

Product Support

The latest revision of the User Guide is available for download from <http://www.memorylink.com>

Support Process

All technical queries (wiring, troubleshooting, and configuration) should be addressed to Memorylink Technical Support Department 1-888-398-4366 (Worldwide) or go to <http://www.memorylink.com> for online support.

FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



Flanger Ultra User Guide

Part Number: 9100-9000

Revision 080109

Disclaimer

Specifications are subject to change without notice. All third party URLs included in this document worked as of the time of its publication.

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Features and Specifications

Basic Features/Functionality

Communications Ports

- Two 802.3 compliant 10/100/1000baseT Ethernet ports with Power over Ethernet for radios.
- One 802.3 compliant 10/100/1000baseT Ethernet port for LAN connection.
- One 802.3 compliant 10/100baseT Ethernet port for Local Configuration.
- One Proprietary RJ45 Synchronization Input.
- One Proprietary RJ45 Synchronization Output.
- One Proprietary RJ45 Clock Input.
- One Proprietary RJ45 Clock Output.
- Eight T1/E1 RJ45 ports meeting ANSI T1.403, ITU-T G.703, AT&T TR62411.
- One Proprietary DB25M Alarm IO.

Electrical

Powered by:

- Radio Input (one per ODU required)
 - Input: 55 VDC, 1.4 A max.
- DC Power Input
 - 24 – 48VDC, 8A max.
 - Customer must limit current with an 8A fuse at the power source.
- Maximum power consumed by Flanger Ultra:
 - 25W
- Maximum power provided to ODU (each):
 - 55V at 1A, 55W
- Chassis Ground screw terminal connection provided.

Physical

General

Enclosure

- Height: 1.75" (44.45mm)
- Width: 19" (482.6mm)
- Depth: 14" (355.6mm)
- Estimated weight: (10lbs (4.54kg))

Environmental

- Operating temperature: -40° F to +140° F (-40° C to +60° C)
- Storage temperature: -40° F to +185° F (-40° C to +85° C)
- Operating humidity: 95% maximum (non-condensing)
- Storage humidity: 95% maximum (non-condensing)
- Passive cooling (No Fan)

Regulatory

- FCC
- CE
- Restriction of Hazardous Substances – RoHS Directive 2002/95/EC compliant

Using Equalizer Control Settings

Use equalization (EQ) settings to match the T1/E1 analog front end to the length and characteristics of the cabling connected between the Flanger Ultra unit and other TDM equipment.

Use short haul settings in an intra-office installation. For short haul T1 installations, determine the EQ settings from the cabling distance between the Flanger Ultra and the customer premise equipment (CPE). There is one EQ setting choice for short haul E1 installations.

Use long haul settings in an interoffice installation. For long haul T1 applications, the EQ settings are based on the amount of cable attenuation between the Flanger Ultra and CPE. For long haul E1 installations, use the “120 ohm Twisted Pair” setting.

T1/E1 channel Transmit Template

Select the transmit template for each channel on the T1/E1 Operation page of the web interface, as illustrated in Figure 15.

T1/E1 Channel Configuration section

Channel	Encoding Method	Transmit Template
1	B8ZS	Short Haul, 0-133ft., 100ohm
2	B8ZS	Short Haul, 0-133ft., 100ohm
3	B8ZS	Short Haul, 133-266ft., 100ohm
4	B8ZS	Short Haul, 266-399ft., 100ohm
5	B8ZS	Short Haul, 399-533ft., 100ohm
6	B8ZS	Short Haul, 533-655ft., 100ohm
7	B8ZS	Long Haul, 0db LBO, 100ohm
8	B8ZS	Long Haul, -7.5dB LBO, 100ohm
		Long Haul, -15dB LBO, 100ohm
		Long Haul, -22.5dB LBO, 100ohm

Submit Updated System Configuration Reset Form

Figure 15: Transmit Template selection

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Introduction

The Memorylink Flanger Ultra is designed to work hand-in-hand with various radios, to provide T1/E1 multiplexer functionality, synchronization, and network management.

The Flanger Ultra works with Memorylink's UltraSync™ GPS-100M which generates a precise, highly stable, proprietary sync signal for timing synchronization.

The Flanger Ultra provides a low-latency TDM-over-IP solution.

