



XBox



NET\*MUX4

# SCRAMBLE\*NET™

## Network Components

*SCRAMBLE\*NET is a securely encrypted network providing a connection between a host PC and one or more DIGI\*TRAC™ controllers. SCRAMBLE\*NET supports multi-drop and direct connections over a variety of media for local, remote and dial-up configurations. A range of components is available to configure system architectures for a variety of applications.*

### Features

- Encrypted Communications
- Range of Media
  - Copper
  - Fiber
  - Dial-up/Leased lines
- Open Protocol Gateway (XBox)
  - Published Protocol
- RS-232 or RS-485
- Up to 63 controllers per SCRAMBLE\*NET Network
  - Xbox for more than 63

### Description

#### SCRAMBLE\*NET Interface Board (SNIB)

The SNIB is installed in a DIGI\*TRAC controller to enable the controller to be programmed, monitored and controlled from a local or remote PC. The SNIB has two ports, one a multi-drop RS-485 channel, the other a direct connect RS-232. Both can be active concurrently. When the RS-485 port is used for connection to other controllers, the RS-232 port can connect to a host PC locally or by modem.

#### NET\*MUX4™ Network Multiplexor

The NET\*MUX4 enables segmenting the SCRAMBLE\*NET communication path into as many as four optically isolated segments for greater distance and survivability. The NET\*MUX4 includes a locked enclosure, integral power supply and battery.

The NET\*MUX4 is also used to extend SCRAMBLE\*NET communications to multiple single-ended segments such as leased phone lines and fiber optic cables. The NET\*MUX4 can be cascaded to provide more than four isolated SCRAMBLE\*NET circuits. All NET\*MUX4s must be located between the host PC and any controller.

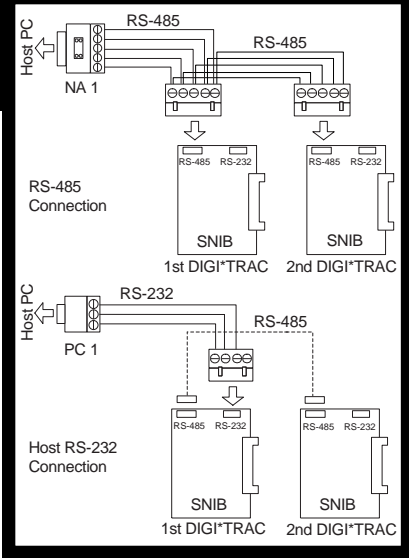
The NET\*MUX4 has five SCRAMBLE\*NET ports (one IN, four OUT), each of which can be single-ended RS-232 or multi-drop RS-485. Each multi-drop RS-485 port will support up to 16 DIGI\*TRAC controllers.

#### Communications Adaptor

Hirsch offers an RS-232 to RS-485 converter so a host PC can communicate with a network of DIGI\*TRAC controllers via multi-drop RS-485 communications using SCRAMBLE\*NET protocol. The NET\*ADAPT (NA1) connects directly to the RS-485 port on a SNIB terminal block in a controller (or to a NET\*MUX4). This enables up to 16 controllers on a single cable run. Transmit and receive status LEDs for both the RS-232 and RS-485 ports verify communications.

#### Network Connectors

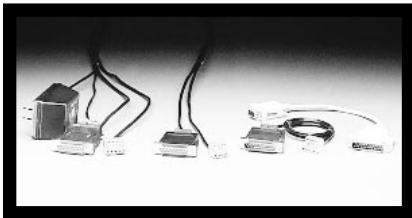
Hirsch offers two types of cable assemblies to connect a host PC or modem directly to a single DIGI\*TRAC controller using SCRAMBLE\*NET protocol. The PC\*CONNECT (PC1) is for a host PC and MODEM\*CONNECT (MC1 or MC2) is for an RS-232 modem. These connect directly to the RS-232 port on a SNIB terminal block in a controller (or to a NET\*MUX4).



