



**NETWORK
TECHNOLOGIES
INCORPORATED**

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XTENDEX® Series

1000 Foot PS/2 KVM Extenders via CAT5

Installation and Operation Manual



**ST-C5KVMRS-1000S
Keyboard, Mouse, Video,
and RS232 Extender**

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.

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.

WARNING: The CATx connection cable used between NTI XTENDEX Series Local and Remote or any XTENDEX Series products must be wired straight through (pin 1 to pin 1, pin 2 to pin 2, etc.) The use of a CROSSOVER CABLE will damage the extender and void your warranty.

External Ground

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

Failure to make this connection may result in poor video quality at the connected monitor(s).

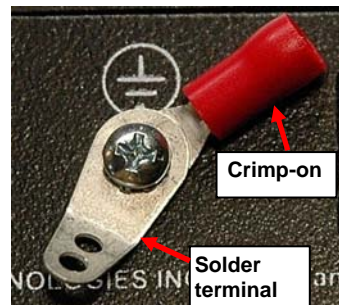


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INTRODUCTION

The XTENDEX Series CAT5 Extender (XTENDEX) is designed to enable one CPU to be controlled by two users, one local and one remote. Extended components may include a standard monitor (or touchscreen monitor when RS232 is supported), PS/2 keyboard, and PS/2 mouse. The remote user can be located as much as 1000 feet away from a PS/2 CPU via Category 5/5e/6 unshielded twisted-pair cable. The local user will be located near the CPU.

The XTENDEX Series Extender is extremely simple to install and has been thoroughly tested to insure reliable performance. Through the use of Category 5 cable it is possible to economically increase the flexibility of a computer system. Here are some of the features and ways this can benefit any workplace:

- Allows the placement of computer peripherals (monitor, keyboard, and mouse) in a location where only these parts are needed without having the CPU there too, taking up valuable space
- Allows a PS/2 CPU to be accessed by both a local and remote user (up to 1000 feet away)
- Compatible with XGA, VGA, and SVGA systems
- Provides crisp and clear resolution up to 1920 x 1200 @ 1000 feet (see page 13 for more details)
- Compatible with all NTI switches and splitters, enabling the joining of products to create a system that satisfies all networking needs
- Video quality adjustment, for varying lengths of cable, is automatic (see page 11) providing optimum image quality
- Built-in surge protection

This manual covers each of the XTENDEX Series CAT5-1000S Extender models offered. Some features described in this manual are available in some models and not in others. The chart below shows the features supported in each:

Model	IR	Keyboard Mouse Support	RS232 Support
ST-C5KVM-1000S	No	Yes	No
ST-C5KVMRS-1000S	No	Yes	Yes

MATERIALS

Materials Included with this kit:

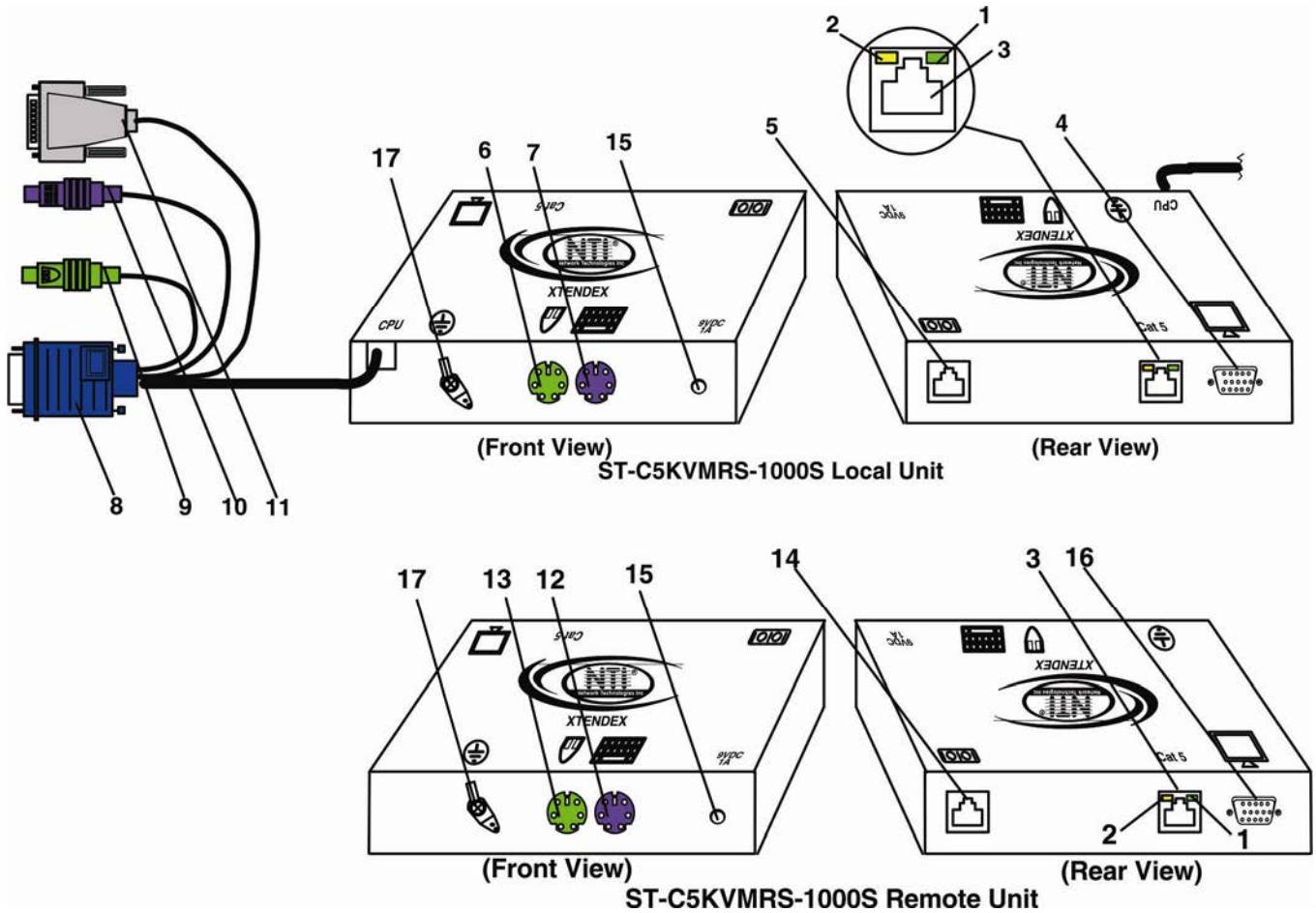
- ✓ NTI XTENDEX Local Unit
- ✓ NTI XTENDEX Remote Unit
- ✓ 2- 120VAC at 60Hz-9VDC/1.0A AC Adapters
 --or--
 230VAC at 50Hz-9VDC/1.5A AC Adapters
- ✓ 2- DB9M-RJ45F Serial Adapter RJ45 Female-DB9 Male (model with RS232 support only)
- ✓ 2- 5 foot RJ45-to-RJ45 CAT5 Patch Cables (model with RS232 support only)
- ✓ 2- Universal mounting brackets with wall anchors

