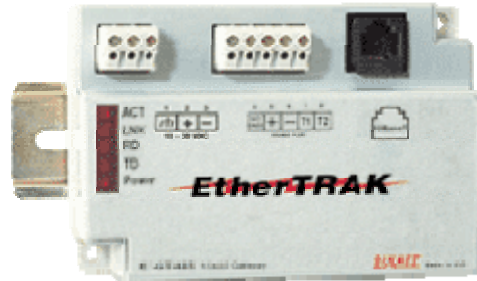# Sixnet

USER MANUAL

EtherTRAK®
Industrial Ethernet
Ethernet to Serial Gateways

Ethernet to Serial Converters for Modbus, Sixnet and other protocols

Contents at a Glance:

This manual applies to the following Sixnet products:
ET-GT-232-1 and ET-GT-485-1

Important Note:
Units prior to Nov. 2004 only support the Modbus and Sixnet protocol. Units shipped after Nov. 2004 (date codes of 239 and higher) have the ability to pass many protocols. Sixnet is offering a 30-day FREE trial for you to see if these units will work in your application. Contact Sixnet for details.

Protected Technology Policy

Sixnet protects your investment in Sixnet systems with long-term planned technology and our unique Protected Technology Policy. We will continue to support the specified capabilities of standard Sixnet products for at least five years. We plan each product improvement and new feature to be upward compatible with existing designs and installations. Our goals are to make each new software release bring new power to your Sixnet systems and have every existing feature, applications program and data file continue to work.

We protect your investment even further with a liberal five-year trade-in policy. Exchange standard products for upgraded versions of the same product to take advantage of new features and performance improvements at any time for five years. A prorated trade-in allowance will be given for your existing equipment.

Sixnet protects your long-term productivity with state-of-the-art planned technology and continued support.

Sixnet Statement of Limited Warranty

Sixnet LLC, manufacturer of Sixnet products, warrants to Buyer that products, except software, manufactured by Sixnet will be free from defects in material and workmanship. Sixnet' obligation under this warranty will be limited to repairing or replacing, at Sixnet' option, the defective parts within one year of the date of installation, or within 18 months of the date of shipment from the point of manufacture, whichever is sooner. Products may be returned by Buyer only after permission has been obtained from Sixnet. Buyer will prepay all freight charges to return any products to the repair facility designated by Sixnet.

Sixnet further warrants that any software supplied as part of a product sale, except obsolete products, will be free from non-conformances with Sixnet published specifications for a period of 90 days from the time of delivery. While Sixnet endeavors to improve the features and performance of software associated with its products, no effort on the part of Sixnet to investigate, improve or modify Sixnet software at the request of a customer will obligate Sixnet in any way.

For the convenience of existing customers, Sixnet continues to supply certain products that are classified as obsolete. No warranty on the software features of these products is stated or implied and Sixnet specifically is not obligated to improve the design of these products in any way. Information about the status of any product is available upon request and customers are advised to inquire about the status of older products prior to making a purchase.

This limited warranty does not cover losses or damages which occur in shipment to or from Buyer or due to improper installation, maintenance, misuse, neglect or any cause other than ordinary commercial or industrial applications. In particular, Sixnet makes no warranties whatsoever with respect to implied warranties of merchantability or fitness for any particular purpose. All such warranties are hereby expressly disclaimed. No oral or written information or advice given by Sixnet or Sixnet's representative shall create a warranty or in any way increase the scope of this warranty. This limited warranty is in lieu of all other warranties whether oral or written, expressed or implied. Sixnet 's liability shall not exceed the price of the individual units, which are the basis of the claim. In no event shall Sixnet be liable for any loss of profits, loss of use of facilities or equipment, or other indirect, incidental or consequential damages.

These products must not be used to replace proper safety interlocking. No software based device (or other solid state device) should ever be designed to be responsible for the maintenance of consequential equipment or personnel safety. In particular, Sixnet disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in any application.

> **Note:** All information in this document applies to EtherTRAK Ethernet to Serial Gateways, except where otherwise noted. Refer to the Sixnet I/O Tool Kit software online help system for detailed product specifications and configuration settings.