Host PC Serial Com Port To DIGI\*TRAC Connection

### Dial-up Modems

The DM9600A-DL modem can be installed in a DIGI\*TRAC controller enclosure for remote site management. Installed in this way, the modem receives both primary and secondary power from the controller, and shares the controller's protection from physical tampering. The EM9600-DL external modem is installed near a host PC or DIGI\*TRAC controller.



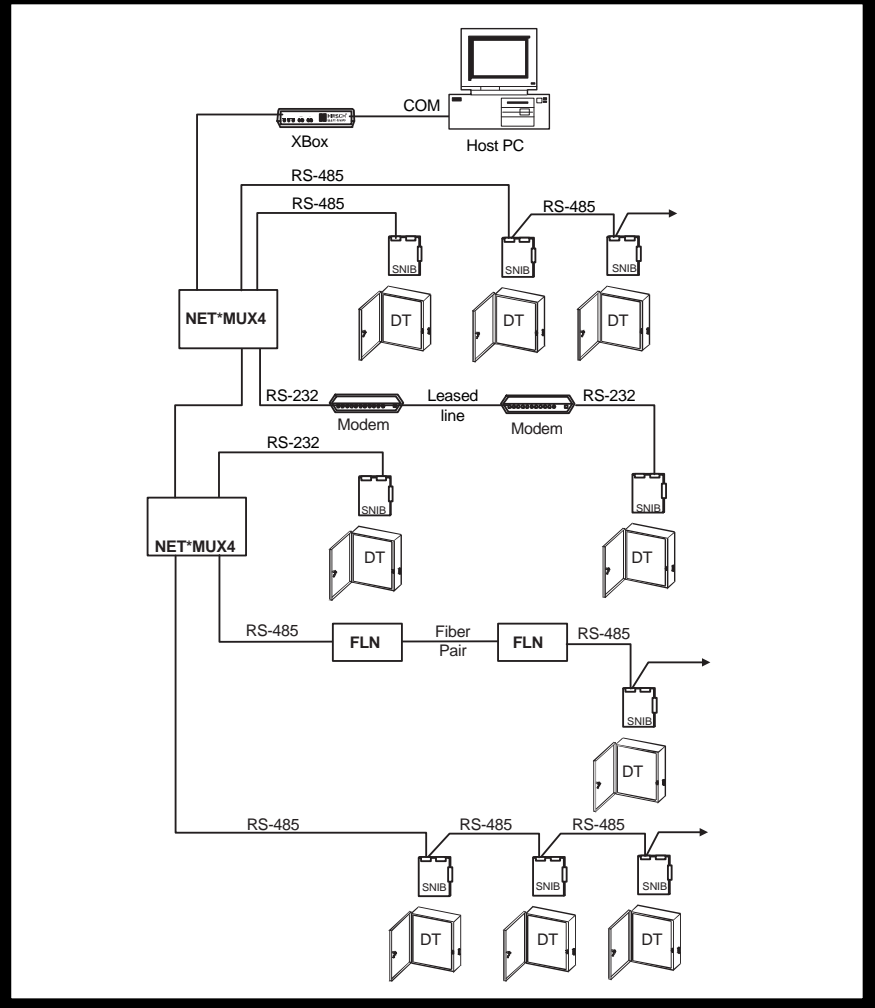
Adaptors & Cables: NAI, PCI, MC2, AT-AC (left to right)

### Leased-Line/Short-Haul Modems

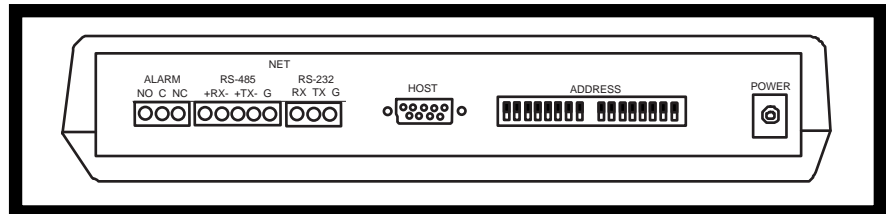
The EM9600-LL is an external modem installed in pairs between a host PC or NET\*MUX4 and a DIGI\*TRAC controller.

