

Digital Video Management System Pre-Installation Guideline

Best Practices for the Installation of ViconNet NVRs and Kollektor Digital Video Recorders

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Introduction

The information in this manual outlines the recommended “Best Practices” for the installation of Vicon’s ViconNet NVRs and Kollector® series of PC-based digital video recorders. These units are Windows®-based PC products and should be treated as expensive computer hardware.

Although this document is a guideline, failure to follow these recommendations, especially for environmental conditions, can cause unnecessary and costly problems. It is in the customer’s best interest to adhere to all points in this guide during the initial stages of system design and installation.

If the installation area does not properly support these requirements, failure of the unit is likely to occur due to excessive heat, poor power conditions and poor cabling.

ViconNet NVRs and Kollector recorders come in many different configurations that support different levels of software capability and performance. However, the installation requirements for all units are the same due to the commonality of the hardware platform across all models. All the recorders will be referred to as Kollectors throughout this manual.

NVRs and Kollectors meet requirements for an FCC Class A computing device.

NOTE: Read all instructions before beginning any installation.

Warning: Please note the following points prior to proceeding with this document.

1. This is sensitive computer equipment. DO NOT stack, drop or otherwise mishandle. Failure to properly handle this unit will result in unit damage.
2. Vicon requires the use of an Uninterruptible Power Supply (UPS) in the electrical power service. Failure to comply voids the warranty.
3. This system should only be installed by a qualified technician using common hand tools and approved materials in accordance with national, state and local wiring codes. This system should only be setup by a qualified technician with a basic understanding of the Windows operating system and intermediate networking skills.
4. This system requires proper shutdown to ensure system integrity. Failure to properly shutdown the recorder can result in data loss and lengthy file rebuilding upon next boot.
5. Removal of the top cover, or any other attempted unit disassembly, should only be attempted by a qualified technician with the express permission of Vicon Technical Support.
6. This system relies on the building’s electrical service for short-circuit (over current) protection. Ensure that a fuse or circuit breaker is present in the service at a minimum of 120 VAC, 15 A (230 VAC, 10 A international).
7. It is not recommended to operate this system in a dusty environment. Failure to periodically inspect and clean the front panel air filter (Kollector Force only) may result in shutdown of the unit and eventual permanent failure requiring factory repair.

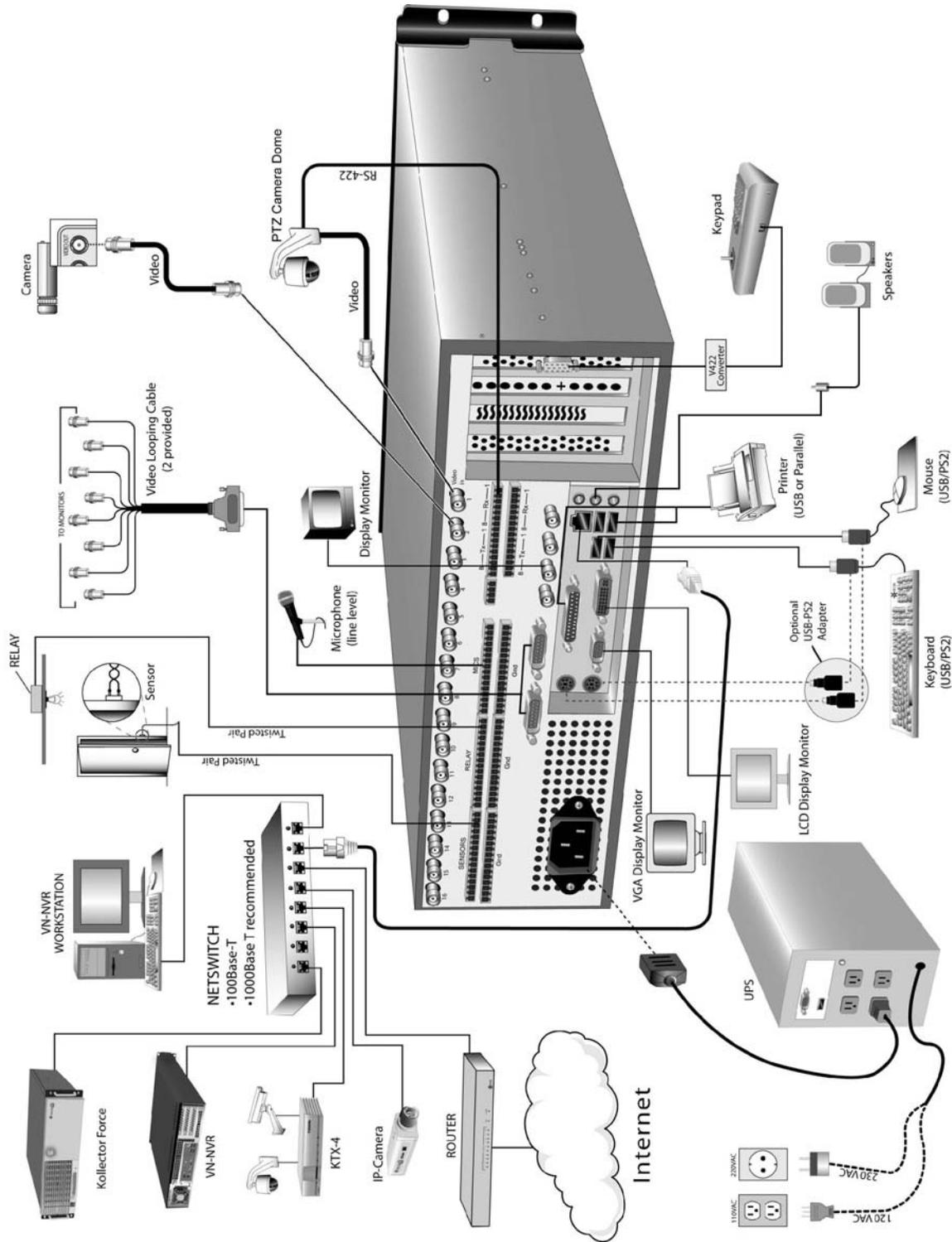
About These Requirements

The requirements within this document are the minimum requirements necessary to operate an NVR or Kollector in a safe and optimal environment to ensure long life and minimize the number of system failures. The items, in order of importance, are listed as follows:

- Quick Installation Diagram**
- Power Source/UPS Requirements**
- Proper Startup/Shutdown**
- Environmental Requirements**
- Video Source Requirements**
- Unit Data Storage Considerations**
- Network Requirements**
- Workstation Requirements**
- 3rd Party Software Statement**
- Software Version Compatibility**

The review and implementation of these requirements will optimize the performance of the ViconNet® system, provide extended and trouble-free service and ensure warranty compliance. For your convenience, we have provided a Post-Installation Manual that provides a comprehensive checklist of completed pre-installation requirements.

