

INTELIPORT+ Dual Powered 2W/4W Data Station Termination Interface Model SDS5486LB Issue 3

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1. GENERAL

1.1 Document Purpose

This document describes the Engenuity INTELIPORT 2W/4W Data Station Termination Interface Model SDS5486LB Issue 3, shown in Figure 1.

NOTE

Hereafter, the Engenuity INTELIPORT 2W/4W Data Station Termination Interface Model SDS5486LB Issue 3, will be referred to as the "INTELIPORT" or the SDS5486LB."

1.2 Document Status

Whenever this practice is updated, the reason will be stated in this paragraph. Revision 003 of this practice updates contact information. Paragraphs 9.2 & 10.1 were updated to reflect new company address and contact information. This practice continues to replace part numbers 057-042900 and 030-101480.

1.3 Product Purpose and Description

Engenuity's INTELIPORT+ Model SDS5486LB Issue 3 provides an interface between a 4-wire facility and a 2 wire or 4-wire data modem. As a member of Engenuity's family of Intelligent Network Channel Terminating Equipment (INCTE), the SDS5486LB provides all the functions of a standard Data Station Termination (DST) but with additional features.

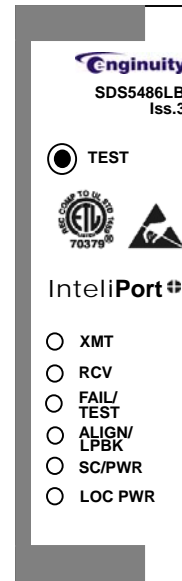


Figure 1. Front View of SDS5486LB

1.4 Product Features

One unique feature of Engenuity's SDS5486LB Issue 3 is its selectable frequencies and operating levels of standard +13 dBm, 0dBm or adjustable +7 to -16 dBm TLP XMT IN and -3 dBm, 0dBm or adjustable +7 to -16 dBm TLP RCV OUT, which allows this unit to operate in normal DATA and FAA applications, or other applications where levels other than standard levels are required. Another unique feature is the SDS5486LB's ability to be locally powered or line powered. The SDS5486LB contains an integral microprocessor and precision oscillator circuit that allow comprehensive remote testing and alignment when the circuit is activated from the Serving Test Center (STC). In addition, the SDS5486LB Issue 3 offers the following features:

- Facility side terminating impedance option (150/600/1200 Ohms) to match the impedance of the 4 wire facility; equipment side impedance is 600 Ohms, fixed.

- Operates in either 2W or 4W data modem applications.
- Internal sealing current circuit provides a TERM for line powered applications or SUPPLY when supplying sealing current to the distant end.
- Soft Switch selection of 1713Hz, 1913Hz, 2413Hz, or 2713Hz (Factory Default 2713Hz), loopback and/or command mode activation.
- Capable of aligning the circuit with respect to TLP (Transmission Level Point) or DLP (Data Level Point).
- Acknowledgement tone (alternating 1010Hz /2810Hz) identifies the unit as Engenuity's INTELIPORT+ module.
- Remote or automatic 3 or 4 tone alignment capability.
- Automatically adjusts RCV channel gain and amplitude response characteristics (up to 15.3 dB).
- RCV OUT Level of -3 dBm, 0dBm or +7 to -16 dBm Transmission Level Point (TLP); XMT IN level of +13 dBm, 0 dBm or adjustable +7 to -16 dBm (TLP) (Factory Default -3 dBm RCV, +13 dBm XMT).
- Adjustable XMT OUT Level of +7 dBm to -16 dBm (TLP); (Factory Default +5dBm TLP).
- Full range transponder (300Hz to 3200Hz) with quiet termination permits remote testing of noise and tone level measurements.
- RCV Pair automatic sweep transponder for testing receive cable pair AML, slope and noise.
- Front panel TEST switch used to manually activate INTELIPORT+'s Wire Test mode for verifying station wiring; Also used to manually activate INTELIPORT's automatic alignment feature for distant DSTs and Intelligent ETOs (Equalized Transmission Only).
- Front panel LEDs for operational mode of the unit.
- Non-volatile memory circuit retains programmed information in the event of a power loss.
- Mounts in one position of a Westell Type 550 Shelf assembly (Type 400 equivalent).

- Local Power: Operates from -48 Vdc at 35 mA maximum; Line Power: Can operate from the serving office simplex leads (Line Powered) at 8 mA.
- Meets UL1459 requirements.
- 7 year warranty.

2. APPLICATIONS

Engenuity's SDS5486LB is designed to operate in normal +13 dBm XMT/-3 dBm RCV, FAA applications requiring a 0 dBm (TLP) RCV and a 0 dBm XMT (TLP) (-13 dBm Data Level) or other applications requiring levels between +7 to -16 dBm. The SDS5486LB provides an interface between the 4-wire facility and a 600 Ohm, 2W or 4W data modem. The SDS5486LB is normally located on the same premises as the data modem. The integral microprocessor circuit of INTELIPORT controls the testing and alignment functions when the circuit is activated from a manual or automated Serving Test Center.

2.1 Command Mode Applications

INTELIPORT incorporates a Command mode from which all functions except manual and tone activation of the loopback circuit and manual activation of the automatic alignment feature are accessed. The Command mode is the operational state in which INTELIPORT monitors its transmission paths for incoming frequencies and interprets these frequencies as commands to carry out specific functions.

The Command mode is remotely activated by sending an activation tone (1713, 1913, 2413, or 2713Hz) to INTELIPORT for more than 30 seconds via the RCV IN port. Upon meeting this requirement, INTELIPORT returns a steady tone of 1010Hz at +5 dBm (TLP) (Default) or the adjusted XMT OUT level, indicating Command mode has been accessed. The tone used to activate INTELIPORT's Command mode is the same tone used to activate INTELIPORT's Loopback mode of operation. The only difference between the two modes is the time frame in which the activation tone is sent. The tone must be sent for more than 30 seconds to activate command mode. If the activation tone is removed in less than 30 seconds, INTELIPORT interprets this as a command to enter the loopback mode.

