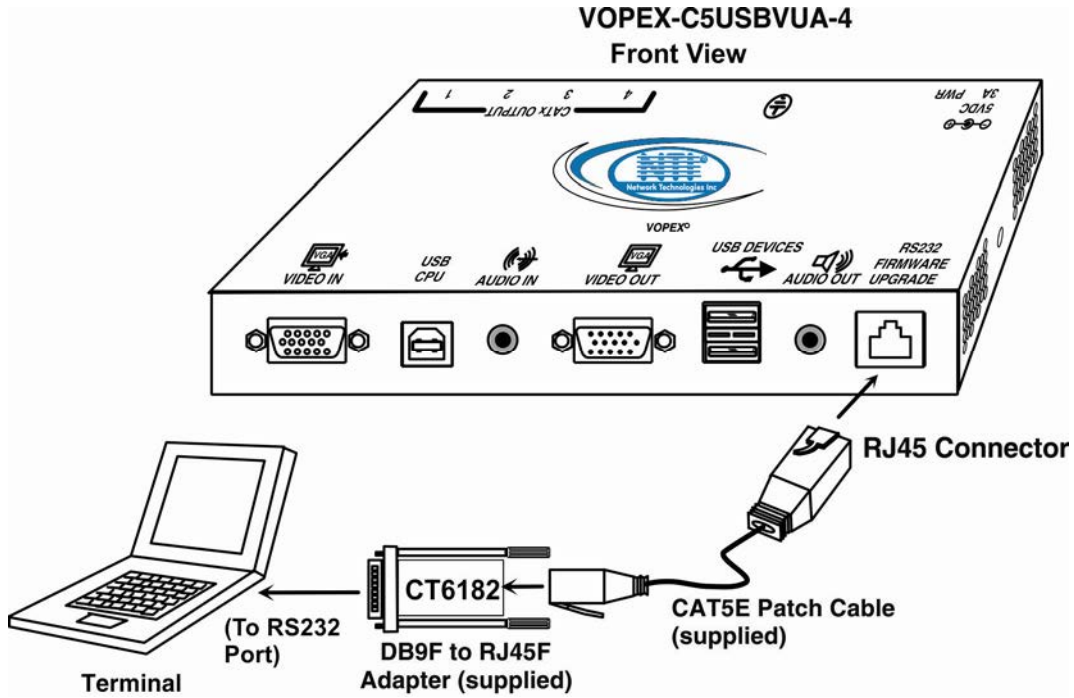

Figure 8- Connect PC for firmware upgrade

2. Power ON the computer only. Open the terminal console and apply the following settings to the terminal console for the port connected to the VOPEX:

> Baud rate: 57600
>
> Data bits: 8
>
> Parity: none
>
> Stop bits: 1
>
> Flow control: none

Upgrade Procedures

Start the Bootloader

In the HyperTerminal window on the attached computer, press **and hold** the **<Tab>** key and power ON the VOPEX. The following message (or one similar) will be displayed on the screen:

```
ST-C5-USBVA Bootloader
Revision: 1.1
Date: 2010/01/11 15:40:16
Copyright (C) Network Technologies Inc

Press <H> for help…
>
```

Release the **<Tab>** key.

The **">"** prompt indicates that the bootloader is waiting for commands. The available commands are composed by sending one ASCII character. To send a command to the bootloader, type the key in the terminal window that corresponds to the desired command. The available commands, listed below, can be viewed by typing **<h>** or **<H>** (the Help command) from the keyboard.

Note: Commands can be typed using upper or lower case letters.

Local Bootloader List of Commands:

h, H - Display list of commands
x, X - Exit Bootloader
u, U - Upgrade Local controller firmware
p, P - Upgrade Local port controller firmware
r, R - Upgrade Remote controller firmware
s, S - Read Checksum of the Local port controller firmware

Upgrade the Local Controller Firmware

The Local controller firmware comes as a file in binary format and has the extension .bin. (i.e. filename.bin). To upgrade the Local controller to this file, press **<u>** from Terminal window. The following message should appear on the screen:

```
 Erasing flash memory…
 Memory successfully erased
Send .bin file using Xmodem protocol..
```

At this point the binary file **vc5usbv-cs*x*-*x*.bin** must be sent. To do this, from HyperTerminal:

>   1. go to "Transfer" menu in the Menu Bar of the HyperTerminal window
>
>   2. click the item "Send File …"
>
>   3. in the dialog box which pops up on the screen, browse for the file to be sent and select it
>
>   4. select "Xmodem" from the Protocol drop-down menu
>
>   5. press "Send" button

The transmission will start shortly. Wait until the transmission is finished. There will be some pauses during transmission, since the processor writes blocks of 4KB.

When the transmission is complete, the HyperTerminal window should show the following status message and return to the menu prompt:

```
Device successfully programmed!

>
```

To exit from the bootloader, press **<x>**.

Upgrade the Local Port Controller Firmware

The Local port controller firmware comes as a file in Intel Hex format and has the extension .hex (i.e. filename.hex). To upgrade any of Local Port controller with this firmware, press **<p>** from the terminal window. The following message should appear on the screen:

Send .hex file using XModem protocol...