Basic Features/Functionality

- Provides power to one or two Radios (for radio type support, please check our website or contact Technical Support).
- Multiplexes eight T1/E1 ports to one or two Gigabit Ethernet ports that support up to two radios.
- Provides a connection for the customer's Gigabit LAN and forwards that connection to its partner Flanger Ultra.
- Provides a Local Config Ethernet port and a web interface for convenient configuration.
- Connects to a timing reference such as Memorylink's UltraSync GPS-100M timing reference for synchronization.
- Supports synchronization with cascaded Flanger Ultra units.
- Allows the connection of external T1/E1 timing references.
- Can generate T1/E1 timing reference to cascaded Flanger Ultra units.
- Allows the connection of up to five alarm inputs and three alarm outputs.
- Displays the status of Flanger Ultra itself, its partner unit, and connected radios.
- Interoperable with Memorylink Flanger 4 Plus units.

Setup and Installation

The following instructions assume that the person installing the Flanger Ultra is knowledgeable and proficient in installing wireless broadband radios as well as wired (Ethernet) networks, and has access to standard telecommunications installation and test equipment.

Necessary Equipment

Remove the contents from the product packaging and make sure that you have all of the items listed in Table 1.

When to use Mode 5

Use clock mode 5 to derive the clock for a given T1/E1 channel from the selected external T1/E1 reference clock; Sync In (Figure 13) or Clk In (Figure 14). You can select the following external reference clocks.

- "None" (no external reference clock).
- "Discrete 1PPS input" present on the Sync Input connector.
- "Discrete T1/E1 clock" (1.544 MHz/2.048 MHz) input present on the Clock Input connector.
- "Line referenced T1/E1 clock" input encoded in the T1/E1 signal on the Clock Input connector.
- "Modulated 1PPS" input present on the Sync Input connector.

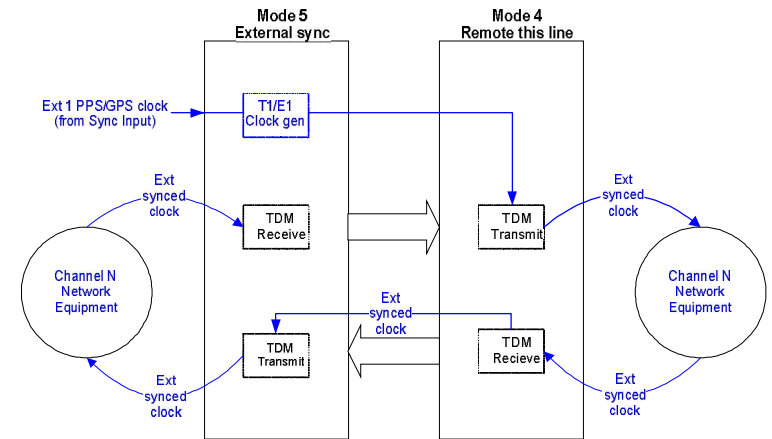


Figure 13: Mode 5 with clock derived from Sync input

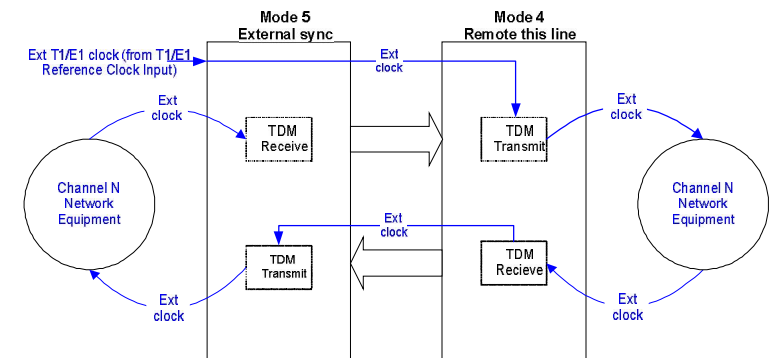


Figure 14: Mode 5 with clock derived from Clock input

When to use Mode 0 to Mode 4 Pairs

Use this configuration (Figure 12) when connecting network equipment that provides its own stable timing source and remote equipment that recovers timing from the received T1/E1 signal for each T1/E1 line independently.

