Versus Information System

User Guide

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Contact Versus Technology Customer Support for a complete listing of US and Foreign Patents and Patents Pending that cover this product or its systems.

Versus Information System

Versus Technology, Inc. uses patented infrared and radio frequency technology to deliver precise location-specific information.

The Versus Information System is marketed directly to medical facilities and through a network of authorized distributors.

Because Versus Technology, Inc. is constantly improving its products, specifications within all Versus manuals are subject to change without notice.

Versus User Guide
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Modifying or tampering with the transceiver's or receiver's internal components can cause a malfunction, invalidate the warranty, and will void your FCC authorization to use these products.

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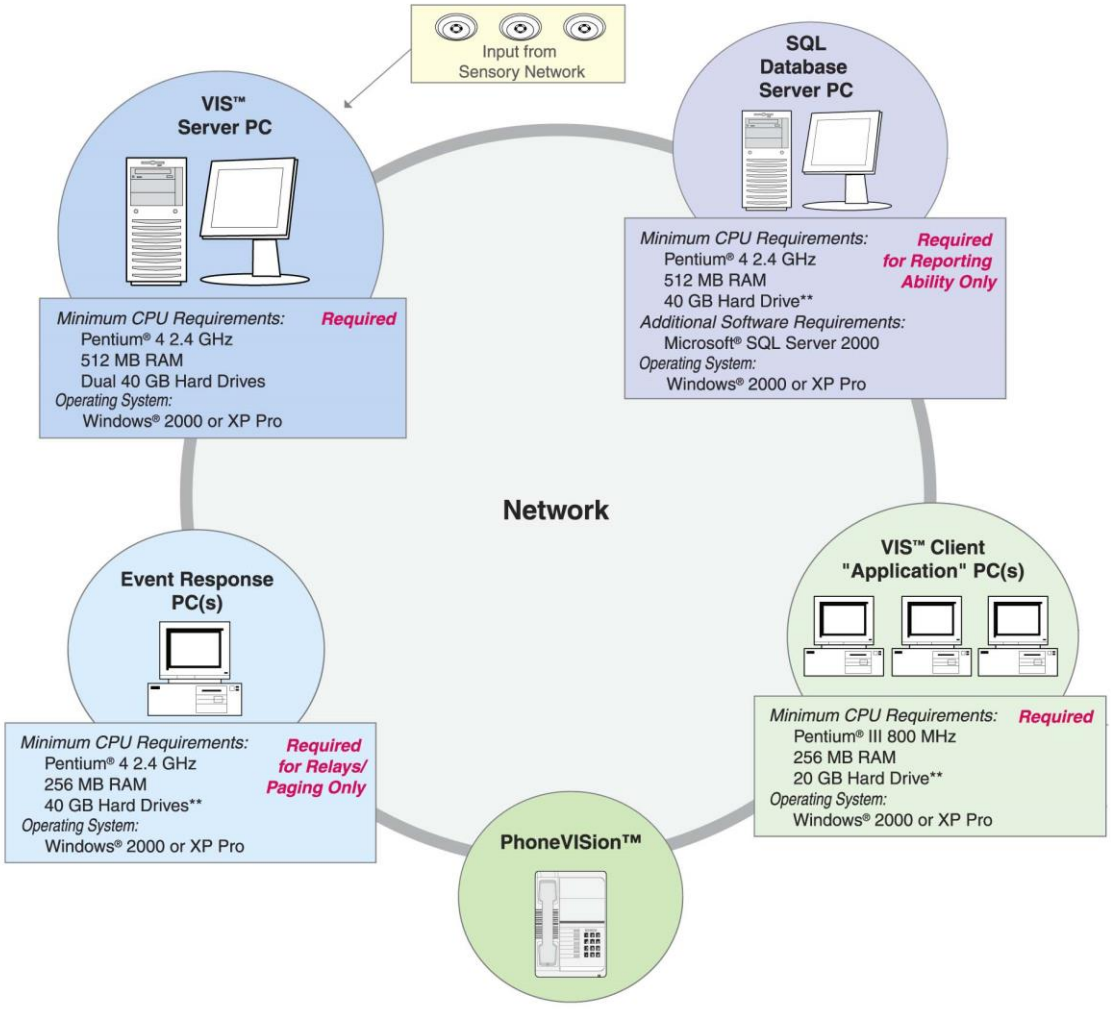
1. Introduction

1.1 Purpose of This Guide

This document is intended to provide information about the components of a Versus Information System. Read this entire document before proceeding with the installation. A general understanding of wiring and telephone installation techniques is assumed.