Section 1 | General Information

This manual will help you install and maintain Ethernet to Serial Gateways. In summary, wiring for power, communications and I/O is connected to each unit. Then, setup choices are entered using the Remote I/O Tool Kit software and the system will be ready to run.
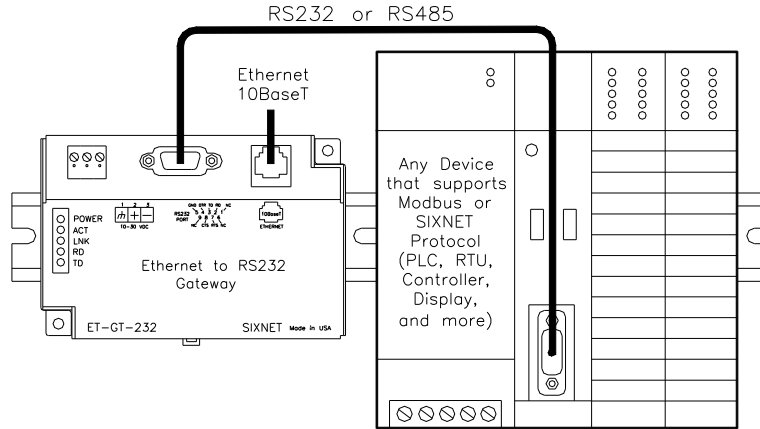
Use these EtherTRAK Gateways to connect one or more Modbus or Sixnet serial devices to Ethernet via RS232 or RS485.

Performance Specs

These general specifications apply to all EtherTRAK gateways. Refer to the individual data sheets or the Sixnet electronic catalog for complete specifications.

Supply Voltage	10 - 30 VDC, 0.5 Watt typical (25 mA @ 24 VDC)
Ethernet Protocols	Modbus/TCP, Modbus/UDP, Sixnet/UDP and others
Serial Protocols	Modbus ASCII, Modbus RTU, Sixnet and others
Ethernet Isolation	1200 Volts RMS (for 1 minute)
Operating Temperature	-30 to 70 °C
Storage Temperature	-40 to 85 °C
Humidity	5 to 95% (non-condensing)
Screw Terminals	14 AWG max. (tighten to 3.48 in-lbs. Max.)

Power Wiring

EtherTRAK gateways can be powered from the same DC source that is used to power your I/O devices. 10 to 30 VDC needs to be applied to terminals 2 and 3 of each gateway. Refer to the wiring diagram for each gateway for more information.

The RM-PS-024-01 can be used to power your EtherTRAK gateways, instrumentation loops, and other devices. It operates on 85-264 VAC (47-63 Hz) or 120-370 VDC and outputs 24 VDC at up to 1 A. Refer to its data sheet for details. Refer to the figure below for the power connections.
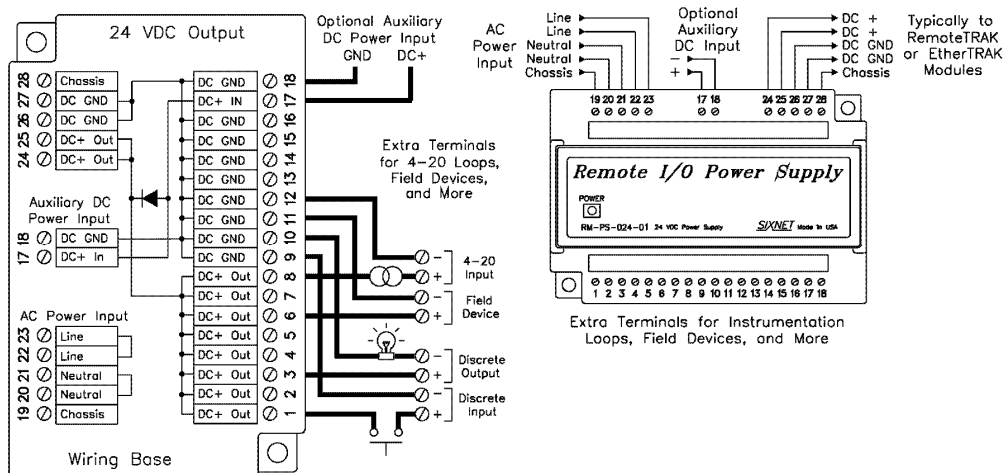
Status LED Indication

On, with a quick "OFF" BLINK (1.9 seconds ON, .1 seconds OFF) - The gateway is configured and fully operational, but has not received a valid request from the host for a time longer than the specified time out period. A communication time out has occurred.

Full ON - The gateway is configured, fully operational, and has received communication from the host device before the timeout period expired. **This is the desired LED indication during system operation.**

HALF BLINK (1 second ON, 1 second OFF) - The gateway is not adequately configured and requires a download from the Sixnet I/O Tool Kit program.