Additional materials may need to be ordered, depending upon the configuration:

- CAT5/5e/6 unshielded twisted-pair cable(s) terminated with RJ45 connectors wired straight thru- pin 1 to pin 1, etc. (see pg. 14 for proper EIA/TIA 568 B wiring method)
- Cable(s) needed if Local Unit will be located further than 15" from the CPU

Model	Cable(s) needed
ST-C5KVM-1000S	VKMEXT-xx
ST-C5KVMRS-1000S	VKMEXT-xx and DINT-xx

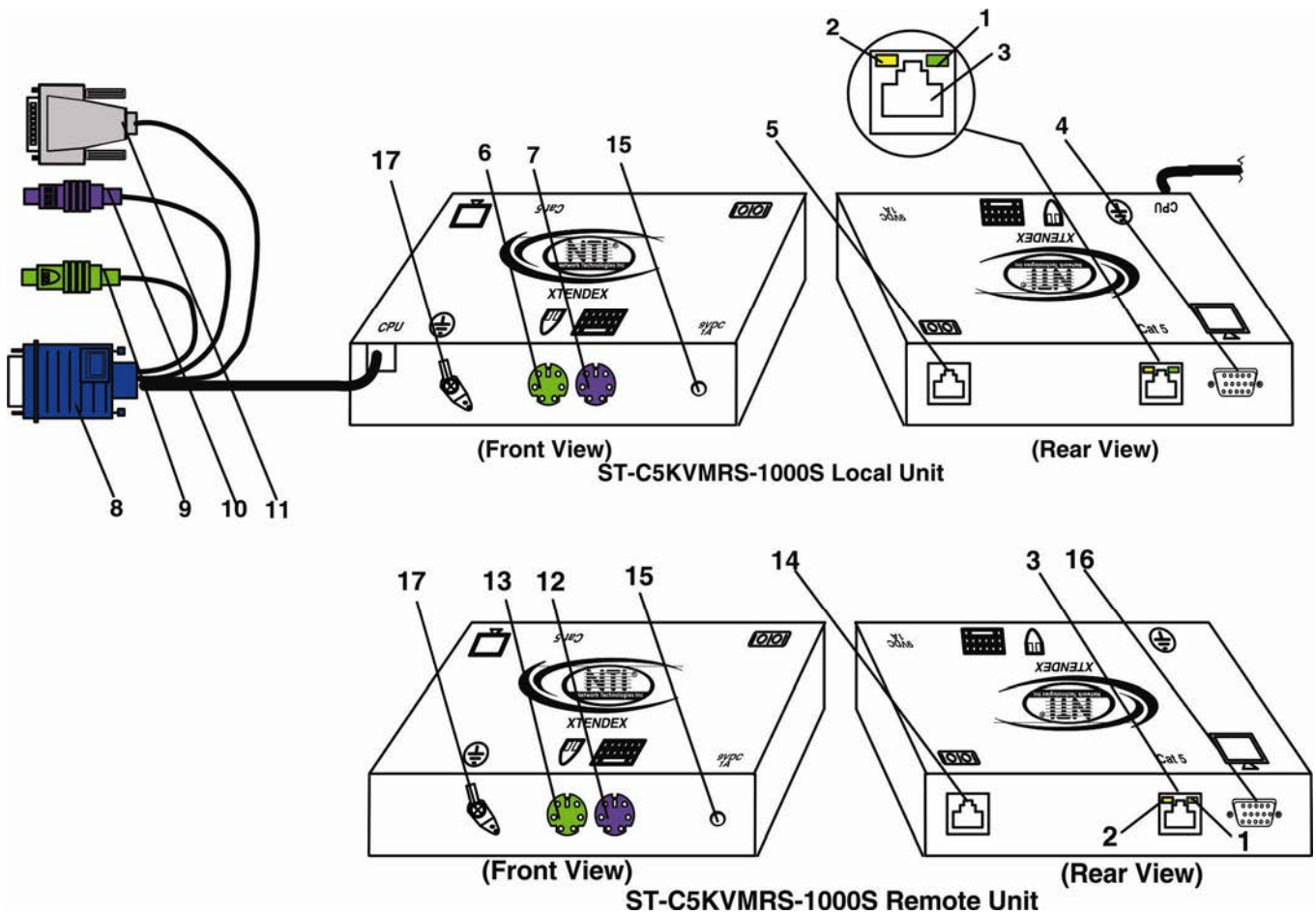
Contact your nearest NTI distributor or NTI directly for all of your KVM needs at 800-RGB-TECH (800-742-8324) in US & Canada or 330-562-7070 (Worldwide) or at our website at <http://www.networktechinc.com> and we will be happy to be of assistance.



