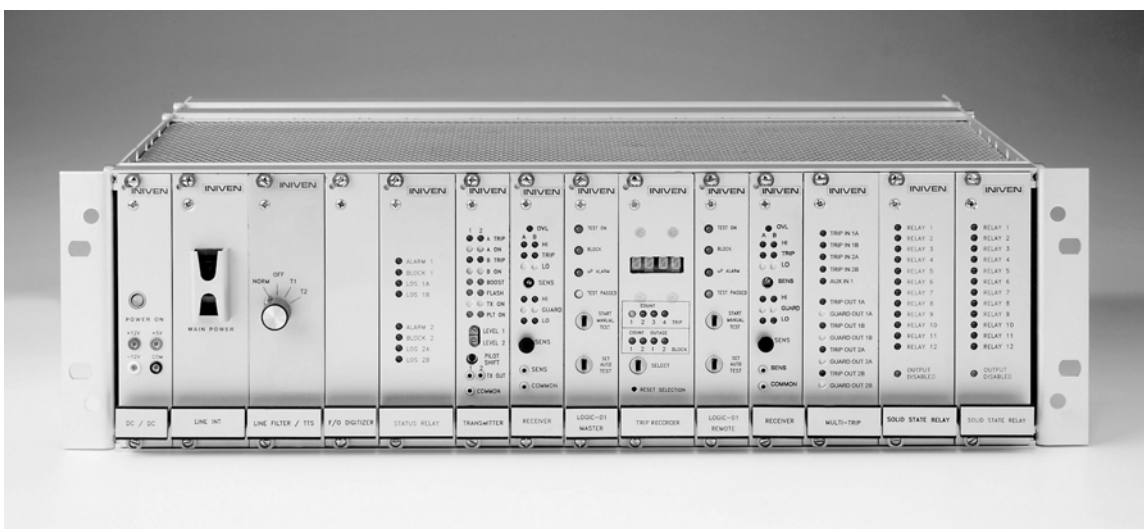




DIVISION OF CONOLOG CORP.

PTR-1500

AUDIO TONE TELEPROTECTION TERMINAL



FEATURES

- Up to four channels per unit
- Full on-board programmability
- Available pilot tone channel
- Single end manual and automatic testing
- Modular design
- Audio or fiber optic outputs
- Easy to program and install
- 12 YEAR WARRANTY

DESCRIPTION

The PTR-1500 is a four channel audio tone protective relaying terminal used for high speed tripping in protective schemes for electric power generation and transmission. The PTR-1500 can communicate over voice-grade telecommunication (i.e., carrier, wire line or metallic pairs and microwave) or fiber optic lines. As with all INIVEN products, the PTR-1500 comes with an unmatched 12 year warranty.

DESIGN

The PTR-1500 has been optimized for high speed, high dependability, and high security. Single and dual channel FSK modulation techniques are used in conjunction with digital differential Guard/Trip energy sensing. These methods have a proven record of accomplishment for high reliability in tone protection relaying applications.

STABLE OPERATION: The Digital Signal Processing (DSP) technology used to generate the transmitter frequency, establish receiver frequency discrimination, and manage all channel filtering is crystal controlled. This design provides a high level of stability, which overcomes the drift with temperature and age problem encountered with analog methods.

PROGRAMMABILITY: The design of the PTR-1500 allows for on-board programming without the need of an external programmer or laptop. Operating characteristics of the PTR-1500 are controlled by firmware. Parameter changes are accomplished by changing DIP switch settings. frequencies, channel bandwidths, communications protocols, and logic modes are all programmable.

COMPATIBILITY: The PTR-1500 is compatible with other INIVEN PTR equipment, as well as, most other manufacturer's audio tone protection equipment, depending on their configuration.

APPLICATIONS: The PTR-1500 can be used for all types of pilot protection schemes that use audio or point-to-point fiber optic communications.

LOGIC

The PTR-1500 is designed as a four channel communications system that can operate in three different modes depending on how the Logic module is programmed

DUAL CHANNEL – two frequencies are always generated by the Transmitter, either two Guard tones or two Trip tones. Both Trip frequencies are required in order for a Trip to be output. The use of two frequencies for Guard and Trip signals dramatically increases the Security of the system.