1.2 Computer Requirements

The Versus software runs in the Microsoft Windows 2000 (or greater) or XP environments, and requires a computer system with reasonable capacity and speed.



1.2.1 Server Computer Requirements

The **minimum** computer requirement for the server computer running the Data Server, Badge Server, and Configuration Utilities are as follows:

Operating System	Windows 2000 or XP, Pro or Server version recommended
Processor	Current shipping model or better
Memory	512 MB RAM or more, depending on operating system
Hard drive	40 GB or equivalent
2nd Hard Drive	40 GB hard drive for purpose of redundancy
Floppy Disk Drive	3.5 1.44 MB
CD-ROM	48X CD-ROM or better, CD-RW optional
Sound Card	Standard sound card or better (optional)
Speakers	Standard Speakers (optional)
Network Card	Standard Ethernet Card
Modem	56K Data/Fax Modem (optional)
Tape Backup	10/20GB, SCSI, Travan-5 or Equivalent (recommended)
UPS	UPS recommended

These are minimum requirements only; additional resources may be needed depending on the size of the system.

1.2.2 Computer Workstation Requirements Including Relay Controlled Devices

As part of the Versus Information System, relay-controlled devices (such as corridor lights) can be connected to relay boards, which are then connected to a computer that contains a relay control board. The computer that contains the relay control board will also have the Relay Control software installed for configuring the relays.

The computer requires a PCI slot for the PCI-DIO96H relay controller card. One PCI-DIO96H relay controller card can have two CIO-ERB48 relay boards connected to it. One workstation can have up to five PCI-DIO96H relay controller cards installed, assuming there are five PCI slots available in the computer. This means that one computer could control up to 480 relays.

Operating System	Windows 2000+ or XP, Pro or Server version recommended
Processor	Current shipping model or better
Memory	256 MB RAM or more, depending on operating system
Hard drive	40 GB or equivalent
Floppy Disk Drive	3.5 1.44 MB
CD-ROM	48X CD-ROM or equivalent, CD-RW optional
Sound Card	Standard Sound Card
Speakers	Standard Speakers
UPS	UPS recommended
Network Card	Standard Ethernet Card
PCI Slot(s) ***Required for relay applications***	One PCI slot required for every 96 relays. Computer case large enough to house a 12-inch relay card. 5 cards can be installed in one computer, assuming 5 PCI slots are available.
Relay Control Card ***Required for relay applications***	PCI-DIO96H

1.3 Terms and Definitions

The following terms will be used throughout this hardware installation guide to refer to system components and modes of operation.

Bridging Clip – A small metal clip used in a Punch-down Block to short the left-hand columns to the right hand columns of punch-down terminals.

Collector – This device gathers the tracking data from as many as 24 Sensors, processes it as required, and sends it via the 2-pair collecting network to the Ethernet Concentrator. Each system must contain at least one Collector, and many systems will contain more than one.

Ethernet Concentrator – This device provides an interface between the 2-pair network that connects Collectors together (the "Collector Network") and the computer system. It assembles the data from the various Collectors and bundles it for delivery to the host computer. Each system must contain at least one Ethernet Concentrator, and many systems will contain only one.

Impedance – A measure of a characteristic of wire that is very important when digital data signals are to be sent over the wires at high speeds. All wires have impedance determined by their makeup and twisting called the "characteristic impedance" of the wire. Most solid twisted pair wire is about 100 ohms impedance, and the coaxial cables used are 50, 75, or 93 ohms.

Sensor – A device that gathers infrared (IR) light or radio frequency (RF) energy and converts it to an electrical signal, which is then sent over a single pair of wires to a Collector.

Sensor Connection – A single-pair cable that connects a Sensor to a Collector port. All of the Sensor connections in a system may be referred to as the "Sensory Network."

Plenum – Any area that serves as a duct or passage for breathable air. Many office buildings use the space above the suspended ceiling as a return air "plenum" for the heating and air conditioning systems. Most laws require any cables that run in an air plenum to be made of materials which will not burn, or which will not release toxic gases when burned.