FEATURES AND FUNCTIONS

1. Green LED- power indicator- illuminates when power has been supplied to the unit
2. Yellow LED-traffic indicator- illuminates when there is communication between the local and remote units.
3. Cat 5- RJ45 female- for connecting the CAT 5 cable
4. Video Connector- 15HD female- for connecting the local user's VGA monitor
5. RS232 Connector- RJ45 female- for connecting the local user's touchscreen monitor (model with RS232 support only)
6. Mouse Connector- green female 6 miniDIN- for connecting the local user's mouse
7. Keyboard Connector- purple female 6 miniDIN- for connecting the local user's keyboard
8. Video Connector- blue 15HD male- for connecting to the video port on the CPU or KVM switch
9. Mouse Connector- green male 6 miniDIN- for connecting to the mouse port on the CPU or KVM switch
10. Keyboard Connector- purple male 6 miniDIN- for connecting to the keyboard port on the CPU or KVM switch
11. RS232 Connector- light gray 9D female- for connecting to the RS232 port on the CPU or KVM switch (model with RS232 support only)

12. Keyboard Connector- purple female 6 miniDIN- for connecting the remote user's keyboard
13. Mouse Connector- green female 6 miniDIN- for connecting the remote user's mouse
14. RS232 Connector- 9D male- for connecting the remote user's touchscreen monitor (model with RS232 support only)
15. 9VDC- 1.0A- connection jack for the AC adapter
16. Video Connector- 15HD female- for connecting the remote user's monitor
17. External ground- for connecting a ground wire to prevent interference



LIMITATIONS

- Hot-plugging of devices is supported provided devices were originally connected at power-up.
 - In order for two users to share a PS/2 CPU, the user in control must pause for at least 3 seconds before another user can take control. After the 3 second pause, either user can take control of the CPU.
- For model with RS232 support:**
- The RS232 ports on the Local and Remote Units will support serial devices other than touchscreen monitors as follows:
 - 2 simple devices (i.e. mice) connected to each unit, or
 - 1 complex device (i.e. serial modem, RS232 command port on an NTI switch) connected to either the Remote or Local Unit.
 - The RS232 port supports all baud rates up to 57.6K bits per second and the attached CPU must be configured accordingly.

PREPARATION FOR INSTALLATION

- Locations should be chosen for the monitors, mice, and keyboards that also have space to connect the Remote and Local Units within the distance provided by the cables. If extension cables are needed, contact NTI for the cables required.
- The CAT5 cables must be run to the locations where the Remote and Local 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.).
- 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 the CPU and monitors 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.

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

WARNING: *The CATx connection cable used between NTI XTENDEX Series Local and Remote or any XTENDEX Series products must be wired straight through (pin 1 to pin 1, pin 2 to pin 2, etc.) The use of a Crossover Cable will damage the extender and void your warranty.*

INSTALLATION

Installing The Local Unit

1. Plug the cables of the Local Unit into the back of the CPU. (See Fig. 1.)
 - a) Connect the blue 15HD cable end to the VGA port on the back of the CPU.
 - b) Connect the purple 6 pin miniDIN cable end with the keyboard symbol on it to the keyboard port on the back of the CPU.
 - c) Connect the green 6 pin miniDIN cable end with the mouse symbol on it to the mouse port on the back of the CPU.