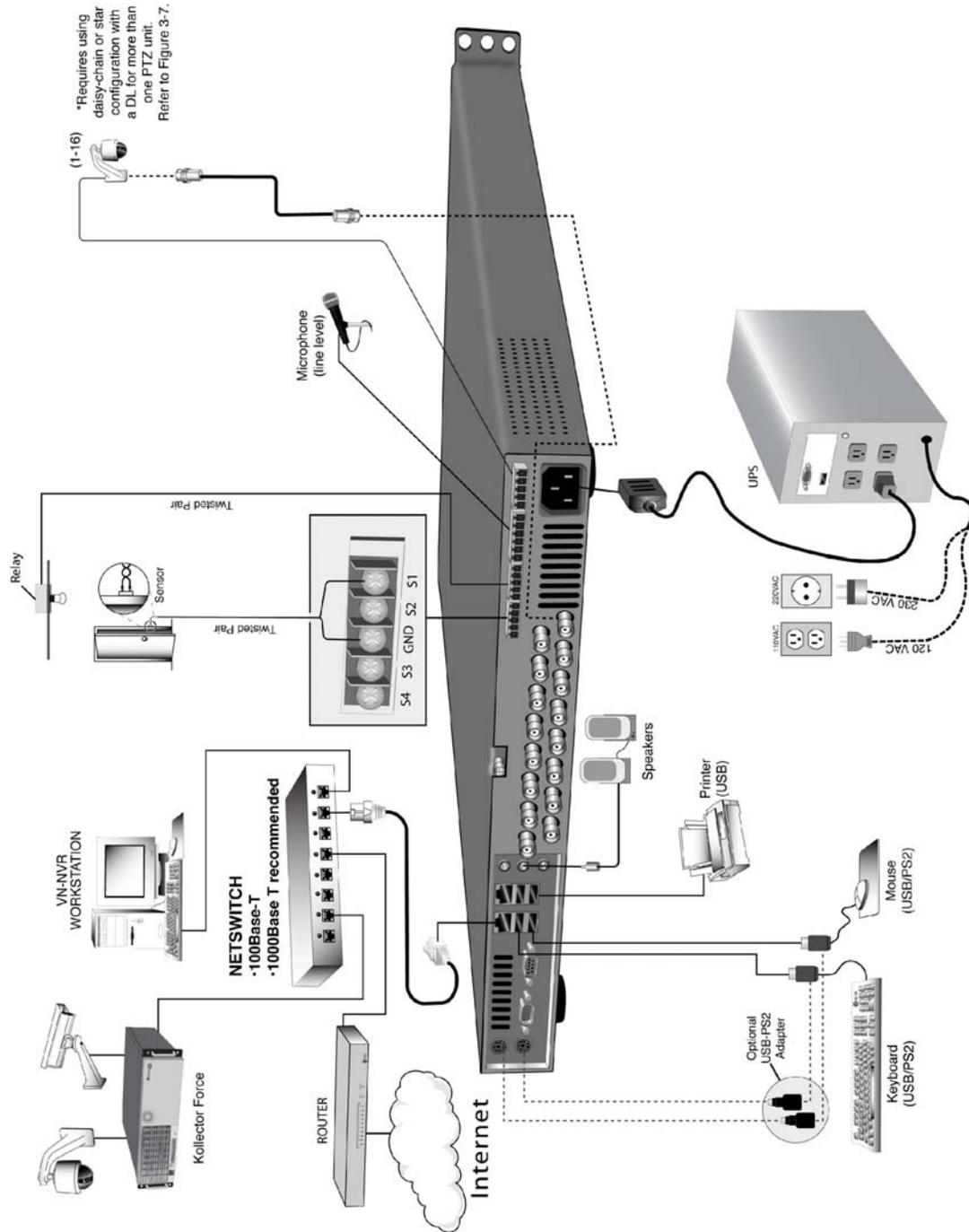
Quick Installation (Kollektor Force)



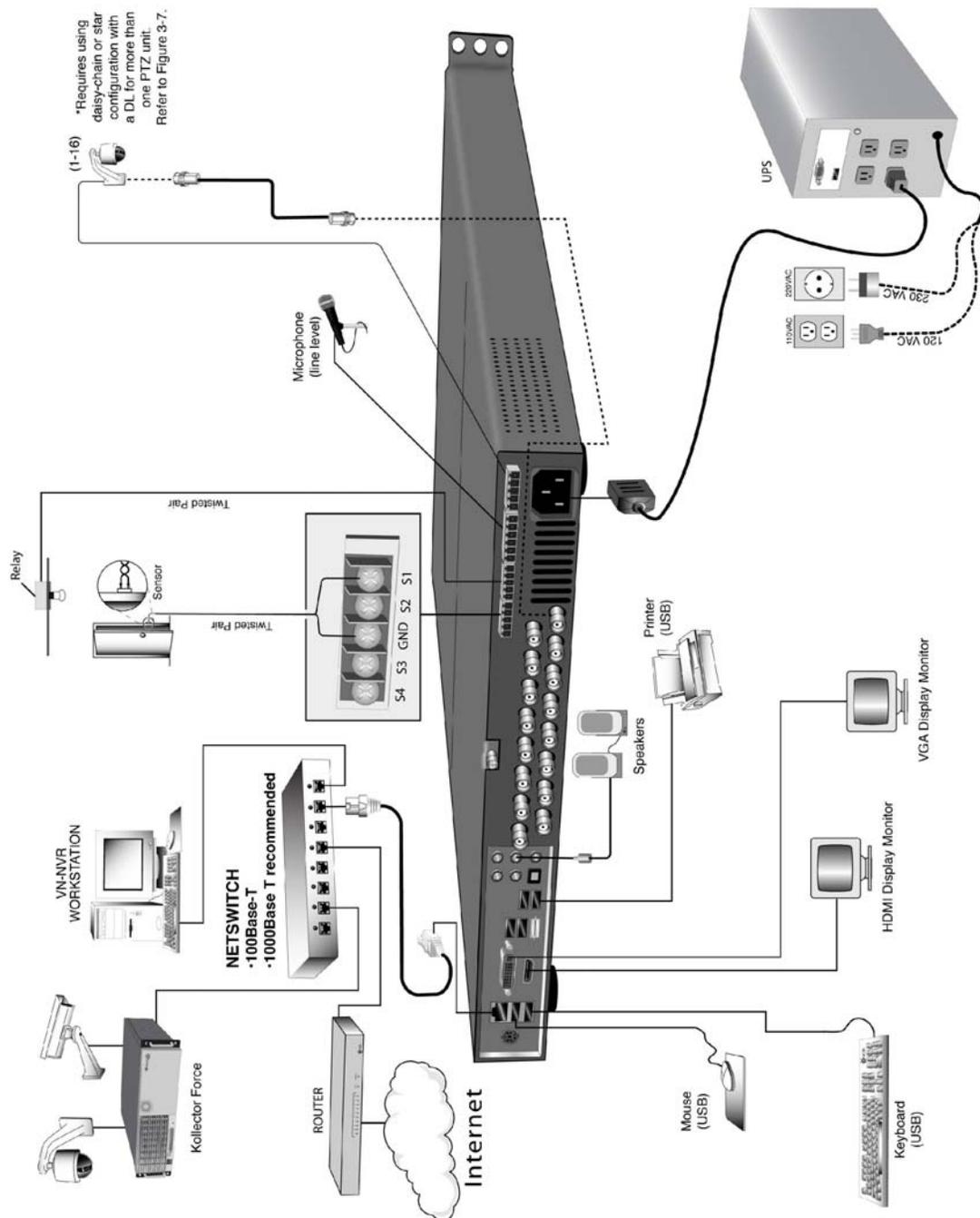
QUICK INSTALLATION (Kollektor Strike)

