UPLC™

Universal Power-Line Carrier

CU4I-VER03

Installation Guide

AMETEK®

POWER INSTRUMENTS

Pulsar THE BRIGHT STAR IN UTILITY COMMUNICATIONS

April 2006

Pulsar

ESD WARNING!

YOU MUST BE PROPERLY GROUNDED, TO PREVENT DAMAGE FROM STATIC ELECTRICITY, BEFORE HANDLING ANY AND ALL MODULES OR EQUIPMENT FROM AMETEK.

*All semiconductor components used, are sensitive to and can be **damaged** by the discharge of static electricity. Be sure to observe all Electrostatic Discharge (ESD) precautions when handling modules or individual components.*

Important Change Notification

This document supercedes the previous version of the UPLC Installation Guide. The following list shows the most recent publication date for the new information. A publication date in **bold type** indicates changes to that information since the previous publication. Note that only significant changes, i.e., those changes which affect the technical use and understanding of the document and the UPLC equipment, are reported. Changes in format, typographical corrections, minor word changes, etc. are not reported. Note also that in some cases text and graphics may have flowed to a different page than in the previous publication due to formatting or other changes.

Each reported change is identified in the document by a change bar, ‖, placed to its left and/or right, just like the ones on this page.

Publication Date	Page Number
‖ **April 2006**	9, 12, 15, 21, 28, 36, 43, 44, 46, 60, 70

⚠ IMPORTANT

*W*e recommend that you become acquainted with the information in this manual before ener-gizing your UPLC™ system. Failure to do so may result in injury to personnel or damage to the equipment, and may affect the equipment warranty. If you mount the carrier set in a cabinet, it must be bolted to the floor or otherwise secured before you swing out the equipment, to prevent the installation from tipping over.

AMETEK does not assume liability arising out of the application or use of any product or circuit described herein. AMETEK reserves the right to make changes to any products herein to improve reli-ability, function or design. Specifications and information herein are subject to change without notice. All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by this manual. If you desire further information regarding a particular installation, operation, or maintenance of equipment, please contact your local Ametek representative.

⚠ PASSWORDS

The UPLC™ is shipped with default passwords. Default passwords should be changed to different passwords at installation. Failure to change each default password may result in unauthorized access. The end user is responsible for any damage resulting from unauthorized access. AMETEK is not responsible for the security of the system.

PREFACE

Scope

This guide describes the installation procedure for the Universal Power Line Carrier (UPLC™). It is intended primarily for use by engineers and technicians involved in the installation, alignment, operation, and maintenance of Power-Line Carrier equipment.

Equipment Identification & Ordering Information

The UPLC™ equipment is identified by the Catalog Number. The Catalog Number can be decoded using the Ordering Information shown opposite this page.

Warranty

Our standard warranty extends for 60 months after shipment. For all repaired modules or advance replacements, the standard warranty is 90 days or the remaining warranty time, whichever is longer. Damage clearly caused by improper application, repair, or handling of the equipment will void the warranty.

Equipment Return & Repair Procedure

To return equipment for repair or replacement:

1. Call your AMETEK representative at **1–800–785–7274 or +1-954-344-9822**.

2. Request an **RMA number** for proper authorization and credit.

3. Carefully pack the equipment you are returning.

   Repair work is done most satisfactorily at the factory. When returning any equipment, pack it in the original shipping containers if possible. Be sure to use anti-static material when packing the equipment. Any damage due to improperly packed items will be charged to the customer, even when under warranty.

   Ametek also makes available interchangeable parts to customers who are equipped to do repair work. When ordering parts (components, modules, etc.), always give the complete AMETEK style number(s).

4. Make sure you include your return address and the RMA number on the package.

5. Ship the package(s) to:

   > **AMETEK**
   > **Power Instruments**
   > **4050 N.W. 121st Avenue**
   > **Coral Springs, FL U.S.A. 33065**

UPLC™ Catalog Numbers

Typical Catalog Number | U | S | 1 | N | S | C | 1 | E | N | S | X |
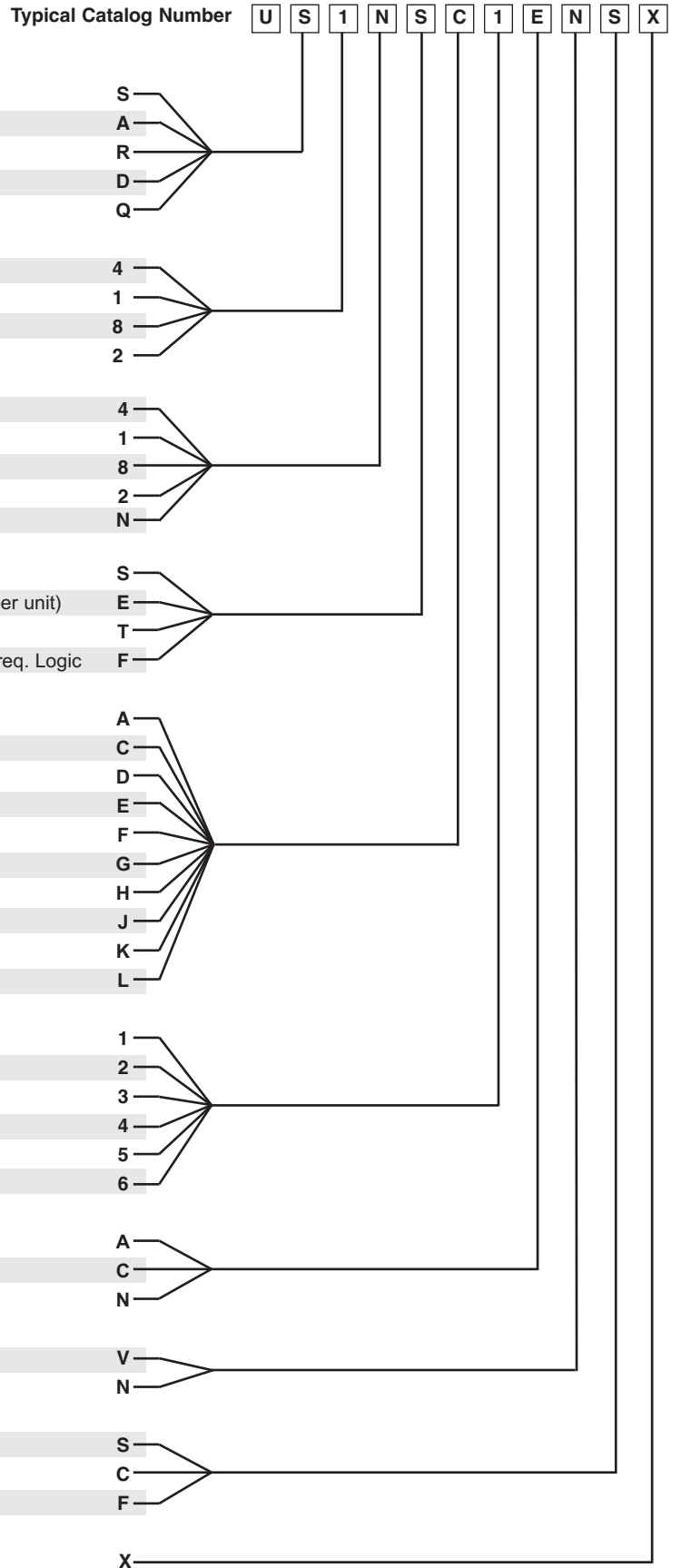
Configuration
Single Transceiver Unit (3RU)	S
Single Transceiver Unit (3RU) w/Dual Power Amplifier[1]	A
Single Receiver Unit (3RU)	R
Dual Transceiver Unit (4RU)[1,2] w/Dual Power Amplifier	D
Dual Receiver Unit (4RU)[1,2]	Q

DC/DC Converter Power Supply
48/60 Vdc	4
110/125/250 Vdc	1
48/60 Vdc w/Auxiliary Power Supply for 20/200mA Output	8
110/125/250 Vdc w/Auxiliary Power Supply for 20/200mA Output	2

Redundant DC/DC Converter Power Supply
48/60 Vdc	4
110/125/250 Vdc	1
48/60 Vdc w/Auxiliary Power Supply for 20/200mA Output[4]	8
110/125/250 Vdc w/Auxiliary Power Supply for 20/200mA Output[4]	2
None	N

Inputs/Outputs
Std Outputs (7 SS, 3 Contacts) only	S
Std Outputs (7 SS & 3 Contacts) + Trip Duty Contact Outputs, (4 per unit)	E
Std Outputs (7 SS, 3 Contacts) with 4 Frequency Logic	T
Std Outputs (7 SS, 3 Contacts) + Trip Duty Contact Outputs w/4 Freq. Logic	F

Ethernet Ports
None	A
10/100 BaseT, Redundant 10/100 BaseT	C
100 BaseFX, Redundant 100 BaseFX w/SC Connectors[2]	D
100 BaseFX, Redundant 100 BaseFX w/ST Connectors[2]	E
100 BaseFX, Redundant 100 BaseFX w/LC Connectors[2]	F
100 BaseFX, Redundant 100 BaseFX w/MTRJ Connectors[2]	G
10/100 BaseT and 100 BaseFX w/ST Connectors[2]	H
10/100 BaseT and 100 BaseFX w/SC Connectors[2]	J
10/100 BaseT and 100 BaseFX w/LC Connectors[2]	K
10/100 BaseT and 100 BaseFX w/MTRJ Connectors[2]	L

Protocols/PC Interface (Front)
Browser Compatible w/RS-232	1
Browser Compatible w/USB	2
IEC 61850/UCA Compliant[2,3] w/RS-232	3
IEC 61850/UCA Compliant[2,3] w/USB	4
DNP w/RS-232[2]	5
DNP w/USB[2]	6

Testing Facilities
Single Transceiver	A
Dual Transceiver	C
None	N

Maintenance Voice
| with Voice Adapter[2] | V |
| None | N |

Back plate Option
Standard (plain)	S
TC-10B Replica (not available on dual unit)[2]	C
TCF-10B Replica (not available on dual unit)[2]	F

Future
| Reserved for Future Options | X |

[1]Any Dual Configuration requires 2nd Power Supply [2]Not available at this time [3]Must also select an ethernet option [4]Only available with Dual Transceiver unit

Table of Contents

NOTES

1. Introduction

The new Universal Power-Line Carrier (UPLC™) equipment has been designed to provide the user with an ease of installation that has never before been attainable in Power-Line Carrier equipment. The UPLC™ can be totally calibrated without the need for any instruments. It also provides the ease of software programmability for most of its functions, and this is accomplished through the use of an internet browser. Thus there is no need to install special software on the computer to configure the UPLC™. This guide describes the simple process that is needed to connect, configure and calibrate the Universal Power Line Carrier from Ametek.

Catalog Number: The UPLC™ has a catalog identification number. It may be viewed from the front panel by depressing the "Set" button, or on the lower left hand corner of the web page when logged on. See page v for decoding.

2. Mounting & Connecting the Unit

2.1 Mounting

The UPLC™ unit is mounted in a standard 19" panel and takes up 3 ru of panel space.

2.2 Backplane

A Backplane is provided with the UPLC™. It is divided into a top section and a bottom section, with an RF foam gasket between the two sections. Remove the top section for making all necessary connections. All outgoing wire will rest between the RF foam gasket. Do not bundle the wire where it comes through the RF gasket. Spread the wire in one layer across the total width of the gasket.

2.3 Safety Precautions

Please review this installation information thoroughly before making any connections to the UPLC™. *Unless you are thoroughly familiar with the hazards involved in handling high voltage equipment, you should not handle the UPLC™ or connect any external apparatus to it.*

2.4 DC Power Supply and Other Connections

Terminals TB1 and TB2, on the rear of the chassis, provide the connection points for the power supply (48, 125 and 250 Vdc) and customer inter-connections. (See Figure 1.). The terminal blocks can accept up to a 14 AWG wire with an AMP #320561, #320619 or #50881 or equivalent, ring lug installed on the end.

Any lead coming to or from the switchyard should be shielded twisted pair to reduce transients to below the Surge Withstand Capability of ANSI C37.90.1.

2.5 Connections

Permanent connections are made from the rear of the chassis. To make these connections remove the top half of the rear cover. This will expose all the connections on the motherboard (See Figure 1.). Table 1 and Table 2 list all the main relaying connection points on the rear of the chassis.

Replace the rear cover after connections are completed.

2.6 Equipment Ground

In addition to the UPLC™ chassis ground connection that is made through the cabinet or rack, a ground connection is provided on the mother-

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⚠ **CAUTION**

DO NOT TURN ON THE UPLC™ WITHOUT A 50Ω OR 75Ω LOAD CONNECTED TO THE RF OUTPUT.

⚠ **CAUTION**

DO NOT GROUND TO THE SHIELD OF THE COAXIAL CABLE AT THE LINE TUNER. THE SHIELD OF THE CABLE SHOULD BE GROUNDED AT THE PLC TERMINAL EQUIPMENT.

Note: ALL inputs and outputs are non-polarity sensitive, except for the Power Supply Auxiliary input & output on TB1-3 & 4 and TB2-3 & 4.

Table 1. Main Relaying Input Connections

Inputs	Terminal Block
Power In	TB1-1 & 2
Redundant Power In	TB2-1 & 2
Input 1	TB3-5 & 10
Input 2	TB3-4 & 9
Input 3	TB3-3 & 8
Input 4	TB3-2 & 7
Input 5	TB3-1 & 6
Optional PS Aux. for KA-4 relays	TB1-3 & 4
Redundant Optional PS Aux. for KA-4 relay	TB2-3 & 4

Table 2. Main Relaying Output Connections

Outputs-1A Transistor		Outputs-1A Contact	
SS Output 1 (LL01)	TB4-5 & 10	EM Output 8 (LL08)	TB5-3 & 8
SS Output 2 (LL02)	TB4-4 & 9	EM Output 9 (LL09)	TB5-2 & 7
SS Output 3 (LL03)	TB4-3 & 8	EM Output 10 (LL010)	TB5-1 & 6
SS Output 4 (LL04)	TB4-2 & 7	**Optional Trip Duty Contacts**	
SS Output 5 (LL05)	TB4-1 & 6	EM Output 1 (TD01)	TB6-7 & 8
SS Output 6 (LL06)	TB5-5 & 10	EM Output 2 (TD02)	TB6-5 & 6
SS Output 7 (LL07)	TB5-4 & 9	EM Output 3 (TD03)	TB6-3 & 4
		EM Output 4 (TD04)	TB6-1 & 2
Power Supply Alarms			
Main PS	TB1-5 & 6		
Redundant PS	TB2-5 & 6	(Optional)	

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Power Supply, Main

Power Supply, Redundant

Power Amplifier, Main

Power Amp, Redundant

Display Board Not Shown

I/O Board
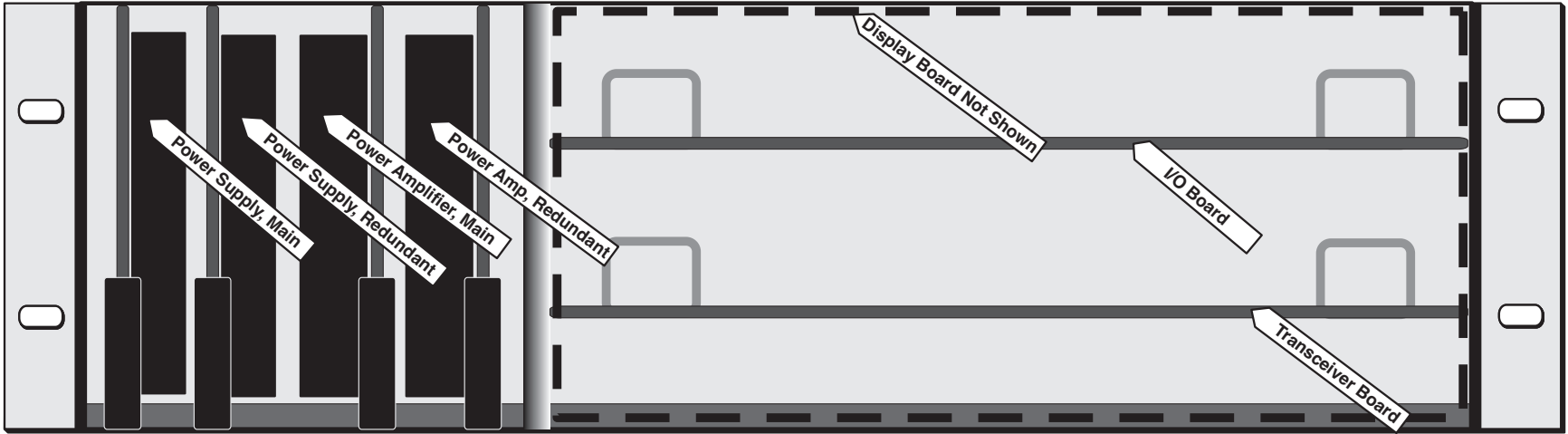
Transceiver Board

(FRONT VIEW)

NOTE: Ethernet board mounted on rear of transceiver board.

TRIP - RATED OUTPUTS (OPTIONAL)

OUTPUTS

TB6

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

TD OUTPUT 4 | TD OUTPUT 3 | TD OUTPUT 2 | TD OUTPUT 1

TB5

B | 6 | 7 | 8 | 9 | 10
A | 1 | 2 | 3 | 4 | 5

CONTACT OUTPUT 3
CONTACT OUTPUT 2
CONTACT OUTPUT 1
SS OUTPUT 7
SS OUTPUT 6

TB4

B | 6 | 7 | 8 | 9 | 10
A | 1 | 2 | 3 | 4 | 5

SS OUTPUT 5
SS OUTPUT 4
SS OUTPUT 3
SS OUTPUT 2
SS OUTPUT 1

TB3

B | 6 | 7 | 8 | 9 | 10
A | 1 | 2 | 3 | 4 | 5

INPUT 5
INPUT 4
INPUT 3
INPUT 2
INPUT 1

JMP5 JMP3
2 WIRE
4 WIRE

JMP1 JMP4
75 OHM
50 OHM

JMP2 JMP6
1 PA
2 PA

TB2

| 1 |
| 2 | STATION BATTERY
| 3 | AUX +
| 4 | AUX -
| 5 |
| 6 | PS ALARM
| 7 |
| 8 |

REDUNDANT POWER SUPPLY (OPTIONAL)

TB1

| 1 |
| 2 | STATION BATTERY
| 3 | AUX +
| 4 | AUX -
| 5 |
| 6 | PS ALARM
| 7 |
| 8 |

MAIN POWER SUPPLY

ETHERNET PORTS

(OPTIONAL)

CHASSIS GND

J4
RS232/485

J13
MOD.

J14
TTL

IRIG-B

TB7
| 1 | 2 | 3 | 4 |

EXTERNAL CLI
VOICE ADPT. ALARM OUT

J5
REMOTE HANDSET (OPTIONAL)

1- EARPHONE HIGH
2- MICROPHONE HIGH
3- AUDIO COMMON
4- SWITCH COMMON
5- HOOK SWITCH HIGH
6- ALERT SWITCH HIGH

2W RX/TX
4W TX OUT
J1

4 WIRE
RX IN
J2

UPLC BACKPLANE MODULE

INT SCHEMATIC

PC BOARD

(REAR VIEW)

Figure 1. UPLC™ Chassis

board. (See Figure 1.) A connection should be made between chassis ground and the earth ground connection at the UPLC™ cabinet location. It is best to use a braided type cable for this connection.

2.7 RF Connections

The RF connections to the chassis are made using the J1 and J2 BNC connectors. The cable used to make this connection must be a 50 Ω or 75 Ω coax cable. Knife switches are usually placed in the rear of the cabinet housing the UPLC™ in order to service it.

If the carrier is set for two-wire mode then both the transmitter and receiver would go through J1. If it is set for four-wire mode then J1 is the transmit output and J2 is the receiver input.

2.8 Coaxial Cable

A coaxial cable is required for a low-loss path between the UPLC™ and the Line Tuner (in the switchyard). Connection jacks (J1 & J2), on the Rear Panel, provide the point for coaxial cable connection.

The type of coaxial cable we recommend is RG-213/U (52 Ω, 29.5 pf/foot):

- Single-conductor
- #12 AWG
- 7 strand #21 copper
- Polyethylene insulator
- Copper shield

⚠ **CAUTION**

NEVER DISCONNECT THE CARRIER LEAD-IN BETWEEN THE LINE TUNER AND THE COUPLING CAPACITOR UNLESS THE LOW POTENTIAL END OF THE COUPLING CAPACITOR IS GROUNDED. BEFORE DISCON-NECTING THE CARRIER LEAD-IN CONDUCTORS, CLOSE THE GROUNDING SWITCH AT THE BASE OF THE COUPLING CAPACITOR. IF THIS GROUND IS NOT PROVIDED, DANGEROUS VOLTAGES CAN BUILD UP BETWEEN THE LINE TUNER AND COUPLING CAPACITOR.

- Vinyl jacket (nominal O.D. 0.405 inch)

It is impractical to use a BNC connector with an RG-213 cable, therefore it is recommended that a change to RG58 be made at a terminal block.

If the coaxial cable is to connect to related cabinets enroute to the switchyard, you should connect the RG-58A/U cable from J1 or J2 to the related cabinets, and RG-213/U from the cabinets to the switchyard. Keep the coaxial cable as short as possible and ground the outer braid of the coax only at the end connected to the UPLC™. If you are connecting the cable directly to the line tuner, the cable connector can enter the line tuner base either through the side or the bottom of the base.

2.9 Other Connections

All the other connections to the UPLC™ are for alarm and information purposes. These inputs and outputs are listed here for reference purposes. Depending on the options ordered, these outputs may or may not be present. These will be listed from left to right looking at the rear of the chassis.

2.9.1 Configuration

- Ethernet Ports – (TX1, RX1 & TX2, RX2) Depending on options ordered, these outputs may be RJ45 connectors for an electrical output, or a combination of ST, SC, LC or MTRJ for optical connectors.
- 9-Pin D shell Connector (J4) – This connector is for a permanent connection, which provides RS232 or RS485 access to the unit for configuration and SOE purposes.

2.9.2 IRIG B

- BNC Connectors (J13 & J14) – These connectors are for the IRIG B input. J13 is the input for a modulated IRIG B signal and J14 is the input for a TTL Unmodulated IRIG B signal. **Only one of these inputs should be used, not both at the same time.**

2.9.3 CLI

- TB7-1 & TB7-2 - These two terminals provide an output for an external CLI meter.

2.9.4 Voice Adapter

- TB7-3 & TB7-4 – Voice adapter Alarm Output. This output provides a dry contact out for an alarm when someone is trying to call the unit.

- RJ11 Jack (J5) – This jack provides a connection for a remote handset/hookswitch and two terminals for an alarm cutoff when the remote handset is off-hook.