### Fiber Optic Transceivers

Optical fiber can be used for SCRAMBLE\*NET communication paths by using the Fiber Optic Link-Network (FLN). The FLN transceiver provides either a simplex or duplex RS-422 data link using fiber optic transmission on one end and RS-485 terminal blocks on the other. The FLN transceiver is used for various tasks



Typical SCRAMBLE\*NET Architecture



Back Of Xbox

- Connecting a DIGI\*TRAC controller via SCRAMBLE\*NET to a remote host PC or NET\*MUX4 over long distances
- Providing a highly secure transmission path, since communications are impossible to detect using electromagnetic sensing devices
- Immunity from electrical noise and transients

### SCRAMBLE\*NET Gateway (XBox™)

The Xbox provides a high-speed gateway from a host PC to a network of DIGI\*TRAC controllers. The Xbox

can communicate with up to 63 DIGI\*TRAC controllers. However, when more than 16 controllers are networked together, a NET\*MUX 4 is required.

The Xbox's host PC communications use non-encrypted X\*NET™ protocol. X\*NET protocol is published so that third parties or strategic partners can interface to Hirsch DIGI\*TRAC controllers via the Xbox. The Xbox's controller communications use encrypted SCRAMBLE\*NET protocol for high security. In addition to the encryption function, the Xbox off-loads processing

Product	LEDs	Host Side		Cable	Controller Side	
		Protocol	Connector		Connector	Protocol
SNIB	T&R	RS-232	4-Pin Plug-in			
	T&R	RS-485	5-Pin Plug-in			
NET*MUX4	T&R	RS-232	Terminals		Terminals (4)	RS-232
	T&R	RS-485	Terminals		Terminals (4)	RS-485
NA1	T&R	RS-232	DB25 (F)	6 ft (2 m)	5-Pin Plug-in	RS-485
PC1		RS-232	DB25 (F)	10 ft (3 m)	4-Pin Plug-in	RS-232
PC2		RS-485	DB9 (F)	10 ft (3 m)	5-Pin Plug-in	RS-485
MC1		RS-232	DB25 (M)	10 ft (3 m)	4-Pin Plug-in	RS-232
MC2		RS-232	DB9 (M)	10 ft (3 m)	4-Pin Plug-in	RS-232
MC-PC		RS-232	DB25 (F)	3 ft (1 m)	DB25 (M)	RS-232
AT-AC			DB9 (F)	9 in (23cm)	DB25 (M)	
DM9600A-DL		RS-232	RJ-11		DB9 (F)	RS-232
EM9600-DL		RS-232	DB25 (F)		RJ-11	RS-232
		RS-232	RJ-11		DB25 (F)	RS-232
EM9600-LL		RS-232	DB25 (F)		RJ-11	RS-232
		RS-232	RJ-11		DB25 (F)	RS-232
FLN		RS-485	Terminals		SMA	RS-422
		RS-422	SMA		Terminals	RS-485
XBOX	T&R	RS-232/RS-485	DB9 (F)		Terminals	RS-232
	T&R				Terminals	RS-485

duties from the host PC by polling the DIGI\*TRAC controllers. This polling technique ensures high throughput and alarm prioritization over event and transaction messages. Separate buffers are provided in the XBox for alarms (highest priority), events and host PC commands. These buffers protect against periodic throughput slow-downs in the host PC due to high message traffic or loss of communications.

A relay, audible, and LED are available on the XBox to announce an alarm anywhere on the SCRAMBLE\*NET network if the host PC is unexpectedly inoperative. A manual reset button is available to reset the XBox alarm condition.