QUICK INSTALLATION

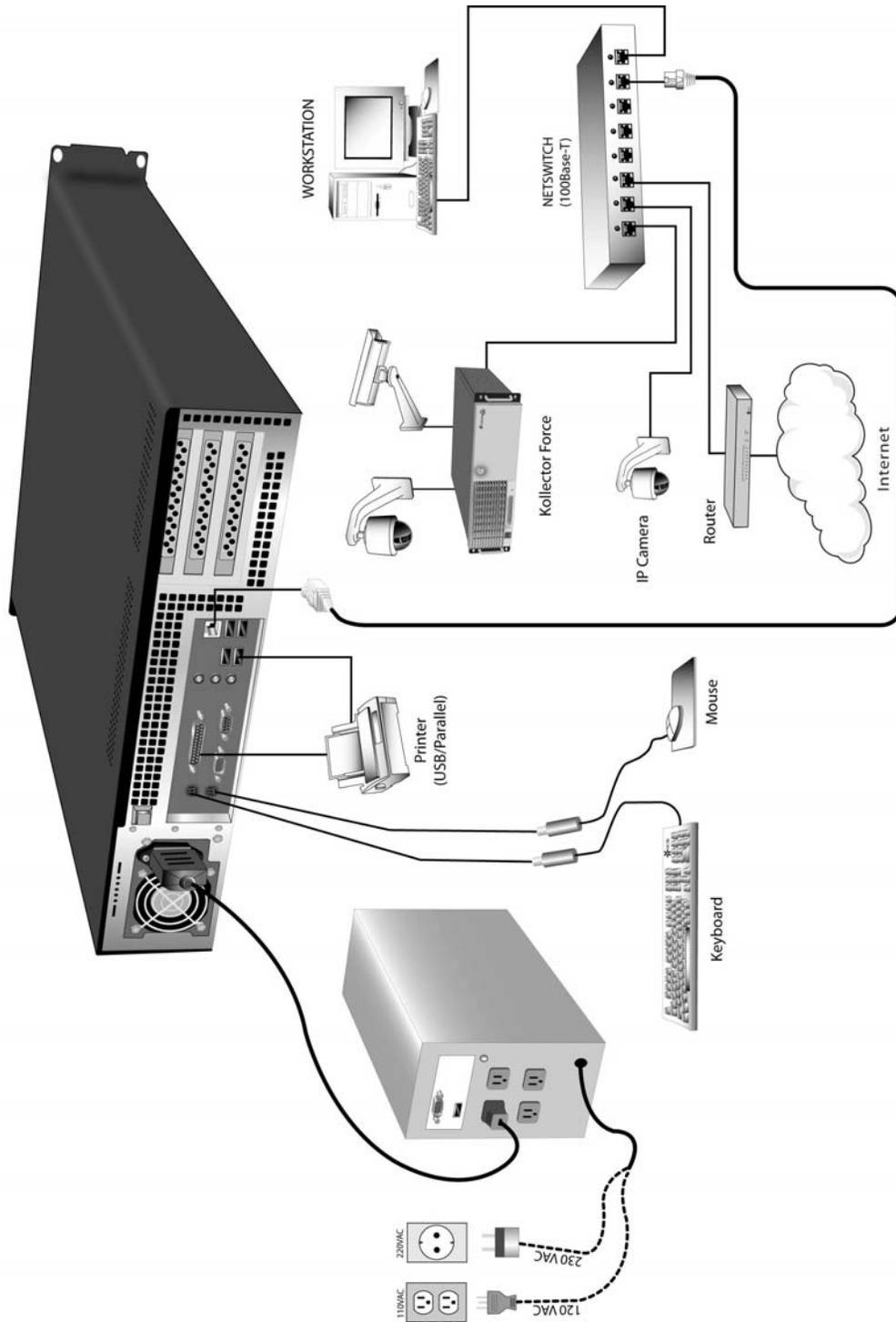
QUICK INSTALLATION



Quick Installation (Kollektor Strike Basic)



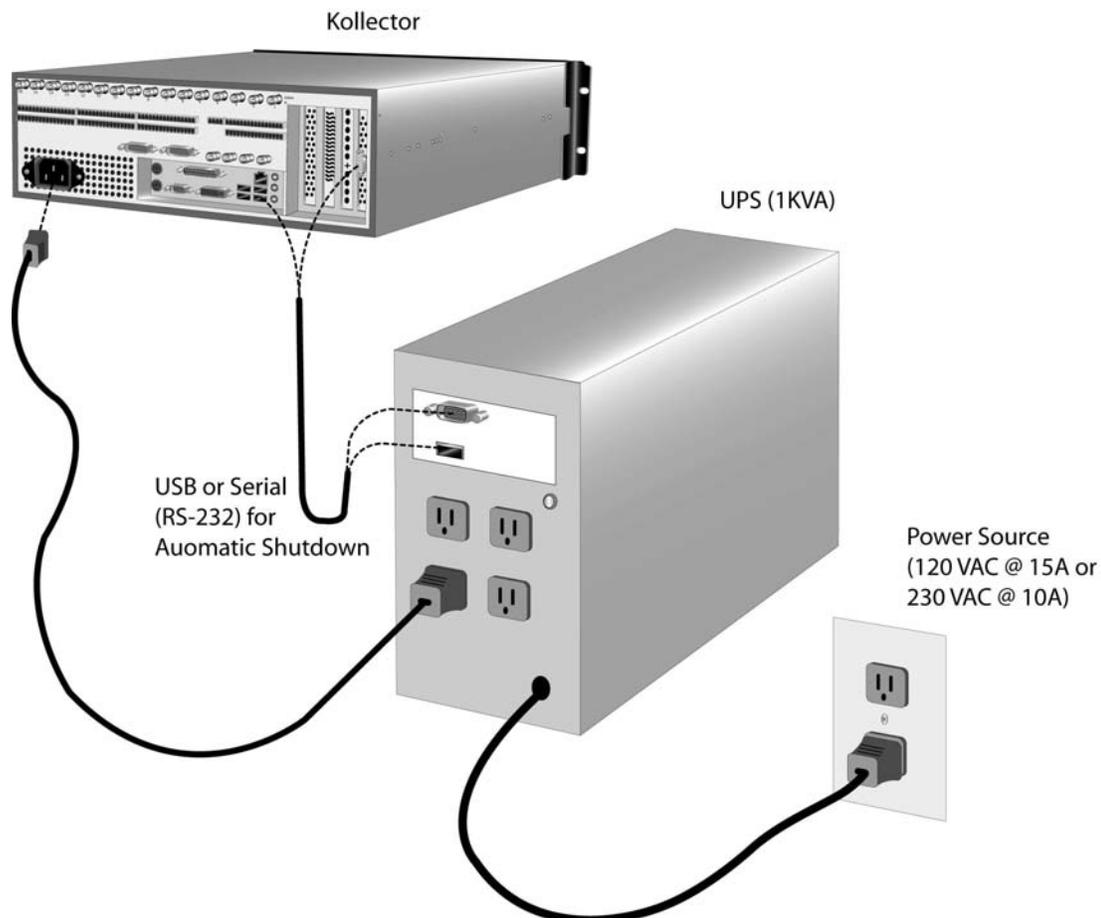
Quick Installation (ViconNet NVR)