2.9.5 Power Supply Outputs

- TB1-3 & TB1-4 – Main power supply Auxiliary output for feeding 20 mA or 200 mA to an electromechanical auxiliary blocking relay such as a KA-4 or SCA carrier auxiliary relay.

- TB1-5 & TB1-6 – Main power supply failure alarm dry contact.

- TB2-3 & TB2-4 – Redundant power supply Auxiliary output for feeding 20 mA or 200 mA to an electromechanical auxiliary blocking relay such as a KA-4.

- TB2-5 & TB2-6 – Redundant power supply failure alarm dry contact.

3. Physical Settings

Some of the settings on the UPLC™ require the use of a hardware jumper. These are settings, which involve selections being made on circuits that are in surge sensitive areas. The jumpers are dual jumpers because one side is the actual jumper setting and the other side is the sensing side. The microprocessor can then look at the sensing side and report the physical jumper setting without opening the unit. Although it looks like two separate jumpers for each selection, it is really a ganged jumper that has two labels.

3.1 Motherboard/Backplane (See Fig. 1)

- JMP1/4 set for 50 Ω or 75 Ω – This setting is used to select the impedance the transmitter is looking into.

- JMP3/5 - set for 2-wire or 4 wire – This sets if the RF output is 2-wire or 4-wire. If it is set to 2-wire then the transmitter and receiver are tied together on J1. This is normally used for a UPLC™ set to ON/OFF mode. If set to 4-wire then the transmitter output is on J1 and the receiver is separated with its input on J2. This setting is normally used when the UPLC™ is set to FSK mode.

- JMP2/6 - set for 1 PA or 2 PA – This jumper is set to "1 PA" when there is only one power amplifier in the chassis and "2 PA" when there are two power amplifiers present.

3.2 I/O Module (See Fig. 2)

3.2.1 Inputs

The input jumpers must be set for the voltage that will be driving them. The selections are 15 V, 48 V, 125 V, and 250 V. If, for example, an input is being driven from a 125-volt station battery through a contact, then the setting should be "125 V". This way one is assured that the input will not operate on high battery voltage if one side of the battery is grounded. The jumpers to be set are labeled INPUT1, INPUT2, INPUT3, INPUT4 and INPUT5. You only need to set the jumpers on the inputs being used. It is recommended that unused inputs be set to "250 V". The input connections are not polarity sensitive.

3.2.2 Low Level Solid State Outputs

The solid state output jumpers are labeled LLO1 through LLO7. These output jumpers must be set for the level of load current on the output. For a device such as a microprocessor relay input, the jumper should be set to position "0.1 A". This means the output will handle a load up to 100 mA. For loads greater than 100 mA, such as an electro-mechanical relay, use the "1.0 A" setting. This means the output will deliver from 100 mA up to 1 A of current. The solid state outputs are not polarity sensitive.

3.2.3 Low Level Electromechanical Outputs

The low-level relay contact output jumpers are labeled LLO8 to LLO10. The only setting required here is whether you want a normally open or a normally closed output contact when the relay is deenergized. The choice of settings are "NO" or "NC."

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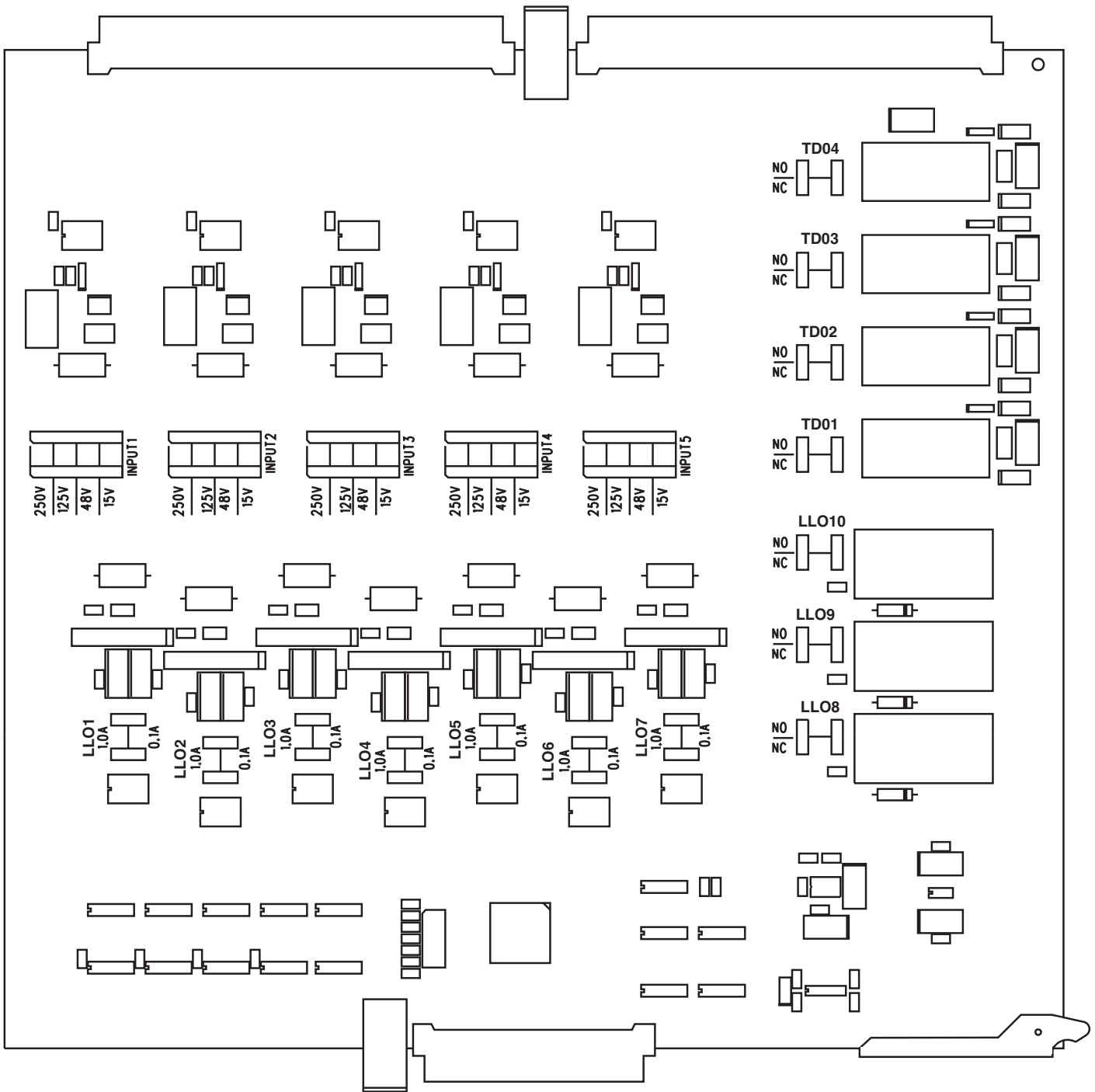
Figure 2. I/O Module Jumper Locations

Jumper J1/2 for Alarm Contact NO/NC

Jumper J5 for Power Supply On/Off
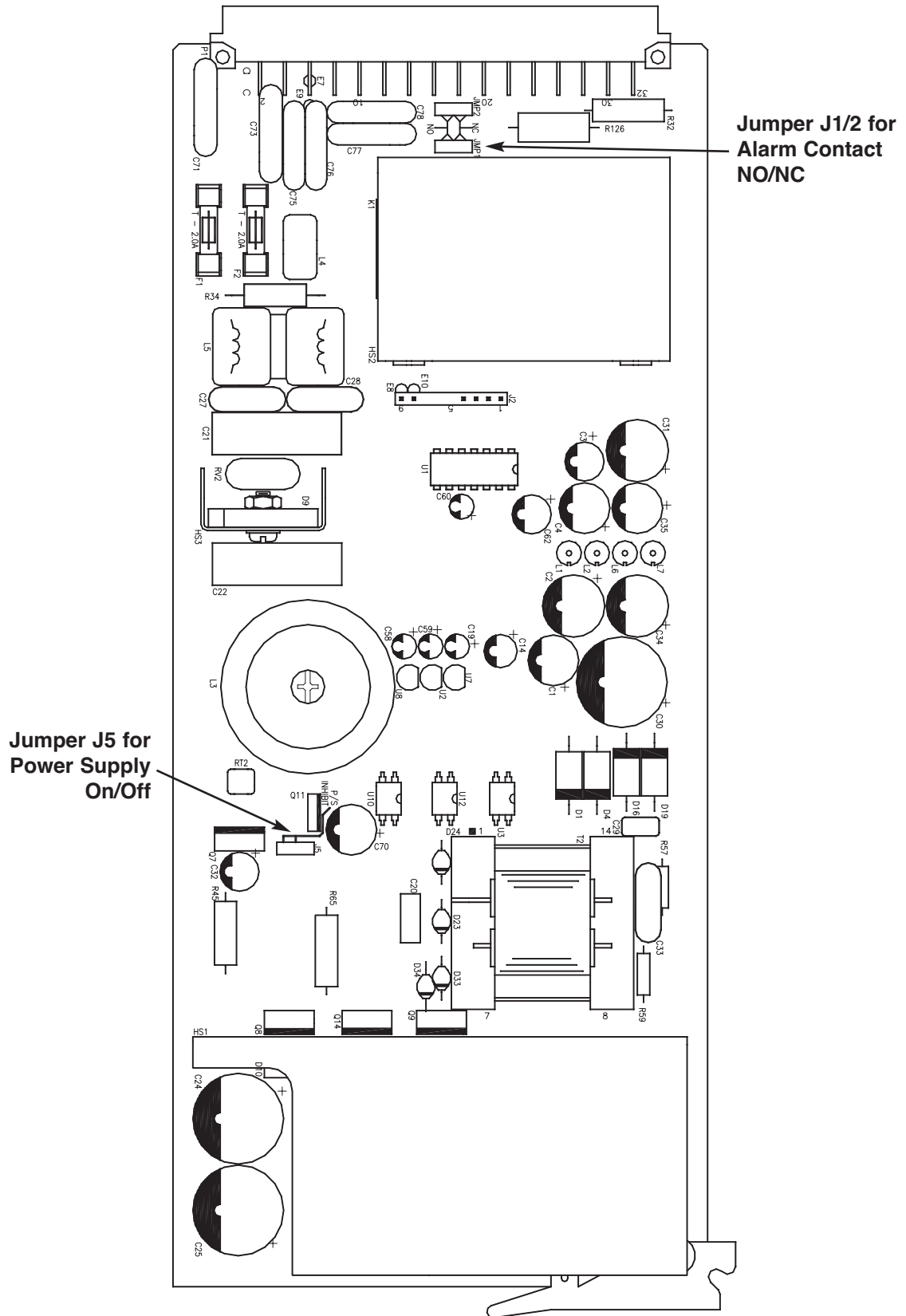
Figure 3. Power Supply Component & Jumper Locations
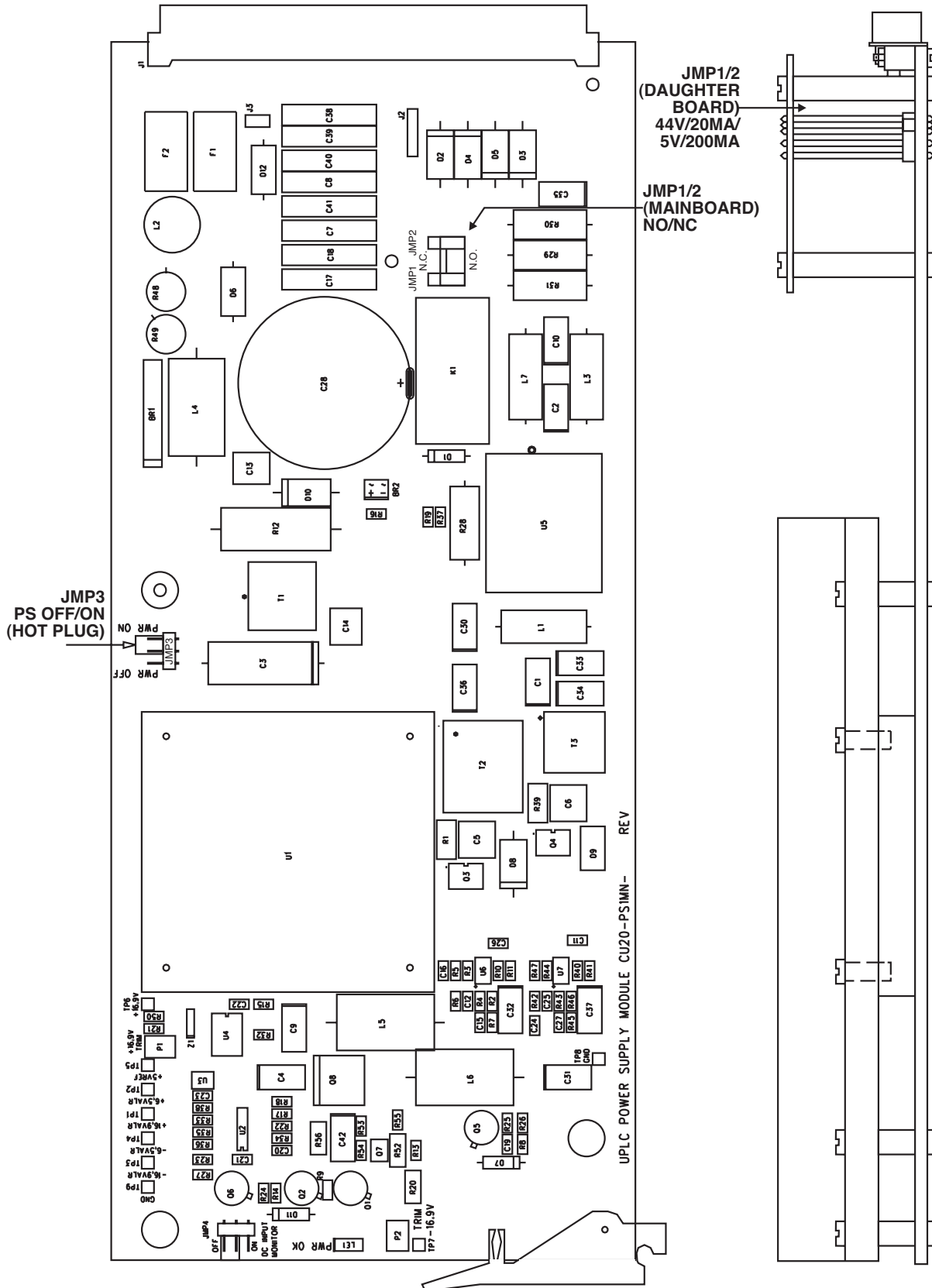
Figure 4. Power Supply Component & Jumper Locations

Tables 3, 4 and 5 illustrate the hardware jumpers of the UPLC™ . These jumpers are "sensed" by the unit and displayed as they are set on the settings web pages for reference.

Table 3. Backplane Jumpers

Function	Selection	Label
Coax Settings	2 wire/4 wire	JMP3/JMP5
Single or Dual Power Amps	1 PA/2 PA	JMP2/JMP6
Coax Impedance	50Ω/75Ω	JMP1/JMP4

Table 4. Power Supply Module Jumpers

Function	Selection	Label
Power ON/OFF Selection	PWR ON/PWR OFF	JMP3
Alarm	NO/NC	JMP1/JMP2

Table 5. Input/Output Module Jumpers

Inputs	Selection	Jumpers	Outputs	Selections	Jumpers
Input 1	15, 48, 125, 250V	INPUT 1	Low Level Output 1	0.1/1.0A	LLO1
Input 2	15, 48, 125, 250V	INPUT 2	Low Level Output 2	0.1/1.0A	LLO2
Input 3	15, 48, 125, 250V	INPUT 3	Low Level Output 3	0.1/1.0A	LLO3
Input 4	15, 48, 125, 250V	INPUT 4	Low Level Output 4	0.1/1.0A	LLO4
Input 5	15, 48, 125, 250V	INPUT 5	Low Level Output 5	0.1/1.0A	LLO5
			Low Level Output 6	0.1/1.0A	LLO6
			Low Level Output 7	0.1/1.0A	LLO7
			Low Level Output 8	NO/NC	LLO8
			Low Level Output 9	NO/NC	LLO9
			Low Level Output 10	NO/NC	LLO10
			Trip Duty Output 1	NO/NC	TD01
			Trip Duty Output 2	NO/NC	TD02
			Trip Duty Output 3	NO/NC	TD03
			Trip Duty Output 4	NO/NC	TD04

3.3 Power Supply Module

The Power Supply Module has an alarm relay to indicate failure of the module. This is a "fail-safe" alarm and is therefore energized if the module is functional. ‖ Referring to Figure 4, jumpers JMP1/JMP2 allow setting contact output as normally open (NO) or normally closed (NC). Jumper, JMP3 (PWR ON/PWR OFF), allows de-energizing the module and re-seating the module in the chassis. JMP1/2, on the daughterboard, lets you choose between 200mA and 20mA, for interfacing with various relays. ‖

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3.2.4 Trip Duty Output Contacts

The trip duty relay contact output jumpers are labeled TD1 to TD4. The only setting required here is whether you want a normally open or a normally closed output contact when the relay is deenergized. The choice of settings are "NO" or "NC."

4. System Specifications

- Frequency Range: 30-535 kHz, in 0.01 kHz steps

- 2- wire or 4-wire application

- 4 wire Receiver Input Impedance > 4 kΩ

- RF Output Impedance – 50 Ω, 75 Ω nominal unbalanced

- RF Output Power 10 W (max.), 0.1 W (min.)

- Harmonic & Spurious Output 55 dB below rated Full Power

- Output Variation ±1 dB over temperature/voltage range

- Modulation Type: ON/OFF (Amplitude Modulation) or FSK (Frequency Shift Keyed), Field Programmable

- Frequency Shifts: Programmable ±100, ±250 or ±500 Hz

- Frequency Resolution: 10 Hz increments, Transmitter and receiver

- Frequency Stability: ±5 Hz

- Front panel displays provide received carrier levels, in volts, and transmitted carrier levels in watts, or in dB units.

- Minimum in-band SNR: w/o voice 13dB for FSK & 20dB for ON/OFF, w/voice 30dB

- Receiver Sensitivity: 5 mV (min.) to 70 V (max.)/-35 dBm to +50 dBm @ 50Ω/75Ω

4.1 Nominal Back-to-Back Channel Delays at 15 dB Margin

ON/OFF	Extreme Wide Band	1.5 ms
	Wide Band	2.1 ms
	Narrow Band	2.8 ms
FSK	Extra Wide Band	4.8 ms
	Wide Band	6.5 ms
	Narrow Band	7 ms

Channel times do not include logic trip delay or relay operation times.

4.2 Inputs

Inputs are optically isolated and selectable for 15 V, 48 V, 125 V or 250 V keying.

ON/OFF	Carrier Start
	Carrier Stop
	Low Level Key
	Checkback Reset
	Checkback Initiate
	Loopback Initiate
FSK	Trip Key (2F)
	Power Off
	TTU Reset
	TTU Initiate
	LR Key (3F)
	DTT Key (3F)

4.3 Functions

ON/OFF

Directional Comparison Blocking

Phase Comparison Blocking

FSK 2 Frequency

Direct Transfer Trip

Line Relaying

Phase Comparison Unblocking

FSK 3 Frequency

Direct Transfer Trip & Line Relaying

FSK 4 Frequency, optional

Trip 1 or Trip 2 and (Trip 1 & Trip 2)

4.4 Programmable Outputs

10 outputs selectable for the following:

ON/OFF

Blocking Output	Carrier Received (block)
Margin Alarm	Minor Alarm
Fade Alarm	Major Alarm
Reflected Power	Delayed Alarm
General Failure	Carrier Recovered

Table 6. Frequency Spacing

ON/OFF Applications			
Wide Band	Directional Comparison Relaying		2000 Hz
Narrow Band	Directional Comparison Relaying		1000 Hz
Extreme Wide Band	Phase Comparison Relaying		4000 Hz
FSK Applications			
Narrow Band:	Directional Comparison or DTT	1 way	500 Hz
Narrow Band	Directional Comparison or DTT	2 way	1000 Hz*
Wide Band	Directional Comparison or DTT	1 way	1000 Hz
Wide Band	Directional Comparison or DTT	2 way	2000 Hz*
Wide Band	Dual Comparator Phase Comp.	1 way	1500 Hz
Wide Band	(50/60Hz sq wave keying)	2 way	3000 Hz*
Wide Band	Segregated Phase Comparison	1 way	2000 Hz
Wide Band	(50/60Hz sq wave keying)	2 way	4000 Hz*
Extra Wide Band:	Directional Comparison or DTT	1 way	2000 Hz
Extra Wide Band	Directional Comparison or DTT	2 way	4000 Hz*
Extra Wide Band	Dual Comparator Phase Comp.	1 way	1500 Hz
Extra Wide Band	(50/60Hz sq wave keying)	2 way	3000 Hz*
Extra Wide Band	Segregated Phase Comparison	1 way	2000 Hz
Extra Wide Band	(50/60Hz sq wave keying)	2 way	4000 Hz*
All Voice Applications:		2 way	4000 Hz*

*An external hybrid or other device offering at least 20 dB rejection of the adjacent channel must be used in the application.
1 way represents transmitter to transmitter or receiver to receiver
2 way represents transmitter to receiver

Table 7. Nominal Receiver Bandwidths

Bandwidth	Nominal	3 dB Point on Band Edge	20 dB Point on Band Edge
ON/OFF			
Narrow	600 Hz	620 Hz	915 Hz
Wide	1200 Hz	1255 Hz	1840 Hz
Extreme Wide	4000 Hz	4400 Hz	5120 Hz
FSK			
Narrow	300 Hz	316 Hz	470 Hz
Wide	600 Hz	620 Hz	915 Hz
Extra Wide	1200 Hz	1255 Hz	1840 Hz

Checkback Passed	In Recovery Mode
Checkback Off	Test In Progress
Checkback Reset	Auto Test Disabled
Main RF Output	Redundant RF Output

FSK

Guard (2F)	Trip (2F)
Checkback Trip (2F)	LR Trip (3F)
LR Guard (3F)	CB LR Trip (3F)
DTT Trip (3F)	DTT Guard (3F)
CB DTT Trip (3F)	Channel Trouble
Shift High	Shift Low
Trip Positive	Trip Negative
General Failure	Channel Fade Alarm

Power Supply Alarm: One contact selectable for NO or NC, rated 0.4A interrupting, 1A from 15 to 250 Vdc carry, non-wetted.‖

Low Level Outputs: 7 solid state programmable rated for 0.1/1.0 A from 15 to 250 Vdc, non-wetted outputs provided. At the 1.0A setting they are capable of tipping a lock-out relay.

3 Contacts Programmable: NO or NC, rated carry 1 A from 15 to 250 Vdc, non-wetted, 0.4A inter-rupting: Operate 15ms, dropout 10ms maximum.‖

Trip Duty Electromechanical Outputs (Optional for FSK): 4 provided.