Punch-down Block – This device is used to connect Sensor wires to the Collector in an organized fashion. A special tool is used to "punch" the wire onto the Punch-down Block terminals, which causes the terminals to penetrate the wire insulation and cut off excess wire in one easy step. Punch-down Blocks are the preferred method of connection for solid wire in telephone systems.

RJ – Acronym for Registered Jack. Versus uses some modular-style connectors identified by their 'RJ' designations. RJ-11 is a generic term, often used to refer to a six-position jack, though it specifically refers to a single-pair connection in a six-position shell. RJ-12 refers to a two-pair connection in a six-pair shell, and RJ-25 refers to a three-pair connection in a six-pair shell.

Shielded Wire – A type of wire wrapped in a braided or foil shield that protects it from electrical interference. Use of shielded wire may be the only solution in a very high-noise environment.

STP – Acronym for Shielded Twisted Pair. This is wiring usually used in audio system installations where electrical interference is a prime concern (see Shielded Wire).

Twisted Pair – The wire used to interconnect Sensors, Collectors, and interfaces is twisted into pairs to make the wire characteristics more uniform and to cancel out many types of interference to which the wires might be subjected (see **UTP**).

USOC – Acronym for Universal Service Ordering Codes. The connectors and wiring adhere to the USOC wiring practices standard wherever possible.

UTP – Acronym for Unshielded Twisted Pair. This is the typical solid, paired wire used in phone system installations. It has no outer shield layer (see **Twisted Pair**).

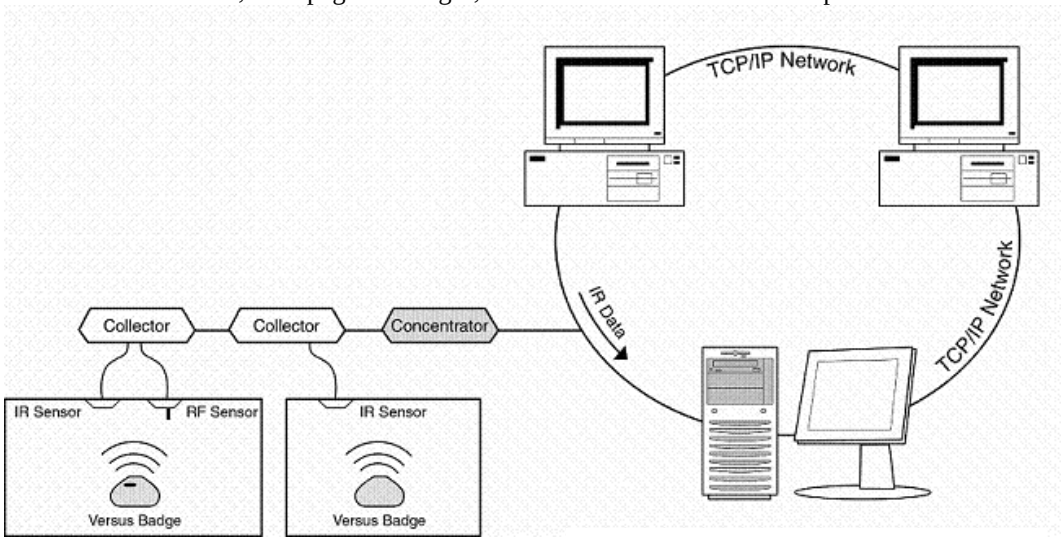
1.4 Versus Hardware Parts List

Part Number	Description
VER-0005	Badge Tester
VER-1770	IR Locator Badge
VER-1780	IR/RF Personnel Alert Badge
VER-1810	IR Asset Tag
VER-1830	IR/RF Asset Tag
VER-188x	Mini Asset Tag
VER-1875	RF/PAS Asset Tag
VER-1920	IR/RF Flex Badge
VER-2032	Ethernet Concentrator
VER-2032-DHCP	DHCP Ethernet Concentrator
VER-2404	Collector
VER-2404-DHCP	DHCP Collector

Part Number	Description
VER-3010	Digital I/O Board
VER-3015	External Relay Board
VER-3500	Perimeter Alarm Sentinel
VER-3600	Wiegand Converter
VER-4426	IR Sensor
VER-4440	Auto Assigner
VER-4442	Supervised Sensor
VER-4444	PC Sensor
VER-4452	RF Sensor
VER-4060	Remote Station
VER-4065	Remote Station with Pull Cord Chain
VER-4070	Remote Station with ¼” Jack

2. System Description

The Versus Information System is a reliable, flexible platform for locating people and equipment indoors. The system badges, worn by people or attached to assets, emit infrared (IR) or a combination of infrared and radio frequency (RF) signals that contain information about the badge. The information is sent through the sensory network to a host computer that retrieves the information and translates the data into names of rooms, people, and equipment. Workstations on a LAN throughout the facility can access the location data with various client software programs, which display the current locations of people and equipment. In addition, the system can display alarms on the monitor, send pager messages, and store data for later use in reports.