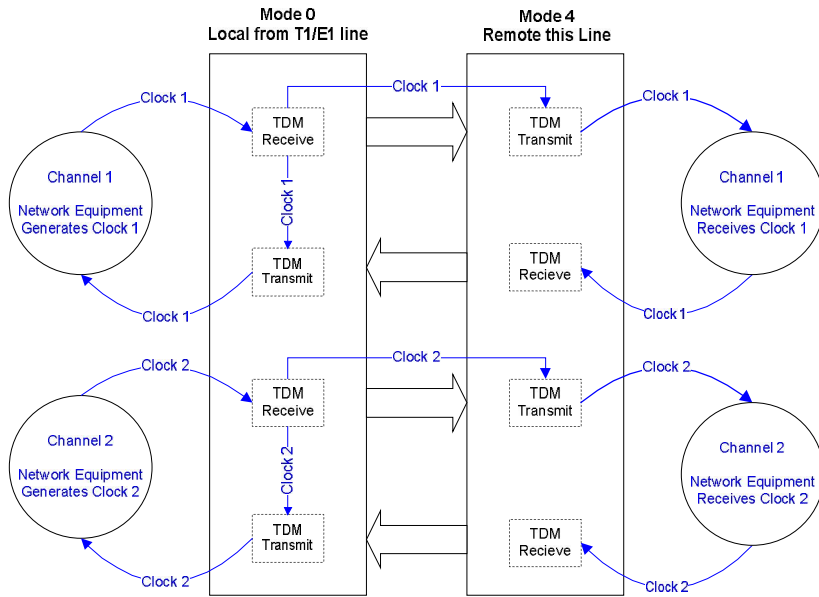


Figure 12: Mode 0 & Mode 4 pair

Qty.	Package Contents
(1)	Flanger Ultra eight-channel multiplexer
(2)	Rack-mount mounting ears (and associated screws)
(1)	DC power cable
(1)	Ground lug
(1)	Flanger Ultra Deployment Guide

Table 1: Flanger Ultra box contents



The Flanger Ultra requires customer supplied cables to connect external Ethernet, T1/E1 and accessory devices.

Make sure you have a compatible radio unit and power supply (Contact Technical Support if necessary). In addition to the hardware mentioned above, procure the following before attempting an installation:

- An appropriate quantity of weatherproof outdoor rated shielded UV resistant standard CAT5E Ethernet cable. Refer to your radio documentation for a list of approved cable types.
- An appropriate quantity of CAT5E Ethernet cable for indoor use.
- Appropriate Alarm IO cabling and connectors if you wish to use the monitoring capabilities of the Flanger Ultra.
- A UL, CSA, or TUV approved surge arrestor is recommended for lightning protection for each cable entering the facility.



It is important to follow lightning protection guidelines and applicable building code(s).

Test Configuration

Configuring your Flanger Ultra on the bench will allow you to confirm correct operation before heading for the field.

Note the version of Flanger Ultra in case you request product support. The product label (Figure 1) is located on the back of each unit. This label identifies the MAC address (serial number) and model number.

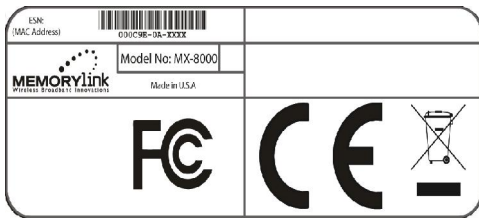


Figure 1: Flanger Ultra example label



To identify the build version the Flanger Ultra is running in case you need technical support, view the main page of the unit's web interface.

Connect up the test setup shown in Figure 2 using care not to connect standard Ethernet devices to the phantom powered ports (Table 2). (Although the factory default for phantom power is "Off," it is good practice to avoid connecting standard Ethernet devices directly to the Flanger Ultra WAN 1 and WAN 2 ports).

Use a DS1 test set and a loopback plug (Figure 4) for DS1 testing on the bench. Once you've confirmed proper DS1 transport over Ethernet, replace the Ethernet cable between WAN ports with a functioning wireless broadband Ethernet link to allow verification of system-level performance on the bench, before deploying the system in the field.

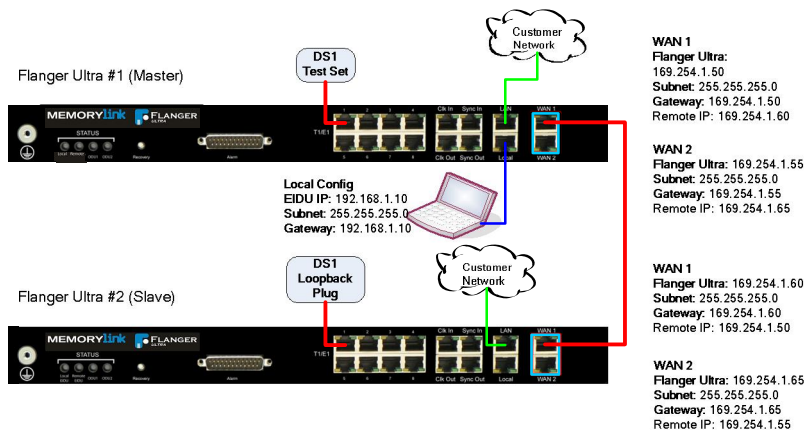


Figure 2: Bench Test Interconnections

When to use Mode 2 to Mode 3 Pairs

Use this configuration (Figure 11) when connecting network equipment that provides its own stable timing source to remote equipment that recovers timing from the received T1/E1 signal.