Power Source/UPS Requirements

A stable power source is essential for reliable and uninterrupted operation. These units are rugged personal computers (PCs). They utilize an industrial PC chassis with its own internal power supply. The power supply is designed to support 110-240 VAC @ 50-60 Hz. The following is required when specifying the power source for the system:

1. Use an electrical outlet that is dedicated to the NVR/Kollector and has a minimum rated circuit breaker of 120 VAC @ 15 A (230 VAC @ 10 A for international).
2. Use an Uninterruptible Power Supply (UPS) to protect the system from power instability. Line voltage surges and lapses can cause stresses on the internal power supply that render it inoperable. A UPS filters the voltage to keep it clean and regulated to the NVR/Kollector.
3. Use a UPS that allows a few minutes of operation if the power source fails. A 1 KVA UPS, per unit, that allows 5-8 minutes of operation, is required.
4. For larger installations, such as the 8 Kollector rack outlined in this manual, a single UPS can be used. For the 8-Kollector installation, a UPS with approximately 10 KVA capacity is recommended.



⚠ WARNING: *Vicon strongly requires the use of an Uninterruptible Power Supply (UPS) in the electrical power service. Failure to comply voids the warranty.*

Proper Startup/Shutdown

NVR/Kollector units must be started and shutdown properly. To start, a boot procedure must take place before the ViconNet application can be used, just as in any other PC-based system. To shutdown, special considerations must be followed to avoid data loss.

Startup

To startup a Kollector:

Open the front panel door and press the front panel power switch towards the “I” position. This momentary switch will spring back to the “O” position. The recorder will display its boot routine.

To startup an NVR:

Press the rear panel power switch towards the “I” position. This momentary switch will spring back to the “O” position. The NVR will display its boot routine.

Shutdown

Preferred method to shutdown:

With the unit booted and operational, select the Shutdown button in the Main screen of the ViconNet GUI and follow the screen prompts. The system will automatically shutdown.

Not-recommended method to shutdown:

There may be instances when the unit cannot be shutdown using the GUI. In these cases, use the power switch as follows:

With the unit booted and operational, momentarily press and release the power switch. The unit will run a proper shutdown routine.

<p>⚠ WARNING: Failure to properly shutdown the unit can result in data loss and lengthy file rebuilding upon next boot. File rebuilding can take up to 3 hours before it is available for use. The revolving hourglass will display during this process. DO NOT attempt to reboot the system during this process or data loss will result.</p>

Environmental Requirements

The environmental conditions for an NVR/Kollektor are essential for reliable and uninterrupted operation. These units are PC-based systems equipped with the proprietary hardware that make it a powerful digital video recorder. Just like a consumer PC, an NVR/Kollektor must be operated under proper environmental conditions. See the Typical Kollektor Installation figures for details.

Mounting

1. A table, shelf or rack, rated at a minimum of 50 lb (22.7 kg) per Kollektor, should be used for support. Do not stack Kollektor units as a permanent means of installation on a table or shelf. The weight load can cause the units to fall and damaging them as well as cause personal injury. In addition, the lack of free air flow between the covers and bases of the units can cause overheating.
2. A Kollektor unit has the following maximum dimensions, based on the particular model:

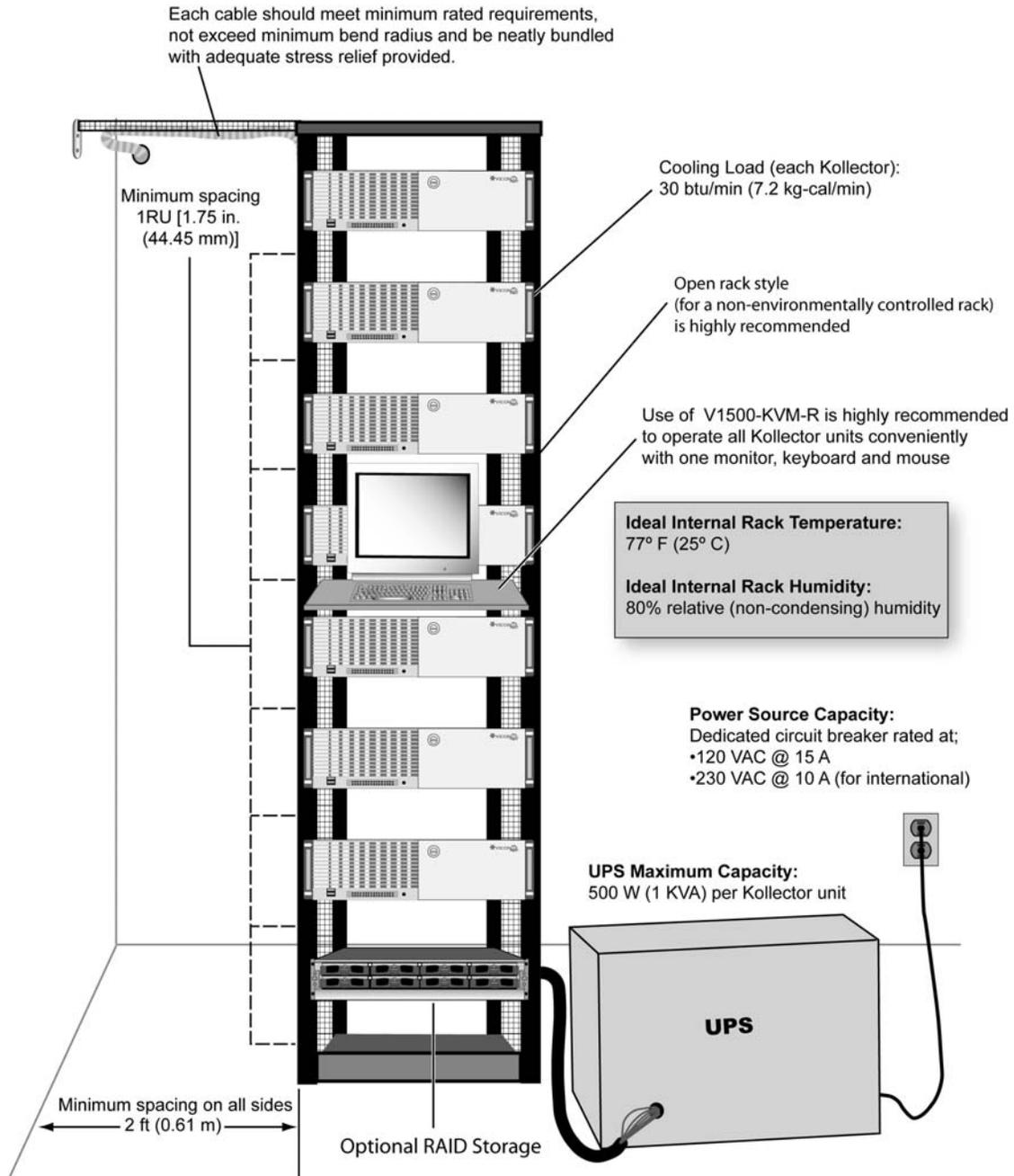
Kollektor Force:	18.75 in. (483 mm) W x 5.25 in. (133.4 mm) H x 21.25 in. (539.75 mm) D (including connectors)
Kollektor Strike:	19 in. (483 mm) W x 1.75 in. (44.45 mm) H x 23.125 in. (587.4 mm) D (including connectors)
Tower NVR:	7.25 in. (184 mm) W x 16.75 in. (413 mm) H x 18.9 in. (480 mm) D (including connectors)
Rack-Mount NVR:	19 in. (483 mm) W x 3.5 in. (89 mm) H x 23.5 in. (597 mm) D (including connectors)