System Structure

Dedicated Versus Server installed with the Badge Server, Data Server, Configuration Utilities, and optional software such as the Event Monitor

2.1 Infrared (IR) Tracking

The use of infrared (IR) signals for tracking has distinct advantages, since it allows accurate locating via signals that will not penetrate walls or floors. A system of strategically placed IR Sensors receives IR signals as badges move between rooms or areas of a building.

2.2 Radio Frequency (RF) Signals

In addition to the IR signal, a low-power radio frequency (RF) signal is incorporated into some badges. RF signals penetrate walls and ceilings, allowing the RF signal to act as a backup if the IR signal is blocked. If the IR signal is blocked and an RF Sensor receives the RF signal, the last known IR location of the badge continues to display. In addition, the RF signal can be used in a supervisory capacity to indicate a low-battery status or button press information, and can trigger the Versus system to activate a pre-programmed response. RF badges and Sensors can also be used for other purposes.

2.3 System Hardware Components

The Versus Information System is made up of a network of badges, Sensors, Collectors, and Ethernet Concentrators.

2.3.1 Badges

Badges send infrared (IR) and/or radio frequency (RF) signals to Sensors that are usually installed in the ceilings of rooms. This signal contains encoded digital information that is used to identify and obtain the status of the badge. Motion, timing, battery state, and auxiliary information are all included in the signal.

Badges are worn by people or attached to equipment, and Remote Station units are affixed to walls. Badges can include IR, RF, or both IR and RF technology, depending on the needs of the facility. Some badges also include a button for alarm notification. Consult the badge specification sheets for more information on battery and component functions.

2.3.1.1 Infrared (IR) Badges

IR badges use near-visible light to communicate with the IR Sensors, so the signal can be blocked from reaching the Sensors by clothing or obstacles. This is the same technology used to operate a television remote control. Just as the television remote control cannot be expected to change the channel on a set in the next room, the IR badge signal should not be expected to be received if the badge is covered or hidden from view of the Sensor.

IR-only tags can be used for locating people or equipment. These badges are ideal for locating applications in which location is required, but communication or alert capabilities are not needed.

IR Locator Badge (VER-1770)

The IR Locator Badge sends infrared signals from two emitters located in the “window” on the front of the badge case. The signals are directed upward and somewhat forward at a wide angle to be received by the Sensors. Better performance occurs by keeping the badge in an upright position.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477 lithium 950 mAH)

IR Asset Tag (VER-1810)

The IR Asset Tag can be affixed to equipment and other assets. The tag emits digitized light signals that relay the badge’s unique identification code to the system and provides location information about the item within a facility.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477 lithium 950 mAH)

2.3.1.2 IR/RF Badges

In addition to sending IR signals, IR/RF badges have the added feature of sending radio frequency signals that are received by RF Sensors.

RF signals are used in a supervisory capacity in cases when IR signals are obstructed from view. RF is also responsible for sending alarms and call signals that are triggered when a badge button is pressed.

IR/RF Personnel Alert Badge (VER-1780)

The Personnel Alert Badge uses IR and RF technologies. It is also equipped with a call/alert button that, when pressed, fires IR and RF signals, which can notify the system to activate a customizable, pre-programmed response.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477 lithium 950 mAH)
- RF Frequency – 433.9 MHz
- IR Wavelength – 875 nanometers

IR/RF Asset Tag (VER-1830)

The Asset Tag uses IR and RF technologies. It is used to identify the current location of portable assets.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477 lithium 950 mAH)
- RF Frequency – 433.9 MHz
- IR Wavelength – 875 nanometers

NOTE: The Asset Tag's RF functions may be limited if the tag is affixed to metal—Versus recommends that the tag be used on non-metal surfaces or with a bracket.