NOTE

The activation tone is factory set for 2713Hz. The activation tone can be programmed for loopback frequencies of 1713, 1913, or 2413Hz if required.

While in the Command mode, the STC can access any of INTELIPORT's intelligent functions that include 3 or 4 tone remote (manual) alignment, 3 or 4 tone automatic alignment, remote adjustment of the XMT OUT, RCV OUT or XMT IN levels (from +7 to -16 dBm), and noise and tone level measurements.

2.2 Dual Powering Feature

The dual powering feature allows the SDS5486LB to operate from either a local power source or from the serving office sealing current/line power source. This feature is especially useful when local power is unavailable, missing, or interrupted for whatever reason. The unit maintains full functionality during maintenance testing, regardless of the powering option used. When both local and line power powering options are present, the SDS5486LB will always choose local power as its power source. If local power becomes unavailable, the SDS5486LB will automatically switch to line power for its power source. If local power is restored, the SDS5486LB will automatically switch back to the local power source.

3. CIRCUIT/FUNCTIONAL DESCRIPTION

Refer to Table 1 and Figure 2, as needed, while reading the following functional description.

3.1 LED Status Indicators

INTELIPORT has six, front panel LEDs that provide a quick visual indication of the units status and mode. A brief description of the LED functions is provided in Table 1.

3.2 Command Mode

INTELIPORT incorporates a Command mode from which all functions, except manual and tone activated loopback and manual activation of the Auto Align feature are accessed. The command mode is the operational state in which INTELIPORT monitors its transmission paths for incoming frequencies, and interprets these frequencies as commands to carry out specific functions. Refer to Figure 2 the SDS5486LB Block Diagram, as needed, while reading the following functional description.

3.3 Command Mode Activation

Refer to Figure 2 (Block Diagram) and Figure 3 (Functional Flowchart), as needed, while reading the following paragraphs.

INTELIPORT's Command mode is activated from the STC by sending the appropriate loopback activation tone (2713Hz [Default] or 1713Hz, 1913Hz, or 2413Hz) to the RCV IN port (pins 7 and 13) for more than 30 seconds.

NOTE

If activation tone is removed in less than 30 seconds, INTELIPORT enters loopback.

Upon detecting the appropriate tone for more than 30 seconds, INTELIPORT returns a steady 1010Hz tone at +5 dBm (TLP) or the adjusted XMT OUT level, via the XMT OUT port (pins 41 and 47). The STC, upon receiving steady 1010Hz from INTELIPORT, removes the activation tone being sent. Command mode is activated.

NOTE

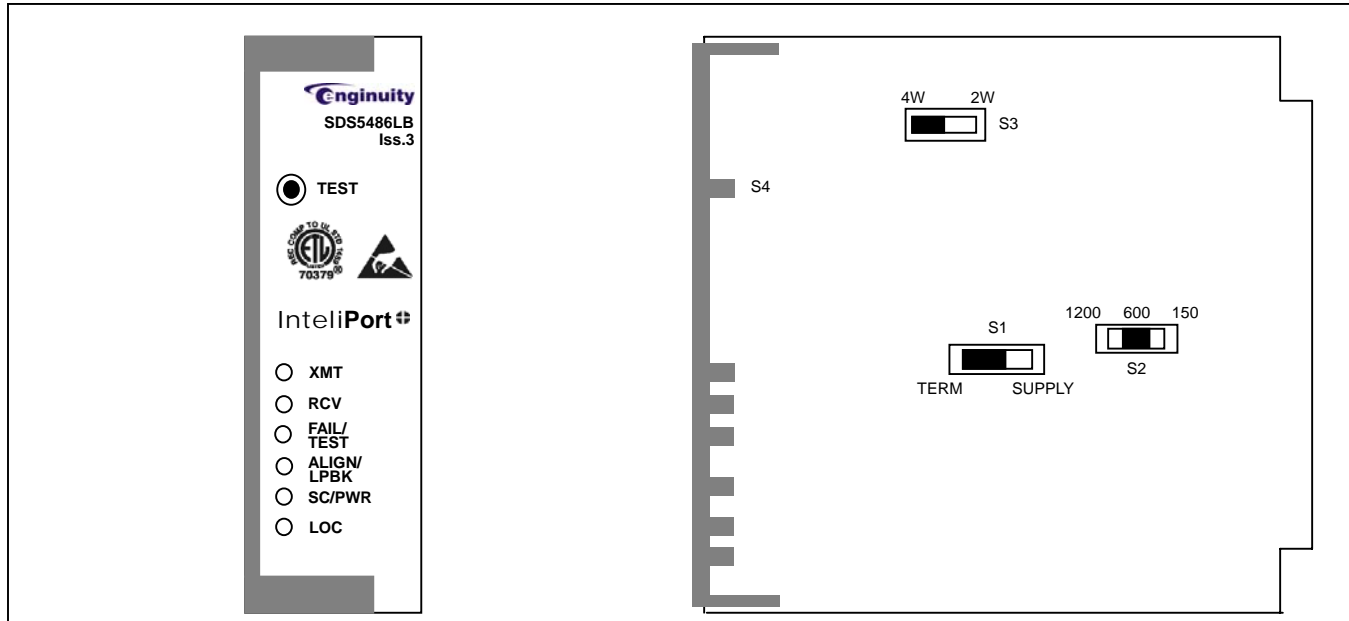
The command mode is equipped with a 5 minute time out circuit. If no tone is sent to INTELIPORT within a 5 minute time frame, INTELIPORT drops out of the command mode and returns to idle.

While in the command mode, the STC can perform any of the desired tests outlined in the following sections.

3.4 Changing Loopback/Command Mode Activation Frequency

This section explains Changing Loopback/Command Mode Activation Frequencies (1713, 1913, 2413, and 2713Hz).