An open, floor-standing rack is highly recommended. Since these units are available in a variety of heights, the maximum number of units per rack varies. For example, a typical 7 ft (2.1 m) high rack can accommodate 8 large Kollektor units allowing for proper spacing. This type of rack should be located in an environmentally-controlled room in an area that provides all sides and the top with a minimum of 2 ft. (0.61 m) free space. This space will provide sufficient air cooling and adequate space for installation and maintenance.

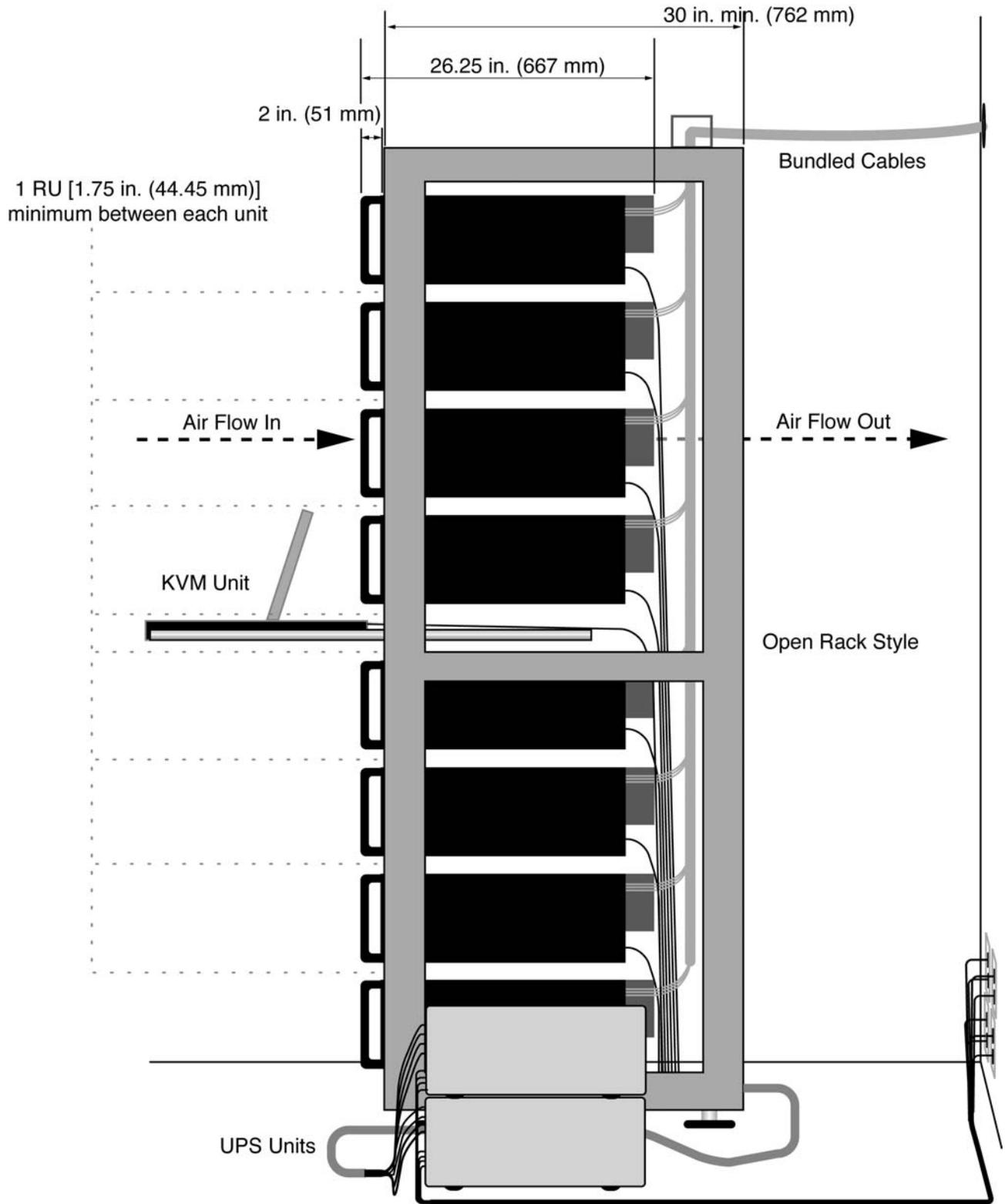
3. If an enclosed, air-circulated rack is used, it is highly recommended to remove the front and back doors and the sides. This recommendation is made to prevent blocking natural recorder airflow from front to rear panel and avoids trapping of hot air pockets. The room temperature must be controlled such that the maximum temperature between the racked components does not exceed 77° F (25° C).
4. If an enclosed, air-conditioned (AC) rack is used, it is highly recommended to keep doors tightly closed. This recommendation is made to best keep the circulated cool air inside the rack. Again, the AC rack must be set to maintain a maximum temperature between the racked components of 77° F (25° C). Lastly, verify that the particular AC rack meets the cooling load requirement of 30 btu/min (7 kg-cal/min) per rack component.
5. For rack-mounted installations, it is recommended to have a minimum of 36 in. (914 mm) of free space in the front of the rack. This space can be used for installation and removal of recorders from the rack.
6. For rack-mounted installations, it is recommended that units be spaced at least 1 RU [1.75 in. (44.45 mm)] apart vertically. Verify that the specified 19 in. (483 mm) rack will allow for this minimum spacing.
7. For rack-mounted installations, it is also recommended to use a rack-mounted KVM (Keyboard Video Monitor) unit with a minimum of 8 unit support. This will eliminate the need for 8 sets of keyboards, mice and monitors.
8. For rack-mounted installations, it is also recommended to use a UPS system meeting the total power capacity of the number of Kollektor units installed. For the 8-Kollektor installation, a UPS system with a minimum of 5 KVA capacity is recommended.

Temperature and Humidity

1. A well maintained rack temperature and humidity is essential for proper operation. An environmentally-controlled area is recommended so a continuous supply of cool and dry air is available around the rack. Ideal operation occurs at a maximum internal rack (space between components) temperature of 77° F (25° C). The ideal room humidity should not exceed 80% non-condensing relative.
2. When calculating HVAC requirements, a good cooling load estimate for each unit is about 30 btu/min (7 kg-cal/min), based on a 500 watt load. However, a better cooling load estimate is based on the addition of a KVM and UPS. This would be about 100 btu/min (25 kg-cal/min).