IR/RF Mini Asset Tag (VER-188x)

Like the Asset Tag, the Mini Asset Tag uses IR and RF technologies to identify the current location of portable assets. The smaller size and round shape of this tag make it suitable for smaller surface mounts.

- Battery Type – 3.0 V lithium coin cell (industry type CR2450 lithium 620 mAH)
- RF Frequency – 433.9 MHz
- IR Wavelength – 875 nanometers

NOTE: The Mini Asset Tag's RF functions may be limited if the tag is affixed to metal—Versus recommends that the tag be used on non-metal surfaces or with a bracket.

IR/RF Flex Badge (VER1920)

The Flex Badge uses IR and RF technologies. Like the Personal Alert Badge,

it is also equipped with a call/alert button that, when pressed, sends IR and RF signals, which can notify the system to activate a customizable response. The Flex Badge ships with a hook and loop band, allowing it to be worn like a wrist watch or suspended from a standard bulldog clip.

- Battery Type – 3.0 V lithium coin cell (industry type CR3032 lithium 500 mAH)
- RF Frequency – 433.9 MHz
- IR Wavelength – 875 nanometers

2.3.1.3 Radio Frequency (RF) Badges

RF/PAS Asset Tag (VER-1875)

The RF/PAS Asset Tag uses radio frequency (RF) signaling technology in combination with Versus' Perimeter Alarm Sentinel (PAS) technology to secure portable assets from unauthorized removal. PAS technology provides security, but not location. The PAS component causes the tag's RF signal to send an alarm when the tag enters a PAS zone, thereby signaling unauthorized removal of a tagged item from a specific area.

- Battery Type – 3.0 V lithium coin cell (industry type CR2477 lithium 950 mAH)
- RF Frequency – 433.9 MHz

The RF/PAS Asset Tag must be used in combination with the Versus PAS Unit (VER-3500), which is installed in a portal or doorway area to create a protected PAS zone.

NOTE: The Asset Tag's RF functions may be limited if the tag is affixed to metal—Versus recommends that the tag be used on non-metal surfaces or with a bracket.

Remote Stations
(VER-4060 w/ Button, VER-4065 w/ Pull Cord, VER-4070 w/ Jack)

This small, wireless, radio frequency (RF) device can be mounted on a wall or other non-metal surface using an electrical outlet box (sold separately). The standard unit includes a button for call capabilities, but is also available with either a pull cord or ¼-inch jack for standard call cord attachments (sold separately).

When activated by pressing the button, pulling the cord, or initiating the call cord attachment, the device sends an RF signal to notify the Versus System to activate a customizable preprogrammed response. In addition, when the unit is activated, an LED illuminates and a magnetic buzzer sounds to provide both visible and audible feedback.

By default, the unit has a red button and red LED that can be customized to yellow or green on request. Please specify preferred alternative color.

- Battery Type – (4) AAA alkaline batteries
- RF Frequency – 433.9 MHz

RF Event Tag (VER-3520/22)

The Event Tag, using Radio-frequency Identification (RFID) signals, continually monitors for an activity and notifies the Versus system that a specific event has been initiated at that tag location. The Event Tag monitors for dry-contact closures, motion switch activity and/or passive IR detection.

When such an event is detected, the Event Tag relays the event information to the Versus system. For example, a resulting message might be: "Crash Cart #4 located in Hallway 2East. Door was opened at 2:15am on 10/12/11.

Additionally, upon detecting an event, the Event Tag scans the immediate vicinity for a Versus RTLS Badge or Tag and, if detected, relays the identity of the badge tied to the initial event. The scan will last for up to five (5) seconds. For example, a resulting message might be: "Soap dispenser #235 located in Patient Room 2030 was activated at 9:20pm on 10/12/11 by RN25 Smith."

- Battery Type – 3.0 V AA (industry type lithium 2400 mAH)
- RF Frequency – 433.9 MHz

NOTE: The Event Tag's RF functions may be limited if the tag is affixed to metal—Versus recommends that the tag be used on non-metal surfaces or with a bracket.

2.3.2 Sensors

Sensors receive signals from badges, convert them into electrical signals and pass the data along to Collectors. Up to 24 Sensors can be connected to a Collector, although Versus recommends no more than 20-22 initially to allow for future expansion. Sensors are usually mounted in the ceiling tiles of a facility, or they can be placed in standard electrical junction boxes where required by local building codes.