Operate Time: NO Contact closing - 2.8 ms, NC Contact closing - 2.0 ms

Release Time: NO Contact opening - 2.8 ms, NC Contact closing - 3.9 ms

Contact Bounce: 1.9 ms

Ratings: Trip Duty make and carry 30 A for 200 ms with a duty cycle as specified per C37.90.

ON/OFF Optional Output for KA-4 Relays (Power Supply Auxiliary) 45 V or 5 V to operate 20 or 200 ma (respectively) holding coils in electro-mechanical carrier aux. relays.

4.5 Minimum Keying Voltage

Nominal Batt. Voltage/Min. Keying Voltage

48/60 Vdc	38 Vdc
110/125 Vdc	70 Vdc
220/250 Vdc	150 Vdc

Table 8. Environmental Specifications

Ambient Temperature, range of air	–30 C to +70 C (ANSI C37.90)
Relative Humidity	Up to 95% (non-condensing) at 40 C (for 96 hrs cumulative) (ANSI C93.5)
Altitude	Up to 1500 m (without de-rating), 6000 m with de-rating
Surge Withstand Capability	Per ANSI C37.90.1
1 Minute withstand	IEC 255-5 and C37.90 (1000 volt class)
Coax, center conductor to ground	3000 Vdc impulse level, 1.2 x 50 μs impulse, per ANSI C93.5
Dielectric	Per ANSI C37.90, 1,000 V class (4,000 V dielectric withstand)
Radiated Electromagnetic Interference from Tranceivers	35 V/m per ANSI C37.90.2

Table 9. Power Requirements

Nominal Battery Voltage	Permissible Voltage Range Range	Standby	1 Watt Transmit Single	10 Watt Transmit Single	1 Watt Transmit Dual	10 Watt Transmit Dual
48/60 Vdc	38 to 76 Vdc	25 watts	35 watts	60 watts	*	*
110/125/250 Vdc	88 to 300 Vdc	20 watts	30 watts	66 watts	80 watts	132 watts

*Not available at this time
Permissable ripple on incoming Vdc 5%
Maximum allowable frequency of ripple 120 Hz
Carrier Frequency on dc input leads when transmitting 1 W 20 mV (max.)

Table 10. Weight and Dimension Specifications

Equipment	Net Weight		Height		Width		Depth		Rack
	lbs	Kg	inches	mm	inches	mm	inches	mm	Space
Single Unit	21	9.53	5.218	132.54	17.437	442.90	12.00	304.80	3 RU
Dual Unit*	35	15.88	7.00	177.9	17.437	442.90	12.00	304.80	4 RU

* Dual unit not available at this time.

5. Typical System Applications

The following diagrams represent utilizing the standard configurations stored in the UPLC™. Before applying these systems, you should check with your engineering department to ensure compliance with your company standards.

5.1 Directional Comparison Blocking with microprocessor-based Protective Relay

This system utilizes the UPLC™ programmed as an ON/OFF (AM) PLC channel. A reverse-looking element of the protective relay will detect an external fault and start the UPLC™ channel to send a "block" to the other end of the transmission line. Should an internal fault be detected, the forward-looking element of the protective relay will squelch the UPLC™ channel to allow tripping. Please refer to Table 12 and Figure 5.

5.2 Directional Comparison Blocking for a KA-4 Relay

The UPLC™ can be applied with the electro-mechanical carrier auxiliary relay KA-4. Using the basic configuration for an ON/OFF, you will need to change several settings. On the LOGIC page, please check the box labeled for Common Start/Stop, this will allow start and stop functions via one lead from the KA-4. On the INPUT page, please change the Carrier Start function to be "Application of Voltage". Also, make sure you set the jumpers for the keying voltage one step down from the station battery. Since there is a dropping resistor in the KA-4, a 125 V station battery will key the UPLC™ in the 48 V range. Likewise, a 250 V battery will key at 125 V, a 48 V battery will key at 15 V. The system will not operate as desired if this is not properly set. Please refer to Figure 6.

5.3 Direct Transfer Trip

When using the UPLC™ to provide remote tripping for breaker failure or transformer protection, program it for an FSK PLC channel. The standard settings provide for using either the low level outputs (set for 1.0 A) to trip a lockout relay of the trip duty contacts to trip a breaker trip coil. If using the low-level output to trip the LOR, be sure that the jumper for the output is set. Please refer to Table 13 and Figure 9.

5.4 Unblock Directional Comparison

The FSK channel can be used for line relaying by utilizing the Unblock configuration. The low level output set for 0.1 A is needed to provide the permission into the line relay for tripping. Please refer to Table 15 and Figure 8.

5.5 3 Frequency - Direct Transfer Trip with Line Relay Trip

A single UPLC™ channel can be used for direct transfer tripping and line relaying if the 3 frequency configuration is selected. The unit will use the center frequency for guard, the higher frequency for a line relay trip ad the lower frequency for a direct transfer trip. Should both be keyed simultaneously, then the direct transfer trip has priority since it represents major equipment failure. For the direct transfer trip function, either the low level output set for 1.0 A can be used to trip a lockout relay or the trip duty output can be used to trip a breaker. Please refer to Table 14 and Figure 7.

5.6 4 Frequency - Two Independant Trip Functions

The UPLC™ can be purchased with the option of setting it for a four-frequency system. The purpose is to use one PLC channel to perform two independant trips. It is similar to the three-frequency system but is able to key two relaying inputs simultaneously, where as with the three-frequency system, if both inputs are keyed simultaneously, only the DTT frequency is output.

Four frequencies are utilized within either a 600Hz bandwidth or a 1200Hz bandwidth system. The shifts for the system are shown in Table 11.

Bandwidth/Shift can be 600Hz, +/- 250Hz or 1,200Hz +/- 500Hz. The receiver is able to discriminate between these four frequencies and provide the necessary input to the logic portion.

The logic is two sets of the full unblock logic. This allows you to select either command function, DTT or Unblock. Should both inputs be keyed simultaneously, the frequency that is sent will engage both Trip A and Trip B outputs.

The trip test feature is not available in the four-frequency system.

Table 11. 4F System Frequencies

Shift from Center Freq.	600 Hz	1,200 Hz
Non-keyed	+83 Hz	+166 Hz
Command A	+249 Hz	+498 Hz
Command B	-83 Hz	-166 Hz
Command A & B	-249 Hz	+498 Hz

Figure 5. UPLC™ Programmed as ON/OFF (AM) PLC Channel (Standard Configuration per Table 12)

Inputs

CC=Contact Converter

Low Level Outputs

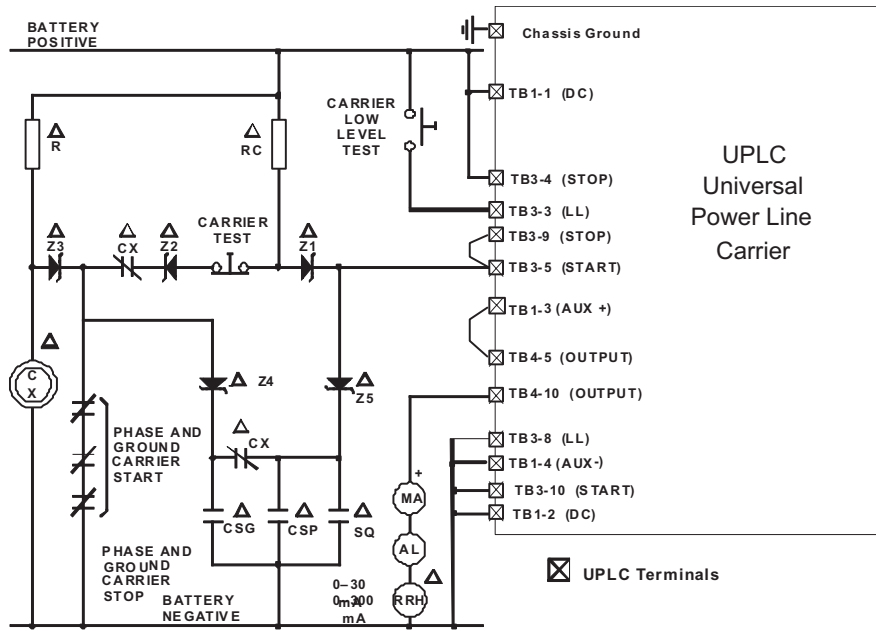Note: All contacts are link selectable for normally open or closed.

☐ Relay Terminals   ⊠ UPLC Terminals

Jumper Table

Module	Function	Selection	Label	Recommendation
Backplane	Coax Setting	2 wire/4 wire	JMP3/JMP5	2 Wire
	# of PAs	1 PA/2PA	JMP2/JMP6	Per factory
	Coax Impedance	50 Ω/75 Ω	JMP1/JMP4	50 Ω *
Power Supply	Power	PwrOn/PwrOff	JMP3	PwrOn
	Alarm Contact	NO/NC	JMP1/JMP2	Per Engineering
Input/Output	Input 1	15/48/125/250 Vdc	Input 1	Station Battery
	Input 2	15/48/125/250 Vdc	Input 2	Station Battery
	Input 3	15/48/125/250 Vdc	Input 3	Per Engineering
	Input 4	15/48/125/250 Vdc	Input 4	Per Engineering
	Input 5	15/48/125/250 Vdc	Input 5	Per Engineering
	LL Output 1	0.1/1.0 A	LIO1	0.1 A
	LL Output 2	0.1/1.0 A	LIO2	Per Engineering
	LL Output 3	0.1/1.0 A	LIO3	Per Engineering
	LL Output 4	0.1/1.0 A	LIO4	Per Engineering
	LL Output 5	0.1/1.0 A	LIO5	Per Engineering
	LL Output 6	0.1/1.0 A	LIO6	Per Engineering
	LL Output 7	0.1/1.0 A	LIO7	Per Engineering
	LL Output 8	NO/NC	LIO8	Per Engineering
	LL Output 9	NO/NC	LIO9	Per Engineering
	LL Output 10	NO/NC	LIO10	Per Engineering

* Or per engineering's recommendation

AMETEK
POWER INSTRUMENTS

Chassis Ground

TB1-1 (DC)

TB3-4 (STOP)

TB3-3 (LL)

TB3-9 (STOP)

TB3-5 (START)

TB1-3 (AUX +)

TB4-5 (OUTPUT)

TB4-10 (OUTPUT)

TB3-8 (LL)

TB1-4 (AUX -)

TB3-10 (START)

TB1-2 (DC)

UPLC
Universal
Power Line
Carrier

BATTERY
POSITIVE

R   RC

CARRIER
LOW
LEVEL
TEST

Z3   CX   Z2   CARRIER TEST   Z1

C X

Z4   Z5

PHASE AND GROUND CARRIER START

CX

CSG   CSP   SQ

PHASE AND GROUND CARRIER STOP

BATTERY NEGATIVE

0-30 mA
0-200 mA

MA
AL
RRH

NOTE 1 - SOME SCHEMES MAY NOT HAVE CARRIER CONTINUATION (CX).

△ IN KA-4

☒ UPLC Terminals

Inputs

TB3-5 | Carrier Start | TB3-10 — CC

TB3-4 | Carrier Stop | TB3-9 — CC

TB3-3 | Low Level | TB3-8 — CC

TB3-2 | | TB3-7 — CC

TB3-1 | | TB3-6 — CC

CC=Contact Converter

Low Level Outputs

TB4-5 | Blocking Output | TB4-10   TB5-5   TB5-10

TB4-4 | Main RF Output | TB4-9   TB5-4   TB5-9

TB4-3 | Blocking Output | TB4-8   TB5-3   TB5-8

TB4-2 | Fade Alarm | TB4-7   TB5-2   TB5-7

TB4-1 | | TB4-6   TB5-1 | General Alarm | TB5-6

TB1-5 | PS Alarm | TB1-6

Note: All contacts are link selectable for normally open or closed.

Note: Under the LOGIC Settings, the "Common Start/Stop" must be enabled.

Jumper Table

Module	Function	Selection	Label	Recommendation
Backplane	Coax Setting	2 wire/4 wire	JMP3/JMP5	2 Wire
	# of PAs	1 PA/2PA	JMP2/JMP6	Per factory
	Coax Impedance	50 Ω/75 Ω	JMP1/JMP4	50 Ω *
Power Supply	Power	PwrOn/PwrOff	JMP3	PwrOn
	Alarm Contact	NO/NC	JMP1/JMP2	Per Engineering
Aux Power Supply	Holding current	20 mA/200 mA	5V(200 mA)/44V(20 mA)	Per KA -4 requirement
Input/Output	Input 1	15/48/125/250 Vdc	Input 1	Set to voltage setting one step below station battery, ie – 125 Vdc battery, use 48 volt jumper
	Input 2	15/48/125/250 Vdc	Input 2	Set to voltage setting one step below station battery, ie – 125 Vdc battery, use 48 volt jumper
	Input 3	15/48/125/250 Vdc	Input 3	Per Engineering
	Input 4	15/48/125/250 Vdc	Input 4	Per Engineering
	Input 5	15/48/125/250 Vdc	Input 5	Per Engineering
	LL Output 1	0.1/1.0 A	LIO1	1.0 A
	LL Output 2	0.1/1.0 A	LIO2	Per Engineering
	LL Output 3	0.1/1.0 A	LIO3	Per Engineering
	LL Output 4	0.1/1.0 A	LIO4	Per Engineering
	LL Output 5	0.1/1.0 A	LIO5	Per Engineering
	LL Output 6	0.1/1.0 A	LIO6	Per Engineering
	LL Output 7	0.1/1.0 A	LIO7	Per Engineering
	LL Output 8	NO/NC	LIO8	Per Engineering
	LL Output 9	NO/NC	LIO9	Per Engineering
	LL Output 10	NO /NC	LIO10	Per Engineering

* Or per engineering's recommendation

Revised 2/07/06

Figure 6. UPLC™ Applied With KA-4 Electromechanical Relay

Figure 7. UPLC™ Programmed as FSK 3-Frequency PLC Channel (Standard Configuration per Table 14)
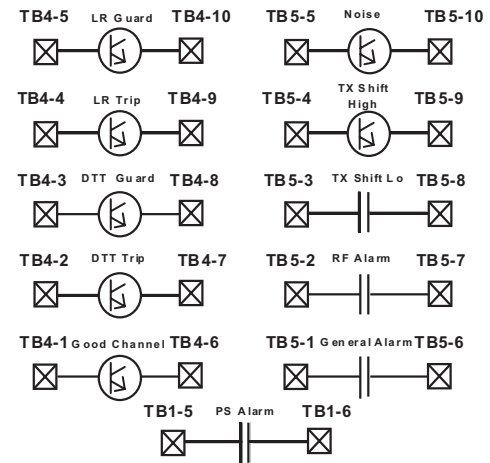

Jumper Table

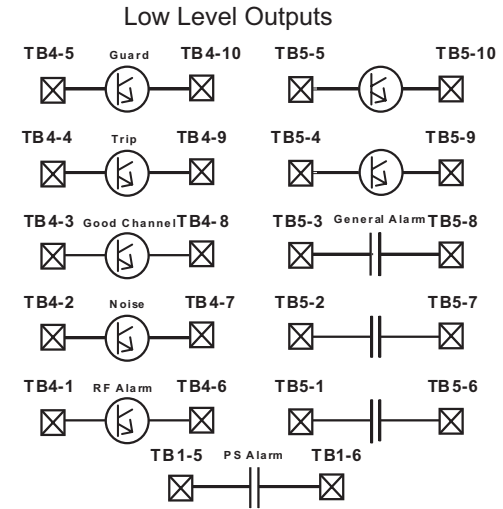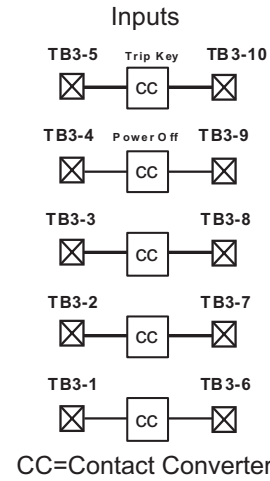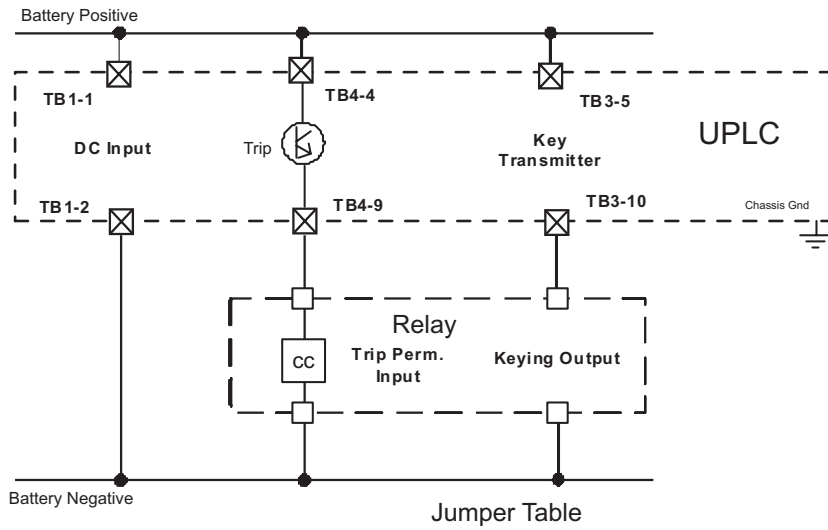| Module	Function	Selection	Label	Recommendation
Backplane	Coax Setting	2 wire/4 wire	JMP3/JMP5	4 wire
	# of PAs	1 PA/2PA	JMP2/JMP6	Per factory
	Coax Impedance	50 Ω/75 Ω	JMP1/JMP4	50 Ω *
Power Supply	Power	PwrOn/PwrOff	JMP3	PwrOn
	Alarm Contact	NO/NC	JMP1/JMP2	Per Engineering
Input/Output	Input 1	15/48/125/250 Vdc	Input 1	Station Battery
	Input 2	15/48/125/250 Vdc	Input 2	Station Battery
	Input 3	15/48/125/250 Vdc	Input 3	Per Engineering
	Input 4	15/48/125/250 Vdc	Input 4	Per Engineering
	Input 5	15/48/125/250 Vdc	Input 5	Per Engineering
	LL Output 1	0.1/1.0 A	LIO1	Per Engineering
	LL Output 2	0.1/1.0 A	LIO2	0.1 A
	LL Output 3	0.1/1.0 A	LIO3	Per Engineering
	LL Output 4	0.1/1.0 A	LIO4	1.0 A
	LL Output 5	0.1/1.0 A	LIO5	Per Engineering
	LL Output 6	0.1/1.0 A	LIO6	Per Engineering
	LL Output 7	0.1/1.0 A	LIO7	Per Engineering
	LL Output 8	NO/NC	LIO8	Per Engineering
	LL Output 9	NO/NC	LIO9	Per Engineering
	LL Output 10	NO/NC	LIO10	Per Engineering
	TD Output 1	NO/NC	TD01	Per Engineering
	TD Output 2	NO/NC	TD02	NO
	TD Output 3	NO/NC	TD03	Per Engineering
	TD Output 4	NO/NC	TD04	Per Engineering

* Or per engineering's recommendation

Note: All contacts are link selectable for normally open or closed.
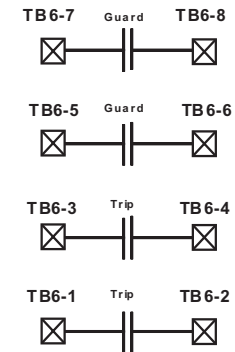
CC=Contact Converter

Relay Terminals   UPLC Terminals

Pulsar

AMETEK
POWER INSTRUMENTS

Battery Positive

TB1-1 — DC Input

TB4-4 — Trip

TB3-5 — Key Transmitter

UPLC

Chassis Gnd

TB1-2

TB4-9

TB3-10

Relay

CC — Trip Perm. Input

Keying Output

Battery Negative

Inputs

TB3-5	Trip Key	TB3-10
TB3-4	Power Off	TB3-9
TB3-3	CC	TB3-8
TB3-2	CC	TB3-7
TB3-1	CC	TB3-6

CC=Contact Converter

Low Level Outputs

TB4-5	Guard	TB4-10	TB5-5		TB5-10
TB4-4	Trip	TB4-9	TB5-4		TB5-9
TB4-3	Good Channel	TB4-8	TB5-3	General Alarm	TB5-8
TB4-2	Noise	TB4-7	TB5-2		TB5-7
TB4-1	RF Alarm	TB4-6	TB5-1		TB5-6

TB1-5 — PS Alarm — TB1-6

Trip Duty Outputs

TB6-7 — Guard — TB6-8

TB6-5 — Guard — TB6-6

TB6-3 — Trip — TB6-4

TB6-1 — Trip — TB6-2

Note: All contacts are link selectable for normally open or closed.