INTELIPORT can be programmed to respond to a Loopback/Command Mode Activation tone of either 1713Hz, 1913Hz, 2413Hz or 2713Hz (Default). To activate the Level/Frequency Selection mode, the STC must first enter the Command mode. While in Command mode, the tester sends 2804Hz. Upon detecting 2804Hz, INTELIPORT returns 2810Hz. The tester, upon receiving 2810Hz from INTELIPORT, sends 1004Hz. INTELIPORT, upon detecting 1004Hz, sends a ramp up sequence indicating the 5486LB is set for 0/0 (TLP) levels then sends a two second interrupted 1010Hz/XX50Hz tone holding on the XX50Hz tone for up to five minutes. The XX50Hz tone represents the current Loopback/Activation frequency (i.e. 1750Hz = 1713Hz, 2450Hz = 2413Hz). To change the Loopback/Activation



OPTION	POSITION	FUNCTION
S1	SUPPLY	Select when supplying sealing current to distant DST.
	TERM	Select for Line Powering and to provide a termination for a distant sealing current source.
S2	1200	Select when interfacing loaded cable
	600	Select when interfacing short non-loaded cable
	150	Select when interfacing long non-loaded cable
S3	2W	Select when interfacing 2W data modem equipment
	4W	Select when interfacing 4W data modem equipment
TEST S4	0-5 sec	Press for less than 5 seconds unit enters Wire Test mode. (Red LED is flashing)
	5-10 sec	Press for more than five seconds but less than 10 to initiate Auto-Align mode. (Yellow LED is on) align in a point-to-point application)
	10+ sec	Press for more than ten seconds, unit will default settings to Factory Default. (Red and Yellow LEDs are flashing)
LEDs		
LOC PWR	ON-indicates Local Power is present OFF-indicates Local Power is not present (NOTE: Unit may be line powered. Verify status of SC/PWR LED)	
SC/PWR	If the LOC PWR LED is ON and if the SC/PWR LED is ON-it indicates sealing current is present. If the LOC PWR LED is OFF but the SC/PWR LED is ON-it indicates the unit is line powered via the distant simplex sealing current source	
ALIGN/LPBK	ON-indicates unit is either in the Command Mode, the Alignment Mode or in the Transponder Mode of operation OFF-indicates the unit is in the idle state FLASH ING-indicates the unit is in the Loopback mode of operation	
FAIL/TEST	ON-indicates a unit failure. Replace unit OFF-indicates unit is in Idle state FLASH ING-indicates unit is in the Wire Test mode	
XMT	ON-indicates unit is receiving data from customer's equipment OFF-indicates unit is in the Idle state	
RCV	ON-indicates unit is sending data to the customer's equipment OFF-indicates unit is in the Idle state	

Table 1. INTELIPORT SDS5486LB (Issue 3) Option Location and Front-panel Diagram

frequency, the tester sends 404Hz for 1713Hz, 1004Hz for 1913Hz, 2804Hz for 2413Hz or 2713Hz for 2713Hz operations. Upon receiving 404, 1004, 2804 or 2713Hz, the INTELIPORT returns interrupted 1010/XX50Hz and holds the XX50Hz tone for then seconds then returns to Command mode.

NOTE

To leave the INTELIPORT frequency setting menu without changing the current frequency, send the appropriate command (i.e. 404, 1004, 2804 or 2713Hz) for the current frequency to return to the Command mode.

3.5 Changing Customer Levels

This section explains changing customer levels for +13/-3, 0/0, or +7 to -16 (factory default is -3 dBm RCV/+13 dBm XMT)

INTELIPORT can be programmed for standard customer interface levels of +13 dBm (TLP) XMT IN and -3 dBm (TLP) RCVOUT, 0 dBm XMT IN and 0 dBm RCV OUT or any level +7 to -16 dBm on either the XMT IN or RCV OUT port. To activate the Level/Frequency Selection mode, the STC must first enter the Command mode. While in Command mode, the tester sends 2804Hz. Upon detecting 2804Hz INTELIPORT returns 2810Hz. The tester, upon receiving 2810 Hz from INTELIPORT, sends 1004Hz. The INTELIPORT, upon detecting 1004Hz, sends a ramp up sequence indicating the 5486LB is set for +13/-3 (TLP) customer levels or ramp down sequence indicating the 5486LB is set for 0/0 (TLP) or custom levels, then sends a two second interrupted 1010Hz/XX50Hz tone holding on the XX50Hz tone for up to five minutes. To change the customer level interface, the tester sends 2600Hz to toggle the current level set. Upon receiving 2600Hz, the INTELIPORT 5486LB, if set for +13/-3 levels, ramps down, toggles levels to 0/0, and enters 1410 sub-menu; if set to any levels other than +13/-3, the INTELIPORT directly enters 1410 sub-menu for setting the individual XMT IN, RCV OUT and XMT OUT levels.

3.6 RCV OUT Level Adjust Mode-Activate

To activate the RCV OUT Level Adjust mode, from the 1410Hz sub-menu, the tester sends 2804Hz. INTELIPORT, upon receiving 2804Hz, maintains previous setting and returns 1510Hz. The 1510Hz tone indicates the RCV OUT Level Adjustment mode is activated.

While in the RCV OUT Level Adjust mode and by monitoring the level at the XMT OUT port from INTELIPORT, the tester can adjust the level from +7 dBm to -16 dBm by adding loss to the output level, or resetting the output level to +7 dBm (TLP).

3.6.1 To Add 0.5 dB LOSS

The tester sends 404Hz. INTELIPORT changes the output level by adding 0.5 dB of loss. If more loss is required, the tester repeats the process of sending 404Hz. INTELIPORT's output level changes by 0.5 dB each time 404Hz is detected.

3.6.2 To Add 1.0 dB LOSS

The tester sends and removes 2804Hz. INTELIPORT changes the output level by adding 1.0 dB. If more loss is required, the tester repeats the process of sending 2804Hz. INTELIPORT's output level changes by 1.0 dB each time 2804Hz is detected.