SINGLE CHANNEL – one frequency is generated by the Transmitter, either a Guard or Trip tone. When the Trip tone is received the Trip is output.

DUAL INDEPENDENT – two frequencies are generated by the Transmitter. The system operates as two Single Channel units simultaneously. When the Trip frequency is received the corresponding Trip is output. Each Trip input will operate independently of the other.

Because the PTR-1500 is a four channel unit, it can operate 2 of the above logic schemes independently in the same unit. The 2 "halves" of the unit need not be the same. For example, a PTR-1500 can be ordered with 2 Dual Channels, a Dual Channel and a Single Channel, a Dual Independent and a Single Channel, etc....

The PTR-1500 can also be ordered as a single direction or as the standard bi-direction. A single direction unit can only transmit or receive while a bi-directional unit can do both. These options may also be combined with the different logic configurations.

PILOT TONE

The PTR-1500 is available with an optional pilot tone feature. The pilot tone allows the unit to transmit an additional frequency, which is used to detect drift of the communications medium. The pilot tone frequencies can be programmed to either 595Hz or 2465Hz. If the pilot tone frequency is more than 15Hz from nominal, the unit will block.

A pilot shift button is included on the transmitter to test the pilot frequency. When depressed, the button shifts the pilot frequency 15 Hz and sends the system into block until the button is released.

An alien tone detector is designed to operate with the pilot tone. If Trip and Guard frequencies are received simultaneously, the unit will block assuming there is an alien tone on the communications line.

The pilot tone and/or the alien tone may be turned off via DIP switches.

FIBER OPTIC

The PTR-1500 is available with an optional fiber optic interface. The Fiber Optic module can house up to two transmit and two receive heads. The optional transmitter heads are listed below.

Emitter Type	Wavelength (nm)	Fiber Mode	Output Power (Into 8um fiber)	Connector
Laser	1550	Single	-10dBm/100µW	FC
Laser	1550	Single	-10dBm/100µW	ST
LED	1550	Single	-17dBm/20µW	FC
LED	1550	Single	-17dBm/20µW	ST
Laser	1300	Single	0dBm/1000µW	FC
Laser	1300	Single	0dBm/1000µW	ST
Laser	1300	Single	-7dBm/200µW	FC
Laser	1300	Single	-7dBm/200µW	ST
Laser	1300	Single	-10dBm/100µW	FC
Laser	1300	Single	-10dBm/100µW	ST
LED	1300	Single	-33dBm/500nW	FC
LED	1300	Single	-33dBm/500nW	ST
LED	1300	Single	-17dBm/20µW	FC
LED	1300	Single	-17dBm/20µW	ST
LED	1300	Single	-35.5dBm/290nW	FC
LED	1300	Single	-35.5dBm/290nW	ST
LED	1300	Single	-13.5dBm/45µW	FC
LED	1300	Single	-13.5dBm/45µW	ST
LED	1300	Single	-7dBm/200µW	FC
LED	1300	Single	-7dBm/200µW	ST
LED	1300	Multimode	75µW	FC
LED	850	Multimode	-17.5dBm/19µW (50um) -15dBm/34µW (62.5um) -10.5dBm/95µW (100um)	ST
LED	850	Multimode	-21.5dBm/7.5µW(50um) -18dBm/16µW (62.5um) -14.5dBm/38µW (100um)	ST

TRIP TIMES

Channel speed is measured with back-to-back terminals and does not include delays inherent in the communication media. For those units equipped with the optional trip relays, add approximately 3ms to the times indicated below.

MODE	CHANNEL SPACING	
	340Hz	680Hz
HIGH SECURITY	12 ms	8 ms
HIGH SPEED	9 ms	6 ms

RELAY I/O

SOLID STATE: The PTR-1500 comes with 8 solid state optically isolated relays. Each relay is rated for 1A @ 300VDC.

UNIVERSAL RELAY: The Universal Relay is an optional module that can hold up to 4 dry contact relays. Each relay is rated for either 3A @ 150VDC or 1A @150VDC. The PTR-1500 can hold up to two Universal Relay modules.

HEAVY DUTY RELAY: The Heavy Duty Relay is an optional module that can hold up to 3 dry contact relays. Each relay is rated for 10A @ 250VDC. The PTR-1500 can hold up to two Heavy Duty Relay modules.