Full OFF - There is no power to the gateway, or the status LED is being turned off intentionally by the Sixnet I/O Tool Kit during the module loading operation.

Off, with a quick "ON" BLINK (1.9 seconds OFF, .1 seconds ON) - The gateway failed self-test at initialization. It will not attempt communication and should be replaced.

Status LED Wink Feature

The "Status" LED may be intentionally winked (10 blinks/ second) by the Sixnet I/O Tool Kit program to visually identify the gateway when other modules are present.

TD / RD LEDs

The Receive Data (RD) LED will be ON when characters are being sent out the serial port.

The Transmit Data (TD) LED will be ON when characters are being received into the serial port.

ACT / LNK LEDs

The activity (ACT) LED on an EtherTRAK gateway will flicker anytime there is traffic on the Ethernet network, regardless of whom the network messages are intended for.

The link (LNK) LED will be ON whenever a valid link to another Ethernet device is detected.

The best troubleshooting tools for EtherTRAK gateways are the Status, ACT, and LNK LEDs on each module.

Each EtherTRAK Status LED indicates the health of the module and also the status of communication from the host device. You can use the Wink feature to provide continuous transmission to an EtherTRAK gateway. Note that an EtherTRAK gateway does not send a reply in response to a Wink command.

Section 2 | Ethernet, RS232, and RS485 Wiring

Overview

EtherTRAK gateways communicate with a master device (such as a PC, SIXTRAK Controller, or VersaTRAK RTU) using 10BaseT Ethernet media. Electrical isolation is provided on the Ethernet port for increased reliability. Please follow normal Ethernet wiring practices when installing EtherTRAK gateways.
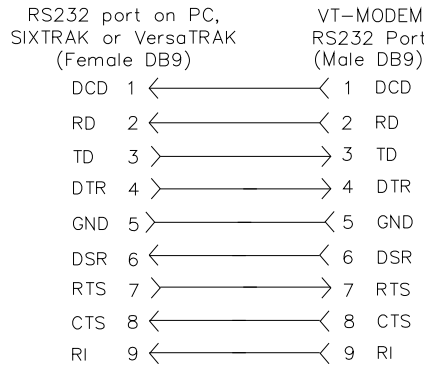
Each EtherTRAK gateway has either a RS485 (2 wire) port or RS232 port. Follow the wiring guidelines below to achieve reliable RS485 or RS232 communication with your device.

RS232 Wiring Guidelines (ET-GT-232-1)

The RS232 port on the ET-GT-232-1 is a female DB9 that follows the DCE pin-out convention. Refer to the diagrams below for connection details.

Gateway (DCE) RS232 Port	
Pin	Signal
1	DCD out
2	RD out
3	TD in
4	DTR in
5	Sig GND
6	DSR out
7	RTS in
8	CTS out
9	RI out

VT—CABLE—MDM
Cable for ET—GT—232—1 to RS232 Port
on PC, SIXTRAK gateway, or VersaTRAK RTU

RS232 port on PC, SIXTRAK or VersaTRAK (Female DB9) — VT—MODEM RS232 Port (Male DB9)

DCD	1	←	1	DCD
RD	2	←	2	RD
TD	3	→	3	TD
DTR	4	→	4	DTR
GND	5	→	5	GND
DSR	6	←	6	DSR
RTS	7	→	7	RTS
CTS	8	←	8	CTS
RI	9	←	9	RI

This cable is optionally available from SIXNET.

RS485 Wiring Guidelines (ET-GT-485-1)