At this point, the hex format file **vc5usbvu-cp*x-x*.hex** has to be sent, using HyperTerminal and the same procedure as before. When the transmission is done, the following message will be shown in the HyperTerminal window:

File transfer OK!
Please, type <A> to program chip or <X> to exit

To program the chip, just press **<a>**).

The following message will be shown on the screen (it may take about 12 seconds to program):

Programming device, please wait...

Device ID: 0x001E
Device successfully programmed!

To exit from the bootloader, press **<x>**.

Note: The Local <u>port</u> controller firmware will rarely, if ever, need to be updated.   The firmware download package will include both of the current Local and Remote controller firmware versions, but will only include the Local <u>port</u> controller firmware if it has changed.

Upgrade the Remote Controller Firmware

Note: To upgrade the Remote Controller firmware, the Remote Unit must be connected to port #4 on the VOPEX.

The Remote controller firmware comes as a file in binary format and has the extension .bin. (i.e. filename.bin). To upgrade the Remote controller to this file, press **<r>** from Terminal window. The following message should appear on the screen:

The Local Unit bootloader will now pass control
to the Remote Unit bootloader
Please, check that the Remote Unit is powered off
Please, type <Y> to continue or <X> to cancel

If you type <Y> to continue you get the following message:

To enter into Remote Unit bootloader, power on the unit
while keeping the <TAB> key pressed

Remote Bootloader List of Commands:

h, H - Display list of commands
x, X - Exit Bootloader
r, R - Upgrade Remote controller firmware

To proceed to upgrade the Remote controller, press **<r>** from Terminal window. The following message should appear on the screen:

```
 Erasing flash memory…
 Memory successfully erased
Send .bin file using Xmodem protocol..
```

At this point the binary file **c5usbvu-rcsx-x.bin** must be sent. To do this, from HyperTerminal:

> 1. go to "Transfer" menu in the Menu Bar of the HyperTerminal window
>
> 2. click the item "Send File …"
>
> 3. in the dialog box which pops up on the screen, browse for the file to be sent and select it
>
> 4. select "Xmodem" from the Protocol drop-down menu
>
> 5. press "Send" button

The transmission will start shortly. Wait until the transmission is finished. There will be some pauses during transmission, since the processor writes blocks of 4KB.

When the transmission is complete, the HyperTerminal window should show the following status message and return to the menu prompt:

```
Device successfully programmed!

>
```

To exit from the bootloader, press **<x>**.

TECHNICAL SPECIFICATIONS

Characteristic	
Video Compatibility	VGA,SVGA, XGA, SXGA,UXGA
Video Quality Adjustment	Automatic, for up to 1000 feet of CAT5 cable, with manual override (fine video quality adjustment can only be performed manually at the Remote Unit)
Sync Types Supported	Separate and composite TTL Level
Maximum Resolution	See tables below
Video Connectors	HD15 male to CPU HD15 female to monitor
Video Coupling	DC
Video Maximum I/O Levels	1.45Vp-p
Input / Output Impedance	75 Ohms
Input Horizontal Frequency Range	15kHz to 130 kHz
Input Vertical Frequency Range	30 Hz to 150 Hz
Audio	
Audio Connectors	3.5mm female stereo audio connectors
Signal Type	Line Level, stereo, unbalanced
Audio Frequency Response	20Hz to 20Khz, $\pm$ 1dB
Signal-to-noise ratio	>76 dBA
Total Harmonic Distortion and Noise	0.017%,F=20-20KHz, RL=2K Ohm, Vout=1 Vrms
Stereo Crosstalk	-70 dB @ 1kHz
Audio Maximum I/O Levels	3.1Vp-p
Output Impedance	Max 2K Ohms, unbalanced
General	
Interconnect Cable	CAT5/5e/6 Solid UTP/STP EIA/TIA 568B wiring w/ male RJ45 connectors
VOPEX-C5USBV(U)A-x	
4-Port Power	120V or 240V at 50 or 60Hz-5VDC/**2.0A** via AC Adapter
8-Port Power	120V or 240V at 50 or 60Hz-5VDC/**3.0A** via AC Adapter
Remote Unit Power	120V or 240V at 50 or 60Hz-5VDC/**3.0A** via AC Adapter
AC Adapter Power Connector	1.3X3.5mm connector, center positive
Storage temperature	-20 to 140°F (-30 to 60°C)
Operating Temperature Range	32°F to 100°F (0°C to 38°C)
VOPEX Size (In.) WxDxH	
VOPEX-C5USBV(U)A-4	7.35x5.0x1.09
VOPEX-C5USBV(U)A-8	7.35x5.0x1.7
XTENDEX Remote Unit Size (In.) WxDxH	5.05x3.1x1.235
Enclosure type	Electro-galvanized steel black powder coated

Distances and Maximum Supported Resolutions for CAT5, CAT5e and CAT6 Cables

Unshielded Twisted Pair (UTP)   Resolutions

UTP CABLE	DISTANCE (feet)	RESOLUTION
CAT5/5e	1000	1920x1200 at 60Hz
CAT5/5e/6	800*	1920x1440 at 60Hz
CAT5/5e/6	600	2048x1536 at 60Hz

*The performance of CAT6 unshielded, is not guaranteed beyond 800 feet.