☐ Relay Terminals   ☒ UPLC Terminals

Jumper Table

Module	Function	Selection	Label	Recommendation
Backplane	Coax Setting	2 wire/4 wire	JMP3/JMP5	4 wire
	# of PAs	1 PA/2PA	JMP2/JMP6	Per factory
	Coax Impedance	50 Ω/75 Ω	JMP1/JMP4	50 Ω *
Power Supply	Power	PwrOn/PwrOff	JMP3	PwrOn
	Alarm Contact	NO/NC	JMP1/JMP2	Per Engineering
Input/Output	Input 1	15/48/125/250 Vdc	Input 1	Station Battery
	Input 2	15/48/125/250 Vdc	Input 2	Per Engineering
	Input 3	15/48/125/250 Vdc	Input 3	Per Engineering
	Input 4	15/48/125/250 Vdc	Input 4	Per Engineering
	Input 5	15/48/125/250 Vdc	Input 5	Per Engineering
	LL Output 1	0.1/1.0 A	LIO1	Per Engineering
	LL Output 2	0.1/1.0 A	LIO2	0.1 A
	LL Output 3	0.1/1.0 A	LIO3	Per Engineering
	LL Output 4	0.1/1.0 A	LIO4	Per Engineering
	LL Output 5	0.1/1.0 A	LIO5	Per Engineering
	LL Output 6	0.1/1.0 A	LIO6	Per Engineering
	LL Output 7	0.1/1.0 A	LIO7	Per Engineering
	LL Output 8	NO/NC	LIO8	Per Engineering
	LL Output 9	NO/NC	LIO9	Per Engineering
	LL Output 10	NO/NC	LIO10	Per Engineering
	TD Output 1	NO/NC	TD01	Per Engineering
	TD Output 2	NO/NC	TD02	Per Engineering
	TD Output 3	NO/NC	TD03	Per Engineering
	TD Output 4	NO/NC	TD04	Per Engineering

* Or per engineering's recommendation

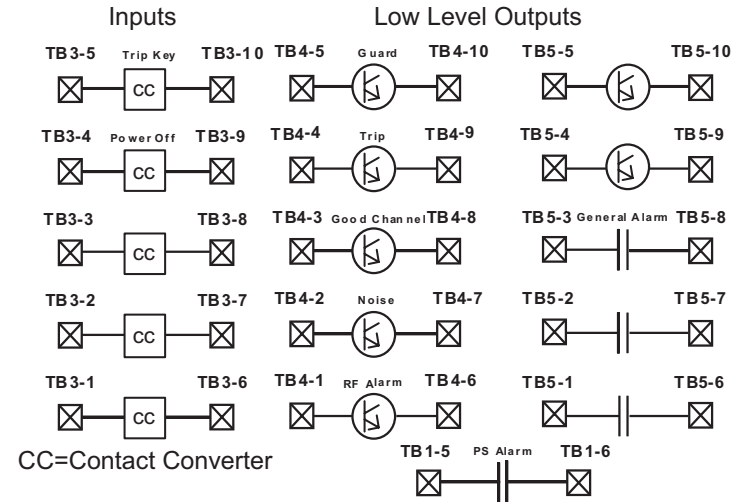**Figure 8. UPLC™ Unblock Configuration (Standard Configuration per Table 15)**

Figure 9. UPLC™ Direct Transfer Trip Configuration (Standard Configuration per Table 13)
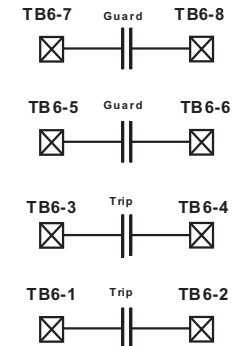

Jumper Table

Module	Function	Selection	Label	Recommendation
Backplane	Coax Setting	2 wire/4 wire	JMP3/JMP5	4 wire
	# of PAs	1 PA/2PA	JMP2/JMP6	Per factory
	Coax Impedance	50 Ω/75 Ω	JMP1/JMP4	50 Ω *
Power Supply	Power	PwrOn/PwrOff	JMP3	PwrOn
	Alarm Contact	NO/NC	JMP1/JMP2	Per engineering
Input/Output	Input 1	15/48/125/250 Vdc	Input 1	Station Battery
	Input 2	15/48/125/250 Vdc	Input 2	Per engineering
	Input 3	15/48/125/250 Vdc	Input 3	Per engineering
	Input 4	15/48/125/250 Vdc	Input 4	Per engineering
	Input 5	15/48/125/250 Vdc	Input 5	Per engineering
	LL Output 1	0.1/1.0 A	LIO1	Per engineering
	LL Output 2	0.1/1.0 A	LIO2	1.0A
	LL Output 3	0.1/1.0 A	LIO3	Per engineering
	LL Output 4	0.1/1.0 A	LIO4	Per engineering
	LL Output 5	0.1/1.0 A	LIO5	Per engineering
	LL Output 6	0.1/1.0 A	LIO6	Per engineering
	LL Output 7	0.1/1.0 A	LIO7	Per engineering
	LL Output 8	NO/NC	LIO8	Per engineering
	LL Output 9	NO/NC	LIO9	Per engineering
	LL Output 10	NO/NC	LIO10	Per engineering
	TD Output 1	NO/NC	TD01	Per engineering
	TD Output 2	NO/NC	TD02	Per engineering
	TD Output 3	NO/NC	TD03	NO
	TD Output 4	NO/NC	TD04	Per engineering

* Or per engineering's recommendation

Note: All contacts are link selectable for normally open or closed.

CC=Contact Converter

UPLC Terminals

AMETEK
POWER INSTRUMENTS

Inputs

Trip Duty Outputs

CC = contact converter

Low Level Outputs

Note: All contacts are link selectable for normally open or closed.

☐ Relay Terminals   ⊠ UPLC Terminals

Jumper Table

Module	Function	Selection	Label	Recommendation
Backplane	Coax Setting	2 wire/4 wire	JMP3/JMP5	4 wire
	# of PAs	1 PA/2PA	JMP2/JMP6	Per factory
	Coax Impedance	50 Ω/75 Ω	JMP1/JMP4	50 Ω *
Power Supply	Power	PwrOn/PwrOff	JMP3	PwrOn
	Alarm Contact	NO/NC	JMP1/JMP2	Per Engineering
Input/Output	Input 1	15/48/125/250 Vdc	Input 1	Station Battery
	Input 2	15/48/125/250 Vdc	Input 2	Station Battery
	Input 3	15/48/125/250 Vdc	Input 3	Per Engineering
	Input 4	15/48/125/250 Vdc	Input 4	Per Engineering
	Input 5	15/48/125/250 Vdc	Input 5	Per Engineering
	LL Output 1	0.1/1.0 A	LIO1	Per Engineering
	LL Output 2	0.1/1.0 A	LIO2	0.1 A
	LL Output 3	0.1/1.0 A	LIO3	Per Engineering
	LL Output 4	0.1/1.0 A	LIO4	.01 A
	LL Output 5	0.1/1.0 A	LIO5	Per Engineering
	LL Output 6	0.1/1.0 A	LIO6	Per Engineering
	LL Output 7	0.1/1.0 A	LIO7	Per Engineering
	LL Output 8	NO/NC	LIO8	Per Engineering
	LL Output 9	NO/NC	LIO9	Per Engineering
	LL Output 10	NO/NC	LIO10	Per Engineering
	TD Output 1	NO/NC	TD01	Per Engineering
	TD Output 2	NO/NC	TD02	NO
	TD Output 3	NO/NC	TD03	Per Engineering
	TD Output 4	NO/NC	TD04	Per Engineering

* Or per engineering's recommendation

Figure 10. UPLC™ 4-Frequency Configuration (Standard Configuration per Table 16)

6. Configuration Process

Here we will describe the upload and download features of the UPLC™. The UPLC™ is configured primarily through a web browser or a disk containing a configuration file. Some settings can be made using the front panel. There are a few conditions to keep in mind however.

- The configuration file must be an xml file.
- An error during upload will cause the settings to revert to the previous state.
- Checkback configuration uploads are irreversible.
- For a setting to take affect, the configuration file must be submitted after uploading.
- Any configuration settings not relevant will be ignored.
- General, Logic and Input/Output settings sections are required for a successful upload.
- Checkback section updates are optional.
- Text in the configuration file is case sensitive.

The UPLC™ stores its configuration in two sets: Working and Temporary. The Working set is a nonvolatile set, and will be saved even if the unit is turned off. It holds the actual settings the UPLC™ uses for operation. The Temporary set is a volatile set that's lost if the unit is turned off. Except when you're editing settings, these two sets are identical.

The Home page shows some of the Working settings, while the Settings pages show the Temporary copy of these settings. All settings are changed from the Settings pages and any changes you make will only affect the Temporary settings. The Working settings won't be changed unless you specifically "submit" your changes on the Submit page. Having two copies of settings allows you to change the UPLC™'s settings while it continues to operate as normal on your bench or on-line in the field.

Similar to online editing, Configurations loaded from a file are also saved in the Temporary set. Once loaded, you can either "submit" them directly on the Submit page, manually edit the settings

before submitting or just save them back to the same or another file.

You can also use the UPLC™ to help you create a configuration file for future use with another UPLC™. Edit the Temporary set as usual to create the alternative settings. Then, rather than submitting these settings, "Save" them. If you are just saving the settings, it is a good idea to discard the settings after saving them to a file. You can discard the Temporary settings by going to the submit page and clicking on the discard button. If you don't do this, clicking on the "logout" button will also cause the Temporary settings to be discarded. If you don't logout the unit will discard all temporary setting changes after an hour of no activity on the serial or Ethernet ports.

Any time you've made at least one settings change either by manually editing or loading a Configuration file, a red bar stating "Changes Pending" will appear at the top of the page. Once you submit or discard these new settings, it will disappear.

6.1 Configuration File Download

To download UPLC™ settings:

1. Click the Settings button in the Main Menu of your UPLC™ Home Page.
2. Click on the 'Load/Save Configuration' tab.
3. Click on the 'Save Settings' button.
4. When the File Download dialog box appears click on the 'Save' button. The name of the file being downloaded will be shown as 'UPLC™ Config'
5. Next a 'Save As' dialog box appears. Enter the name you want to call this configuration file, with an .XML extension. It is required that the saved file have an XML extension in order to upload it to the carrier set.

The file name cannot automatically have the .XML extension added to it and be able to "save it as file" on your local computer. If the browser recognizes it as an XML file, the "save as" dialog box will not be presented and the browser will show the raw XML data.

6.2 Uploading Configuration File

1. Go to the settings pages of the UPLC™. Choose the 'Load / Save Configuration' tab.

2. Choose the configuration file (an XML file type), which you wish to load, by clicking the 'Browse' button.

3. Click 'Load Configuration'. You will see a dialog box, read it and then click 'ok'.

4. Once Upload completes, click 'continue'. This will take you to the General Settings Page.

5. Review the configuration to verify the new settings are OK. If you aren't satisfied with the settings, you can make further changes or click "Discard Changes" to cancel all changes and continue with the current settings.

6. After completing your review, Click 'Submit Changes'.

The last step will refresh your window to show the new UPLC™ mode. If you want to generate a settings file without changing the current UPLC™ settings, you can configure the UPLC™ as you normally would, Save the settings to a file, then "Discard" rather than "Submit" them.

This method does not affect the UPLC™ and will minimize the effort required to go through the unfamiliar looking XML Configuration file by providing a valid starting point.

Always remember: get it, modify it and upload it. Don't try to hand code xml from scratch.

6.2.1 Selecting a Pre-existing Configuration

You can also use a pre-exiting configuration to configure a UPLC™. The UPLC™ includes a set of configuration files. Each of these files configures the UPLC™ to work in a different mode and function with default values. You can choose one of these configurations without having to download or modify a configuration file, but you'll still be able to review, edit or even cancel the new settings before locking them in.

Configuration Selection

1. Click the Settings button in the Main Menu of your UPLC™ Home Page.

2. Click on the 'Load/Save Configuration' tab.

3 On your left you'll see a list box, 'Choose Configuration'.

4. Select the configuration you want.

5. Click on the 'Select Configuration' button.

6. The UPLC™ will tell you when the configuration is loaded then will go to the General Settings page.

7. Verify the settings and submit the changes for the configuration to take effect.

6.2.2 Available Configurations

Tables 12-16 show the default settings for the different configurations that are provided with the UPLC™.

Table 12. ON/OFF - Directional Comparison Settings
(Available as a Standard Configuration)

General	TX Frequency	250.00 Hz	RX Frequency	250.00 Hz
	Bandwidth	1200 Hz		
	TX Power	1.0 W/10.0 W		
	Fade Alarm	10 dB	Fade Margin	15 dB
Logic	Priority	Stop	Rec. Dropout	0 ms
	Checkback	Disabled	Voice	Not Set
Inputs	1	Carrier Start	Removal of Voltage	
	2	Carrier Stop	Application of Voltage	
	3	Low Level	Application of Voltage	
	4	not used	Application of Voltage	
	5	not used	Application of Voltage	
TD Outputs	1	not used		
	2	not used		
	3	not used		
	4	not used		
LL Outputs	1	Blocking Output	NO	
	2	Main RF Output	NO	
	3	Blocking Output	NO	
	4	Fade Alarm	NO	
	5	not used	NO	
	6	not used	NO	
	7	not used	NO	
	8	not used		
	9	not used		
	10	General Alarm		

Table 13. FSK - 2 Frequency POTT/DTT Settings
(Available as a Standard Configuration)

General	TX Frequency	250.00 Hz	RX Frequency	252.00 Hz
	Bandwidth	300 Hz	Shift	100.00 Hz
	TX Power	1.0 W/10.0 W		
	Fade Alarm	10 dB	Fade Margin	15 dB
Logic	Trip Test	Disabled	Voice	Not Set
	Pre-trip Delay	30 ms	Guard Hold	0 ms
	Trip Hold	0 ms	Guard Before Trip	Required
Inputs	1	Trip Key	Application of Voltage	
	2	Power Off	Application of Voltage	
	3	not used	Application of Voltage	
	4	not used	Application of Voltage	
	5	not used	Application of Voltage	
TD Outputs	1	Guard		
	2	Guard		
	3	Trip		
	4	Trip		
LL Outputs	1	Guard	NO	
	2	Trip	NO	
	3	Good Channel	NO	
	4	Noise	NO	
	5	not used	NO	
	6	TX Shift Low	NO	
	7	Main RF Output	NO	
	8	not used		
	9	not used		
	10	General Alarm		

Table 14. FSK - 3 Frequency Settings
(Available as a Standard Configuration)

General	TX Frequency	250.00 Hz	RX Frequency	252.00 Hz
	Bandwidth	600 Hz	Shift	250.00 Hz
	TX Power	1.0 W/10.0 W		
	Fade Alarm	10 dB	Fade Margin	15 dB
Logic	Trip Test	Disabled	Voice	Not Set
	LR Pre-trip Delay	30 ms	DTT Pre-trip	30 ms
	LR Trip Hold	0 ms	DTT Trip Hold	0 ms
	LR Guard Hold	0 ms	DTT Guard Hold	0 ms
	Unblock Timer	0 ms		
	Unblock Delay	0 ms		
	Guard Before Trip	Required		
Inputs	1	LR Trip Key	Application of Voltage	
	2	DTT Key	Application of Voltage	
	3	Power Off	Application of Voltage	
	4	not used	Application of Voltage	
	5	not used	Application of Voltage	
TD Outputs	1	LR Guard		
	2	LR Trip		
	3	DTT Guard		
	4	DTT Trip		
LL Outputs	1	LR Guard	NO	
	2	LR Trip	NO	
	3	DTT Guard	NO	
	4	DTT Trip	NO	
	5	Good Channel	NO	
	6	Noise	NO	
	7	TX Shift High	NO	
	8	TX Shift Low		
	9	Main RF Output		
	10	General Alarm		

Table 15. FSK - 2 Frequency Unblocking Settings
(Available as a Standard Configuration)

General	TX Frequency	250.00 Hz	RX Frequency	252.00 Hz
	Bandwidth	600 Hz	Shift	250.00 Hz
	TX Power	1.0 W/10.0 W		
	Fade Alarm	10 dB	Fade Margin	15 dB
Logic	Trip Test	Disabled	Voice	Not Set
	Pre-trip Delay	2 ms	Guard Hold	0 ms
	Trip Hold	0 ms	Guard Before Trip	Required
	Unblock Timer	0 ms	Unblock Delay	0 ms
Inputs	1	Trip Key	Application of Voltage	
	2	Power Off	Application of Voltage	
	3	not used	Application of Voltage	
	4	not used	Application of Voltage	
	5	not used	Application of Voltage	
TD Outputs	1	Guard		
	2	Guard		
	3	Trip		
	4	Trip		
LL Outputs	1	Guard	NO	
	2	Trip	NO	
	3	Good Channel	NO	
	4	Noise	NO	
	5	not used	NO	
	6	TX Shift Low	NO	
	7	Main RF Output	NO	
	8	not used		
	9	not used		
	10	General Alarm		

Table 16. FSK - 4 Frequency Settings
(Available as a Standard Configuration)

General	TX Frequency	250.00 Hz	RX Frequency	252.00 Hz
	Bandwidth	600 Hz	Shift	250.00 Hz
	TX Power	1.0 W/10.0 W		
	Fade Alarm	10 dB	Fade Margin	15 dB
Logic			Voice	Not Set
	Function A		Function B	
	Pre-trip Delay	0 ms	Pre-trip	0 ms
	Trip Hold	0 ms	Trip Hold	0 ms
	Guard Hold	0 ms	Guard Hold	0 ms
	Unblock Timer	0 ms	Unblock Time	0 ms
	Unblock Delay	0 ms	Unblock Delay	0 ms
	Guard Before Trip	Required	Guard Before Trip	Required
Inputs	1	A Key	Application of Voltage	
	2	B Key	Application of Voltage	
	3	Power Off	Application of Voltage	
	4	not used	Application of Voltage	
	5	not used	Application of Voltage	
TD Outputs	1	A Guard		
	2	A Trip		
	3	B Guard		
	4	B Trip		
LL Outputs	1	A Guard	NO	
	2	A Trip	NO	
	3	B Guard	NO	
	4	B Trip	NO	
	5	Good Channel	NO	
	6	Noise	NO	
	7	TX Shift High	NO	
	8	TX Shift Low		
	9	Main RF Output		
	10	General Alarm		

AMETEK
POWER INSTRUMENTS

UPLC **Universal Power Line Carrier**

Pulsar
Technologies, Inc.

MAIN   REDUNDANT

RF ON   PWR ON   RF ON   PWR ON

CALL   ESC

Power
Carrier
Line ®

1	2	3
4	5	6
7	8	9
0	↑ DISP ON	↵ SET
← TEST	↓ ACK ALM	→ VIEW ALM

ON/OFF-DC
TX:250.00KHZ 0.0W
RX:235.00KHZ 0MV
MARGIN ↓- 40.0 DB OFF

Handset   PC Interface

Figure 11. UPLC™ Front Panel Controls and Indicators

7. Front Panel (See Figure 11)

Limited access is available through the front panel interface of the UPLC™.

Prior to inputting a password, you may view alarms, acknowledge alarms, turn on the display after it has self-extinguished, and (optionally) test or exercise the unit functionally.

- To turn on the display, press the "UP" arrow or any other key.
- To view Alarms, press the "RIGHT" arrow.
- To acknowledge alarms, press the "DOWN" arrow.
- To test the functionality, press the "LEFT" arrow.

7.1 Password

A password is required to make any changes to settings. The default password is 4050. Front panel passwords can be four to eight numeric characters.

The front panel password may be changed. However, it can only be changed using the front panel.

When the "SET" key is pressed, a password must be entered to progress.

The following numbers are then used to gain access to the various functions of the UPLC™.

1. Settings
2. Configure
3. Calibrate

7.2 Settings

1. TXFreq: xxx.xx kHz
2. RXFreq: xxx.xx kHz
3. Bandwidth: xxxx Hz

Frequencies may be either input from the numeric keypad or using the arrow keys, scrolling up or down. Bandwidths are selectable via the up or down arrow key.

7.3 Configure

1. Change Password
2. IP Address

3. View MAC Address
4. View Revisions

7.4 Calibrate

1. Transmitter
2. Receiver (to Distant Transmitter)
3. Receiver to Local Transmitter - On/Off only.

7.5 Testing

Pressing the TEST or Left arrow allows you to test the functionality of the unit. In an On/Off system you can send a high level (HL) transmitted output, a low level (LL), Checkback (CB) Initiate, or a loopback initiate, as well as resetting of CB alarms and CB Recovery. In an FSK system you can shift the transmitter to the higher frequency, lower frequency or send a power-boosted signal.

7.6 Front Panel Alarms

LOLV - Low Level Output

NOIS - Noise

TPUB - Trip Unblock

TPDT - Trip DTT

TPKU - Trip Key Up

TPKD - Trip Key Down

PA1 - Power Amp Main

PA2 - Power Amp Redundant

PS1 - Power Supply Main

PS2 - Power Supply Redundant

CBMJ - Checkback Major Alarm

CBMN - Checkback Minor Alarm

RECO - Checkback in Recovery Alarm

GENA - General Alarm

TRBD - Transmitter/Receiver Board Alarm

IOBD - Input/Output Board Alarm

DSPL - Display Board Alarm

FADL - Fade Alarm

8. Software Settings

Most of the settings on the UPLC™ are configurable using a computer connected to either the front RS232 port, front USB port, the rear RS232/RS485 port or the rear Ethernet port (if present). You can use an Internet browser to communicate with the UPLC™ . There is no need for special software. If there is no Ethernet port on the unit then the best way to configure it is to connect to the front panel RS232 port (See Figure 11) or USB port (optional). Before this can be done, you need to set up a direct computer-to-computer connection on the computer you are going to use to configure the UPLC™ . See Appendix A for instructions on how to set up this connection on your computer.

9. Making a Connection to the UPLC™ Front Panel

The UPLC™ front panel is a DCE serial port. Since most computer serial ports are DTE devices, a standard straight through serial cable may be used to connect the UPLC™ to a computer via the serial port.

Connecting your computer to the UPLC™

1. After initially powering up the unit, wait approx. 1 min. prior to accessing the unit.

2. Connect a straight-thru serial cable between your computer serial port and the front serial port on the UPLC™ .
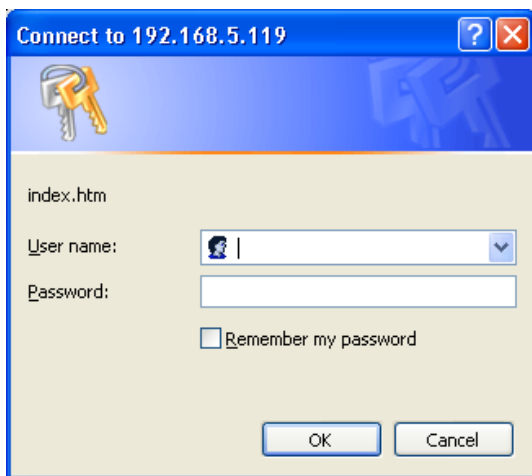
Figure 12. Example of Logon Screen

3. Either double click the connection icon you placed on your desktop from the configuration procedure in Appendix A or double click the "My Computer" icon on your desktop.

4. Under My Computer double click on "My Network Places" icon and then double click on "view network connections."

5. Then double click on the direct connection you set up from the procedure in Appendix A to talk to the UPLC™ .

6. The connection window will pop up. Leave the user name and password blank. Click on the "Connect" button.

7. You may see a dialog box pop up that says "dialing…" and this is ok. Then you will see "Verifying username and password….." After that you will see "Registering your computer on the network…" The dialog box will go away and you will get confirmation that you are connected. Should you get a 777 error after "dialing", close the window and restart the direct connection. Do not "redial".

8. Now open your Internet Explorer program. In the address line enter http://100.100.100.100 and then hit Return. You will then be asked for a username and password. An example of the login screen is shown in Figure 12. If this is your first time logging onto a UPLC™ unit from the factory, type "administrator" for the

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⚠ **CAUTION**

A DEFAULT USER NAME "administrator" AND A DEFAULT PASSWORD SET TO "pulsar" HAS BEEN PROVIDED WHEN THE UNIT IS SHIPPED. IT IS YOUR RESPONSIBILITY TO CHANGE THE DEFAULT PASSWORD TO SOMETHING DIFFERENT TO ENSURE THE SECURITY OF YOUR UPLC™. AMETEK IS NOT RESPONSIBLE FOR THE SECURITY OF THE SYSTEM.