STATUS RELAYS

The Status Relay module contains eight relays (2-Block, 2-Alarm, 4- Loss of signal) and eight relay driver circuits. There are four relays per Dual Channel. The status relays drive external equipment when a change in system operation status is detected.

Relays

BLOCK: Detection of a corrupted signal will be indicated by this relay

ALARM: This relay indicates the following conditions:

1. Receiver failed to detect a signal.
2. Power failure (all other relays will also de-energize).
3. Long term noise/interference on the incoming signal.

LOSS OF SIGNAL (LOS): Indicates received signal level is below the set threshold. Two LOS relays can be configured as transmit fail alarms.

TESTING

SET/AUTOSET: This is an option that is integrated into the Logic module. **Single End Testing (SET)** is a one-operator trip test. **AutoSET** is a feature that allows the PTR-1500 to automatically send a test trip and report a pass or fail indication of the test. Real trips will override the test.

MANUAL TEST PANEL: This option requires two people, one at each end. The outputs are disabled and trip frequencies are manually keyed.

SPECIFICATIONS

Chassis Dimensions

Height 5.25 in. (13.3cm)
Width 19 in. (48cm)
Depth 12 in. (30.5cm)

Maximum Weight

20 lb. (9.1kg)

Operating Temperature

-30°C to +70°C (-22°F to 158°F)

Relative Humidity

95% maximum @ +42°C (+108°F)

Interface Dielectric Strength

All contact inputs, solid-state outputs, power supply inputs and relay outputs meet the following specifications:
ANSI C37.90-1989
ANSI C37.90.1-1989
ANSI C37.90.2
IEC-255

External Connections:

Screw type terminal blocks on the rear of the chassis are provided for the user. Screws are 6-32,

which will accept lugged wires from 12 AWG to 20 AWG. Telephone terminal blocks are 45° entry Screw-Cage Clamp type, which will accept 12 AWG to 22 AWG wire.

Tone Transmitter

Frequency Range 300 to 3400 Hz
Frequency Accuracy: \pm .1% or Better
Output Impedance: 600 Ω , Balanced
Output Level:
Four Wires: +6dBm to -30dbm
Two Wires: 0dBm to -30dbm
Total Harmonic Distortion: 1% or Better
Trip Boost Levels: 3, 6, 9, or 12db
Trip Boost Duration's: 100ms or 200ms
Loss of Transmit Signal Detector
DIP Switch Programmable:
Bandwidth
Frequency
Trip Boost Level and Duration

Tone Receiver

Input Sensitivity:
Four-Wire +10dbm to -35dbm
Two-Wire +10dbm to -35dbm
Input Impedance: 600 Ω , Balanced
Dynamic Range: 20db
In Band Noise Detection
Loss of Receive Signal Detector
DIP Switch Programmable:
Frequency
Bandwidth

Logic Card

DIP Switch Programmable:
Logic Functions:
Block Timer
Alarm Timer
Flasher
Guard Before Trip Timer
Pre Trip Timer
Trip Hold Timer
Standard Logic Configurations:
Single, Dual, Independent Dual & Dual Function

Trip IN/OUT (Multi-Trip I/O Card)

5 Trip Inputs-Optically Isolated
Current Draw: 10mA @ 125VDC
8 Trip and Guard Solid State, Optically Isolated Outputs
Max. Voltage: 300VDC
Make Contact: 1A
Break Contact Rating: 1A
2A for 1 min.

Power Supply

Input Voltages:
24VDC, 48VDC, 110VDC, 125VDC, 250VDC

Line Interface

2 Output Transformers, 600 Ω to 600 Ω
2 Input Transformers, 600 Ω to 600 Ω

Status Relay

2-Alarm Relay
2-Block Relay
2-Loss of Signal Relay A
2-Loss of Signal Relay B
Max. Contact Voltage: 300VDC
Max. Contact Rating: 10A
Max. Break Rating: .5A @ 125VDC

DC / DC Converter Card

+5VDC input, \pm 12VDC output
Over voltage and Under voltage detection

Dual 50/60Hz High Pass/Hybrid Module

Filter Attenuation: 45db min.
Hybrid/Splitter: 600 Ω , Balanced

OPTION MODULES

Universal Relay Card

Up to 4 Form C Relays
 Max. Voltage: 300VDC
 Make Contact Rating: 10A
 Break Contact Rating: 1A or 3A @ 150VDC