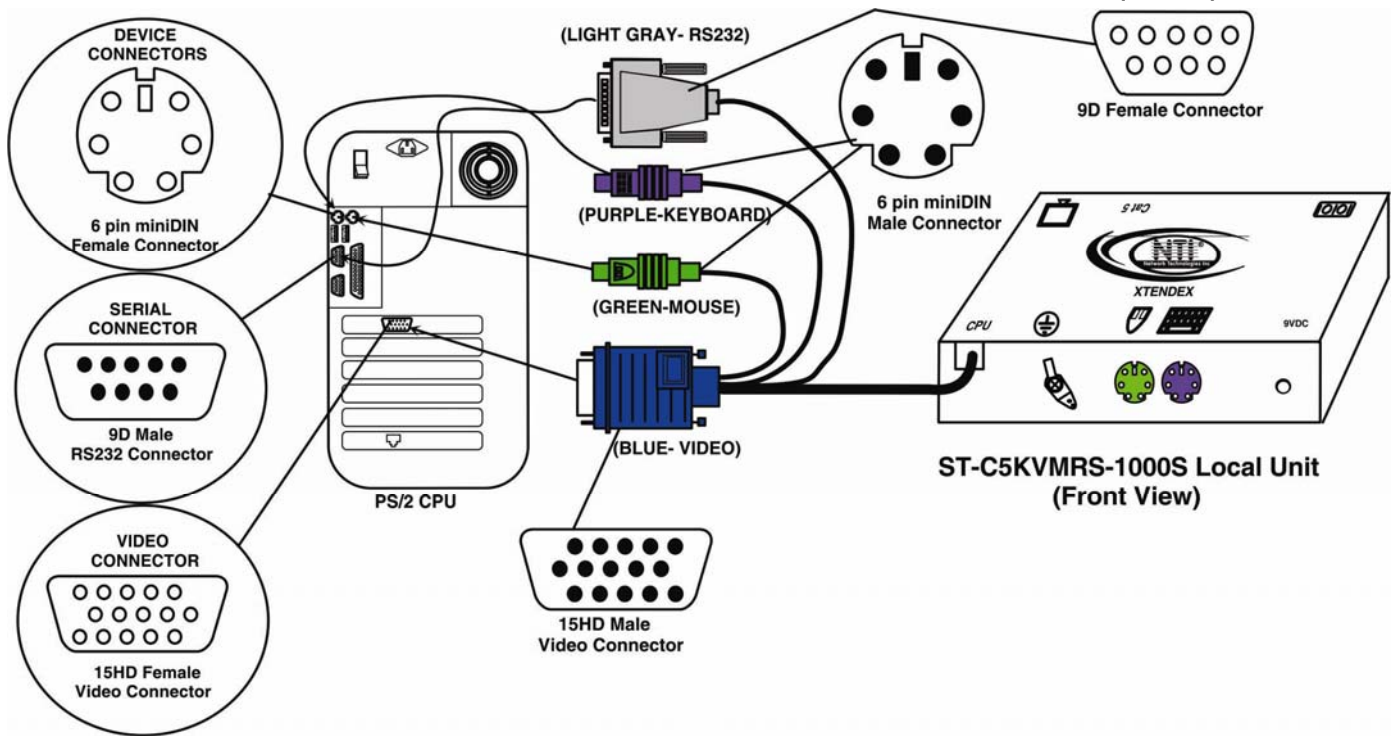
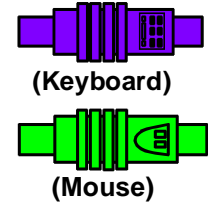


Figure 1- Connect the Local Unit with VGA video and RS232 support to the CPU

- d) If the Local Unit has RS232 support, connect the light gray 9D cable end to the RS232 port on the back of the CPU.

2. Make connections for a local user (see Fig. 2)
 - a) Connect the cable from the local user's VGA monitor to the female 15HD port on the Local Unit.
 - b) Connect the local user's keyboard to the purple 6 pin miniDIN female port on the Local Unit.
 - c) Connect the local user's mouse to the green 6 pin miniDIN female port on the Local Unit.