NOTE
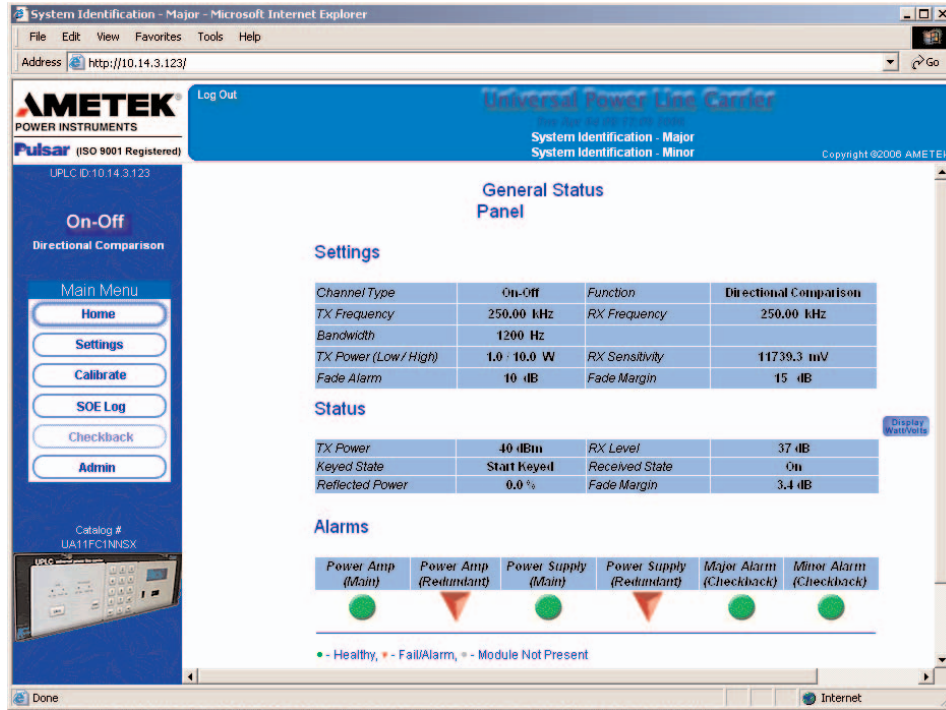Refreshing any web page will automatically return you to the UPLC™ home page.

Figure 13. Example of the Home Page

username and "pulsar" for the password. If this is not the first time logging onto the UPLC™, and user accounts have been set up, use your assigned user name and password.

9. The UPLC™ web pages should then appear. Type in the username and password. You will be taken to the Home page. Go to the Admin page, where you can setup user accounts for Ethernet access to the unit. See section 10.3 for user account information.

This completes the connection process to the UPLC™ front panel.

NOTE

If using the front USB port, prior to unplugging the UPLC™, be sure to "disconnect" the device via the "Safely Remove Harware" icon in the bottom right hand side of your taskbar.

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10. Making a Connection to the UPLC™ Ethernet Port

If the UPLC™ is supplied with an Ethernet port, you will need a cross-connect Ethernet cable to connect directly to the UPLC™. Alternatively, you may use a straight-through Ethernet cable via a switch or port.

10.1 LAN Connection

The UPLC™ IP address is set for 192.168.0.10 as the default. You will need to change that per your IT department's instructions should this unit be on the corporate LAN. To change the IP address of the UPLC™, you must use the Front Panel Interface.

1. Press the SET/RETURN button; when prompted for the password, input the numeric password (default is 4050).

2. Press "2" or scroll down to 2 for the "Configure" section, press the ENTER key.

3. On the next menu, scroll to the IP address. Press the SET button. Enter the IP address assigned to the UPLC™, the mask should be 255.255.255.0 and the gateway should be

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192.168.0.1, press SET, then ESCape out to the top level.

4. Open the web browser on your computer and type in http://"IP Address", where "IP Address" is the assigned address.

5. A dialog box will pop up with username and password fields for you to fill in.

6. The UPLC™ web pages should then appear. Type in the username and password. You will be taken to the Home page. Go to the Admin page, where you can setup user accounts for Ethernet access to the unit. See section 10.3 for user account information.

10.2 Direct Connect

To connect directly to the UPLC™ via an Ethernet cable, you need to disable the DHCP settings on your LAN connection.

1. Go to 'My Computer' then to 'My Network Places'. Select 'Local Area Connection', then 'View Properties'.

2. Click on 'TCP/IP', then on 'Properties'.

3. Choose the radio button for 'Use the following IP Address' and input an address that is less than the one on the UPLC™.

4. Click in the Subnet Mask box, 255.255.255.0 should appear in the field, if it doesn't then enter it manually.

5. Click 'OK'.

6. A dialog box will pop up with username and password fields to fill in.

7. The UPLC™ web pages should then appear. Type in the username and password. You will be taken to the Home page. Go to the Admin page, where you can setup user accounts for Ethernet access to the

unit. See section 9.8 for user account information.

10.3 User Accounts

User accounts allow limited access to the maintenance and setting of the UPLC™. This is required security to prevent unauthorized access to the UPLC™.

There are four levels of access allowed through the user account. The UPLC™ is provided from the factory with only one administrator level account. The administrator can only assign user accounts and upgrade firmware. The guest level can only see settings and adjustments, but cannot make any changes. The user level has the ability to make setting changes, calibrate the unit and download files such as the SOEs and settings. The fourth level is the "super user", which is the combination of the administrator level and the user level.

11. Home Page

The home page shows the general status and settings of the unit at the time the home page was requested by your browser, as well as other information. In the main blue bar at the top of the page is the date and time the web page was requested as well as two title lines which identify the unit to which you are connected, provided this text string has been set. The main blue bar on the left of the screen shows the IP address of the unit connected and also several menu buttons you can choose from. An example of the Home Page is shown in Figure 13. The top table shows basic settings on the unit, such as frequency, channel type, bandwidth, shift, transmit level, receive sensitivity and fade

Table 17. Authority Level Matrix

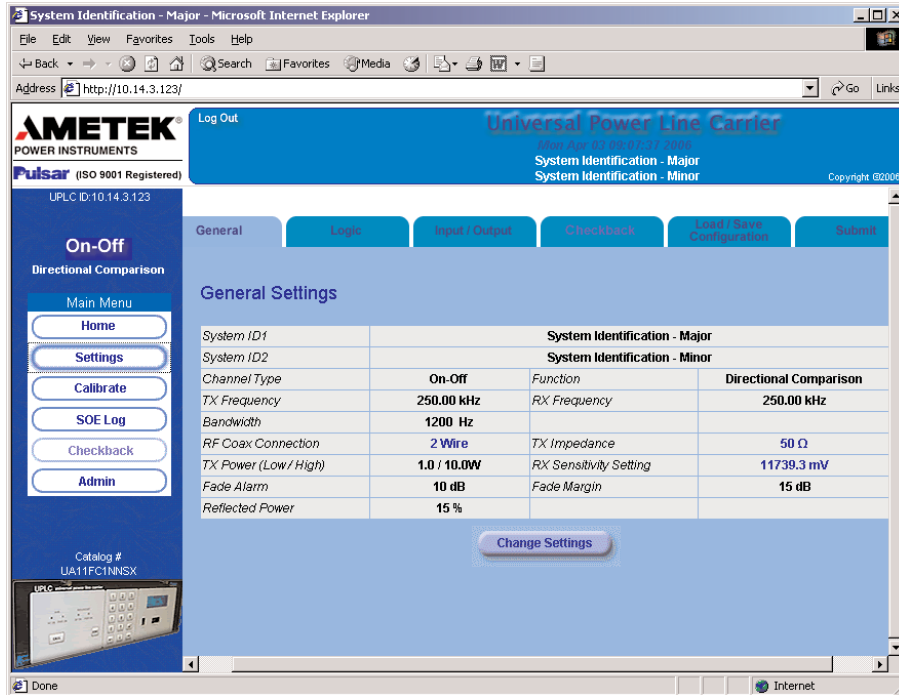| Level	Assign User Accounts	Upgrade firmware	Setting changes	Calib-rations	Up/down load files	View only
Admin	X	X				
Guest						X
User		X	X	X	X	
Superuser	X	X	X	X	X	

Figure 14. Example of The General Tab

alarm. The settings table is only updated when the web page is refreshed manually either by pushing on the IE refresh button, selecting View>Refresh, or by pressing [F5].

The next table shows the status of the unit. The actual transmit power and receive level is shown, as well as, the keyed and received state of the unit. The status table is only updated when the web page is refreshed manually. The last table shows the alarm state of the unit. A green indicates that the item is not in alarm. A red will indicate an alarm. In the case of the redundant power supply, it will also show red when none is present. The redundant power amplifier will show gray when none is present. This alarms table is the only item on the page that is updated periodically. It is updated once about every 20 seconds while connected to the unit.

12. Settings Pages

When you click on the "Settings" button on the left menu table you will be presented with the settings tabs for the UPLC™ . Note the four tabs at the top of the white area. They are General, Logic, Input/Output and Submit. These tabs are where all

the settings are made to the UPLC™ . The tab that is seen first is the General settings for the connected unit. The bold items are the set items and can be changed. Depending on what has been selected for the settings on this page, this will determine what settings appear on the next pages. Therefore, the settings on the General tab must be set correctly before proceeding to the other tabs.

12.1 General Tab

Figure 14 shows an example of the General Settings tab. If the user account you have used to log into the UPLC™ is set to "User" rights then you will see a "change settings" button below the Current Settings table on the web page. If you do not see this button then your user account does not have rights to make changes to the settings and you can only view the settings. You must then logon with a user name that has rights to make changes if you desire to change the settings. When you click on the change settings button on the General settings page, you will see the first items that need to be selected. At the top, is the System ID1 and System ID2 Setting. These two boxes allow you put an identification you want the unit to show in the Title bar of the web pages. One
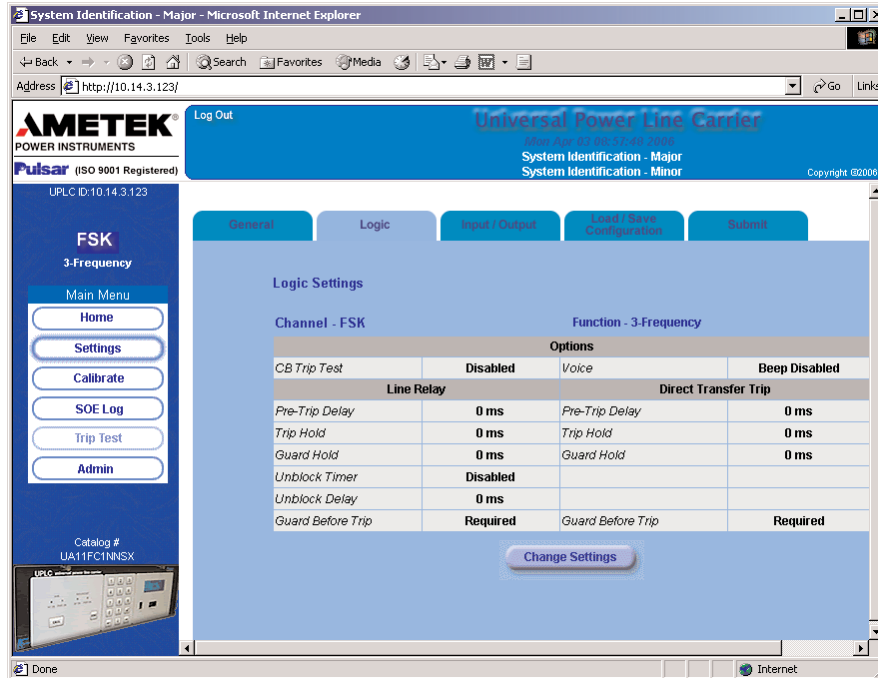
Figure 15. Example of The Logic Settings Tab for an FSK 3-Frequency Setting

suggestion here might be to identify the substation name with the line name and breaker number that the carrier set's associated relaying is connected to.

The last item to select is the most important. That is, do you want this unit to be a Frequency Shift Keyed (FSK) or ON/OFF type? This setting will affect all the other settings you are presented on the next pages.

Once these settings are made click on the "Continue" button. You will be taken to the next screen for the general settings and if you had made any changes on the last page you will see a narrow red bar appear at the top of the window that has the words "Changes Pending" in it. This tells you that you have made changes to the settings but they have not been sent to the UPLC™ yet. If you shut down your computer at this point or disconnect the communications cable you will lose these settings.

On the second screen of the General settings tab you will see more items to set. These items depend on whether FSK or ON/OFF is selected. See

Table 18. General Settings for ON/OFF

	Selection	Steps
Function	Directional or Phase Comparison	N/A
TX Frequency	30 to 535 kHz	10 Hz
RX Frequency	30 to 535 kHz	10 Hz
Bandwidth	600, 1200 or 4,000 Hz	N/A
TX Power	Low Power/High Power (0.1 to 10 W)	0.1 W
Fade Alarm	1 to 25 dB	1 dB
Fade Margin	1 to 25 dB	1 dB

Pulsar

Table 19. General Settings for FSK

	Selection	Steps
Function	Phase Comparison, Unblocking-2F POTT/DTT-2, 3 or 4 Frequency||	N/A
TX Frequency	30 to 535 kHz	10 Hz
RX Frequency	30 to 535 kHz	10 Hz
Bandwidth	300, 600 or 1,200 Hz	N/A
Shift	100, 250 or 500 Hz	N/A
TX Power	Low Power/High Power (0.1 to 10 W)	0.1 W
Fade Alarm	1 to 25 dB	1 dB
Fade Margin	1 to 25 dB	1 dB

Table 18 and Table 19 for the setting options that appear.

This concludes the general settings on the unit. When complete click on the "continue" button and you will be taken to the Logic Settings tab.

12.2 Logic Tab

In the logic settings all the time selections are changed in increments of 1 ms. Figure 15 shows the Logic settings tab for a FSK, 3-Frequency type and function selection. The others are similar.

The Logic settings for an ON/OFF type of channel and the Directional Comparison function are shown in Table 20. **Caution should be taken when considering setting receiver dropout delay to anything other than 0 ms. Applying a setting of 1 - 15 ms can adversely affect relaying logic such as transient blocking logic.**

The ON/OFF & FSK Phase comparison Logic settings are shown in the following pages.

The Logic settings for the FSK type of channel and the different functions are shown in Table 21-25. Note that GBT=Guard Before Trip.

Table 20. Logic Settings for ON/OFF & Directional Comparison

Blocking		Receiver Drop-out Delay
Priority	Start or Stop	0 to 15 ms
Common Start/Stop (KA-4)		
Options		
Voice	Beep Enabled or Disabled	
Checkback	Enabled or Disabled	

⚠ **CAUTION**

IF YOU ARE CONSIDERING SETTING ANY CONTACT BOUNCE TIME PLEASE KEEP IN MIND THAT ANY TIME OTHER THAN 0ms WILL AFFECT THE SECURITY OF YOUR SYSTEM. IF ANY TIME IS SET AND YOU GET A VERY SHORT INPUT OF 100μS OR LESS, THE INPUT WILL BE HELD FOR THE TOTAL CONTACT BOUNCE TIME. IT MAY BE WISER TO LET THE INPUT FOLLOW WHATEVER IS COMING IN AND LET THE RECEIVER RESPOND ACCORDINGLY.
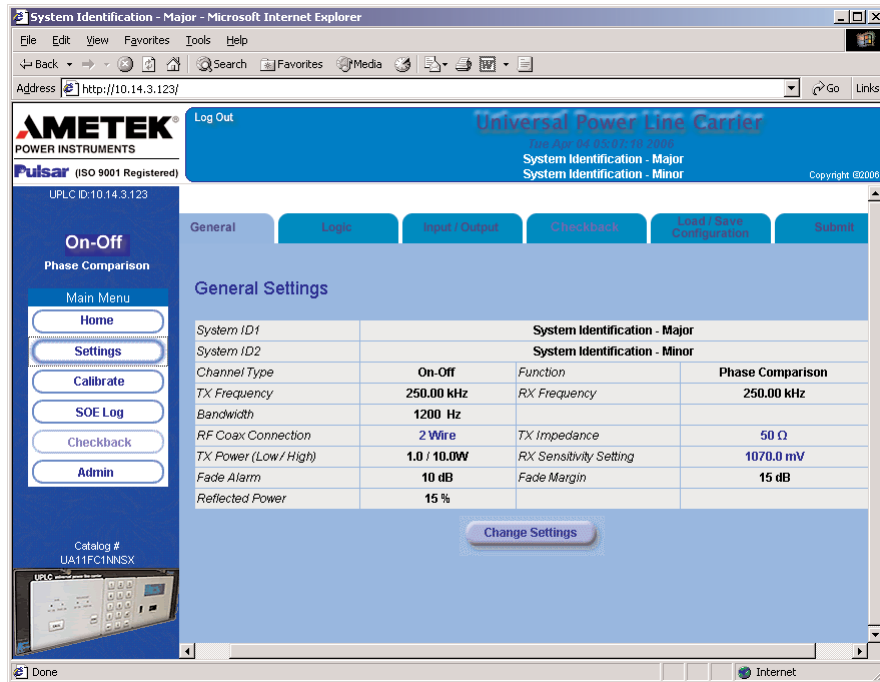
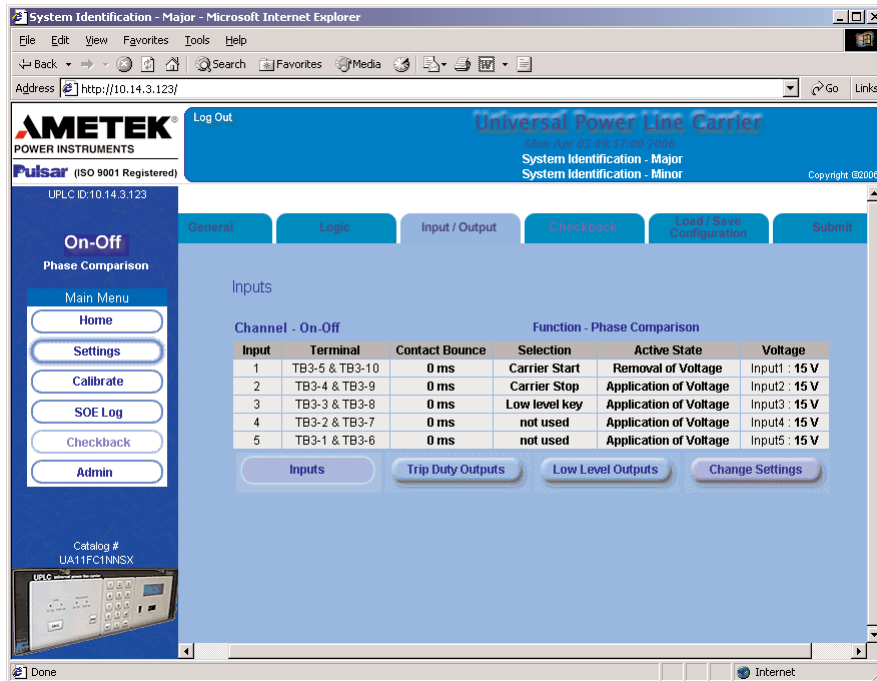**Figure 16. Example of The General Settings Page for an ON/OFF Phase Comparison Setting**
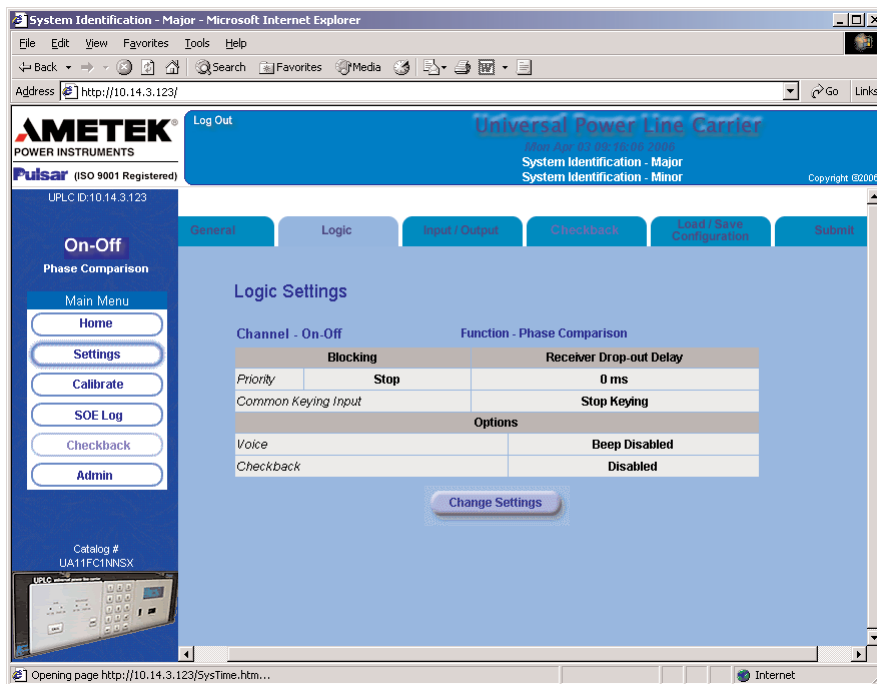
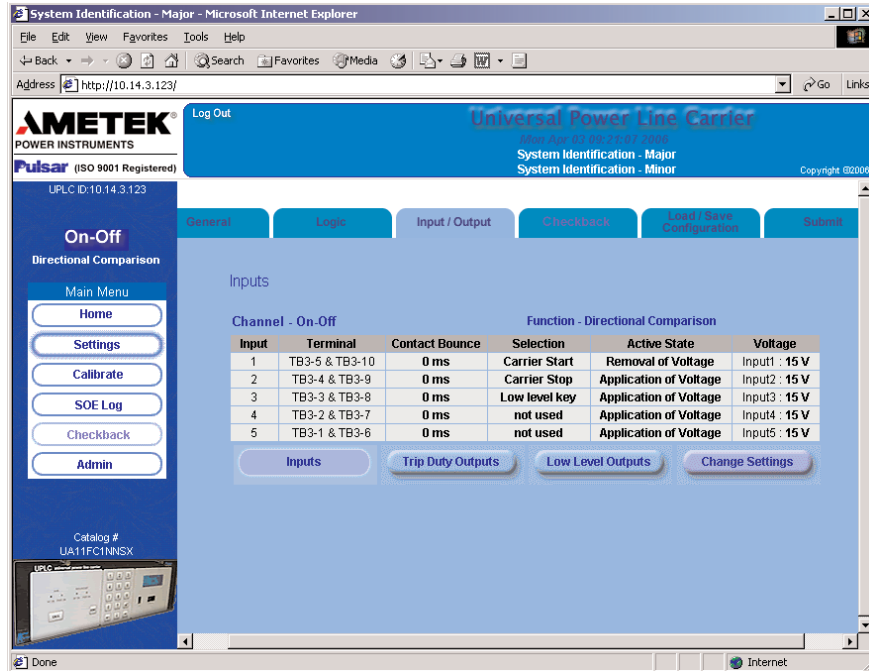**Figure 17. Example of The Logic Settings Page for an ON/OFF Phase Comparison Setting**