The XBox has a single RS-232 input and normally connects to the host PC using an RS-232 COM port. The RS-232 input may be reconfigured to RS-485 via internal jumpers allowing multiple (up to 16) XBoxes to be daisy-chained to a single COM port. (This configuration requires RS-232 from the host PC to be converted to RS-485.) The XBox has both an RS-232 and an RS-485 output connector, one of which is connected to a NET\*MUX4 or a network of DIGI\*TRAC controllers.

## Specifications

### Communications

#### ■ Serial Interface Ports:

- SCRAMBLE\*NET: Encrypted message structure
- X\*NET: Non-encrypted message structure
- RS-485 or RS-232 protocol.
- RS-485 is multi-drop to 16 controllers max.
- Baud Rate: 9600
- RS-485: 4000 ft. (1220 m) to last controller on a cable run with 22 gauge. 2 pair, stranded, twisted, overall shield
- RS-232: 50 ft. (15 m) @9600 baud

#### ■ SCRAMBLE\*NET Interface Board (SNIB):

- Connectors: removable
- Optically isolated serial ports
- LEDs: Power, T&R (RS-232), T&R (RS-485)

#### ■ NET\*MUX4 Network Multiplexor

- Connectors: direct connect
- 1 input +4 output ports, each with RS-232 and RS-485 terminals
- Optically isolated serial ports
- 16 controllers per RS-485 output
- 1 controller per RS-232 output
- Distance per “Serial interface ports” above
- Primary and standby power: 90-130VAC, 50/60 Hz, fused. 180-260VAC, 50/60 Hz, fused

- Uninterruptible power supply
- Standby batteries: 1.3 AH included
- Enclosure: NEMA type, with conduit knockouts & key lock
- Dimensions: 12”H x 12”W x 5.5”D (30.5 cm x 30.5 cm x 14 cm)
- Shipping weight: 5.3 lbs (2.4kg)
- Operating temperature range: 32°F to 140°F (0° to 60°C)
- Relative Humidity: 0 to 90%, non-condensing

#### ■ Modems

- Baud Rate: 28.8 KB
- Dial-up: Dedicated Auto-Dial, Auto-Answer via dedicated 3002 voice-grade lines.
- Leased Line: Via 3002 voice-grade lines 2-wire full duplex line
- Power: DM series 24VDC from DIGI\*TRAC, EM series via 120VAC plug-in transformer.

#### ■ Fiber Optic Transceivers

- Connectors: SMA plug-in
- Fiber supported: 50µ 10,000 ft. (3048 m) 62.5µ 15,000 ft. (4572 m) 100µ 20,000 ft. (6096 m)
- Power via 12VAC plug-in transformer

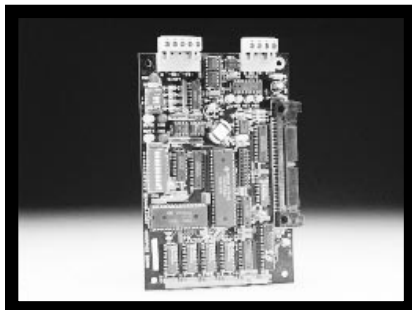
#### ■ SCRAMBLE\*NET Gateway (XBox)

- Connectors: removable
- Buffers: 50 host PC commands, 500 Alarm (priority), 1000 Event, FIFO, battery back-up
- Global Alarm Monitor: Operates relay and LED. Reset Button. Relay: 2Amp, Form C
- Baud Rate: X\*NET (2400 to 38,400), SCRAMBLE\*NET (9600)
- Addressing: 0-255 via DIP switch
- Controllers supported: 63 per box. Requires NET\*MUX4 if greater than 16
- Power: 12-30VDC (2W), 9-20 VAC (3VA) from plug-in transformer
- Dimensions: 1” H x 8”W x 4”D (2.5 cm x 20 cm x 10 cm)
- Shipping weight: 2.5 lbs (1.1 kg)
- Operating temperature range: 32° to 140°F (0° to 60°C)
- Relative Humidity: 0 to 90%, non-condensing