2.3.2.1 Infrared (IR) Sensor (VER-4426)

IR Sensors receive IR signals from badges and convert them into electrical signals. A single unshielded twisted-pair wire transmits the signals to a Collector and provides the Sensor's operating power.

The VER-4426 Hi-Efficiency IR Sensor replaces the original VER-4422 IR Sensor. The new version is less susceptible to interference from outside IR and RF noise and fluorescent lighting. They also read low battery badges at greater distances. The Hi-Efficiency IR Sensor can be identified by its dim yellow Activity Indicator Light that blinks when an IR signal is received, and stays on when the Sensor is flooded by outside interference—a feature which can be a helpful troubleshooting tool.

The maximum run length from an IR Sensor to a Collector is 1000 feet. IR Sensors have 360-degree horizontal coverage, 180-degree vertical coverage, and 15-foot reception distance.

An additional focus ring can be installed inside the IR Sensor to narrow its pickup range to a smaller area, which can be useful in rooms with multiple patient beds or for pinpoint desk-to-desk coverage in a nurses' station.

2.3.2.2 Radio Frequency (RF) Sensor (VER-4452)

RF Sensors operate at 433.92 MHz receive frequency. They convert encoded RF signals emitted by badges into electrical signals, and send them to Collectors via a single unshielded, twisted-pair wire.

Planning the location of RF Sensors depends upon the facility. In most cases, for complete coverage, they can be placed approximately 100' apart, because they have a sensitivity range radius of approximately 50'. However, because concrete and steel structures absorb the RF signal, and other materials affect the strength of RF signals, testing is necessary to determine the best placement of RF Sensors.

2.3.2.3 Supervised Sensor (VER-4442)

The Supervised Sensor is an IR Sensor with the added ability to generate its own badge signal, allowing the Versus system to monitor the data delivery to its Collector. Using one Supervised Sensor per Collector, the Versus system can send an alert if a portion of the sensory network or facility intranet stops sending badge data. Utilization of this Sensor's supervisory capabilities requires the use of the Collector Checker software (included with the VER-8000 Data Server software) and Audio/Visual Services software (sold separately). The Supervised Sensor contains a red diagnostic LED that flashes when receiving IR signals, or stays lit when the Sensor is flooded by light.

2.3.2.4 PC Sensor (VER-4444)

The PC Sensor is an IR Sensor that can be attached to any PC computer to create a location zone. Unlike a standard IR Sensor, no hardwiring is necessary. Simply attach it to a computer's serial port, install the software, and you have a permanent or temporary location for use with the Versus Information System. The PC Sensor's range is 4-6 feet in front of the Sensor, and the computer to which it is attached must be running in order for it to sense badges. To accomplish a greater sensing range, a standard IR Sensor may be wired to the PC Sensor to be used externally. An RF Sensor may also be wired to the PC Sensor.

2.3.3 Collectors

After Sensors receive signals from badges and convert them to electrical signals, the data is passed to a Collector. The Collector accepts the inputs from the Sensors and assembles the inputs into larger, network-ready packets. The packets are then relayed to the Ethernet Concentrators.

Note: Although all Versus Collectors can support up to 24 Sensors, we recommend placing no more than 20-22 on each Collector at initial installation to allow for future expansion without having to add additional Collectors.

2.3.4 Ethernet Concentrators

Ethernet Concentrators are network devices that receive all data passed from Sensors through Collectors, format the data, and send it as a data packet to a computer over a LAN. Up to four Collectors can be connected to one Ethernet Concentrator. Each Ethernet Concentrator is assigned an IP address, which is how the data is communicated to the Data Server.

2.3.5 Optional Hardware

Badge Tester (VER-0005)

A Badge Tester tests the battery and auxiliary information from the badge. It will indicate whether a valid IR packet is received and if the battery needs to be replaced. If a valid IR packet is received, the tester will display all badge details and flash a red LED in the corner. Badge information includes the badge number, T-count, button press state(s), motion state, and battery state. The tester does not test RF function.

Auto Assigner (VER-4440)

The Auto Assigner makes the badge assignment process fast and easy. By placing a Versus IR or combination IR/RF badge under the unit, the Versus Badge Wizard automatically pops up on the computer screen and fills in the badge number field without the need to manually type in each badge number during the assignment process. Requires the Event Monitor software.