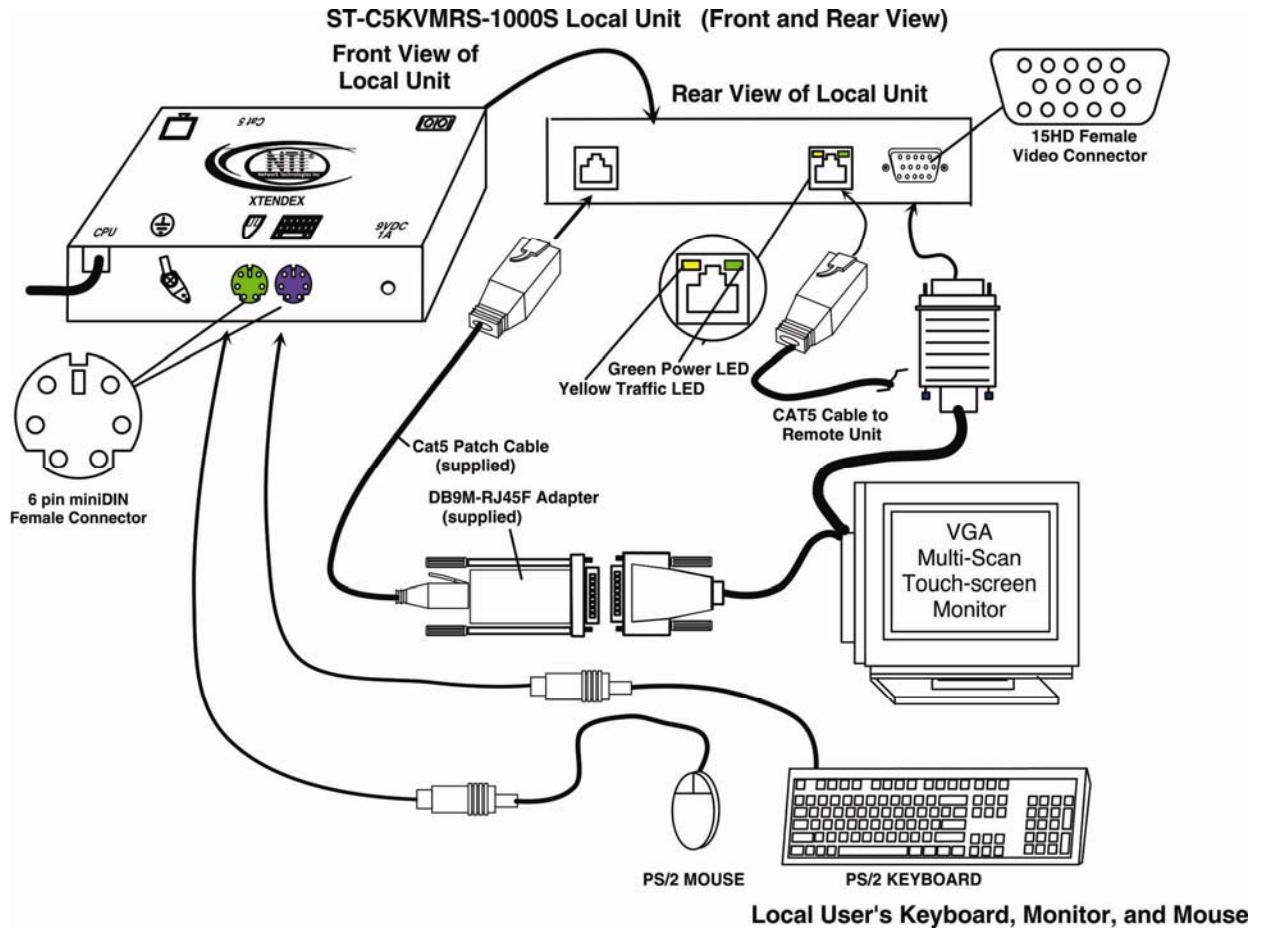


Figure 2- Connect the local user to the XTENDEX Local Unit

- d) If the Local Unit has RS232 support, connect the local user's RS232 cable from a touch screen monitor to the RJ45 port on the Local Unit using the DB9M-to-RJ45 adapter and patch cable provided.

Connect The CAT5 Cable

Connect the CAT5 cable to the “Cat 5” port on the Local Unit. (See Fig. 3.) When properly inserted the cable end should snap into place.

Note: If an RJ45 wall outlet is being used, connect the other end of the extension cable to the RJ45 wall outlet.



WARNING: Never connect the XTENDEX 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.

WARNING: The CATx connection cable used between NTI XTENDEX Series Local and Remote or any XTENDEX Series products must be wired straight through (pin 1 to pin 1, pin 2 to pin 2, etc.) The use of a Crossover Cable will damage the extender and void your warranty.

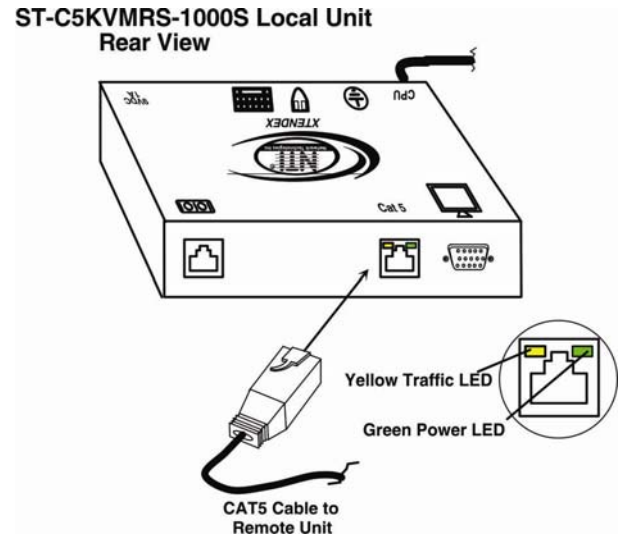


Figure 3- Connect CAT5 cable to Local Unit

Installing The Remote Unit

1. Position the Remote Unit such that the CAT5 cable, the monitor cable, device cables, and the AC adapter power connector can each reach the Remote Unit without putting strain on the cables.
2. Connect the monitor cable to the female 15HD video connector on the Remote Unit.
3. Connect the device(s) to the Remote Unit (see Fig. 6)(KVM models only).
 - a. Connect the keyboard to the purple female 6 pin miniDIN connector on the Remote Unit.
 - b. Connect the mouse to the green female 6 pin miniDIN connector on the Remote Unit.
4. If the Remote Unit has RS232 support, connect the remote user's RS232 cable from a touch screen monitor to the RJ45 port on the Remote Unit using the DB9M-to-RJ45 adapter and patch cable provided.