Typical Kollektor Rack Installation



Side View Kollector Rack Installation

Dusty Environments

NVRs/Kollectors should not be installed or operated in a dusty or otherwise unclean environment. In a clean environment the front panel air filter should be cleaned a minimum of every 3 months (Kollector Force).

▲WARNING: *Failure to periodically inspect and clean the front panel air filter may result in shutdown of the unit and eventual permanent failure requiring factory repair.*

Video Source Requirements

The video source is an important factor in obtaining crisp and clear digital video images. The incoming video signal to the Kollector must have the following specifications:

Video Signal Type: Standard composite video, NTSC, PAL, EIA and CCIR formats supported.

Video Level Input: 1.0 V peak-to-peak (140 IRE) nominal. Specifically, the following signal specifications should be maintained:

Luminance:	100 IRE +/- 15%.
Sync:	40 IRE +/- 15%.
Colorburst:	40 IRE +/- 15%.

Video Input Impedance: 75Ω, unbalanced coaxial input using a standard BNC connector.

The Camera and Illumination

A good quality camera with adequate illumination will prevent many potential problems in video quality. A camera with sufficient sensitivity and horizontal resolution should be used. When this camera is coupled with a good lighting source, the camera's AGC (Automatic Gain Control) circuit should provide just enough gain to maximize the camera's signal-to-noise ratio.

This can be demonstrated by enabling the camera's AGC and viewing a scene with good lighting. As the light source is slowly reduced, the scene will begin to display moving specks or noise. As the light is eventually removed from the scene, the display will show a completely speck-filled or noisy screen. This is due to the AGC circuit overworking or providing too much gain to compensate for an insufficient light source. This noisy video will cause the NVR/Kollector to record digital video images that use excessive space on the hard drive. The illumination should be sufficient as to not make the AGC circuit provide excessive gain.

Some cameras provide an adjustable AGC range. It is advised to maintain a low AGC range and adequate illumination for each desired scene.

Cables and Connectors

⚠ Caution: Careful selection of proper cable is essential to obtain the best performance from this equipment. Vicon assumes no responsibility for poor performance when cables other than those recommended, or equivalent, are installed. In all cases, coaxial cable impedance should be 75 ohms.

Materials

Use only a pure copper center conductor. Do not use a copper-plated steel or aluminum center conductor, as they will result in poor quality video. Solid-core bare copper conductor is the best type, where flexing and bending will be minimal. If severe bending and flexing is required for installation, use a stranded center conductor. Never exceed the manufacturers' minimum bend radius specification. Use cellular (foam) polyethylene dielectric except where heavy moisture exists. For moisture conditions, use solid polyethylene dielectric cable with a heavy exterior insulation. The shield must be copper braid providing 95% or better coverage.

Cable Types

The cable types listed below are the most common 75-ohm types used. They vary in size (diameter), dielectric type and net DC resistance. The larger cable results in a lower DC resistance and better video quality, with increased difficulty in handling and installation. Let the required picture quality and cable distances provide a guide in choosing the best cable type. For cables other than the approved Vicon types below, contact the manufacturers listed below. Note that "BC" refers to bare copper and "TC" refers to tinned copper.

Recommended Coaxial Cable Types

Cable Type	Belden Type No.	Alpha Type No.	West Penn Type No.	Type Center Conductor	Type Shield and % Coverage	DC Resistance ohms/1000 ft (km)
RG-11/U	8213	9847	811,4811	14 Solid BC	BC braid (95%)	2.6 (8.5)
RG-6/U	9248	9804C	806,4806	18 Solid BC	Foil + 61% TC braid (100%)	7.5 (24.6)
RG-59/U	8281*	----	815	20 Solid BC	2 TC braids (96%)	9.9 (32.5)
RG-59/U	9259	9803	816	22 Stranded BC	BC braid (95%)	15.0 (49)
RG-59/U	9659	----	----	22 Stranded BC	BC braid (95%)	15.0 (49)

*Requires special BNC-M connector due to 0.305 nominal O.D.

Belden Inc.	http://www.belden.com/	(800) 235-3361
Alpha Wire Company	http://www.alphawire.com/	(800)-52 ALPHA (522-5742)
West Penn Wire	http://www.westpenn-cdt.com/	(800)-245-4964

Picture Quality vs. Cable Length

Picture Quality	Maximum Cable Run** ft (m)		
	RG-59/U	RG-6/U	RG-11/U
Usable picture	1100 (350)	1500 (450)	2400 (750)
Clean picture	820 (250)	1000 (300)	1600 (500)
Best picture	400 (120)	530 (160)	820 (250)

** For longer cable runs, use a Vicon Video Amplifier to obtain a suitable picture.

Video Amplification

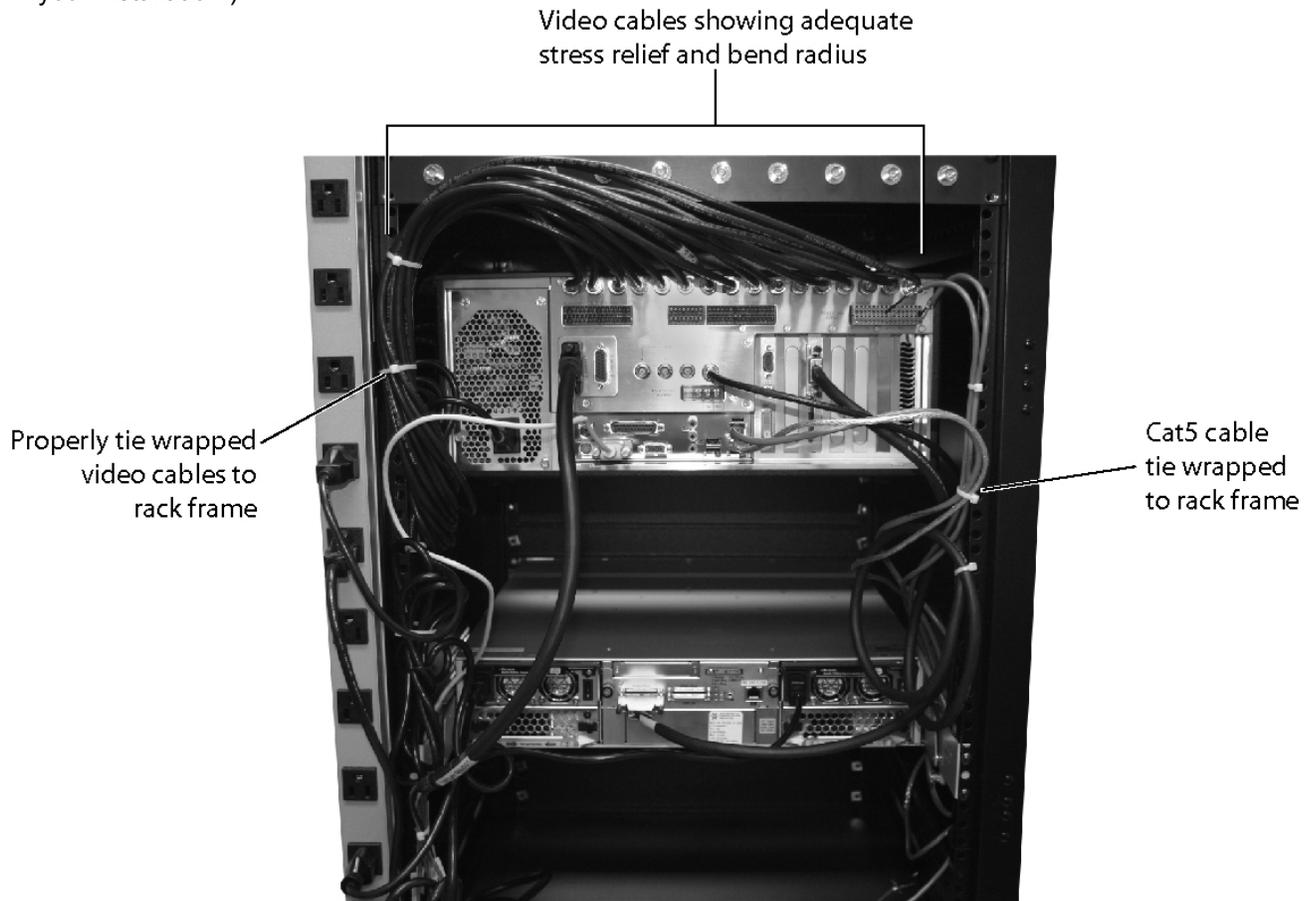
If you are using a video signal amplifier between the camera and Kollector, verify good picture quality from video source to destination. Remember that amplifying a noisy signal does not only amplify the signal but the noise as well. A noisy video signal will affect the Kollector unit's recording and performance, causing poor video quality and high storage consumption.