3.6.3 To Add 2.0 dB of LOSS

The tester sends and removes 1004Hz. INTELIPORT changes the output level by adding 2.0 dB. INTELIPORT's output level changes by 2.0 dB each time 1004 Hz is detected.

3.6.4 To RESET + 7 dBm Output Level

The tester sends 2600Hz. INTELIPORT changes the output level to +7 dBm (TLP) then returns to the 1510Hz sub-menu

3.7 RCV OUT Level Adjust Mode - Release

After setting the required output level, the tester sends 2713Hz for more than five seconds. Upon detecting 2713Hz, INTELIPORT releases from the RCV OUT Level Adjust mode and returns to the 1410Hz sub-menu.

NOTE

Once the RCV OUT level is set, the output level will remain at the level programmed

3.8 XMT IN Level Adjust Mode - Activate

To activate the XMT IN Level Adjust mode, from the 1410Hz sub-menu, the tester sends 1004Hz. INTELIPORT, upon receiving 1004Hz, maintains the previous setting and returns 1310Hz. The 1310Hz tone indicates the XMT IN Level Adjustment mode is activated.

By monitoring the level at the XMT OUT port while INTELIPORT is in the XMT IN Level Adjust mode, the tester can adjust the level from +7 dBm to -16 dBm by adding loss to the output level, or reset the input level to +7 dBm (TLP).

3.8.1 To Add 0.5 dB of LOSS

The tester sends 404Hz. INTELIPORT changes the output

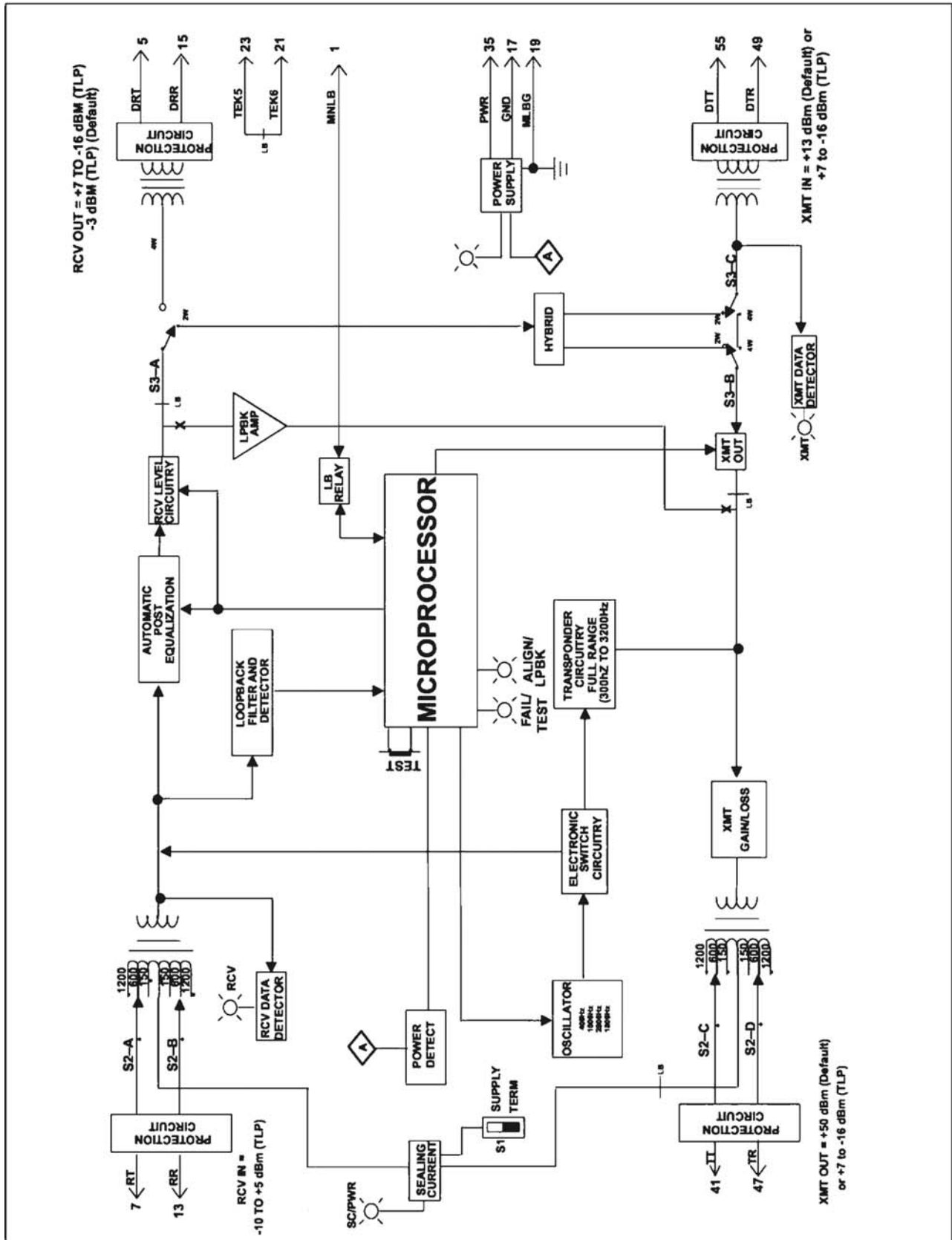


Figure 2. SDS5486LB (INTELIPOINT) Issue 3 Block Diagram

level by adding 0.5 dB of loss. If more loss is required, the tester repeats the process of sending 404Hz. INTELIPORT's output level changes by 0.5 dB each time 404Hz is detected.

3.8.2 To Add 1.0 dB of LOSS

The tester sends and removes 2804Hz. INTELIPORT changes the output level by adding 1.0 dB. If more loss is required, the tester repeats the process of sending 2804Hz. INTELIPORT's output level changes by 1.0 dB each time 2804Hz is detected

3.8.3 To Add 2.0 dB of LOSS

The tester sends and removes 1004Hz. INTELIPORT changes the output level by adding 2.0 dB. INTELIPORT's output level changes by 2.0 dB each time 1004Hz is detected.