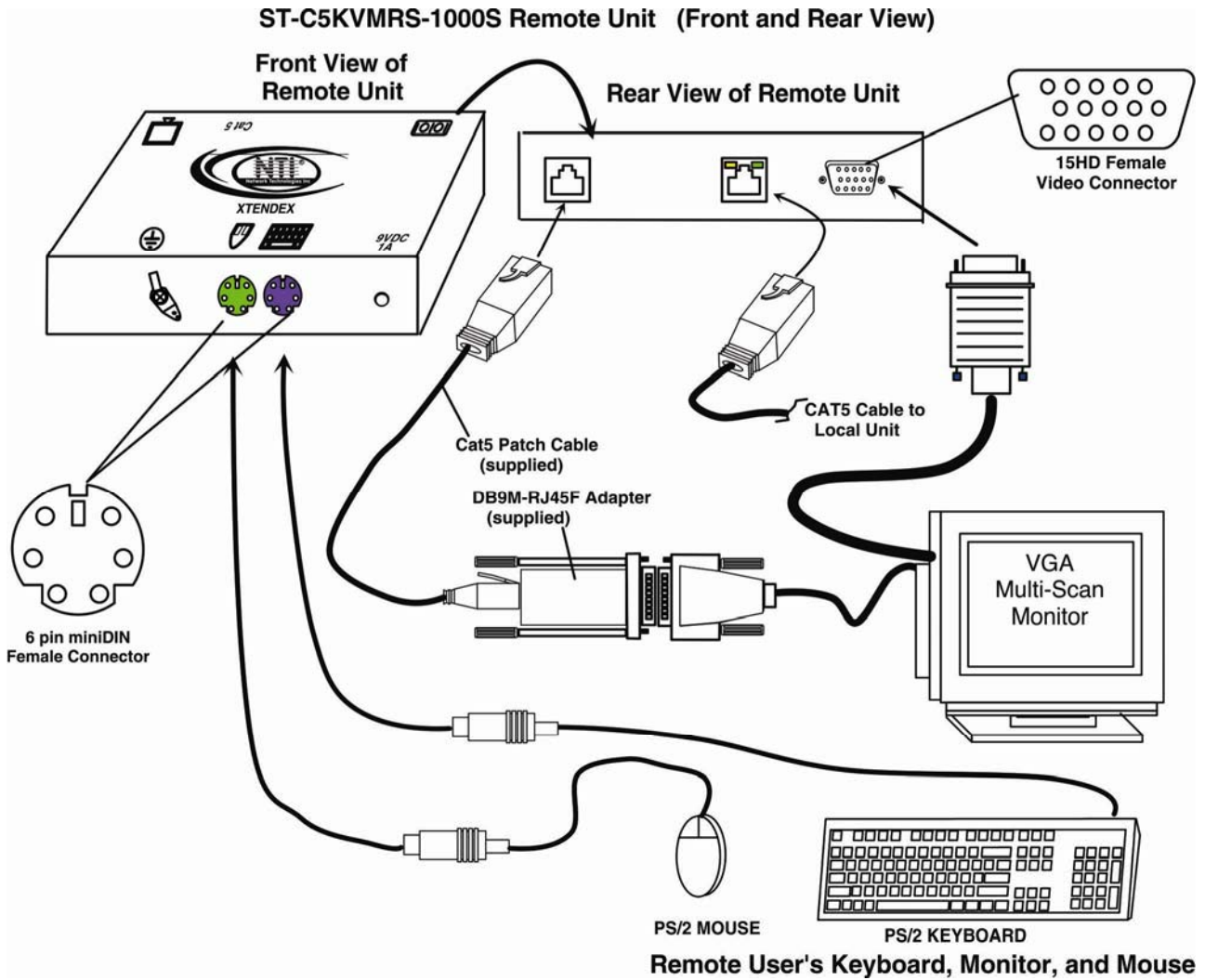


Figure 4- Connect the extended components to the Remote Unit

Connect the CAT5 cable

Make sure the CAT5 cable has been installed in accordance with the "Preparation for Installation" instruction on page 3. Connect the CAT5 cable to the "Cat 5" port on the Remote Unit. (See Fig. 5.) When properly inserted the CAT5 cable end should snap into place.

Note: If an RJ45 wall outlet is being used, connect the other end of the extension cable to the RJ45 wall outlet.



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ST-C5KVMRS-1000S Remote Unit Rear View

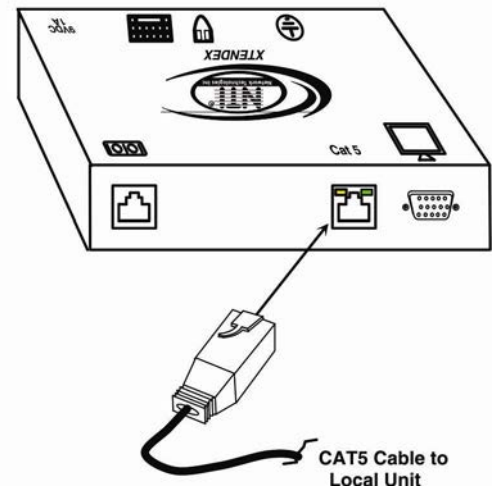


Figure 5- Connect the CAT5 cable to the Remote Unit

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Plug-in and Boot Up

1. Plug the power cord from the monitor into the power outlet.
2. Connect each AC adapter power connector to the 9VDC ports on the Remote and Local Units. Plug each AC adapter into a power outlet. The green LED on the RJ45 connector of both the Remote and Local Units should illuminate, indicating that a proper power connection has been made to them. (See Fig. 6.)