The RS485 port on the ET-GT-485-1 supports 2 wire (plus ground) party-line connections. It is recommended that the ground wire be connected to all stations to provide a common return. The RS485 on this EtherTRAK gateway is isolated from its internal circuitry, local power source, and Ethernet port to improve communications reliability. It is recommended that only 32 RS485 devices be connected on any RS485 party-line, and that the termination be installed on the last device on each end of the RS485 network. Limiting the cabling to two network arms (segments) radiating from the master controller will yield the best signal results.
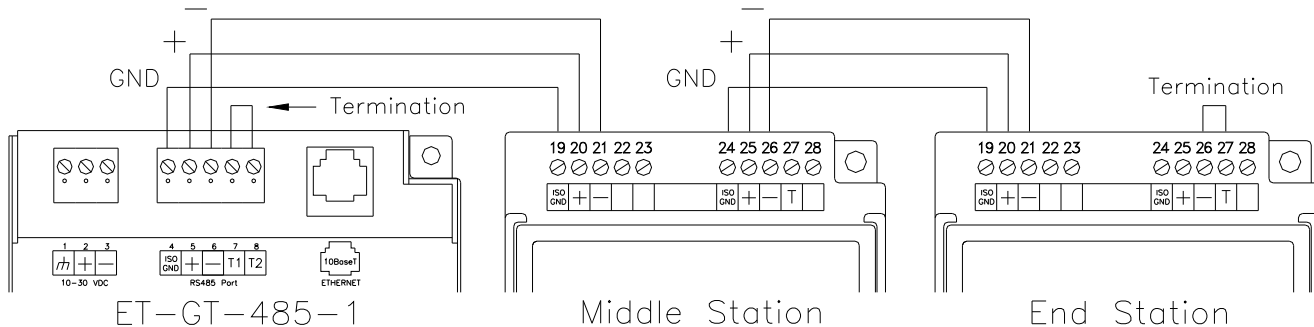
This diagram shows an example of two RemoteTRAK modules off of an Ethernet gateway.

Screw Torque

All the screw terminals on the base should be tightened to a maximum of 3.48 in-lbs.

Section 3 | Configuration

All configuration parameters are entered using the Sixnet I/O Tool Kit software, which stores all setup information into permanent memory in the EtherTRAK gateway. Configuration parameters are loaded to the gateway over Ethernet. Refer to the Sixnet I/O Tool Kit help for details.

Here are the basic steps for configuring an EtherTRAK gateway.

1. Connect power to the gateway.

2. Connect your Ethernet to the gateway. Use a straight-through cable if you are connecting the gateway to an Ethernet hub or switch. Use a cross-wired cable if you are connecting the gateway directly to a PC. Make sure the LNK LED on the gateway is on solid (not blinking).

3. Install and run the Sixnet I/O Tool Kit. Add an EtherTRAK gateway to your project. Select Configure Station/Module to define the parameters for the gateway. Make sure to:

    *   Choose an IP address that is appropriate for your network. See the help file for details.

    *   Enter in the serial number that is printed on a label on the gateway.

    *   Choose a station (slave) number for the gateway that is **unique** from other gateways and the device you are interfacing to.

    *   Select the appropriate RS232 or RS485 com parameters (protocol, baud rate, etc.) to match the device that you are interfacing to.

4. Once you've completed setting your desired parameters, save your project file, and go to the Operations menu and select Load. This should set the IP address in the gateway and then load down your other parameters.

    If this load fails, here are some items to check:

    *   Make sure the LNK LED is on solid. If it's off or blinking then a typical cause is a bad cable, an incorrect cable, or you are plugged into the wrong port on your hub/switch.

    *   Try to "ping" the gateway. Ping is a utility that comes with your PC. Go to a DOS window and type "ping" followed by the IP address of the gateway and then hit return. For example, "ping 10.1.0.1" (do not type the quotes). If you get an "unknown command" error then you need to install the TCP/IP Ethernet protocol on your computer. If you get "destination unreachable" then make sure the gateway's IP address is valid with respect to the IP address and subnet mask of your computer. If you get "request timeout" then check all the items above.

5. Once you establish that you can communicate with the gateway from the Sixnet I/O Tool Kit you then should attempt to communicate with your device using your master software (i.e. KepServer, Citect, Intellution, etc.).

Note 1: The EtherTRAK gateways do not convert protocols. If the gateway's serial port is configured for Modbus Passthru protocol then you must communicate to the gateway over Ethernet with Modbus/TCP or Modbus/UDP. If the gateway's serial port is configured for Sixnet Passthru protocol then you must communicate to the gateway over Ethernet with the Sixnet protocol.

Section 4 | Ethernet Gateways

ET-GT-232-1   Ethernet to RS232 Converter

ET-GT-232-1 Overview

This Ethernet to RS232 gateway is typically used in one of these situations:
- To connect an older Sixnet device such as an IOMUX or Versamux to an Ethernet network
- To connect a Modbus RS232 slave device to an Ethernet network
- To connect a Modbus RS232 master device, such as a display, to an Ethernet network
- To connect other slave RS232 devices to an Ethernet network
- To interchange between a telephone modem and Ethernet interface

Ethernet Protocols Supported	**Modbus/TCP, Modbus/UDP, Sixnet and others**
Serial Protocols Supported	**Modbus ASCII, Modbus RTU, Sixnet and others**
Supply voltage	**10 – 30 VDC, 0.5 watt typical**
Virtual Analog Outputs	**16**
Virtual Discrete Outputs	**16**

More information can be found in the on-line help of the Sixnet I/O Tool Kit program.