3.8.4 To RESET + 7 dBm Input Level

The tester sends 2600Hz. INTELIPORT changes the output level to +7 dBm (TLP) then returns to the 1310Hz sub-menu.

3.9 XMT IN Level Adjust Mode - Release

After setting the required input level, the tester sends 2713Hz for more than five seconds. Upon detecting 2713Hz, INTELIPORT releases from the XMT IN Level Adjust mode and returns to the 1410Hz sub-menu.

NOTE

Once the "XMT IN" is set, the input will remain at the level programmed.

3.10 XMT OUT Level Adjust Mode - Activate

To activate the XMT OUT Level Adjust mode, from the 1410Hz sub-menu, the tester sends 404Hz. Upon receiving 404Hz, INTELIPORT returns 1110Hz and enters with the previous setting. The 1110Hz tone indicates the XMT OUT Level Adjustment mode is activated.

By monitoring the level at the XMT OUT port while INTELIPORT is in the XMT OUT Level Adjust mode, the tester can add either gain or loss to the output level.

3.10.1 To Add 0.5 dB of GAIN (with 2804Hz)

The tester sends and removes 2804Hz. INTELIPORT automatically changes the output level by adding 0.5 dB of gain. If more gain is required, the tester repeats the process of sending and removing 2804Hz. INTELIPORT's output level changes by 0.5 dB each time 2804Hz is detected.

3.10.2 To Add 0.5 dB of LOSS (with 404Hz)

The tester sends and removes 404Hz. INTELIPORT automatically changes the output level by adding 0.5 dB of loss. If more loss is required, the tester repeats the process of sending and removing 404Hz. INTELIPORT's output level changes by 0.5 dB each time 404Hz is detected.

3.10.3 To Add 5.0dB of LOSS (with1004Hz)

The tester sends and removes 1004Hz. INTELIPORT automatically changes the output level by adding 5.0 dB of loss. If more loss is required, the tester repeats the process of sending and removing 1004Hz. INTELIPORT's output level changes by 5.0 dB each time 1004Hz is detected.

3.10.4 To RESET +5 dBm Output Level

The tester sends 2600Hz. INTELIPORT changes the output level to +5 dBm (TLP) then returns to the 1110Hz sub-menu.

3.11 XMT OUT Level Adjust Mode - Release

After setting the required output level, send 2713Hz for more than five seconds. Upon detecting 2713Hz, INTELIPORT releases from the XMT OUT Level Adjust mode and returns to the 1410Hz sub-menu.

NOTE

Once the "XMT OUT" level is set for a level other than 0 dBm while in the 0/0 or custom level set, the output level will remain at the level programmed. The "XMT OUT" level will not default when the XMT OUT mode is accessed.

3.12 Release From the Level Setting Sub-Menu

After setting the required levels, send 2713Hz for more than five seconds. Upon detecting 2713Hz, INTELIPORT releases from the 1410Hz Level Adjust mode and returns to the 1010Hz command mode.

4.0 SWITCH OPTIONS

Engenuity's SDS5486LB provides three option switches that are used to condition the module for proper operation in a given application. Refer to Table 1 for more details on the location and description of each option switch. The SDS5486LB is also equipped with a front-panel TEST switch. The installer can use the TEST switch to activate INTELIPORT's Wire Test mode for verifying station wiring after the unit is installed. While on site, the installer can also use the TEST switch to activate INTELIPORT's automatic alignment feature.

NOTE

The TEST switch, when used to activate INTELIPORT's automatic alignment feature, should be pressed only when instructed. Otherwise, pressing this switch at an inappropriate time may cause circuit disruption.

5.0 INSTALLATION

This section covers the physical installation of the SDS5486LB. Refer to Table 2 and Table 4, as needed, while reading this section.

Installation consists of inspecting the equipment for damages, following proper safety precautions, mounting the units in the proper slot of the mounting assembly, or in a rack/on a wall, verifying the presence of power and signaling as indicated by the status LEDs.

INSPECTION NOTE -

If not previously inspected at the time of delivery, visually inspect the unit for damages prior to installation. If the equipment has been damaged in transit, immediately report the extent of the damage to the transportation company and to Enginuity (see Part6 for telephone number).

CAUTION - STATIC-SENSITIVE

This product contains static-sensitive components! Proper electrostatic discharge procedures must be followed to maintain personal and equipment safety. Do not store units near magnetic, electromagnetic or electrostatic fields. Always store or ship units in the original static-protective packaging from Enginuity. Use anti-static mats when working on units.

- PRECAUTIONARY STATEMENT -

Never install telephone wiring during a lightning storm.

Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

Use caution when installing or modifying telephone lines

5.1 Installer Connections

When installing the SDS5486LB in Westell's USA pre-wired, Type 550 shelf (Type-400 mounting), connections are made via 25-pair cables mating to the appropriate 25-pair cable connectors located on the rear of the mounting assembly.

DESCRIPTION		PIN
RT-RCV IN (Tip)	Facility	7
RR - RCV IN (Ring)		13
TT - XMT OUT (Tip)		41
TR - XMT OUT (Ring)		47
DRT - 4W RCV OUT (Tip)	Modem	5
DRR - 4W RCV OUT (Ring)		15
DTT - XMT IN/2W (Tip)		55
DTR - XMT IN/2W (Ring)		49
TEK5-Data Set Disable		23
TEK6-Data Set Disable		21
MNLB-Manual Loopback	Misc.	1
MLBG-Manual Loopback		19
Ground		
PWR - Power		35
GND - Ground		17

Table 2. Installer Connections

5.2 Power Requirements

Power requirement for proper operation can be supplied as follows:

1. From a line powered source via the 4-wire facility (XMT OUT and RCV IN ports) at >8mA, or
2. From a local power source of 20 to 28 Vac (24 Vac nominal) at 40 mA max.; -22 to -56 Vdc (-48 Vdc nominal) at 20 mA max.