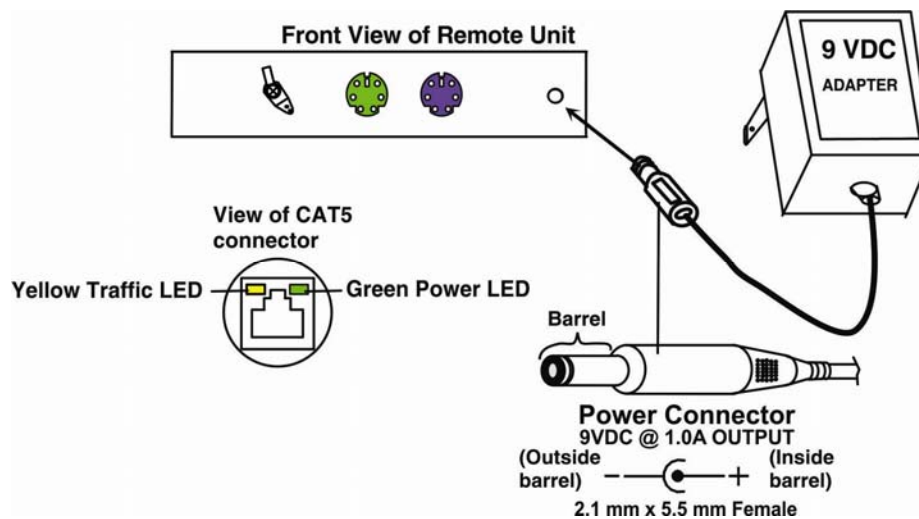


Figure 6- Connect the AC adapter to the Remote Unit

3. Turn ON the CPU and Monitor. They should each react as if they were directly connected to each other.

Note: The yellow LED on each RJ45 connector will illuminate anytime data traffic is passing between the Local and Remote Units, indicating proper CAT5 cable connection and communication. (See Fig. 6)

VIDEO ADJUSTMENTS

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. 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 (see link below).

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.

Test Patterns for Color Skew Adjustment

To verify the need for and effect of color skew adjustment using a test pattern specifically designed for your display setting, go to <http://www.networktechinc.com/usbkvm.html#tab-5> and click on the “test-pattern-nXm.pdf” file that matches your current video resolution. Follow the instructions below to make adjustments as needed.

Fine Video Quality Adjustment

These extenders 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

Most of the video quality adjustment is automatic at power ON, but if some adjustment is necessary, this can be done using only the keyboard attached to the Remote Unit.

Enter Command Mode

The user can enter Command Mode using any of three different methods;

Method 1

1. Press and hold the left <Shift> key
2. Press the right <Shift> key
3. Release both keys

Method 2

Press and release the <Scroll Lock> key twice fast (press twice within 1 second)

Method 3

Press and release the left <Shift> key twice fast, then press and release the <Esc> key once, all within 2 seconds

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

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 respectively. The keyboard LEDs will identify the mode as indicated in the table on page 14. 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.

Update DDC at Remote

To update DDC information based on the monitor connected to the Remote Unit, press <D> to enter Remote DDC mode. The CapsLock LED will illuminate solid, the NumLock and ScrollLock LEDs will be OFF . Press the <Left Arrow> or <Right Arrow> key to cause DDC information to be updated. When the update is complete (less than one second), the unit will return to General Video Quality Adjustment mode (the three keyboard LEDs will blink at the same time).

Update DDC at Local

To update DDC information based on the monitor connected to the Local Unit, press <C> to enter Local DDC mode. The CapsLock LED will illuminate solid, the NumLock and ScrollLock LEDs will be OFF . Press the <Left Arrow> or <Right Arrow> key to cause DDC information to be updated. When the update is complete (approximately seven seconds), the unit will return to General Video Quality Adjustment mode (the three keyboard LEDs will blink at the same time).

Note: It is recommended that the monitors connected to the Remote and Local units be of the same make and model.

Note: When updating DDC, the update should be done at EITHER the Remote Unit OR the Local Unit, but not both. The last update performed will cancel out the data from the previous update.

Keyboard LED Indications

Adjustment Mode	NUM LOCK	CAPS LOCK	SCROLL LOCK
General Video Quality	Blink	Blink	Blink
Red Skew	Blink	Solid	Solid
Green Skew	Solid	Blink	Solid
Blue Skew	Solid	Solid	Blink
DDC	OFF	Solid	OFF

Reset Defaults

Press the <A> key (while in Command Mode) to reset the fine tuning to default settings. Once settings have been reset, the user will automatically return to General Video Quality Adjustment mode.