Power and RS232 Wiring

This gateway operates on 10 to 30 volts DC. Connect this power to terminals 2 and 3. Connect terminal 1 to a suitable earth ground.

In many cases a straight-through RS232 cable, such as the Sixnet VT-CABLE-MDM, can be used to connect the RS232 port of this gateway to a Sixnet or Modbus serial device.

This gateway can be connected to an Ethernet hub with a straight-through 10BaseT Ethernet cable. Use a cross-wired cable if you are connecting directly to a PC or other Ethernet master device.

I/O Registers

The ET-GT-232-1 has sixteen virtual discrete output registers and sixteen virtual analog output registers. These are provided so that a master RS232 Modbus device (such as a display) can pass register values over Ethernet to a computer or other device.

Function	Sixnet Registers	Modbus Registers
Discrete Outputs	Y0 – Y15	00001 – 00016
Analog Outputs	AY0 – AY15	40001 – 40016
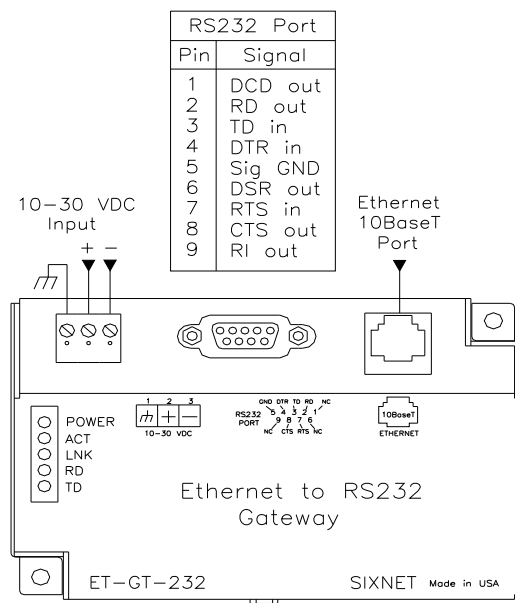
ET-GT-485-1   Ethernet to RS485 Converter

ET-GT-485-1 Overview

This Ethernet to RS485 gateway is typically used in one of these situations:
- To connect one or more Modbus RS485 slave devices to an Ethernet network
- To connect a Modbus RS485 master device, such as a display, to an Ethernet network
- To connect RemoteTRAK modules to an Ethernet network
- To connect other slave RS232 devices to an Ethernet network

Ethernet Protocols Supported   **Modbus/TCP, Modbus/UDP, Sixnet and others**
Serial Protocols Supported   **Modbus ASCII, Modbus RTU, Sixnet and others**
Supply voltage   **10 – 30 VDC, 0.5 watt typical**
Virtual Analog Outputs   **16**
Virtual Discrete Outputs   **16**

More information may be found in the on-line help of the Sixnet I/O Tool Kit program.

Power and RS485 Wiring

This gateway operates on 10 to 30 volts DC. Connect this power to terminals 2 and 3. Connect terminal 1 to a suitable earth ground.

Refer to the diagram below for RS485 wiring.

This gateway can be connected to an Ethernet hub with a straight-through 10BaseT Ethernet cable. Use a cross-wired cable if you are connecting directly to a PC or other Ethernet master device.

I/O Registers

The ET-GT-485-1 has sixteen virtual discrete output registers and sixteen virtual analog output registers. These are provided so that a master RS485 Modbus device (such as a display) can pass register values over Ethernet to a computer or other device.

Function	Sixnet Registers	Modbus Registers
Discrete Outputs	Y0 – Y15	00001 – 00016
Analog Outputs	AY0 – AY15	40001 – 40016
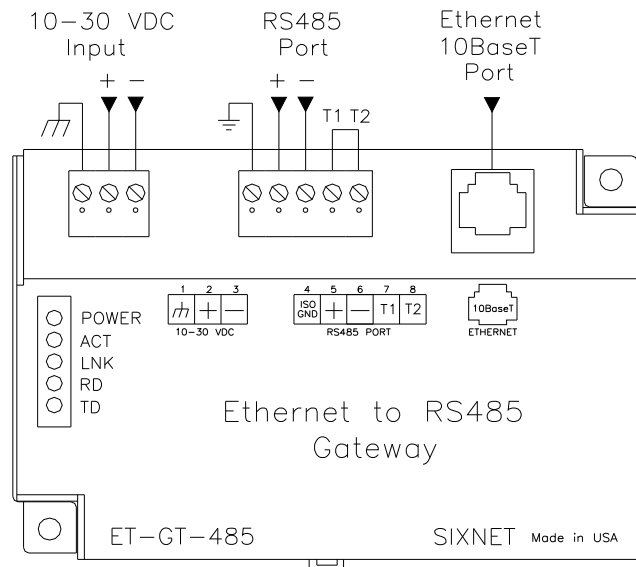
Section 5 | Operational Information