5.3 Dual Powering Feature

The Power Detect circuit monitors both the local power source (pins 35 and 17) and the 4-wire facility simplex power. If the unit is being powered from a local power source, the internal Sealing Current provides a termination for sealing current. If a local power source is not available, INTELIPORT will operate off the 4-wire facility simplex current. If both local power and simplex powering is present, INTELIPORT will always operate off the local power source as it first choice. This way, if local power is ever interrupted, for whatever reason, the Power Detect circuit automatically switches the internal circuitry to the Line Powering option so that INTELIPORT can operate off the 4-wire facility line power source. Subsequently, when local power is restored, the internal circuitry automatically switches back to operate off the local power

5.4 Sealing Current/Simplex Powering

Sealing current is recommended on all metallic facilities to help prevent transmission path noise. Sealing current is a low-value dc current (approx. 20 mA) applied to the 4-wire dry cable pairs, on a simplex basis, to break down resistance that may build up at non-soldered cable splices. Continuous application of sealing current helps prevent degradation of transmission performance.

The internal sealing current circuit provides a TERM for sealing current when sealing current is supplied from the distant end of SUPPLY, and when the INTELIPORT must provide sealing current to a distant end DST. When local power and sealing current are present, both the LOC PWR LED and the SC/PWR LED will light. When local power is not present, but sealing current is present (from the distant end), the LOC PWR LED will be off but the SC/PWR LED will be lit (on steady) indicating INTELIPORT is being powered via the simplex current.

5.5 Wire Test Mode

Once the installer connections are complete and the option switches have been set, the unit can be installed. After installing the unit, the installer should activate INTELIPORT's Wire Test mode to verify installation and station wiring. Pressing the front-panel push-button TEST switch for less than five seconds (see NOTE below) causes steady 1010Hz to be applied to the RCV ports and interrupted 1010Hz to be applied to the XMT ports. Station wiring is verified by connecting a Transmission Test Set (with a built-in speaker or other suitable listening device) to the receive and transmit channel pairs at the cable connection and demarcation points and listening for the appropriate tones. Refer to Table 3 for a summary of the INTELIPORT'S output tones generated when operating in 2W or 4W applications.

NOTE

If the TEST switch is pressed and held for longer than five seconds, INTELIPORT recognizes this as a command to enter the Auto-Align sequence.

After verifying the tones, press the TEST switch again to end the Wire Test mode. If the Test switch is not pressed a second time, the Wire Test mode automatically times out one hour after initial activation. If desired, the tester can release the Wire Test mode remotely by sending the appropriate loopback activation tone (1713, 1913, 2413, or 2713Hz) 10 to 60 minutes after initial activation.

PORT	4W APPLICATIONS	2W APPLICATIONS
RCV IN PORT (Facility-Side)	continuous 1014Hz	continuous 1014Hz
XMT OUT PORT (Facility-Side)	continuous 1014Hz	not applicable
RCV OUT PORT (Demarcation Point)	interrupted 1014Hz	interrupted 1014Hz
XMT IN PORT (Demarcation Point)	interrupted 1014Hz	interrupted 1014Hz

*Note: In 2W applications the RCV OUT and XMT IN ports utilize the same transmission pairs (XMT IN, T and R pins 55 and 49).

Table 3. Wire Test Mode Tones

6.0 ALIGNMENT

INTELIPORT features both remote (manual) and automatic alignment capability. During alignment the INTELIPORT'S operating levels are as follows:

- RCV IN= +5 dBm to -10 dBm
- RCV OUT= -3 dBm (Standard) or 0 dBm (FAA)
- XMT IN= + 13 dBm (Standard) or 0 dBm (FAA)
- XMT OUT= +5 dBm

The XMT OUT, RCV OUT and XMT IN levels can be adjusted for any level from +7 to -16 dBm.

6.1 Remote Alignment

Remote alignment allows the tester to remotely align INTELIPORT. Remote alignment is accomplished with respect to either 3 tones or 4 tones as required.

6.2 Automatic Alignment

The Automatic Alignment (Auto-Align) feature is used to automatically align INTELIPORT with the equipment at the distant end when the distant end is equipped with an intelligent equivalent. Auto-Align is accomplished using 3 or 4 tones (depending on the alignment capability of the distant end unit). The fourth tone in the alignment sequence allows for a more accurate equalization when interfacing long sections of loaded cable or a mixture of loaded and non-loaded cable. Auto-Align can be activated remotely while the INTELIPORT is in the command mode.

NOTE

If desired, Auto-Align can be activated manually by pressing and holding the front-panel TEST switch for more than five seconds. If the switch is pressed and released in less than five seconds, INTELIPORT interprets this as a command to activate the Wire Test Mode feature (see paragraph 5.5).

Before Auto-Align can be activated from the STC, INTELIPORT must be in Command mode (see paragraph 3.2). While in Command mode, the tester sends 2804Hz. INTELIPORT, upon detecting 2804Hz, returns 2810Hz. Upon receiving 2810Hz from INTELIPORT, the tester sends a second 2804Hz tone. Upon detecting the second 2804Hz, INTELIPORT enters the Auto-Align mode.

Upon detecting the command to enter the Auto-Align mode (via the tester sending a 2804Hz tone or the pressing TEST switch), INTELIPORT sends 2600Hz via the RCV IN port to the distant end equipment for 60 sec. and then removes the 2600Hz and tests for 508Hz command mode tone from the distant end.

If a command mode tone is received from the distant end after sending 2600Hz, INTELIPORT assumes the unit at the distant end is an intelligent 4W ETO (4-Wire Equalized Transmission Only) and automatic alignment continues. If a command mode tone is not detected after sending 2600Hz, INTELIPORT sends 2713Hz via the XMT OUT port. If a command mode tone is detected from the distant end after approximately 45 seconds, INTELIPORT assumes an intelligent DST is at the other end and automatic alignment continues.