This is the factory default configuration for a Flanger Ultra pair. Use this configuration unless the equipment on channels two through eight uses a different clock source than that on channel one.

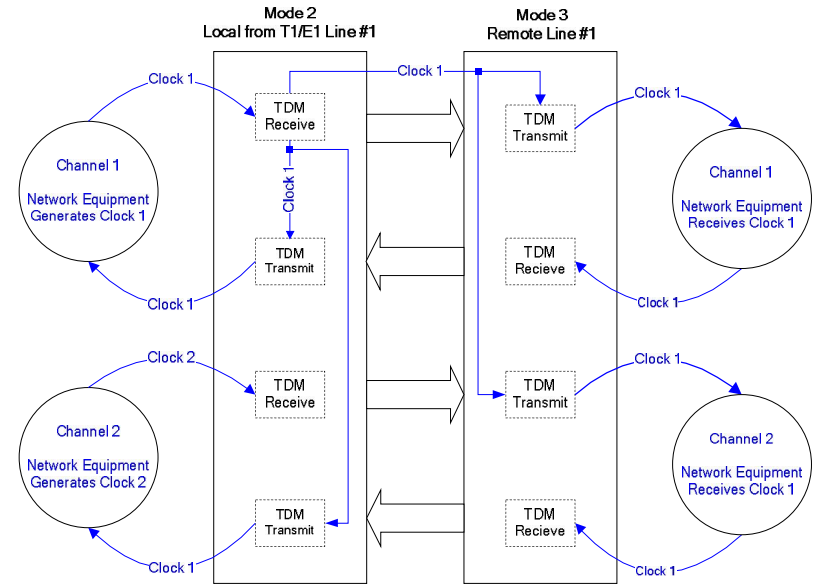


Figure 11: Mode 2 & Mode 3 pair

When to use Mode 1 to Mode 3 Pairs

Use this configuration (Figure 10) when connecting network equipment that expects to receive stable timing from the Flanger Ultra and remote equipment that recovers timing from the received T1/E1 signal for T1/E1 channel one directly.

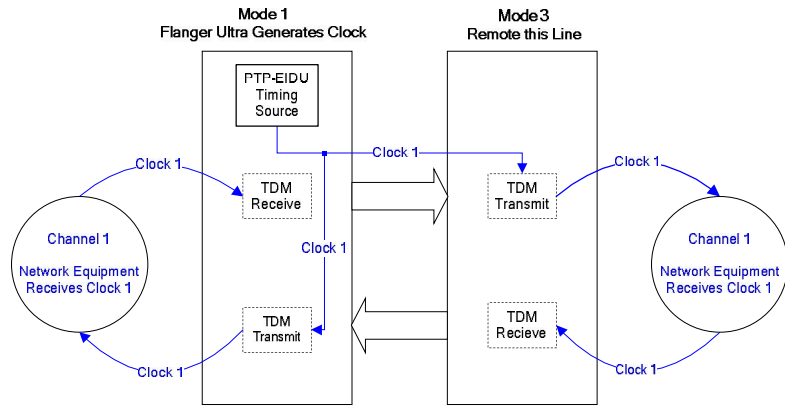


Figure 10: Mode 1 and Mode 3 pair

The Flanger Ultra provides Power over Cat5 to supply power to connected radios as shown in Table 2.

WAN 1 Port	Power and Data from the Flanger Ultra to the first radio.
WAN 2 Port	Power and Data from the Flanger Ultra to the second radio.
LAN Port	Data to and from the customer's LAN.
Local Config Port	Connect to a local PC for configuration and management of the Flanger Ultra.

Table 2: Flanger Ultra Ethernet ports



Only connect radios to the WAN ports. Standard Ethernet equipment **CAN BE damaged** if power is enabled on the WAN ports.

Cable Diagrams

The Flanger Ultra uses RJ-45 connectors for DS1 and Ethernet cables. The pin number is explained in Figure 3. The cable diagrams in Figure 4 refer to pin numbers.

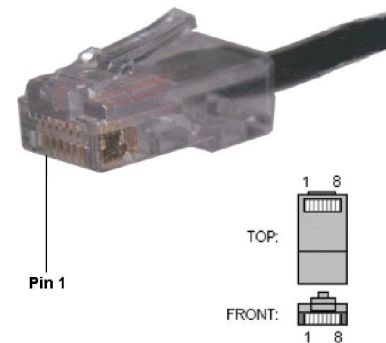


Figure 3: RJ-45 connector

T1/E1 with RJ-45 Cable Diagrams

The T1/E1 ports may require cross-over cables between them and the Customer Premises Equipment (CPE). If the CPE T1/E1 ports use pins 1 and 2 for Receive Ring and Tip respectively, you'll need crossover cables. These cables can be made using the pinout drawings in Figure 4.