Heavy Duty Relay Card

Three form A Relays
 Max. Voltage: 250VDC
 Make Contact Rating: 10A
 Break Contact Rating: 10A @ 250VDC

Solid State Relay Card

13 form A Solid State Relays:
 12 Trip and 1 Alarm
 Max. Voltage: 300VDC
 Make Contact Rating: 1A
 Break Contact Rating: 1A

Pilot Tone Receiver

595Hz or 2465Hz
 Alien Tone Detector
 DIP Switch Programmable
 Frequency
 On/Off

Set / Autoset (Optional on the Logic Card)

Single End Test / Auto Single End Test
 Dual Channel Test: Available with Dual Logic only
 Test all commutation and Logic Card.

Test Panel with Keylock Switch

Single or Dual Trip Send (with LED's)
 Single or Dual Trip Receive- (with LED's)

Fiber Optic Digitizer Module

Fiber Optic Digitizer Module provides all Logic Functions.
 Provides CMOS output for the Fiber Optic Interface Unit.

Fiber Optic Interface Unit

Connector Type: FC or ST
 Mode: Single Mode or Multimode
 Wavelength: 1300nm, 1550nm and 850nm
 Receiver Sensitivity: 7dbm to -35dbm

Other Options:

Trip Counter/Outage Timer
 Event Recorder
 Tone Test Jacks
 Extender Card
 Level Monitor
 Tone Test Switch (TTS)
 Power Amplifier

Call for Special Requests

WARRANTY

As with all INIVEN equipment, the PTR-1500 is covered by a 12 year warranty.

BLOCK DIAGRAM

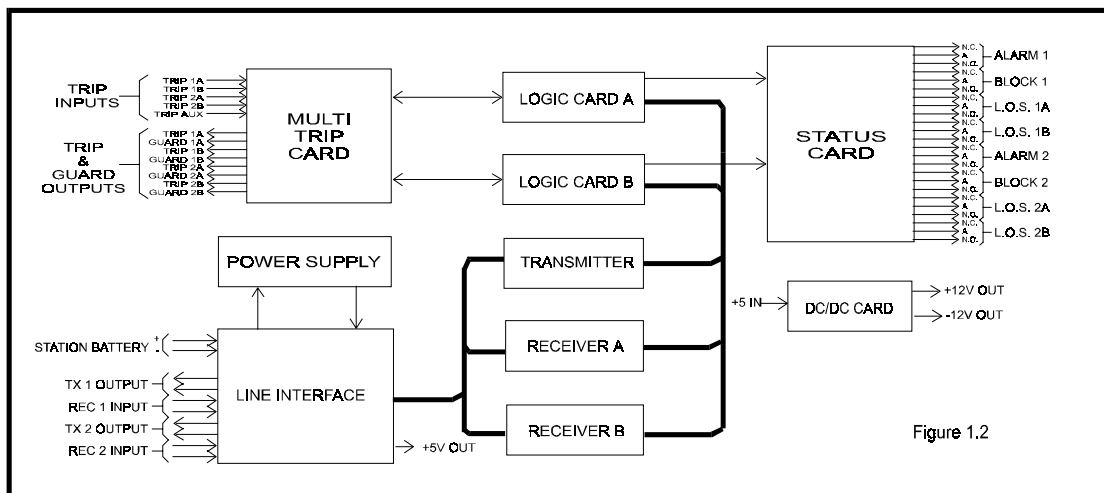


Figure 1.2

WARRANTY AGREEMENT

We hereby certify that the INIVEN product line carries a warranty for any part which fails during normal operation or service for 12 years. A defective part should be returned to the factory after receiving a return material authorization (RMA) number, shipping charges prepaid, for repair f.o.b. Somerville, New Jersey. In case INIVEN cannot promptly return the unit to you it will endeavor to provide a loaner until the repair or replacement is returned to you. Any unauthorized repairs or modifications will void the warranty. This warranty is contingent upon the commercial availability of parts as purchased by INIVEN. However, in the event that failure is less than two years from the date of delivery of the product, INIVEN will accept full responsibility.



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