NOTE

If no response is detected from the distant end after sending either 2600Hz or 2713Hz, INTELIPORT assumes the equipment at the other end is either non-intelligent or missing. In this case, ULTRAPORT re-sends 2713Hz to the distant end and returns to idle.

With both ends set for auto-align, tones are automatically sent and received between both ends. If the distant end is capable of aligning to four tones, the fourth tone is sent. If the distant end is not capable of aligning to four tones, both ends automatically align to three tones. Gain and equalization is automatically set and alignment is complete. The automatic alignment sequence takes place in approximately three to five minutes.

NOTE

If aligning the SDS5486LB with an intelligent 4WETO (such as Engenuity's ISQ4386LB or AUA 441LB), the intelligent 4WETO returns either a ramp-up tone or a ramp-down tone after alignment. After receiving the ramping tone, INTELIPORT sends 1010Hz to the ISQ for five seconds. At this point, the ISQ returns to idle. After five seconds, INTELIPORT returns to idle. If aligning the SDS5486LB with another intelligent DST, the distant end returns either a ramp-up or ramp-down tone after alignment. After receiving the ramping tone, INTELIPORT sends 1010Hz to the distant end. At this point, INTELIPORT returns either a ramp-up tone or a ramp-down tone toward the tester. After the ramping tone, INTELIPORT re-sends 2713Hz to the distant end and returns to idle. The distant end, upon detecting 2713Hz from INTELIPORT, also returns to idle.

6.3 Remote Alignment

NOTE

During remote alignment, INTELIPORT provides a 5-minute waiting period for each tone that is to be returned by the STC. If INTELIPORT does not receive the correct tone, INTELIPORT drops the current tone transmission and returns to idle without updating the non-volatile memory circuit. Please also note that the tester can, at any time, escape from the alignment mode by sending the loopback activation frequency (1713, 1913, 2413 or 2713Hz) for more than five seconds causing INTELIPORT to return to idle.

While in command mode (1010Hz present), the tester should record the level received at 1010Hz. Remote alignment is then initiated by sending 1004Hz to INTELIPORT, via the RCV IN port. Upon detecting 1004Hz, INTELIPORT returns 2810Hz. The tester, upon receiving 2810Hz from INTELIPORT, should record the level received then send 2804Hz to INTELIPORT. INTELIPORT, upon detecting 2804Hz from the STC, returns 410Hz. The tester, upon receiving 410Hz from INTELIPORT, should record the level received. At this point, the tester has the option of aligning the circuit to 3 tones or 4 tones.

6.4 3-Tone Alignment

If a 3-tone alignment is required, the tester sends 404Hz in response to INTELIPORT's 410Hz. Upon detecting 404 Hz, INTELIPORT aligns the circuit, sets the gain and equalization with respect to the three tones, and returns either a ramp-up tone indicating a successful alignment or a ramp-down tone indicating a successful alignment was not achieved. After sending the ramping tone sequence, INTELIPORT enters loopback to permit verification of alignment settings. See paragraph 6.6 for details on the ramp-up/ramp-down tone sequence.

6.5 4-Tone Alignment

If a 4-tone alignment is required, the tester sends 1804Hz in response to INTELIPORT's 410Hz. Upon detecting 1804Hz from the STC, INTELIPORT returns 1810Hz for 30 seconds followed by 410Hz. The tester, upon detecting the 1810Hz followed by 410Hz from INTELIPORT, should record the level received at both frequencies and then send 404Hz to INTELIPORT. Upon detecting 404Hz, INTELIPORT aligns the circuit, sets the gain and equalization with respect to the four tones, returns either a ramp-up tone indicating a successful alignment or a ramp-down tone indicating a successful alignment was not achieved. After sending the ramping tone sequence, INTELIPORT enters loopback to permit verification alignment settings See paragraph 6.6 for details on the ramp-up/ramp-down tone sequence.

6.6 Ramp-Up/Ramp-Down Tone Sequence

The ramp-up or ramp-down tone at the end of the alignment sequence indicates whether or not the cable pair on the facility side equalized within the parameters of C5 conditioning. The ramp-up sequence, consisting of series of tones ranging from 300Hz to 3000Hz in ascending order, indicates alignment is within the parameters of C5 conditioning. The ramp-down sequence, consisting of a series of tones ranging from 3000Hz to 300Hz, in descending order, indicates alignment is not within the parameters of C5 conditioning. The ramp-up or ramp-down sequence is applied for approximately two seconds with the last tone (3000Hz in the ramp-up sequence or 300Hz in the ramp-down sequence) held for five seconds.

6.7 Loopback After Alignment

While in loopback, the RCV path is interconnected to the XMT path via a loopback amplifier. The loopback amplifier automatically inserts 16 dB (+13/-3), 0 dB (0/0) of gain or gain/loss equal to the difference in the programmed RCV OUT/XMT IN levels to provide an equal-level loopback condition toward the STC. During loopback, the tester sends tones (404Hz, 1004Hz, 1804Hz and 2804Hz), one at a time, to INTELIPORT. The level of each tone returned by INTELIPORT should be recorded and verified against the levels recorded during the remote alignment procedure.

6.8 Loopback Release

INTELIPORT automatically releases the loopback condition 20 minutes after initial activation. If release from loopback is desired before the 20-minute time frame, send the appropriate loopback frequency (1713, 1913, 2413 or 2713Hz) for more than 0.9 seconds. The automatic time-out release feature ensures the transmission paths restore to normal operation if the loopback frequency is not sent.

6.9 XMT OUT Level

INTELIPORT's XMT OUT level is factory programmed to provide an output level of +5 dBm (TLP). The output can be re-programmed for any level from +7 dBm to -16 dBm. While in Command mode, the tester can change the output level remotely either by adding loss (in increments of 0.5 dB or 5.0 dB up to 21 dB of loss) or gain (in increments of 0.5 dB up to +2.0 dB of gain) to the +5 dBm level.

6.10 XMT OUT Level Adjust Mode - Activate

While in the XMT OUT adjust mode and by monitoring the level at the XMT OUT port from INTELIPORT, the tester can add either gain or loss to the output level.