Modes of Operation

The EtherTRAK gateways have the following two main modes of operation:

Passthru Mode – This is the most common mode. In this mode the serial port is configured for Passthru operation and must be connected to a Modbus, Sixnet or other slave device. The serial port cannot be connected to a master device in this mode because it will not respond to unsolicited messages. The Ethernet port must be connected to a master device (via a switch or hub) such as a PC, PLC, or Sixnet controller/RTU. When the gateway receives a message on the Ethernet port from the master device it will look at the station number (or Modbus slave ID) in the Modbus or Sixnet message (embedded in a TCP or UDP packet). If the number is 0 or matches it's own then it will respond directly to the message. If the number is anything else then it will pass the message out the serial port. If the gateway is set for Generic Passthru then it will always pass the content of the Ethernet message. Please note that the gateway does not convert protocols so if the incoming Ethernet message is Sixnet protocol then it will get sent out the serial port as Sixnet protocol. If the incoming Ethernet message is Modbus then it will get sent out as Modbus ASCII or Modbus RTU depending on how the serial port was configured with the I/O Tool Kit software. The gateway will then send any response it gets on the serial port out the Ethernet port to the IP address of the originator. It will then process the next Ethernet message in its buffer.

Master to Master Mode – This advanced mode allows two master devices to use the EtherTRAK gateway to exchange I/O data. In this mode the serial port is configured for Slave operation and must be connected to a Modbus or Sixnet master device. This device then can write/read I/O data to/from the internal registers of the gateway. Another master device can then do the same on the Ethernet side. With this scheme the two ports can be using different protocols. The EtherTRAK gateways have 16 discrete output registers and 16 analog output registers that can be read or written.

Other Protocols

The EtherTRAK gateway supports Modbus, Sixnet and many other protocols. Sixnet cannot guarantee that all protocols will work. However, Sixnet does offer a 30-day FREE trial for you to see if these gateways are suitable for your application.

Section 6 | Service Information

Service Information

We sincerely hope that you never experience a problem with any **Sixnet** product. If you do need service, call **Sixnet** at (518) 877-5173 and ask for Applications Engineering. A trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call. If it is necessary to return a unit to us, an RMA (Return Material Authorization) number will be given to you.

Sixnet tracks the flow of returned material with our RMA system to ensure speedy service. You must include this RMA number on the outside of the box so that your return can be processed immediately.

The applications engineer you are speaking with will fill out an RMA request for you. If the unit has a serial number, we will not need detailed financial information. Otherwise, be sure to have your original purchase order number and date purchased available.

We suggest that you give us a repair purchase order number in case the repair is not covered under our warranty. You will not be billed if the repair is covered under warranty.

Please supply us with as many details about the problem as you can. The information you supply will be written on the RMA form and supplied to the repair department before your unit arrives. This helps us to provide you with the best service, in the fastest manner. Normally, repairs are completed in two days. Sometimes difficult problems take a little longer to solve.

If you need a quicker turnaround, ship the unit to us by air freight. We give priority service to equipment that arrives by overnight delivery. Many repairs received by mid-morning (typical overnight delivery) can be finished the same day and returned immediately.

We apologize for any inconvenience that the need for repair may cause you. We hope that our rapid service meets your needs. If you have any suggestions to help us improve our service, please give us a call. We appreciate your ideas and will respond to them.

For Your Convenience:
Please fill in the following and keep this manual with your **Sixnet** system for future reference:

P.O. #:_____ Date Purchased: _____

Purchased From:_____

Product Support

To obtain support for Sixnet products, call Sixnet and ask for applications engineering. Our phone numbers are:

    +1 (518) 877-5173 Office
    +1 (518) 877-8346 Fax
    mailto: support@sixnet.com
    web: http://www.sixnet.com

    Our mailing address:
    Sixnet Technology Park
    331 Ushers Rd.
    Ballston Lake, NY 12019