You can use a loop back plug in the Flanger Ultra remote unit to do bench testing.

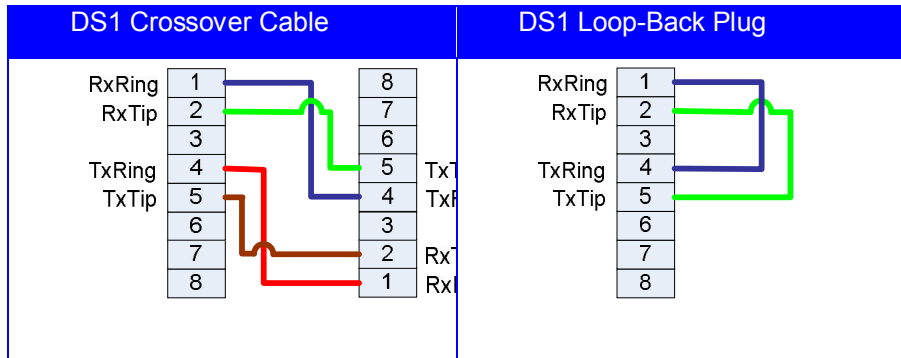


Figure 4: DS1 Crossover Cable & DS1 Loop Back Plug

Accessing the User Interface

In order to access the Flanger Ultra’s web interface, use a current version of either Internet Explorer or Firefox web browser software.

- Access the Flanger Ultra by connecting a PC or laptop computer directly to the Local Config Port (Figure 2).
- Access the Flanger Ultra remotely through the customer’s infrastructure (Figure 5) to either WAN IP address. The default IP addresses are shown in Table 3.

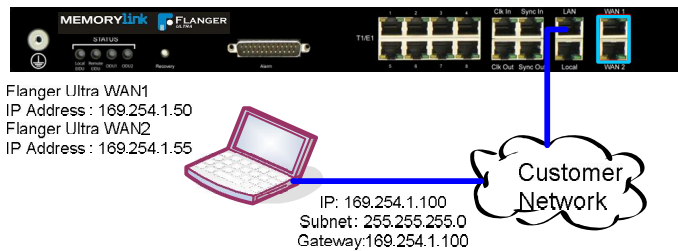


Figure 5: Accessing a Flanger Ultra remotely through the customer network

Login

For security purposes, the Flanger Ultra requires a login whenever accessing the web configuration pages or the command line interface (CLI) via telnet. If you exceed the maximum number of login retry attempts, you need to cycle power to the Flanger Ultra before you can try to login again.

Once you’ve successfully logged in, you’ve established a login session. Keyboard activity determines session activity. When there is no session activity for a period exceeding the session timeout, you

DC Power Input

A four position Molex Minifit Jr. connector is provided to allow the connection of a DC power source. When this source is provided, the Flanger Ultra and both radios will operate from this supply in the event of power failure. Customer must limit current input with an 8A fuse at the power source.

Setting Clock Modes

The Flanger Ultra supports five T1/E1 clock modes which specify the clock source for a T1/E1 input on a per-channel basis, and a sixth (Mode 5) that specifies one selected external timing reference for all channels set to that mode.

- Mode 0 – Derive clock from this T1/E1 line
- Mode 1 – the Flanger Ultra generates clock internally
- Mode 2 – Derive clock from local T1/E1 line #1
- Mode 3 – Derive clock from remote T1/E1 line #1
- Mode 4 – Derive clock from remote this T1/E1 line
- Mode 5 – Derive clock from selected external reference

The clock source mode for each channel is selected on the T1/E1 Operation page of the web interface, as illustrated in Figure 9.

T1/E1 Channel Operation section

Channel	Enabled	Clock Source Mode
1	<input checked="" type="checkbox"/> Enabled	Mode 0: Local this line
2	<input checked="" type="checkbox"/> Enabled	Mode 0: Local this line Mode 1: Internal clock Mode 2: Local line #1
3	<input checked="" type="checkbox"/> Enabled	Mode 3: Remote line #1 Mode 4: Remote this line Mode 5: External Sync
4	<input checked="" type="checkbox"/> Enabled	Mode 2: Local line #1
5	<input checked="" type="checkbox"/> Enabled	Mode 2: Local line #1
6	<input checked="" type="checkbox"/> Enabled	Mode 2: Local line #1
7	<input checked="" type="checkbox"/> Enabled	Mode 2: Local line #1
8	<input checked="" type="checkbox"/> Enabled	Mode 2: Local line #1

Figure 9: Clock Source Mode selection

A Gigabit Ethernet port is provided for connection to the customer's LAN. Data from the LAN port is forwarded to the WAN ports. Two LEDs are provided to display status.