# Systems With Integrity

## Ordering Information

Model #	Description	Comments
SNIB	SCRAMBLE*NET Interface Board	Networks DIGI*TRAC controller to PC with appropriate software (such as SAM). Optically isolated RS-485 and RS-232 ports. RS-485 for multi-drop, RS-232 for local host or modem.
NET*MUX4	NETWORK MULTIPLEXOR 4	Provides 1 input & 4 output ports, each optically isolated RS-232 or RS-485, with status LEDs. Up to 16 DIGI*TRAC controllers per output port. Cascading supported. Includes enclosure, power supply, battery, lock.
NA1	NET*ADAPT Communications Adaptor	Converts RS-232 to RS-485 to connect host PC to RS-485 SCRAMBLE*NET network. Includes transmit and receive status LEDs, external plug-in transformer, AT-AC cable to connect to DB9 host PC COM port, and 6-ft. cable to connect to SNIB terminal plug.
PC1	PC*CONNECT Network Connector 1	Use to connect a host PC RS-232 port directly to the RS-232 port of a SNIB in a DIGI*TRAC controller or to the RS-232 port of a NET*MUX4. DB25 female connector with 10 ft. of cable to 4-pin RS-232 terminal plug (remove for NET*MUX4).
MC1	MODEM*CONNECT 1 Network Connector	Used to connect a modem's DB25 RS-232 port directly to the RS-232 port of a SNIB in a DIGI*TRAC controller. Includes cable and 4-pin RS-232 terminal plug.
MC2	MODEM*CONNECT 2 Network Connector	Used to connect a modem's DB9 RS-232 port directly to the RS-232 port of a SNIB in a DIGI*TRAC controller. Includes cable and 4-pin RS-232 terminal plug.
MC-PC	MODEM Cable	Use to connect a host PC to a modem's RS-232 port. 3-ft. cable with DB25 female connector on one end and DB25 male connector on other end.
AT-AC	AT ADAPTOR Cable	Use to convert a DB9 male serial port to a DB25 male serial port. 9-inch cable with DB9 female connector on one end and DB25 male connector on the other end.
DM9600A-DL	DIGI*TRAC 9600 BAUD MODEM ASSEMBLY (Factory Set: Dial-Up Line)	A miniature 9600-baud modem assembly that can be powered from & installed in the M2, M8, M16 or MSP for remote site management via dial-up network. Includes cables, adaptor, and power supply harness. Do not use at host PC or NET*MUX4.
EM9600-DL	EXTERNAL 9600 BAUD MODEM (Factory Set: Dial-Up Line)	For dial-up installations. The EM9600's setups are set with DIP switches and non-volatile memory, and will return to proper function after power failures. Includes power transformer. Requires MC-PC for host PC or MC1 for DIGI*TRAC controller or NET*MUX4.
EM9600-LL	EXTERNAL 9600 BAUD MODEM (Factory Set: Leased Line)	For leased line installations. The EM9600's setups are set with DIP switches and non-volatile memory, and will return to proper function after power failures. Includes power transformer. Requires MC-PC for host PC or MC1 for DIGI*TRAC controller or NET*MUX4.
FLN	SCRAMBLE*NET Fiber Optic Link - Network	Pair of transceivers for SCRAMBLE*NET network. Simplex or duplex RS-422 SMA plug-in fiber connector to RS-485 terminal block. Accepts 50, 62.5, or 100 micron fiber. Requires 12VAC at each transceivers (not included).
XBOX	SCRAMBLE*NET Gateway	Polling engine & encryption for host PC communications to up to 63 DIGI*TRAC controllers (16 max without NET*MUX4). RS-232 (or RS-485) port for host PC and RS-232 & RS-485 ports for DIGI*TRAC controllers or NET*MUX4. Includes transformer, alarm relay and status LEDs.



SCRAMBLE\*NET Interface Board (SNIB)



Fiber Optic Link - Network (FLN) Pair



EM9600-DL Modem



Specifications are subject to change without notice.

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