Good Cabling Practices

A neatly cabled unit is also a good performing device. It is imperative to follow good cabling practices to avoid the pitfalls of signal loss, broken cables, intermittent signals, etc. Generally speaking, the following are basic dos and don'ts:

- DO NOT make tight cable runs! DO leave plenty of slack in cables, provide stress relief and never exceed the minimum bend radius of any cable.
- DO make use of tie wraps in the anchoring of cables. Be careful not to over-tighten them. DO NOT tie wrap cables together without anchoring them to the rack. DO use a Velcro wrap around all CAT5 type cables at the point of tie wrapping to the rack.
- DO attach clearly printed labels to each cable wire. This practice makes cable verification and troubleshooting much easier.

The following photograph shows a properly cabled rack installation including a Kollector unit and a RAID storage unit. (The models of Kollector and RAID shown are just examples and may not reflect the actual unit in your installation.)



Unit Data Storage Considerations

NVR/Kollector units store their video and audio files on internal hard drives. These hard drives are dedicated to data file storage, separate from the operating system hard drive. When these drives become full of data, they are configured to overwrite the oldest data. This is called FIFO, or first-in-first-out, format. It is important to select a model with the proper hard drive capacity to satisfy the required video and audio time storage requirements. For example, most businesses and agencies have requirements for 1 month to 1 year of video and audio data storage before the old data begins to be overwritten with new data.

There are many variables that can directly affect the recording performance. The performance is measured in hard drive consumption, system network bandwidth and fps capability of the recorder. The parameters below can be fine tuned to optimize recorder performance. These factors are as follows:

1. **Number of Cameras Recorded:** The number of recording cameras directly affects the system's performance. Therefore, any cameras that do not require recording should not be recorded. These cameras can be dedicated to live view and are most commonly used by security operators for site patrol. Fewer recording cameras will use less hard drive space.
2. **Number of Microphones Recorded:** The number of recording microphones also directly affects the system's performance. Therefore, any microphones that do not require recording should not be recorded. Again, these microphones can be reserved by security operators for 2-way communication with other security staff.
3. **Number of Recording Hours per Day:** Whether video or audio, the number of recording hours directly affects system performance. Therefore, it is highly recommended to establish scheduled macros for precise planning of recorded activity. The video charts provided have a vertical axis of GB/Day. However, when a Kollector is configured with scheduled macros, cameras and microphones can be programmed to record for portions of a day. Fractional days of recording will use less hard drive space, system bandwidth and fps usage.
4. **Amount of Motion in Each Scene:** The amount of motion in any scene is directly proportional to system performance. A scene with 20% motion will use fewer resources than a scene with 80% motion. There are also subtle attributes of a scene that can be related to performance such as the speed of the motion, the range of the motion, the change in background lighting, the change in colors, etc. In an effort to quantify these factors, we have established levels of motion as follows:

Very High: This is the highest activity level. This activity level is found on a busy casino floor. This would be defined as a scene with large numbers of moving people in varied traffic patterns with a dynamic color background and flashing lighting.

High: This is an above average activity level. This activity level is found in a shopping mall. This would be defined as a scene with large numbers of moving people in similar traffic patterns with a moderate color background and contrasted lighting.

Normal: This is an average activity level. This activity level is found in an office environment. This would be defined as a scene with small numbers of people either stationary in groups or with moderate movement under static lighting conditions with little varied color.

Low: This is a below average activity level. This activity level is found in a typical building corridor. This would be defined as a generally static scene with an occasional person passing by and unchanged lighting with very bland colors.

5. **Camera Quality Settings:** The camera quality settings also affect system performance. The settings range from 1 to 8, 1 being the highest and 8 being the lowest. It is important to record only the minimum quality that captures the required information. For example, if it is desired to view the general activity in a hallway, the quality level should be set to a low value. If it is required to clearly read license plate numbers from vehicles, the quality should be set to a higher value. The table shows our current recorder quality settings.

For assistance in estimating the required storage, please contact Vicon Sales.

Network Requirements

The ViconNet system relies on the network to transfer video, audio and data. To optimize system performance, the network should be specified and built according to the standard for Ethernet network known as IEEE802.3. Within this standard, specifications for the following items should be followed:

- The maximum cable length of any single CAT5 type cable should be 246 ft (75 m) maximum (including wall to equipment cable lengths).
- It is highly recommended to use switched hubs, or switches, in place of standard hubs. These intelligent switches will reduce data collisions on the network and increase throughput.
- It is also recommended to use a dedicated physical network for video security. It is not recommended to mix the video security network and a corporate data network, as this will reduce required bandwidth for video files and, in some instances, breach security. If a separate physical network is not possible, it is recommended to setup the video network on a different network segment with the use of routers and addressing schemes.
- The minimal requirement for an Ethernet network is 100 Mbps and it is recommended to use a Gigabit Ethernet network (1 Gbps) where possible. NVR/Kollector units are provided with a 100/1000 Mbps network card.
- Test your network performance to assure it is not congested using a network sniffer. Make sure that a large data chunk PING (ping X.X.X.X -l 30000) from station to station is stable and without timeouts.

Routers and Firewalls

The ViconNet application utilizes TCP transmission protocol. For supportive tools like remote software installation, a few UDP ports are also used. The following table lists the protocol and ports currently used by the application:

Open Ports	Closed Ports
TCP: 4354, 4355, 4356, 4357, 4358, 4359	All other Windows ports
UDP: 4354, 4355, 4356, 4357, 4358, 4359	All other Windows ports

The ViconNet IP devices are using Ethernet broadcast for the auto-discovery feature, which allows locating them in the network even before initial configuration. Please be aware that this mechanism cannot cross the segment boundary unless you configure your router to forward broadcasts. If the ViconNet application is installed in a manner that requires it to cross the corporate firewall, it is required to open the ports listed in the table for the ViconNet systems.