Shielded Twisted Pair (STP)   Resolutions

STP CABLE	DISTANCE (feet)	RESOLUTION
CAT5/5e	800**	1920x1200 at 60Hz
CAT5/5e	600	1920x1440 at 60Hz
CAT5/5e	400	2048x1536 at 60Hz
CAT6	400**	1280x1024 at 60Hz
CAT6	300	1600x1200 at 60Hz
CAT6	200	2048x1536 at 60Hz

**The performance of CAT5 and CAT5e shielded cable is not guaranteed beyond 800 feet (400 feet for CAT6 shielded).

Note: Results may vary depending on cable and/or display quality

INTERCONNECTION CABLE WIRING METHOD

The connection cable between the VOPEX and each XTENDEX Remote Unit is terminated with RJ45 connectors and must be wired according to the EIA/TIA 568B industry standard.   Wiring is as per the table and drawing below.

RJ45 Connector Wiring

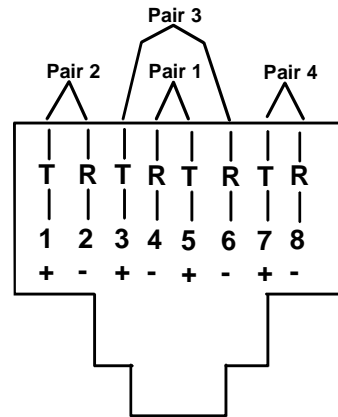| Pin	Wire Color	Pair	Function
1	White/Orange	2	T
2	Orange	2	R
3	White/Green	3	T
4	Blue	1	R
5	White/Blue	1	T
6	Green	3	R
7	White/Brown	4	T
8	Brown	4	R

Figure 9- View looking into RJ45 female

Note: CATx connection cable used between NTI VOPEX and the XTENDEX Series Remote or any XTENDEX Series products should not be run underground, outdoors or between buildings.

⚠ *WARNING: Outdoor or underground runs of CATx cable could be dangerous and will void the warranty.*

TROUBLESHOOTING

Each and every piece of every product produced by Network Technologies Inc is 100% tested to exacting specifications. We make every effort to insure trouble-free installation and operation of our products. If problems are experienced while installing this product, please look over the troubleshooting chart below to see if perhaps we can answer any questions that arise.   If the answer is not found in the chart, a solution may be found in the knowledgebase on our website at http://information.networktechinc.com/jive/kbindex.jspa or please call us directly at (**800) 742-8324 (800-RGB-TECH)** or **(330) 562-7070** and we will be happy to assist in any way we can.

Problem	Cause	Solution
VOPEX power LED does not illuminate	• Power supply is not connected or plugged-in.	• Make sure the outlet is live and the AC adapter is plugged-in. Make sure DC plug / AC line cord is fully connected.
XTENDEX power LED does not illuminate	• VOPEX is not powered ON • CATx cable not connected	• Make sure VOPEX is ON • Check that the CATx cable is snapped-in properly at each end of the cable
No video on monitor/display	• One or more video cables is loose or disconnected. • No power to the VOPEX or the XTENDEX Remote Unit. • Video Cable was not attached when video source was powered-up. • CATx cable is not connected. • Cable is too long for the selected resolution	• Check all video cable connections • Make sure power LEDs are illuminated for local and remote. If not, see solution for problem above. • With all the cables properly connected, cycle the power to the video source. • Check cable connections. Make sure they are snapped-in properly and reboot. • Check Distances and Resolutions chart on page 14.

Problem	Cause	Solution
Monitor sometimes goes blank for an instant or the video is noisy	• Electrical power system is very noisy, particularly the ground. • The CATx cable is not properly connected. • Cable is too long for the selected resolution	• Make sure the interconnection cable is not near any power lines. • Check cable connections. Make sure they are snapped-in properly. • Check Distances and Resolutions chart on page 14.
No audio	• Audio cable is not properly plugged in • Speakers are not plugged in • CATx cable is not properly connected	• Check all cable connections • Verify speakers are powered (if applicable) • Check CATx cable connections
USB doesn't does not work after power cycling VOPEX or hot plugging the USB on the VOPEX	The CPU may take a minute or more to re-recognize the VOPEX after a hot plug or power cycle	Wait at least a minute or two to give the CPU opportunity to refresh its connection with the VOPEX.

WARRANTY INFORMATION

The warranty period on this product (parts and labor) is two (2) years from the date of purchase. Please contact Network Technologies Inc at **(800) 742-8324** (800-RGB-TECH) or **(330) 562-7070** or visit our website at http://www.networktechinc.com for information regarding repairs and/or returns. A return authorization number is required for all repairs/returns.

Manual 208 Rev. 5/21/19