Yellow – On when Gigabit speed is negotiated.

Green – On when a link is present. Blinking when there is Ethernet activity.

Local Config

A 10/100 Ethernet port is provided to allow local management of the Flanger Ultra unit. The IP address of this port is fixed (192.168.1.10). This port has two LEDs to display its status.

Yellow – On when 100Mbit speed is negotiated.

Green – On when a link is present. Blinking when there is Ethernet activity.

WAN 1 and WAN 2

Each of these Gigabit Ethernet ports can provide Power over Cat5 to a supported radio.

Yellow – On when Gigabit speed is negotiated.

Green – On when a link is present. Blinking when there is Ethernet activity.

Understanding the Back Panel

The back panel has the power supply connections to the Flanger Ultra.

PIDU Power 1 and 2

Two modular connectors are provided to allow brick-type power supplies to provide power to the Flanger Ultra and its attached radios. One such power supply must be installed for each radio that is installed. The top connector provides power to the WAN 1 connector and the bottom connector provides power to the WAN 2 connector. Two LEDs in each connector will be lit when power is applied to that connector.

must login again.



The default factory configured username and password is "admin". The default number of login retry attempts is unlimited and the session inactivity timeout is 600 seconds.

Forgot your username/password?

Yes, you can get back into your Flanger Ultra. Contact customer support for assistance.

Factory Default Configuration

Flanger Ultra units are shipped in pairs and although they may sometimes have sequential serial numbers, there is no requirement they do.

IP Defaults

The default factory-set IP addresses for a pair of Flanger Ultra units is shown in Table 3.

Master

	Local Config	WAN 1	WAN 2
IP	192.168.1.10	169.254.1.50	169.254.1.55
Subnet	255.255.255.0	255.255.255.0	255.255.255.0
Gateway	192.168.1.10	169.254.1.50	169.254.1.55
Remote IP	N/A	169.254.1.60	169.254.1.65

Slave

	Local Config	WAN 1	WAN 2
IP	192.168.1.10	169.254.1.60	169.254.1.65
Subnet	255.255.255.0	255.255.255.0	255.255.255.0
Gateway	192.168.1.10	169.254.1.60	169.254.1.65
Remote IP	N/A	169.254.1.50	169.254.1.55