Table 21. Logic Settings for ON/OFF & Phase Comparison

Blocking		Receiver Drop-out Delay
Priority	Stop	0 ms
Common Keying Input		Stop Keying
Options		
Voice		Beep Disabled
Checkback		Enabled

Table 22. Logic Settings for FSK & Phase Comparison

Options			
Trip Test	Enabled	Voice	Beep Disabled
Receiver Logic			
Pre-Trip Delay	0 ms	Guard Hold	0 ms
Trip Hold	0 ms	Guard Before Trip	Required

Figure 18. Example of The I/O Settings Page for an ON/OFF Phase Comparison Setting
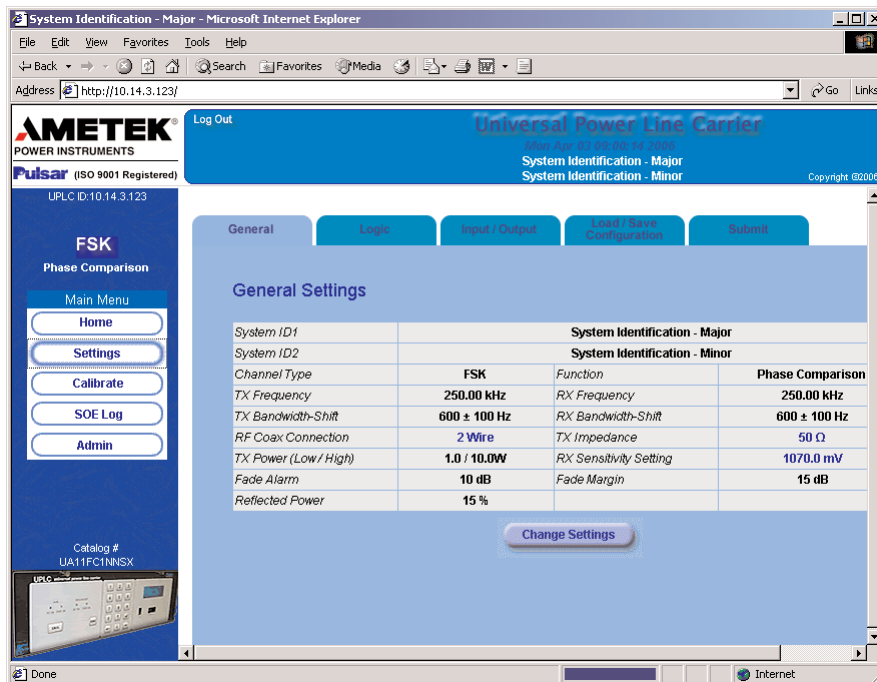
Figure 19. Example of The General Settings Page for an FSK Phase Comparison Setting

Table 23. Logic Settings for FSK & 2F Unblock

Options			
Trip Test	Enabled or Disabled	Voice	Beep Enabled or Disabled
Receiver Logic			
Pre-Trip Delay	0 to 30 ms	Guard Hold	0 to 100 ms
Trip Hold	0 to 100 ms	Guard Before Trip	None, GBT or GBT with Override
Unblock Timer	0 to 500 ms	Unblock Delay	0 to 100 ms

Table 24. Logic Settings for FSK & 2F POTT/DTT

Options			
Trip Test	Enabled or Disabled	Voice	Beep Enabled or Disabled
Receiver Logic			
Pre-Trip Delay	0 to 30 ms	Guard Hold	0 to 100 ms
Trip Hold	0 to 100 ms	Guard Before Trip	None, GBT or GBT with Override
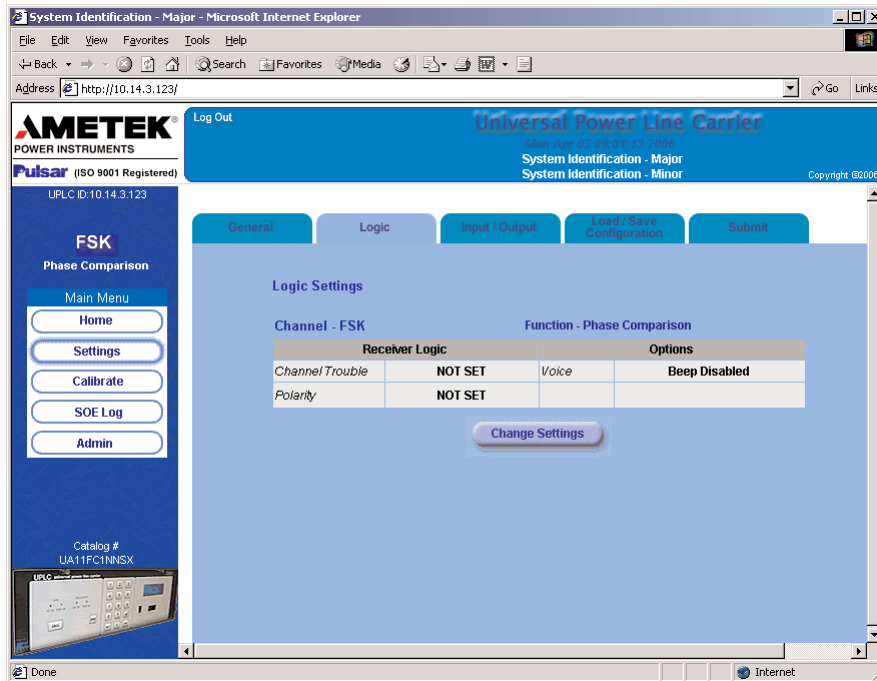
Figure 20. Example of The Logic Settings Page for an FSK Phase Comparison Setting
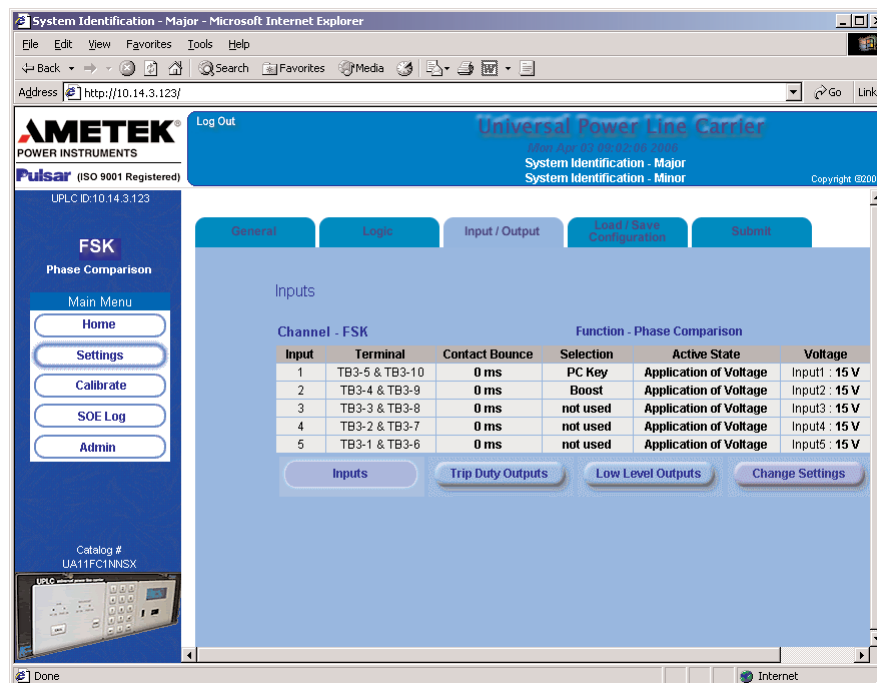
Figure 21. Example of The I/O Settings Page for an FSK Phase Comparison Setting

Figure 22. Example of The Input Selection Tab

When you have completed the logic settings click the "Continue" button.

12.3 Input/Output Tab

There are five inputs on the UPLC™. Each input can be set with a contact bounce time of 0 to 8 ms, any one of several selection points and if the input is active for voltage applied or no voltage applied. An Input web page is shown in Figure 22.

The input selection choice varies depending on the channel type and function setting. Table 26 shows the various input selection choices for different channel type and function selections. Of course, there is always the choice of "Not Used." You do not have to program all inputs just the ones you need.

After you have programmed all the inputs needed click on the "Continue" button and you will be taken to the Trip Duty Contact output programming functions, if your UPLC™ has this option. If not you will be taken to the Low Level output settings page. First we will take a look at the Trip Duty Outputs.

There are four trip duty relays on the UPLC™, if that option is ordered. The trip duty relay program-

mable selections are shown in Table 27, and a sample web page is shown in Figure 23. There are hardware jumpers to select for either a normally open or normally closed contact.

There are ten Low Level 1 A outputs available to be programmed to various output functions. Seven of these outputs are isolated transistor outputs that can be set for either 0.1 A or 1.0 A output. It is highly recommended to use the 0.1 A selection if your load is less than 0.1 A, such as, microprocessor based relay inputs. This will provide you with a much faster dropout time than if you use the 1.0 A selection. Three of these low level outputs are electromechanical relays that provide either a normally open or normally closed contact out. This contact has a 1.0 A rating. All ten of these outputs may be programmed to one of several functions or to a not used state. The output functions are shown in Table 29. The output selections under the ON/OFF channel type that are marked with an asterisk are only available if the checkback option has been ordered.

An example of the Low Level output selection option page is shown in Figure 24. Also programmable on the solid-state low level output is a

Table 25. Logic Settings for FSK & 3-Frequency

Options			
Trip Test	Enabled or Disabled	Voice	Beep Enabled or Disabled
Receiver Logic			
LR Pre-Trip Delay	0 to 30 ms	DTT Pre-Trip Delay	0 to 30 ms
LR Trip Hold	0 to 100 ms	DTT Trip Hold	0 to 100 ms
LR Guard Hold	0 to 100 ms	DTT Guard Hold	0 to 100 ms
Unblock Timer	0 to 500 ms		
Unblock Delay	0 to 100 ms		
Guard Before Trip	None, GBT or GBT w/Override		

Table 26. Input Selection Choice

ON/OFF		FSK				
Directional Comparison	Phase Comparison	Unblocking-2F	Phase Comparison	POTT/DTT-2F	3-Freq.	4-Freq.
Carrier Start	Carrier Start	UB Key	PC Key	Trip Key	LR Key	A Key
Carrier Stop	Carrier Stop	Power Off	Boost	Power Off	DTT Key	B Key
Low Level Key	Low Level Key	TTU Reset		TTU Reset	Power Off	Power Off
Checkback Reset	Checkback Initiate	TTU Initiate		TTU Initiate	TTU Reset	52B
Checkback Initiate	Checkback Reset	52B		Boost/52B	TTU Initiate	SOE Event 1
SOE Event 1	Boost II	SOE Event 1		SOE Event 1	Boost/52B	SOE Event 2
SOE Event 2		SOE Event 2		SOE Event 2	SOE Event 1	SOE Event 3
SOE Event 3		SOE Event 3		SOE Event 3	SOE Event 2	
				SOE Event 3	SOE Event 3	
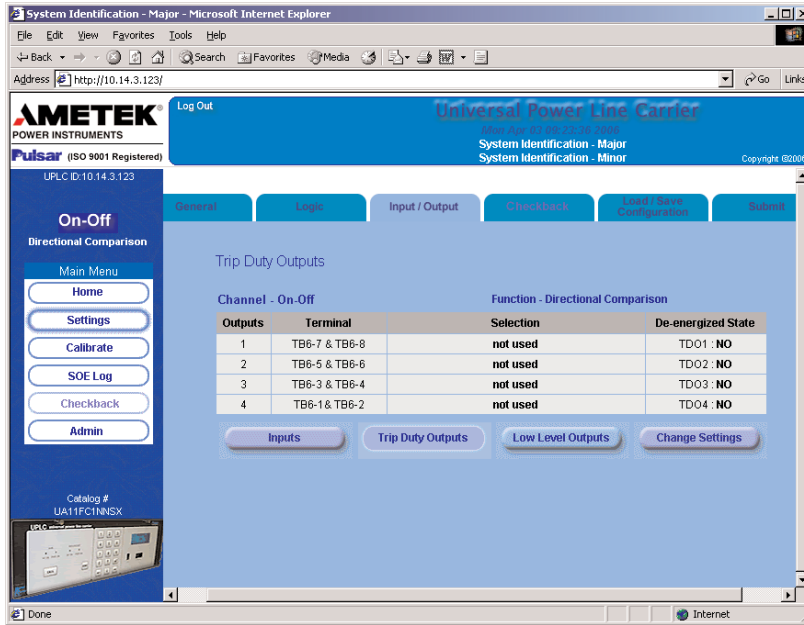
Figure 23. Example of The Trip Duty Contact Output Page

Table 27. Trip Duty Output Programmable Selections

ON/OFF	FSK			
Directional Comparison	Unblocking-2F	POTT/DTT-2F	3-Frequency	4-Frequency
Blocking	Guard	Guard	LR Guard	A Guard
Fade Alarm	Trip	Trip	LR Trip	A Trip
			DTT Guard	B Guard
			DTT Trip	B Trip

Table 28. Logic Settings for FSK & 4-Frequency

Options			
Voice		Beep Enabled or Disabled	
Receiver Logic			
Cmd A Pre-Trip Delay	0 - 30 ms	Cmd B Pre-Trip Delay	0 - 30 ms
Cmd A Trip Hold	0 - 100 ms	Cmd B Trip Hold	0 - 100 ms
Cmd A Guard Hold	0 - 100 ms	Cmd B Guard Hold	0 - 100 ms
Cmd A Unblock Timer	0 - 500 ms	Cmd B Unblock Time	0 - 500ms
Cmd A Unblock Delay	0 - 100 ms	Cmd B Unblock Delay	0 - 100ms
Cmd A Guard Before Trip	None, GBT or GBT w/Override	Cmd B Guard Before Trip	None, GBT or GBT w/Override
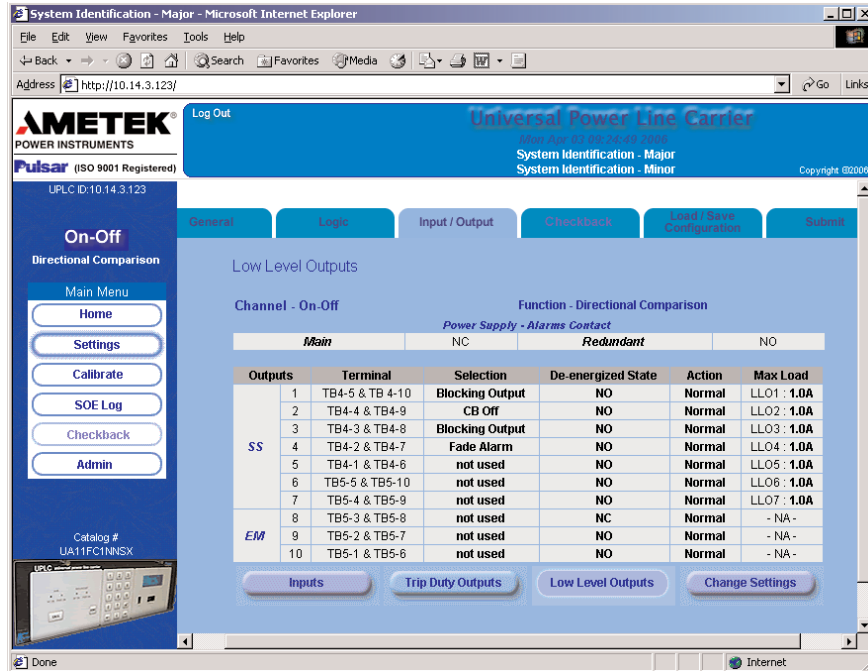
Figure 24. Example of The Low Level Output Selection Page

normally open or normally closed selection. However, it should be remembered that these outputs are transistor switches and if normally closed is selected the transistor is energized when that output is not active. Because of this, the transistor will de-energize if the power is turned off to the set. If it is desired to have a normally closed state during power off then select a normally closed contact of one of the low-level relay outputs. When your are complete with the low level output settings click the "Continue" button and you will be taken to the final settings page, the Submit tab.

Input/Output Additional Information

1. SOE Event 1, 2, & 3 Inputs

There are 3 input choices that allow you to bring an event external to the UPLC™ into the sequence of events, for example, a breaker position.

2. General Alarm Output

The general alarm is a fail-safe alarm. That is, the general alarm is normally energized and drops out in any alarm condition. The following are included in the general alarm:

    • Power Supply   • EPLD

    • RF Alarm   • I/O Board

    • DSP   • Transceiver Board

    • PPC

12.4 Load/Save Configuration Tab

There are three selections to be made on this page. First on the left side you can choose which mode the UPLC™ will operate in. Then in the center you can browse for a configuration file and load it to the UPLC™. And finally you use the save button to save the configuration that you chose.

12.5 Submit Tab

When you get to the submit page, you can either choose to submit the settings to the UPLC™ or you can discard the settings. Figure 26 is an example of the Submit page. Select the "Submit Changes" button to send the new settings to the UPLC™.

The next settings you can make are the system time and date. This will be the time used to time tag the Sequence of Events. Therefore, use the time that is common practice in your company for time tagging events, such as standard local time or GMT. If IRIG-B is connected to the unit the hour, minute and second will be set to GMT by the IRIG-B

Table 29. Low Level Output Programmable Selections

ON/OFF		FSK				
Directional Comp.	Phase Comp.	Unblocking-2F	Phase Comp.	POTT/DTT-2F	3-Freq.	4-Freq.
Blocking Output	Blocking Output	Guard	Trip Negative	Guard	LR Guard	A Guard
Fade Alarm	Checkback Off	Trip	Good Channel	Trip	LR Trip	A Trip
Margin Alarm	Blocking Output	CB Trip	Trip Negative	CB Trip	DTT Guard	A CB Trip
Gen. Alarm[1]	Fade Alarm	Good Channel	Trip Positive	Good Chan.	DTT Trip	B Guard
Refl. Power	Delayed Alarm	Noise	Gen. Alarm[1]	Noise	LR CB Trip	B Trip
Main RF Output	Gen. Alarm[1]	Gen. Alarm[1]	Refl. Pwr.	Gen. Alarm[1]	DTT CB Trip	B CB Trip
Red. RF Output	Refl. Pwr.	Fade Alarm		Fade Alarm	Good Chan.	Refl. Pwr.
Carrier Rec. (Block)		Main RF Output		Main RF Output	Noise	Main RF Out
*Checkback Off		Red. RF Output		Red. RF Output	Gen. Alarm[1]	Refl. RF Pwr.
*Checkback Passed		TX Shift High		TX Shift High	Fade Alarm	Good Chan.
*Major Alarm		TX Shift Low		TX Shift Low	Main RF Output	Noise
*Minor Alarm		Refl. Pwr.		Refl. Pwr.	Red. RF Output	Fade Alarm
*Delayed Alarm					TX Shift High	TX Shift A
*Carrier Recovered					TX Shift Low	TX Shift B
*In Recovery Mode						
*Tests in Progress						
*Auto Tests Disabled						

[1] Only available on outputs 8-10

signal. The user must set the date. The time and date are submitted separately from all the other settings.

At this point you have completed the settings on the UPLC™. As described here we progressed through the settings from beginning to end as if we were dealing with a new installation. However, you may go into the settings and map another input or output or change an existing one without going through the whole procedure. All you do is make the settings change you want then click on the Submit Tab and then click the "Submit Changes" button. Thus after a UPLC™ is configured, it is easy to make a couple of needed changes.

The only time your settings will be cleared and you will have to go through all the settings tabs, is when you change the channel type or the function.

13. Calibration

Now that the settings have been submitted to the UPLC™, the transmitter and receiver levels must be calibrated. Figure 27 shows an example of the Calibration web page for the FSK channel type, and

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NOTE

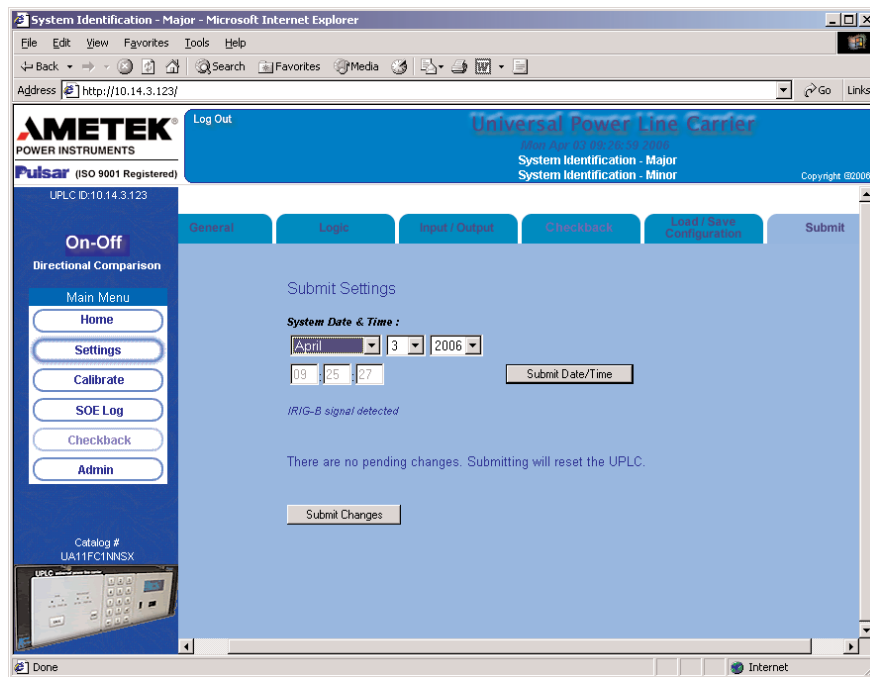In order for your settings to take effect, you must click the "Continue" button on each page.
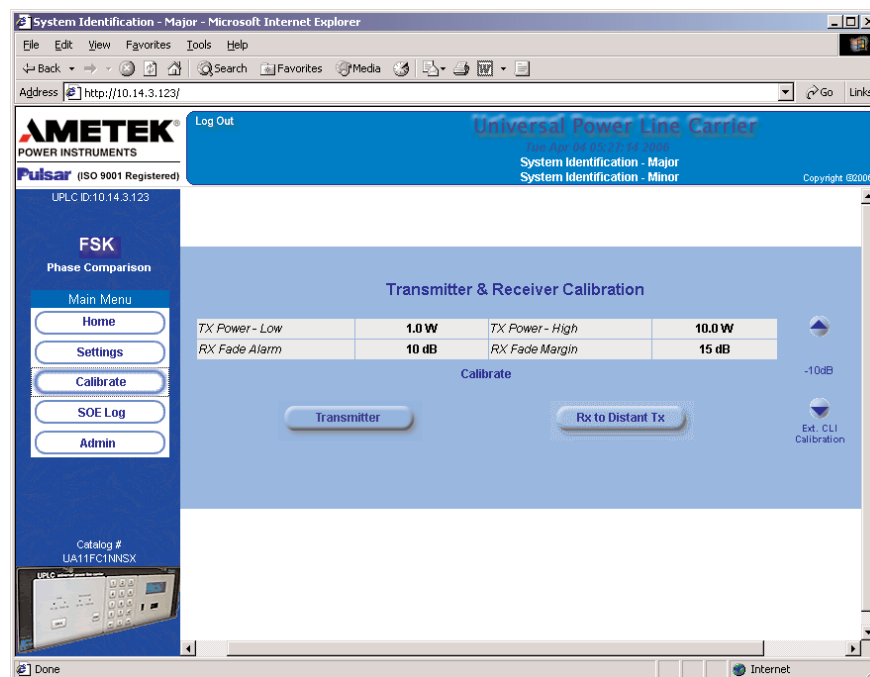

Figure 26. Example of The Submit Tab

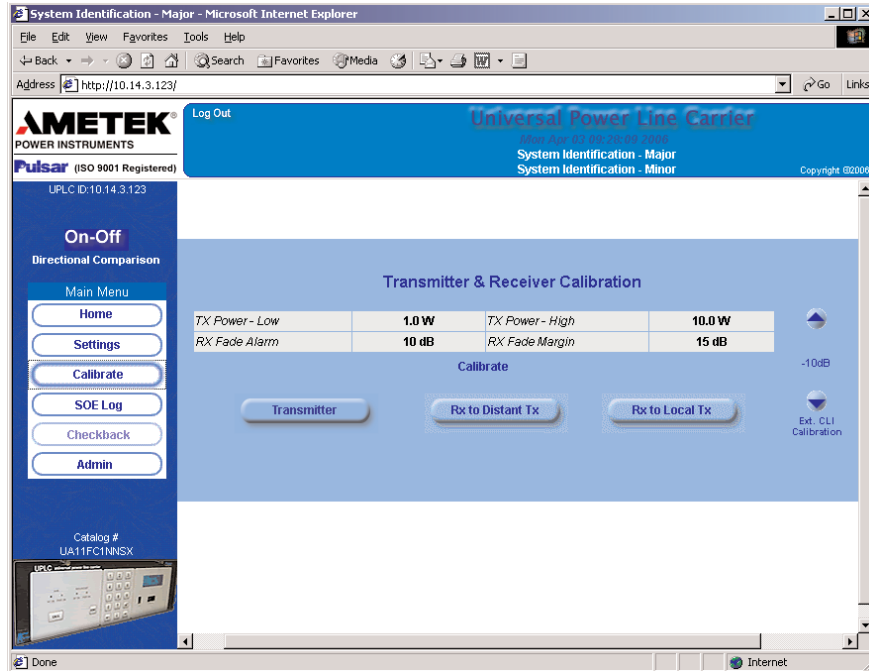**Figure 27. Example of The FSK Calibration Page**

Figure 28. Example of The ON/OFF Calibration Page

Figure 28 shows the same page for an ON/OFF channel type.