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

TECHNICAL SPECIFICATIONS

Models with VGA Video	
Video Compatibility	VGA,SVGA, XGA, SXGA,UXGA
Video Coupling	DC
Video Connectors	HD15 male to CPU HD15 female to monitor
Input / Output Impedance	75 Ohms
Input Horizontal Frequency Range	15kHz to 130kHz
Input Vertical Frequency Range	30 Hz to 150 Hz
Sync Types Supported	Separate and composite TTL Level
Video Maximum I/O Levels	1.45Vp-p
Keyboard/Mouse Connectors	Female 6 pin miniDIN to Keyboard and Mouse Male 6 pin miniDIN to CPU device ports
Mouse and Keyboard Compatibility	All PS/2 mice and keyboards
Keyboard and Mouse Current Rating	500mA maximum
Models with RS232 Support	
RS232 Connectors	RJ45 female to device 9D female to CPU
RS232 Baud Rate	57.6K bps maximum (no adjustment for baud rate is needed)
RS232 Compatibility	RXD, TXD, RTS, DTR, CTS, DSR, DCD
General	
Interconnect Cable	CAT5/5e/6 Solid UTP EIA/TIA 568 B wiring w/ male RJ45 connectors
Remote and Local Unit Power	120V at 60Hz-9VDC/1.0A via AC adapters (2) -or- 230V at 50Hz-9VDC/1.5A via AC adapters (2)
Size (In.) WxDxH	5.05x3.1x1.235
Regulatory Approvals	RoHS

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).

INTERCONNECTION CABLE WIRING METHOD

The connection cable between the remote and local is terminated with RJ45 connectors and must be wired according to the EIA/TIA 568 B industry standard. Wiring is per the table and drawing below.

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

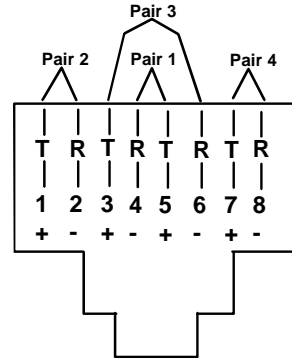


Figure 7- View looking into RJ45 female

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, please check the FAQs (Frequently Asked Questions) at our website at <http://www.networktechinc.com> or contact us directly for help at 800-742-8324 (800-RGB-TECH) in US & Canada or 330-562-7070 worldwide. We will be happy to assist in any way we can.

Problem	Cause	Solution
Remote or Local Unit green power LED does not illuminate	<ul style="list-style-type: none"> Power supply is not connected or plugged-in. 	<ul style="list-style-type: none"> Make sure outlet is live and AC adapter is plugged-in. (one for the Remote and one for the Local) Make sure 9VDC jack is fully connected
No Video on monitor	<ul style="list-style-type: none"> One or more video cables is loose or disconnected. No power to Remote or Local Units. Video Cable was not attached when CPU was booted. CAT5 cable is not connected. 	<ul style="list-style-type: none"> Check all video cable connections Make sure green LEDs are illuminated for local and remote. If not, see solutions for problem above. With all the cables properly connected, reboot the CPU. Check cable connections. Make sure they are snapped-in properly and completely and reboot.
Video Picture is not sharp or is smeared	<ul style="list-style-type: none"> All Video Cables are not firmly seated. CAT5 cable is too long. The CAT5 cable is not properly connected. Video not adjusted 	<ul style="list-style-type: none"> Check all connections. Make sure all cables are fully seated. Verify length is within specified limits-1000'. Check cable connections. Make sure they are snapped-in properly and completely. Check cable connections and power cycle. See page 11 for video quality adjustment instruction.

Problem	Cause	Solution
The picture on the monitor is black and white, rather than color	The video cable was not attached to the CPU when it was booted.	With the cables all properly connected, reboot the CPU.
A constant vertical wobble appears down the screen	CAT5 cable is too close to a strong power source.	Reroute CAT5 cable if possible.
Monitor sometimes loses sync, causing it to go blank for a second or two	<ul style="list-style-type: none"> Electrical power system is very noisy, particularly the ground. The CAT5 cable is not properly connected. 	<ul style="list-style-type: none"> Make sure the interconnection cable is not near any power lines. Check cable connections. Make sure they are snapped-in properly and completely.
Wrong or missing characters from those typed	The keyboard may be in the wrong mode.	<ul style="list-style-type: none"> Disconnect keyboard at Remote Unit end and reconnect. Reboot the system.
CPU doesn't detect the keyboard and the mouse	<ul style="list-style-type: none"> Keyboard cable or mouse cable are loose or reversed Cat 5 cable is too long 	<ul style="list-style-type: none"> Check cable connections Cat 5 cable can be no more than 1000 feet in length
IBM Scroll Point mouse is not recognized by CPU	Only one IBM Scroll Point mouse is connected at either the Local or Remote unit	<ul style="list-style-type: none"> In order for an IBM Scroll Point mouse to be recognized, an IBM Scroll Point mouse must be connected at <u>both</u> the Local and Remote extender units. Otherwise it will be recognized and work only as a Microsoft Intellimouse.
Image is not displayed properly, lacks definition	Signal is being skewed by the CAT5 cable and not being received correctly by the monitor .	<ul style="list-style-type: none"> Check the user's manual for the monitor, projector, or display equipment for an "automatic adjustment" or "auto-configure". This is most common to LCD type monitors.
Models with RS232 Support		
No RS232 communication	<ul style="list-style-type: none"> One or more RS232 cables is loose or disconnected 	<ul style="list-style-type: none"> Check all RS232 cable connections

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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.

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.

WARNING: *The CATx connection cable used between NTI XTENDEX Series Local and Remote or any XTENDEX Series products must be wired straight through (pin 1 to pin 1, pin 2 to pin 2, etc.) The use of a CROSSOVER CABLE will damage the extender and void your warranty.*

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