DS1 Defaults

Encoding Method	HDB3
Transmit Template	E1 Short Haul

Table 3: Default factory-set IP addresses & DS1 Defaults

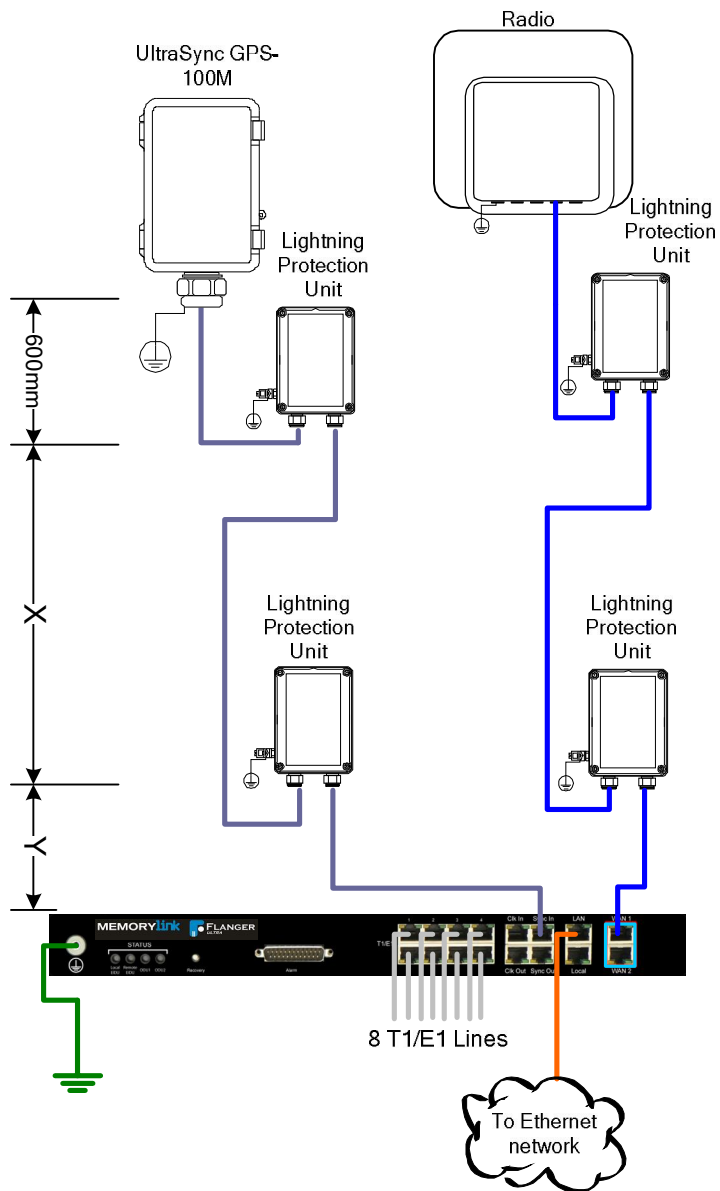


Figure 6: Example System with lightning protection units

T1/E1 Reference Clock Input

This port supports a line-encoded or discrete T1/E1 (1.544 MHz/2.048 MHz) reference clock input on a differential pair. It has two LEDs to display its status.

Yellow – On when enabled.

Green – On when active.

T1/E1 Reference Clock Output

This port supports a line-encoded or discrete T1/E1 (1.544 MHz/2.048 MHz) reference clock output on a TX (TIP/RING) and differential pair. It is meant for connection to a cascaded Flanger Ultra. It has two LEDs to display its status.

Yellow – On when enabled.

Green – On when active.

Synchronization Input

This port is for connection of a Memorylink UltraSync GPS-100M timing reference or a generic (GPS-derived) 1PPS reference such as that from a Memorylink UltraSync GPS-100C. It has two LEDs to display its status.

Yellow – Used to display status when connected to a Memorylink UltraSync GPS-100M. Blinking when TDD sync is enabled and the unit is not synchronized. On when TDD sync is enabled and the unit is synchronized.

Green – Used to display status when connected to a generic (GPS-derived) 1PPS reference. On when an UltraSync GPS-100C is connected. Blinking when a 1PPS signal is present.

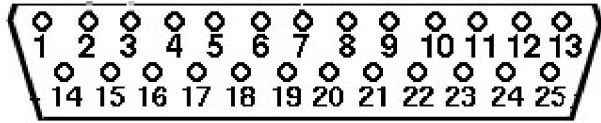
Synchronization Output

This port is meant to provide synchronization to a cascaded Flanger Ultra. It has two LEDs to display its status.

Yellow – On when sync is enabled.

Green – Blinks when a 1PPS sync event is present.

LAN



DB-25M View looking at pins

Pin	Signal	Pin	Signal
1	ALARM1_IN1	14	Signal Ground
2	ALARM2_IN1	15	Not Connected
3	ALARM1_IN2	16	Not Connected
4	ALARM2_IN2	17	ALARM1_OUT_COMMON
5	ALARM3_IN1	18	ALARM1_OUT_NC
6	ALARM4_IN1	19	ALARM1_OUT_NO
7	ALARM3_IN2	20	ALARM2_OUT_COMMON
8	ALARM4_IN2	21	ALARM2_OUT_NC
9	ALARM5_IN1	22	ALARM2_OUT_NO
10	Not Connected	23	ALARM3_OUT_COMMON
11	ALARM5_IN2	24	ALARM3_OUT_NC
12	Not Connected	25	ALARM3_OUT_NO
13	Not Connected		

T1/E1 Ports

Up to eight T1/E1 channels may be connected to these ports. Each port has two LEDs to show status.

Yellow – On when a DS1 signal is present and the port is enabled.

Green – Blinks when there is activity on the DS1 line (whether or not the port is connected to an external T1/E1 device).

Selecting Locations

Flanger Ultra:

- Locate the Flanger Ultra indoors in a locked equipment closet or in a locked UL50 or CSA22.2 No. 94 or IEC60529 approved outdoor enclosure. Access to the unit must be limited to trained personnel.

Follow manufacturer's guidelines for mounting the radio and for lightning protection. Additionally:

- Insure that the total length of the Ethernet cables connecting the Flanger Ultra and the radio, UltraSync GPS-100M, and lightning protection units, is less than the wired Ethernet distance limitation of 330 feet (100 meters).
- Locate a lightning protection unit as near as possible to the radio.