The table in the middle of the web page shows the values that will be used to calibrate the transmitter and receiver. In the case shown in Figure 27, the transmitter will be calibrated to 1 W low power and 10 W high power. The receiver will be calibrated for a 10 dB fade alarm and the fade margin will be set to 15 dB.

You must start by calibrating the transmitters at all line terminals first. In order to calibrate the transmitter you will need a 50Ω/75Ω non-inductive resistor. This resistor must be able to handle at least 10 W of power for a brief period of time. It is suggested to use a 25 W, 50Ω/75Ω non-inductive resistor. First turn off the power and then remove the transmitter coax from the rear of the chassis. Then connect the 25 W, 50Ω/75Ω non-inductive resistor to the transmitter output. Now turn the UPLC™ power back on. The transmitter may be calibrated by selecting the "Transmitter" button on the calibration web page. When you select the transmitter button the following dialog box will pop up.
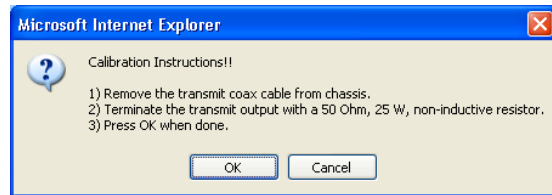
**Figure 25.
Calibration Instructions Dialog Box**

It reminds you that the transmitter must be terminated with a 25 W, 50Ω/75Ω non-inductive resistor. If the transmitter is connected as described above then click the OK button in the dialog box. The transmitter will now be calibrated to the low and high power settings. The web page and the display on the front panel will show the calibration progress.

After the transmitter is calibrated, turn off the unit and and remove the load. Then reconnect the coaxial cable that goes to the line tuner and turn the transmitter power on. The transmitters at all line terminals must be calibrated in the same manner before continuing. Also, the line tuners and line traps at all line terminals must be calibrated.

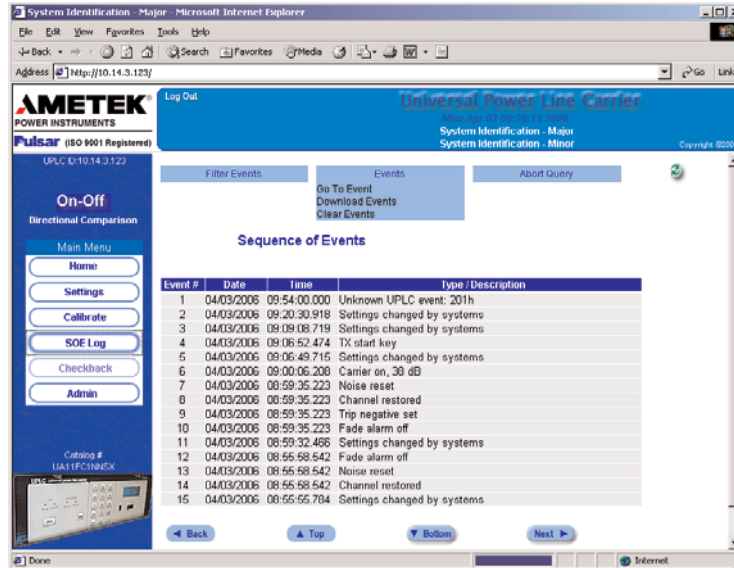After the above steps are completed at all terminals, the receivers may be calibrated. The transmitter at

Figure 31. Example of The SOE Web Page

the remote end of the line must be transmitting guard in the case of an FSK channel type or turned on to the normal blocking level in the case of an ON/OFF channel type. Now select the "Rx to Remote Tx" button on the calibrate web page. When this button is selected the following dialog box will appear.
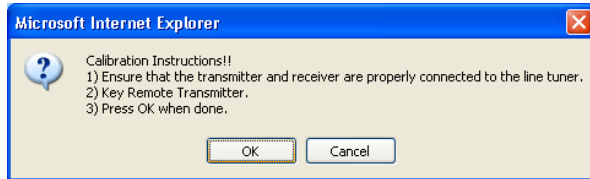

**Figure 29.
Calibration Instructions Dialog Box**

If things are set up as instructed then click on the OK button. The web page and the display on the front panel will show the calibration progress. If the channel type is FSK then this will complete the calibration of the UPLC™. If the channel type is ON/OFF then one more step is needed to complete the process. Figure 28 shows the calibration web page for the ON/OFF channel type. Note that there is one extra button on the calibration web page for an ON/OFF channel type. This is the "Rx to Local Tx" button. In an ON/OFF channel type, the receiver needs to be calibrated to the signal it receives from the remote transmitter and also the

signal it sees from the local transmitter, since both are on the same frequency. To complete the calibration click the "Rx to Local Tx" button. The remote transmitter must be off. The following dialog box will pop up.
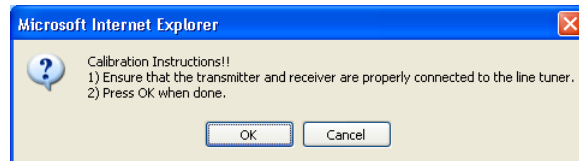

**Figure 30.
Calibration Instructions Dialog Box**

Click the OK button. The web page and the display on the front panel will show the calibration progress.

This completes the calibration process for the UPLC™. With the settings made and the unit calibrated you are now ready to go through your normal testing of the system to ready it for service.

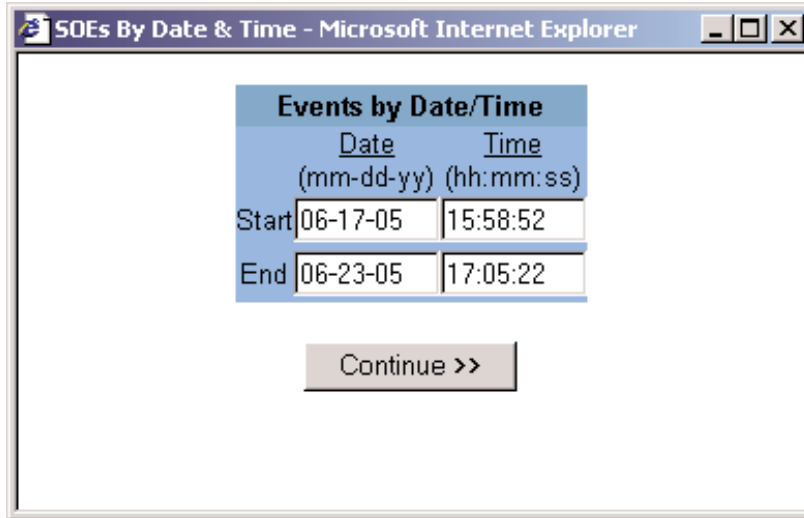| ⚠	**CAUTION**
ONCE YOU CLICK "CLEARING SOE LOG OK", ALL EVENTS WILL BE CLEARED FROM THE UNIT AND IT IS NOT REVERSIBLE.	

Figure 32. Events by Date/Time Range Dialog Box

14. SOE Log

The Sequence of Events (SOE) logs will show the history of the events that have occurred to the unit. Many different items are time-tagged and listed in the SOE Log. Appendix C lists the events per the configuration. All the events in the log, except for one, are time tagged to the nearest 1ms. The "Power off" event is time tagged to the nearest 1 second. The unit can store as many as 5000 events. After 5000 events are stored then the oldest ones will be erased as new ones are added. A sample of the SOE web page is shown in Figure 31. When the web page is first opened you will see the 15 most current events. You can obtain older events by clicking on the "Next" button. When you click the Next button you will be presented with the next oldest 15 events. If you click the "Back" button you will be presented with the next 15 later (in time) events. Thus, by using the Next and Back buttons you can scroll through the events 15 events at a time. A quick way to get to the oldest set of 15 events is to click the "Bott" button, and in the same fashion you can go to the latest set of 15 events by clicking on the "Top" button.

You may also filter the events if you wish. By placing your cursor over the filter events at the top of the web page, you will get a pull down menu as shown in Figure 31. You may filter, Event Number or Date/Time. There is also a "Clear All Filters"

command on this drop down list. When you set up a filter it will be remembered when you display events until it is cleared. So it is important to remember to clear event filters when you are done. That way the next person accessing the unit will be able to see all events.

A useful filter is the time and date range filter. When you select the Date/Time filter you are presented with the dialog box in Figure 32. Here you can enter the date and time range, remember that the time needs to be entered in a 24-hour format. After you have entered the time and date range click on continue and you will be presented with all events, in order of time form the latest to the oldest, in that time/date range.

If you know a number range of the events you want to view you may enter that by selecting the "By event Number" selection from the pull down list. This will allow you to view all events in a given number range.

These filters are very useful in quickly allowing you to view the events you desire without the confusion of seeing all events. You may also download the list of events to a comma-delimited file that can be used in most any spreadsheet application. If a filter is in place at the time of the download then that filter is used to download only those events. Events can be downloaded by moving the cursor to the area at the top of the screen labeled

Events. A pull down menu will appear that has two selections. One of these selections will be to download events. Select that one and the following dialog box appears.

Figure 33.
Download Dialog Box

This is just warning you that there may be a large number of events in the unit and it may take a few minutes to download. This is especially true if no filter is selected. Click OK and the download will start. After the download is complete the following Dialog box appears.
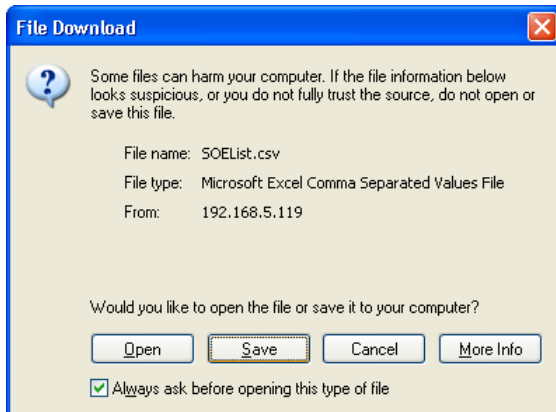
Figure 34.
File Download Dialog Box

Now click the Save button and you will be presented with the opportunity to change the name of the file and the storage location on your local computer. After the file is saved click on Continue.

You may also clear all the events in the unit by moving your cursor over the events pull down menu and clicking Clear Events. You will be presented with a dialog box giving you a chance to cancel. Click OK to clear events.

Remember that when you are viewing the SOE web page, it is not being refreshed on an automatic basis. If you want to see if any new events have occurred since you last pulled up the web page click on the

little refresh oval to the right of the web page screen. Do not click on the normal explorer refresh button in the top menu line. If you do you will be sent to the UPLC™ Home page.

15. Admin

The Admin web page is used to add and delete users and change the overall security of accessing the UPLC™ . You must be logged in as a user who has administration rights in order to change users, however, you will be able to view the Admin web page no matter what your user rights. This will allow you to find out what user has Administration rights to the UPLC™ in case you need to change something, such as, your password.

The Admin page has four Tabs associated with it. They are User Admin, System Time, Software and Network. The main Admin web page is shown in Figure 35. This page opens up to the User Admin Tab. At this level you will see the number of total accounts set up for the UPLC™ and the number of accounts logged in. At this point, the administrator may be set if a password is required to access the front panel of the unit. It is probably a good idea to have a password set for this function since if it is not set anybody can walk into the substation and make changes to the unit.

There are also two other buttons on the User Admin. tab. They are Add User and Show Users. Clicking on Add User will allow the administrator to add a new user to the system. The "add new user" screen is shown in Figure 36. The administrator should fill in the required information and click on the "Add User" button.

⚠ **CAUTION**

A DEFAULT USER NAME "administrator" AND A DEFAULT PASSWORD SET TO "pulsar" HAS BEEN PROVIDED WHEN THE UNIT IS SHIPPED. IT IS YOUR RESPONSIBILITY TO CHANGE THE DEFAULT PASSWORD TO SOMETHING DIFFERENT TO ENSURE THE SECURITY OF YOUR UPLC™. AMETEK IS NOT RESPONSIBLE FOR THE SECURITY OF THE SYSTEM.

Clicking on the "Show Users" Button will allow the Administrator to see all user accounts and to change each user's rights and passwords. This page is shown in Figure 35. On this page the administrator can change the rights of any user, change the password of any user or delete a user.

15.1 Accounts

There are four types of accounts available:

Admin – only able to add/delete users & passwords

User – able to change settings (not admin functions)

Guest – can view all settings & SOEs

Super user – combination of Admin & User

15.2 Other Admin Tabs

The System time tab just shows the system date and time. The Software tab shows the revision levels of software that are in the unit. The Network tab is the area where the administrator will be able to make all the network settings required to access the users network, such as, IP address and Gateway address.

We have covered the entire setup of the UPLC™ Power Line Carrier set. By using the web pages in a standard browser and providing a controlled workflow, the set up of the unit has been greatly simplified. That is, by only presenting the user with the menu selections needed based on previous menu selections, this eliminates confusion and lessens the chance for an error in setup. Since many protection system security and dependability problems relate to system setup issues, Ametek feels this controlled workflow process will have the overall affect of improving the protection system reliability where UPLC™ is applied.
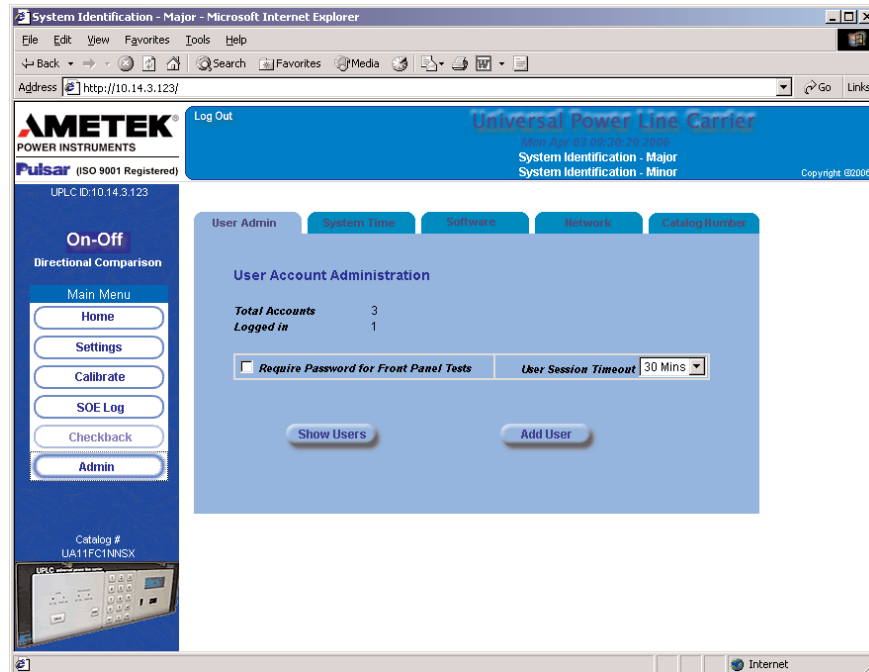

Figure 35. Main Admin. Web Page

Figure 36. Create a New Account Page

Figure 37. User Account Information Page

Appendix A – Configuring a Serial Connection for UPLC™

Windows XP

Setup of a computer running Windows XP to connect to the front serial port

1. Click the "Start" button in the lower left hand corner of the screen.

2. Then click on the "Control Panel" button to open the Control Panel.

3. Select the "Phone & Modem Options" button in the Control Panel.

4. Select the "Modems" tab in the Phone & Modem Options window.

5. Then click the "Add" button and this will open the Add Hardware Wizard.

6. Click on the check box that says "Don't detect my modem; I will select it from a list." Then click on the "Next" button.

7. In the box labeled Manufacturer select "(Standard Modem Types)" and under models on the right select "Communications" cable between two computers" then click on the "Next" button.

8. Now select the serial port number that you will use to communicate to the UPLC™. Then click the "Next" button.

9. You should now see a box that says, "your modem has been set up successfully" Then click on the "Finish" button. After a short delay you should then see the connection appear in the Modem tab of the "Phones and Modem Options" window.

10. Now click on the new modem connection to highlight it. A "Properties" button should appear at the bottom of the window. Click on this "Properties" button, and wait for the properties window to open.

11. When the properties window opens click on the "Modem" tab and select the Maximum Port Speed pull down menu. Select a port speed of 115200. Then click on the "OK" button.

12. Now click the "OK" button to close the Phone & Modem Options window.

13. Now you have to set up the network connection. This is done by opening the Control Panel again and clicking on the Network Connection Icon.

14. When the Network Connections window opens click on "Create a new connection" on the left side of the window under the heading Network Tasks.

15. When the New Connection Wizard window opens just click on the "Next" button and the "What do you want to do?" window will open.

16. Click on "Set up an advanced connection" and then click the "Next" button.

17. The "Which type of connection do you want to set up" appears. In this window you want to select "Connect directly to another computer" and then click the "Next" button.

18. In the "Host or Guest?" window select "Guest" and then click the "Next" button.

19. Now you are asked for a Computer Name. This is the name you want for the connection. A suggestion might be UPLC™ Connection. Then click the "Next" button.

20. Now you are asked to select the communications device. Select the "Communication cable between two computers (COMX)" device. Where COMX is the COM port you had set up before. For most computers this will be COM1. Click the "Next" button.

21. You are asked to select who will use this connection. Select which one will apply to your computer and then click the "Next" button.

22. The Completing the New Connection Wizard window will pop up. At this time you may choose to add an icon to your desktop or not. Then choose "Finish."

23. At this point the connect window will pop up. It will have a space to put in a User Name and Password. At this time these are left blank. Click on the "Properties" button. The General tab should now be showing and you should see a pull down menu titled Select a device.

24. Pull down the menu, by selecting the down arrow on the right. Select the device that was set up for UPLC™ communications. Then click on the "Configure" button and this will bring up a Modem Configuration window. If it isn't already set select the Maximum speed to 115200. Check the hardware flow control check box. Nothing else should be checked. Now click "OK."

25. Click on the Networking tab of the Properties window. Then highlight the Internet Protocol (TCP/IP), and then click on the "Properties" button.

26. Select the radio button titled "Use the following IP address:" and then enter 100.100.100.101 in the IP address location. Then click on the "OK" button.

27. The area titled "Type of dial-up server I am calling:" should have "PPP: Windows 95/98/NT 4/2000, Internet" selected. If that isn't selected then select it.

28. Click the "OK" button

29. You are now ready to connect to the UPLC™ Front Panel.

This completes the Windows XP setup process.

Windows 2000

Setup of a computer running Windows 2000 to connect to the front serial port

1. Click the "Start" button in the lower left hand corner of the screen.

2. Then click on the "Control Panel" button to open the Control Panel.

3. Select the "Phone & Modem Options" button in the Control Panel.

4. Select the "Modems" tab in the Phone & Modem Options window.

5. Then click the "Add" button and this will open the Add Hardware Wizard.

6. Click on the check box that says "Don't detect my modem; I will select it from a list." Then click on the "Next" button.

7. In the box labeled Manufacturer select "(Standard Modem Types)" and under models on the right select "Communications" cable between two computers" then click on the "Next" button.

8. Now select the serial port number that you will use to communicate to the UPLC™. Then click the "Next" button.

9. You should now see a box that says, "your modem has been set up successfully" Then click on the "Finish" button. After a short delay you should then see the connection appear in the Modem tab of the "Phones and Modem Options" window.

10. Now click on the new modem connection to highlight it. Click on the "Properties" button, and wait for the properties window to open.

11. When the properties window opens, select the Maximum Port Speed pull down menu. Select a port speed of 115200. Then click on the "OK" button.

12. Now click the "OK" button to close the Phone & Modem Options window.

13. Now you have to set up the network connection. This is done by opening the Control Panel again and clicking on the Network and Dial-up Connection Icon.

14. When the Network Connections window opens, click on "Make New Connection".

15. When the Network Connection Wizard window opens, just click on the "Next" button and the Network Connection Type window will open.