Internet/Intranet (WAN) Requirements

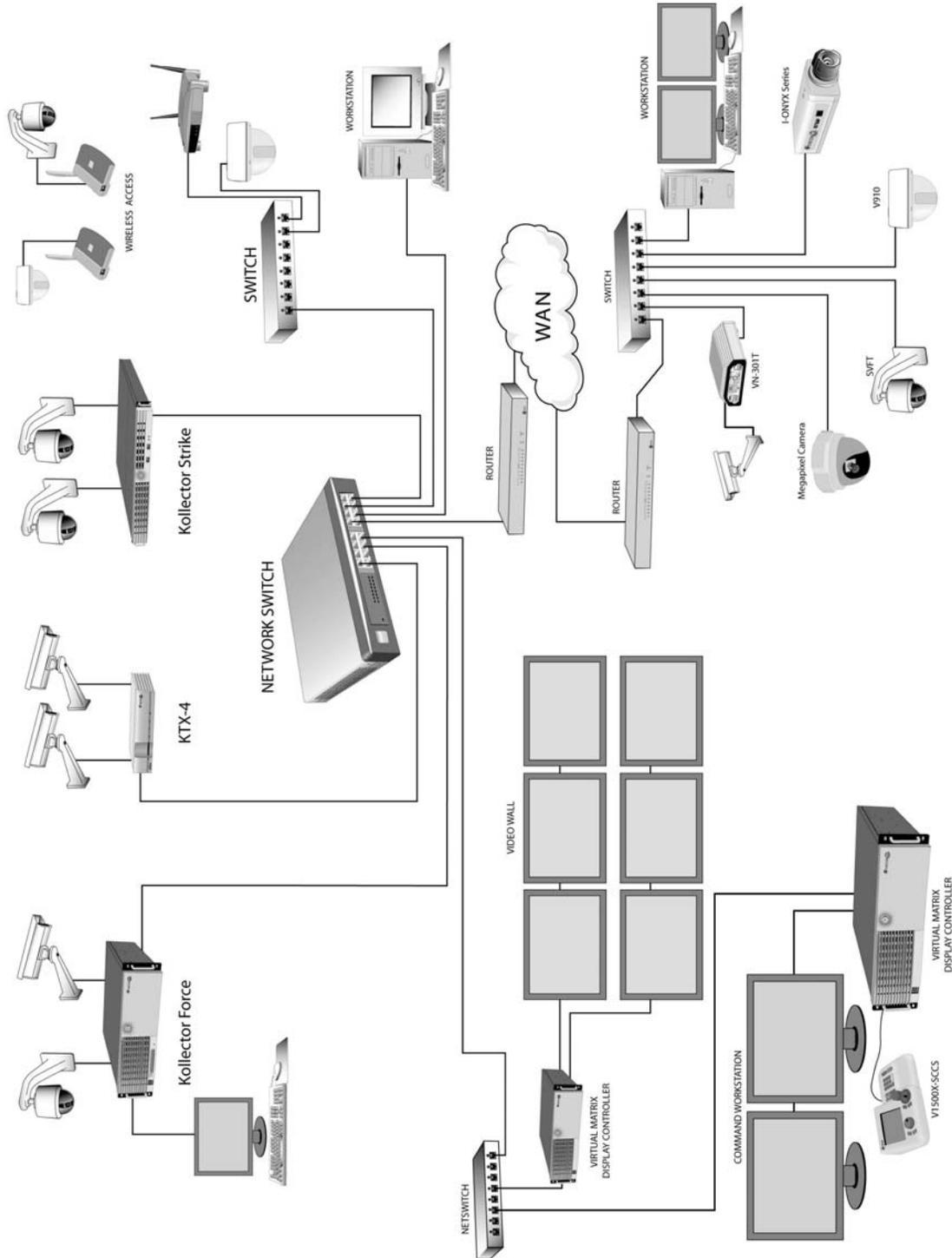
ViconNet can be used over any type of network configuration using TCP/IP protocol including Intranets, WANs and the Internet itself. When used on any network other than the Internet, a minimal amount of security precautions need to be taken. However, the Internet is an environment rich in security violations in the form of viruses and hackers.

Therefore, Vicon strongly suggests the use of a hardware firewall and router. This is the best protection against Internet security violations. In addition, it is suggested to use Microsoft® XP Embedded Personal Firewall software. This software module is available in certain versions of the Windows XP Embedded operating system. To find the XP Embedded version, exit the ViconNet application by using the Exit-to-OS button from the Site Configuration window. At the desktop, the version will be displayed in the lower right corner.

1. All XP Embedded versions lower than or equal to D2, E2, F2, G1 and J will have the Personal Firewall module. However, they will require configuration. Refer to Tech Note TN019 for information on setup.
2. All Embedded versions higher than D2, E2, F2, G1 and J will have the Personal Firewall module included and configured. However, these versions will not include setup of the feature ICMP, which will allow an incoming echo request (ping) command. Refer to Tech Note 1400-0001-62 for information on setup.
3. In XP Embedded versions K and higher, the Personal Firewall module will be installed and configured. In addition, this version will provide the feature ICMP, which will allow an incoming echo request (ping).

The Personal Firewall will block all Windows known open ports.





ALL NETWORK RECORDERS
CAN SHARE VIDEO OVER THE
IP ENVIRONMENT

Workstation Requirements

The ViconNet software was designed to be installed on a consumer-grade PC for use as a system workstation. A workstation running ViconNet software can view, record, playback and operate a Kollector recorder remotely. These are the workstation minimal requirements:

Operating System:	Microsoft Windows XP Professional, 32 bit or 64 bit; Windows 7 Professional 32 bit or 64 bit; Windows Server 2003 or 2008.
CPU:	Intel® Core™ Duo i5-660 3.33 GHz..
RAM Memory:	2 – 4 GB
DVD Drive	Internal DVD drive.
Ports :	7 USB ports, PS-2 mouse, PS-2 keyboard, serial (COM), VGA, RJ-45, parallel.
NVR Storage :	Internal 0.5, 1, 1.5, 2, 3, 5, or 6 TB, depending on model. Note that capacities can change frequently.
Network Interface:	100/1000 Base T Ethernet interface on main board.

3rd Party Software Statement

The ViconNet software runs on a specially compiled version of Windows XP Embedded that contains only specific modules necessary for the application. Any alteration of this configuration or file structure is forbidden unless approved in advance by a Vicon Technical Support representative.

The installation of any unapproved 3rd party software on any of the units is not allowed. Such installation on these devices can impede its real-time performance and cause the system to become unstable. Vicon Industries Inc. will not assume any liability for the loss of service, operation, or performance resulting from such installation and this action will void the warranty.

Software Version Compatibility

It is important to verify that the entire ViconNet network is using compatible versions of ViconNet software. When incompatible versions are used, there will be trouble with video display, storage and remote control of recorders. The ViconNet software version can be found at the top of the Main Screen in the software.

When setting up a ViconNet network, it is advised to use the same or similar versions of ViconNet software. A backup version of the ViconNet application is included on the CD with each unit and can be used to upgrade existing units when adding onto a system.

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