System Interconnections

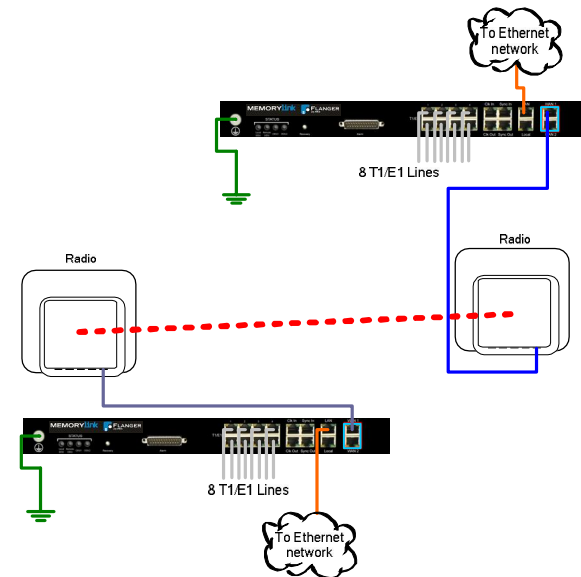


Figure 7: Flanger Ultra and Radio System Interconnection

Understanding the Front Panel

The front panel provides all of the data connections and indicators

for the Flanger Ultra.

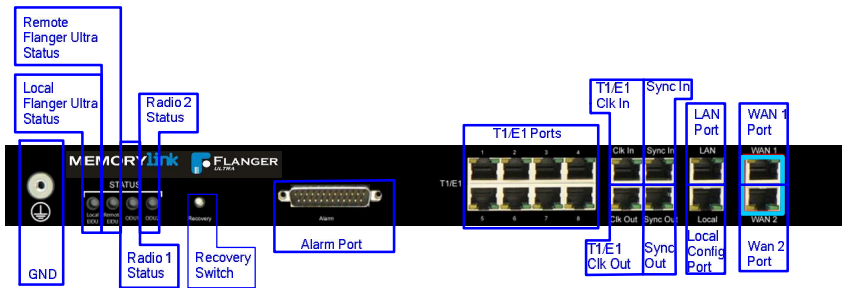


Figure 8: Front Panel Connectors

LED INDICATORS

Local Status	<p>The status indicator displays the condition of the local Flanger Ultra system as follows:</p> <p>OFF – No power.</p> <p>Solid Red – Hardware Fault.</p> <p>Flashing Red – Very poor system performance.</p> <p>Alternating Red / Green – Poor system performance.</p> <p>Flashing Green – Acceptable system performance.</p> <p>Solid Green – Very good to excellent system performance.</p> <p>Alternating Orange / Green – DS1 line down due to LOS or not receiving from remote.</p> <p>Alternating Orange / Red – Remote Flanger Ultra(s) not found.</p>
Remote Status	<p>The status indicator is used to determine the condition of the remote Flanger Ultra system(s) as follows:</p> <p>OFF – No power.</p> <p>Solid Red – Hardware Fault on one or more remote units.</p> <p>Flashing Red – Very poor system performance.</p> <p>Alternating Red / Green – Poor system performance.</p> <p>Flashing Green – Acceptable system performance.</p> <p>Solid Green – Very good to excellent system performance.</p> <p>Alternating Orange / Green – DS1 line down due to LOS or not receiving from remote.</p> <p>Alternating Orange / Red – Remote Flanger Ultra(s) not found.</p>

ODU1 Status	<p>The status indicator is used to determine the overall condition of the ODU connected to the WAN 1 connector:</p> <p>OFF – Power output not enabled and link not present.</p> <p>Blinking Green – Initializing.</p> <p>Solid Green – Power output disabled and link present.</p> <p>Alternating Green / Orange – Power output enabled and link present.</p> <p>Blinking Orange – Power output enabled and link not present.</p> <p>Alternating Red / Orange – Power fault.</p> <p>Blinking Red – Over current protection engaged.</p>
ODU2 Status	<p>The status indicator is used to determine the overall condition of the ODU connected to the WAN 1 connector:</p> <p>OFF – Power output not enabled and link not present.</p> <p>Blinking Green – Initializing.</p> <p>Solid Green – Power output disabled and link present.</p> <p>Alternating Green / Orange – Power output enabled and link present.</p> <p>Blinking Orange – Power output enabled and link not present.</p> <p>Alternating Red / Orange – Power fault.</p> <p>Blinking Red – Over current protection engaged.</p>

Chassis Ground Terminal

A Chassis Ground Terminal is provided. It must be permanently connected to building ground with an 18AWG Green/Yellow wire that is as short as possible.

Recovery Switch

- Depressing the Recovery Switch for 20 seconds during system power-on to reset the Flanger Ultra to its factory defaults.

Alarm IO

- The DB25M connector provides the Alarm IO connections for the Flanger Ultra. Provided are five alarm inputs and three Form-C relay outputs.