16. In this window you want to select "Connect directly to another computer" and then click the "Next" button.

17. In the "Host or Guest?" window select "Guest" and then click the "Next" button.

18. Now you are asked to select the communications device. Select the "Communication cable between two computers (COMX)" device. Where COMX is the COM port you had set up before. For most computers this will be COM1. Click the "Next" button.

19. Now you are asked for a connection name. This is the name you want for the connection. A suggestion might be UPLC™ Connection. Then click the "Finish" button.

20. You are asked to select who will use this connection. Select which one will apply to your computer and then click the "Next" button.

21. At this point the connect window will pop up. It will have a space to put in a User Name and Password. At this time these are left blank. Click on the "Properties" button. The General tab should now be showing and you should see a pull down menu titled Select a device.

22. Pull down the menu, by selecting the down arrow on the right. Select the device that was set up for UPLC™ communications. Then click on the "Configure" button and this will bring up a Modem Configuration window. If it isn't already set select the Maximum speed to 115200. Check the "Enable hardware flow control" check box. Nothing else should be checked. Now click "OK."

23. Click on the Networking tab of the Properties window. Then highlight the

Internet Protocol (TCP/IP), and then click on the "Properties" button.

24. Select the radio button titled "Use the following IP address:" and then enter 100.100.100.101 in the IP address location. Then click on the "OK" button.

25. The area titled "Type of dial-up server I am calling:" should have "PPP: Windows 95/98/NT 4/2000, Internet" selected. If that isn't selected then select it.

26. Click the "OK" button

27. You are now ready to connect to the UPLC™ Front Panel.

This completes the Windows 2000 setup process.

Appendix B – General File Format

Here is an example of a configuration file downloaded from the UPLC™ . This is an XML file. The file can be checked with any common XML tools to see if it conforms to XML format rules. It can be edited in any standard text-editing program, however you must be certain not to change any of the XML required format. If you are going to edit the file in a text editor it is important that you understand the format requirements of an XML file.

The file has a main section <UPLC™ >, also called the 'root node'. The main section encompasses three major sub-sections;

> <genset> - General Settings
>
> <logset> - Logic Settings
>
> <ioset> - Input/Output Settings

The Inputs/Outputs settings also has a three minor sub-sections;

> <inputs> - Inputs
>
> <tdoutputs> - Trip Duty Outputs
>
> <lloutputs> - Low Level Outputs

These sections encompass the entire configuration for the UPLC™ . Typically this file should be system generated to avoid any typographic and syntax errors. Rather than starting from scratch, it's easier to download from the UPLC™ and create a configuration file first, then edit that before uploading it back to the UPLC™ . After uploading you should review the changes on the settings pages to ensure they're correct before locking them in by submitting. The XML configuration file can be loaded into any text editor and the data can be changed. We recommend you familiarize yourself with the nuances of the eXtensible Markup Language (XML Files), prior to attempting any changes to the data in the file. Be careful not to change any file formatting or the file will not load properly.

Following, is an example of the downloaded XML file. The data in the example file is shown in bold for instructional purposes only.

NOTE: It will not and should not be in bold in the downloaded or uploaded file.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<UPLC™ >
  <genset>
    <id_line0>System ID Text string 1</id_line0>
    <id_line1>System ID Text string 2</id_line1>
    <chan_type>1</chan_type>   // AM - 0 FSK - 1
    <functn>1</functn>
    <tx_freq>250</tx_freq>
    <rx_freq>252</rx_freq>
    <bandwidth>1</bandwidth>
    <shift_freq mode="FSK">1</shift_freq>
    <tx_low>1</tx_low>
    <tx_hi>10</tx_hi>
    <fade_alarm>10</fade_alarm>
    <fade_margin>15</fade_margin>
  </genset>
<logset>
    <ptt_delay>30</ptt_delay>
    <trip_hold>10</trip_hold>
    <guard_hold>15</guard_hold>
    <ptt3_delay>30</ptt3_delay>
    <trip3_hold>35</trip3_hold>
    <guard3_hold>40</guard3_hold>
    <unblock_time>20</unblock_time>
    <unblock_delay>25</unblock_delay>
    <fade_drop_delay>0</fade_drop_delay>
    <ttu0>1</ttu0>
    <voice>2</voice>
    <guard_t0>2</guard_t0>
    <blk_pri0>1</blk_pri0>
    <checkback0>0</checkback0>
</logset>
<ioset>
  <inputs>
```

```
<in1_hold>1</in1_hold>

<in1_selection>1</in1_selection>

<in1_active_state>0</in1_active_state>

<in2_hold>3</in2_hold>

<in2_selection>2</in2_selection>

<in2_active_state>1</in2_active_state>

<in3_hold>5</in3_hold>

<in3_selection>3</in3_selection>

<in3_active_state>0</in3_active_state>

<in4_hold>7</in4_hold>

<in4_selection>4</in4_selection>

<in4_active_state>1</in4_active_state>

<in5_hold>9</in5_hold>

<in5_selection>5</in5_selection>

<in5_active_state>0</in5_active_state>

</inputs>
<tdoutputs>
<em1_selection>1</em1_selection>

<em2_selection>1</em2_selection>

<em3_selection>2</em3_selection>

<em4_selection>2</em4_selection>

</tdoutputs>
<lloutputs>
<prog1_selection>1</prog1_selection>

<prog1_active>0</prog1_active>

<prog2_selection>2</prog2_selection>

<prog2_active>1</prog2_active>

<prog3_selection>3</prog3_selection>

<prog3_active>0</prog3_active>

<prog4_selection>4</prog4_selection>

<prog4_active>1</prog4_active>

<prog5_selection>5</prog5_selection>

<prog5_active>0</prog5_active>

<prog6_selection>6</prog6_selection>

<prog6_active>1</prog6_active>

<prog7_selection>7</prog7_selection>

<prog7_active>0</prog7_active>

<prog8_selection>8</prog8_selection>

<prog9_selection>9</prog9_selection>

<prog10_selection>10</prog10_selection>

<!—Comments look like this.-->

</lloutputs>
</ioset>

<checkback>

<address>0</address>

<prim_comm>1</prim_comm>

<auto_test>1</auto_test>

<fallback>0</fallback>

<low_pwr>0</low_pwr>

<last_rem>4</last_rem>

<retries>4</retries>

<int_type>0</int_type>

<time1>5</time1>

<time2>10</time2>

<time3>15</time3>

<time4>20</time4>

<test_period>8</test_period>

<reco_enab>0</reco_enab>

<recovery_time>10</recovery_time>

<reco_time>30</reco_time>

<loop_time>10</loop_time>

<sync_enab>1</sync_enab>

</checkback>
</UPLC™ >
```

Configuration File Modification

General Settings

System Identification

```
<id_line0>System       Identification       Line
    1</id_line0>
<id_line1>System    Identification    Line    II
    </id_line1>
```

These two lines are 40 characters free form text. You are free to enter any text here to identify the system.

Channel

```
<chan_type>1</chan_type>
```

This indicates the channel type and is a single digit value.

0 - Configures the system to operate in AM or otherwise called ON/OFF mode

1 - Configures the system for operation in FSK Mode

Function

<functn>1</functn>

Function allows you to choose the function type. This is a number between 0 & 3 depending on the choice of mode.

If the Channel is configured for AM Mode, you can choose from the following types:

0 – Phase Comparison

1 – Directional Comparison

If the Channel is configured for FSK Mode, you can choose from the following types:

0 – Phase Comparison

1 – Unblocking-2Frequency

2 – POTT/DTT-2Frequency

3 - 3-Frequency

4 - 4-Frequency ‖

Tx & Rx Frequency

<tx_freq>250.35</tx_freq>

<rx_freq>252.55</rx_freq>

These are the transmit and the receive frequencies within the range of 30 to 530 kHz in steps of 0.01 kHz, e.g. 250.55 is 250.55 kHz.

Bandwidth

<bandwidth>1</bandwidth>

Bandwidth is specified as a single digit number:

ON/OFF Mode

1 – Sets the bandwidth to 600 Hz.

2 – Sets the bandwidth to 1200 Hz.

3 – Sets the bandwidth to 4000 Hz.

FSK Mode

This is called the TX Bandwidth-Shift & RX Bandwidth-Shift

0 – Sets the bandwidth-shift to 300±100 Hz.

1 – Sets the bandwidth-shift to 600±100 Hz.

2 – Sets the bandwidth-shift to 600±250 Hz.

3 – Sets the bandwidth-shift to 1200±250 Hz.

4 – Sets the bandwidth-shift to 1200±500 Hz.

FSK - 3 & 4-Frequency has only ‖

0 – Sets the bandwidth-shift to 600±250 Hz.

1 – Sets the bandwidth-shift to 1200±500 Hz.

Tx Power

<tx_low>1.5</tx_low>

<tx_hi>9.5</tx_hi>

The tx_hi and tx_low values must be between 1 & 10 W in steps of 0.1 W, with tx_low smaller than tx_hi, e.g. 1.5 specifies 1.5 W.

Fade Alarm

<fade_alarm>10</fade_alarm>

Fade Alarm is between 1 & 25 dB

Fade Margin

<fade_margin>15</fade_margin>

Fade Margin is between 1 & 25 dB

Logic Settings

Pre-trip Delay (Valid for FSK Mode Only)

<ptt_delay>30</ptt_delay>

Pre-trip Delay is 0 – 30 ms in 1 ms steps.

Trip Hold (Valid for FSK Mode Only)

<trip_hold>10</trip_hold>

Trip Hold is 0 – 100 ms in 1 ms steps.

Guard Hold (Valid for FSK Mode Only)

<guard_hold>15</guard_hold>

Guard Hold is 0 – 100 ms in 1 ms steps.

Pre-trip Delay (Valid for FSK Mode Only)

<ptt3_delay>30</ptt3_delay>

Pre-trip Delay is 0 – 30 ms in 1 ms steps.

Trip Hold (Valid for FSK Mode Only)

<trip3_hold>35</trip3_hold>

Trip Hold is 0 – 100 ms in 1 ms steps.

Guard Hold (Valid for FSK Mode Only)

    <guard3_hold>40</guard3_hold>

Guard Hold is 0 – 100 ms in 1 ms steps.

Unblock Time (Valid for FSK Mode Only)

    <unblock_time>20</unblock_time>

Unblock Time is 0 – 500 ms in 1 ms steps.

Unblock Delay (Valid for FSK Mode Only)

    <unblock_delay>25</unblock_delay>

Unblock Delay is a number between the range of 0 – 100 ms.

Fade Drop Delay (Valid for AM Mode Only)

    <fade_drop_delay>0</fade_drop_delay>

Fade Drop Delay is 0 – 15 ms in 1 ms steps

Trip Test (Valid for FSK Mode Only)

    <ttu0>1</ttu0>

Trip Test is a single digit value. Only 1 or 2 is valid:

    1 – Disabled

    2 – Enabled

Voice

    <voice>2</voice>

Voice is a single digit value. Only 1 or 2 is valid:

    1 – Beep Disabled

    2 – Beep Enabled

Guard Before Trip (Valid for FSK Mode Only)

    <guard_t0>2</guard_t0>

Guard Before Trip is a single digit value between 1 & 3:

    1 – Not Required

    2 – Required

    3 – Required But With Override

Blocking Priority (Valid for AM Mode Only)

    <blk_pri0>1</blk_pri0>

Blocking Priority is a single digit value:

    1 – Stop

    2 – Start

Checkback (Valid for AM Mode Only)

    <checkback0>0</checkback0>

Checkback is a single digit value. Only 0 or 1 is valid:

    0 – Checkback Disabled

    1 – Checkback Enabled

Input/Outputs

Inputs

Contact Bounce

    <in1_hold>1</in1_hold>

Contact Bounce is between 0 to 15. Each unit denotes 0.5 ms. As an example, 8 would be equal to 4ms.

Selection

    <in1_selection>1</in1_selection>

Selection is a number between 0 & 8 or 9 depending on the mode:

    FSK

    0 – Not Used

    1 – UB Key

    2 – Power Off

    3 – Trip Test

    4 – 52B

    5 – SOE Event 1

    6 – SOE Event 2

    7 – SOE Event 3

    AM

    0 – Not Used

    1 – Carrier Start

    2 – Carrier Stop

    3 – Low Level Key

    4 – Checkback Reset

    5 – Checkback Initiate

    6 – SOE Event 1

    7 – SOE Event 2

    8 – SOE Event 3

    9 – Loopback Test

Active State

Active State is a single digit value. Only 0 or 1 is valid:

    0 – Application of Voltage

    1 – Removal of Voltage

Trip Duty Outputs

Selection

<em1_selection>1</em1_selection>

Trip Duty Outputs is a single digit value between 0 & 2

    FSK

    0 – Not Used

    1 – Guard

    2 – Trip

    AM

    0 – Not Used

    1 – Blocking Output

    2 – Fade Alarm

Low Level Outputs

Selection

    <prog1_selection>1</prog1_selection>

Low Level Outputs is a single or double-digit value between 0 & 11 or 16 depending on the mode:

FSK

Phase Comparison

    0 – Not used

    1 – Trip Negative

    2 – Trip positive

    3 – Reflected Power

    4 – Main RF Output

    5 – Redundant RF Output

    6 – Good Channel

    7 – Noise

    8 – Fade Alarm

    9 – TX Shift High

    10 – TX Shift Low

    11 – General Failure

2F-Unblocking & 2F-POTT/DTT

    0 – Not used

    1 – Guard

    2 – Trip

    3 – Reflected Power

    4 – Main RF Output

    5 – Redundant RF Output

    6 – Good Channel

    7 – Noise

    8 – Fade Alarm

    9 – TX Shift High

    10 – TX Shift Low

    11 – Checkback Trip

    12 – General Failure

3-Frequency

    0 – Not used

    1 – LR Guard

    2 – LR Trip

    3 – Reflected Power

    4 – Main RF Output

    5 – Redundant RF Output

    6 – Good Channel

    7 – Noise

    8 – Fade Alarm

    9 – TX Shift High

    10 – TX Shift Low

    11 – LR Checkback Trip

    12   DTT Guard

    13   DTT Trip

    14   DTT Checkback Trip

    15 – General Failure

4-Frequency

    0 – Not used

    1 – A Guard

    2 – A Trip

    3 – Reflected Power

    4 – Main RF Output

5 – Redundant RF Output

6 – Good Channel

7 – Noise

8 – Fade Alarm

9 – TX Shift to A

10 – TX Shift to B

11 – A Checkback Trip

12   B Guard

13   B Trip

14   B Checkback Trip

15 – General Failure

AM

0 – Not used

1 – Blocking Output

2 – Fade Alarm

3 – Reverse Power

4 – Main RF Output

5 – Redundant RF Output

6 – CB Off

7 – CB Passed

8 – Carrier Received

9 – CB Major Alarm

10 – CB Minor Alarm

11 – CB Delayed Alarm

12 – CB Carrier Recovered

13 – CB In Recovery Mode

14 – CB Test In Progress

15 – CB Auto Test Disabled

16 – General Alarm

NOTE: General Alarm is a valid option only for the EM Outputs.

De-Energized State

<em1_selection>1</em1_selection>

De-energized State is a single digit value:

0 – Normally Open

1 – Normally Closed

Checkback Configuration

Module Address

<address>0</address>

Module Address is a number between 0 and 10. 0 being the Master and 1-10 are Remote Modules

Primary Communication Mode

<prim_comm>1</prim_comm>

Primary Communication mode is a single digit value. Only 0 or 1 is valid:

1 – Coded Communication Mode

0 – Timed Communication Mode

Auto Tests

<auto_test>1</auto_test>

Auto tests is a single digit value. Only 0 or 1 is valid:

1 – Auto Tests On

0 – Auto Tests Off

Fallback Communication Mode

<fallback>0</fallback>

Fallback Communication Mode is a single digit value. Only 0 or 1 is valid:

1 – Enable Fall back Communication

0 – Disable Fall back Communication

Low Power Tests

<low_pwr>0</low_pwr>

Low Power Tests is a single digit value. Only 0 or 1 is valid:

1 – Enable Low Power Tests

0 – Disable Low Power Tests

Last Module

<last_rem>1</last_rem>

Last Module is between 1 and 10; up to ten Remote Modules can be assigned.

Retries

<retries>4</retries>

Retries is 0 – 15, indicating, up to 15 retries are allowed.

Interval Type

> <int_type>0</int_type>

Interval type is a single digit value. Only 0 or 1 is valid:

> 1 – Checkback Hours of the day

> 0 – Periodic checkback select

Hours Of The Day

(Valid only when 'Hours of the Day' is selected)

> <time1>5</time1>

> <time2>10</time2>

> <time3>15</time3>

> <time4>20</time4>

Hours of the day 0 – 23 in a 24 hour clock format. This indicates the hours of the day checkback needs to run.

Periodic Checkback

(Valid only when 'Checkback Hours' is selected)

> <test_period>8</test_period>

Periodic Checkback is 0 – 99. This indicates the number of hours to wait before the next Checkback test will run.

Carrier Recovery

> <reco_enab>0</reco_enab>

Carrier Recovery is a single digit value. Only 0 or 1 is valid:

> 1 – Enable Carrier Recovery

> 0 – Disable Carrier Recovery

Recovery Window

> <recovery_time>10</recovery_time>

Recovery Window is a number between the range of 0 – 24 hours. It specifies how long a UPLC™ will be in Recovery Mode before indicating a Delayed Alarm.

Recovery Period

> <reco_time>30</reco_time>

Recovery Period number between the range of 5 – 60 minutes. It specifies the time between Master initiated Checkback tests when the UPLC™ is in Recovery Mode.

Loopback Duration

> <loop_time>10</loop_time>

Loopback Duration is 4 – 60 seconds. It specifies how long a UPLC™ will key its transmitter at high and low power during a Loopback test.

Synchronize Clock Automatically

> <sync_enab>1</sync_enab>

Synchronize Clock Automatically is a single digit value. Only 0 or 1 is valid:

> 1 – Enable Automatic Synchronization

> 0 – Disable Automatic Synchronization

Appendix C – Sequence of Events Listing

Access Events

<User name> Logged off

<User name> Logged on

Front panel logoff

Front panel logon

User logged in

User logged out

Hardware Events

DC power down

DC power up

General alarm

General alarm reset

I/O board failed

I/O board restored

Main power supply failed

Main power supply restored

Main TX power low

Main TX power OK

Novram settings restored from flash memory of <Date>

Power amp failed

Power amp restored

Redundant power amp failed

Redundant power amp restored

Redundant power supply failed

Redundant power supply restored

Redundant TX power low

Redundant TX power OK

Software Events

All UPLC settings initialized to default values

DSP checksum mismatch

Ethernet settings restored from flash memory

Ethernet settings restored from flash memory of <Date>

Ethernet settings set to default values

SOE file system repaired

Software Watchdog reset occurred (x)

Calibration Events

Local transmitter calibrated

Local transmitter failed calibration

Receiver calibrated to distant transmitter

Receiver calibrated to local transmitter

Receiver failed distant transmitter calibration

Receiver failed local transmitter calibration

Communications Events

Ethernet interface 1 not detected

Ethernet interface 2 not detected

Ethernet link lost

Ethernet link restored

Redundant ethernet link lost

Redundant ethernet link restored

Administration Events

<User name>: User account deleted from the system

<User name>: User account modified

New user added to the system

Settings changed by <User name>

Settings changed via front panel

Settings file uploaded to the system

Events Caused by External Stimulus

IRIG signal acquired

IRIG signal lost

User event 1 - reset

User event 1 - set

User event 2 - reset

User event 2 - set

User event 3 - reset

User event 3 - set

System Events in All Modes

Fade alarm off

Fade alarm on

RF powered off

RF powered on

System Events for ON-OFF Mode

Carrier off

Carrier on

Low level key

Low level key reset

TX start key

TX start key reset

TX stop key

TX stop key reset

Checkback Events

<current module name> received timed CB

<current module name> sent high power CB to <module name>;

<current module name> sent low power CB to <module name>

<current module name> failed <module name>'s high power coded test

<current module name> failed <module name>'s low power coded test

<current module name> passed <module name>'s high power CB

<current module name> passed <module name>'s low power CB

<current module name> passed <module name>'s high power coded CB

<current module name> passed <module name>'s low power coded CB

<current module name> received <module name>'s high power coded CB

<current module name> received <module name>'s low power coded CB

<Current Module Name> received timed CB

<current module name> sent high power coded CB to <module name>;

<current module name> sent high power timed CB to <module name>;

<current module name> sent low power coded CB to <module name>;

<current module name> sent low power timed CB to <module name>;

<module name> Alarms cleared

<module name> Checkback event counts cleared

<module name> failed high power CB

<module name> failed low power CB

<module name> failed high power coded CB

<module name> failed high power timed CB to <module name>;

<module name> failed low power coded CB

<module name> failed low power timed CB to <module name>;

<module name> passed high power coded CB

<module name> Passed high power test

<module name> passed high power timed CB to <module name>;

<module name> passed low power coded CB

Pulsar

<module name> Passed low power test

<module name> passed low power timed CB to <module name>;

Auto checkback tests disabled

Auto checkback tests disabled

Auto checkback tests enabled

Auto checkback tests enabled

Carrier recovered

Carrier recovered

Carrier recovered

CB Alarms Cleared

CB event counts cleared

Communications error

Delayed alarm set

Delayed alarm set

Events cleared

Local carrier failed

Major alarm cleared

Major alarm set

Major alarm set

Minor alarm cleared

Minor alarm set

Minor alarm set

Remote <module number> requested CB

Remote <module number> requested CB

Starting carrier recovery mode

System Events for FSK Mode

Boost key reset

Boost key set

Channel lost

Channel restored

Noise detected

Noise reset

2-Frequency DTT/POTT/Unblock

Checkback trip

Checkback trip reset

Guard

Loss of guard

Trip

Trip key

Trip key reset

Trip reset

Unblock trip

Unblock trip reset

3-Frequency Mode

DTT checkback trip

DTT checkback trip reset

DTT guard

DTT trip

DTT trip key

DTT trip key reset

DTT trip reset

Loss of DTT guard

Loss of LR guard

LR checkback trip on

LR checkback trip reset

LR guard

LR trip

R trip key

LR trip key reset

LR trip reset

Phase Comparison

PC Key Off

PC key on

Trip negative off

Trip negative on

Trip positive off

Trip positive on

TTU Events

Failed TTU

Passed TTU

Received CB TTU request

Received real TTU request

Request CB TTU

Request real TTU

4-Frequency Mode II

Checkback Trip A

Checkback Trip A Reset

Trip A

Trip A Reset

Loss of Guard A

Guard A

Loss of Guard B

Guard B

Checkback Trip B

Checkback Trip B Reset

Unblock A

Unblock A Reset

Unblock B

Unblock B Reset

Both Trip A & B

Both Trip A & B Reset

Guard A & B

Guard A & B Reset

Checkback Trip A & B

Checkback Trip A & B Reset