6.10.1 To ADD 0.5dB GAIN

The tester sends and removes 2804Hz. INTELIPORT automatically changes the output level by adding 0.5 dB of gain. If more gain is required, the tester repeats the process of sending and removing 2804 Hz. INTELIPORT's output level changes by 0.5 dB each time 2804Hz is detected.

6.10.2 To ADD 0.5 dB LOSS

The tester sends and removes 404Hz. INTELIPORT automatically changes the output level by adding 0.5 dB of loss. If more loss is required, the tester repeats the process of sending and removing 404Hz. INTELIPORT's output level changes by 0.5 dB each time 404Hz is detected.

INTELIPORT also provides an additional feature that allows the tester to add loss to the output level in increments of -5.0 dB. Adding -5.0 dB of loss to the output level is accomplished by sending 1004Hz while in the 1110Hz XMT OUT Level Adjust mode. INTELIPORT, upon detecting 1004Hz, automatically re-adjusts the output level by -5.0 dB. From this point, the tester can add either gain or loss in increments of 0.5 dB. From this point, the tester can add either gain or loss in the 0.5 dB increments as indicated above.

6.10.3 To ADD 5.0 dB LOSS

The tester sends and removes 1004Hz. INTELIPORT changes the output level by adding 5.0 dB of loss. If more loss is required, the tester repeats the process of sending and removing 1004Hz. INTELIPORT's output level changes by 5.0 dB each time 1004 Hz is detected.

6.10.4 To Reset +5.0 dBm Output Level

The tester sends 2600Hz. INTELIPORT changes the output level to +5.0 dBm (TLP) then returns to the Command mode

6.11 XMT OUT Level Adjust Mode - Release

After setting the required output level, the STC must send the appropriate loopback activation frequency (1713, 1913, 2413, or 2713Hz) for more than five seconds. Upon detecting the loopback activation frequency, INTELIPORT releases from the XMT OUT Level Adjust mode and returns to the Command mode. The output level of the Command mode is 1010Hz at the offset level programmed.

NOTE

Once the XMT OUT level is set for a level other than +5.0 dBm; the output level will remain at the level programmed

6.12 Default to Factory Settings

The INTELIPORT can be restored to the Factory Default settings of:

- RCV OUT = -3.0 dBm TLP
- XMT IN= +13.0 dBm TLP
- XMT OUT = +5.0 dBm TLP
- EQUALIZER = FLAT

To restore the factory settings, from the 1010Hz command mode, the tester sends 2804Hz. Upon detecting 2804Hz, INTELIPORT returns 2810Hz. The tester, upon receiving 2810Hz from INTELIPORT, sends 2600Hz. INTELIPORT, upon detecting 2600Hz, sends 1610 Hz sub-menu tone. The tester then removes and sends 2804Hz. INTELIPORT, upon detecting 2804Hz, defaults to the factory settings, returns 1010Hz interrupts for two seconds, and then returns to the 1010Hz command mode.

NOTE

Default factory settings can be restored by depressing front panel button > 10 seconds.

7.0 MAINTENANCE TESTING

Maintenance testing features provided by INTELIPORT include Loopback (both manual and tone-activated) and a Quiet Term/Transponder mode of operation.

7.1 Loopback - Tone Activated

Loopback can be initiated any time the unit is idle by sending the appropriate loopback activation frequency (1713, 1913, 2413 or 2713Hz) for 2.5 seconds minimum to 29 seconds maximum. Upon detecting the loopback activation frequency during this time frame, INTELIPORT returns a 2-second acknowledgement tone of 1010Hz/2810Hz indicating the circuit being accessed for maintenance testing is Engenuity's INTELIPORT Model SDS5486LB.

NOTE

If the loopback frequency is present for more than 30 seconds, INTELIPORT enters the Command mode.

7.2 Loopback - Manually Activated

Manual activation of the loopback circuit can be accomplished at any time by applying a ground to the MNLB (Manual Loopback) lead, pin 1. When the loopback circuit is activated manually, neither automatic time-out nor detection of loopback frequency will effect loopback release. Release of a manually activated loopback condition can only occur by removing the ground from pin 1.

While in loopback, the RCV path is interconnected to the XMT path via a loopback amplifier. The loopback amplifier automatically provides 16 dB (+13/-3) or 0 dB (0/0) of gain to provide an equal-level loopback condition toward the STC. During loop-back, the tester sends tones (404Hz, 1004Hz, 1804Hz and 2804Hz) one at a time to INTELIPORT. The level of each tone returned by INTELIPORT should be verified/recorded.

7.3 Loopback Release

INTELIPORT automatically releases the loopback condition 20 minutes after initial activation. If release from loopback is desired before the 20-minute time frame, the tester sends the appropriate loopback frequency (1713, 1913, 2413 or 2713Hz) for more than 0.9 seconds. The automatic time-out release feature ensures the transmission paths restore to normal operation if the loopback frequency is not sent.

7.4 Quiet Termination/Transponder Mode

INTELIPORT's Quiet Term/Transponder mode of operation allows the tester to remotely conduct noise and tone level measurements. The Quiet Term/Transponder is activated by sending 404Hz while INTELIPORT is in the Command mode.

Upon detecting 404Hz, INTELIPORT applies a quiet termination over the XMT IN port and sets a 20-minute time-out circuit. Signals from the data modem are isolated so the tester can perform noise measurements.

NOTE

Quiet termination remains in effect for 20 minutes or until another tone (Le. to enter the 4-ToneAuto-sweep or Full-range Transponder mode or return to command mode or return to idle) is sent to INTELIPORT. If no tone is sent to INTELIPORT within the 20-minute time frame, INTELIPORT times out and returns to the Command mode.

7.5 Transponder Mode

INTELIPOORT features a 4-tone Auto-sweep and a Full-Range Transponder mode of operation. The 4-tone Auto-

sweep Transponder allows the tester to perform a quick level verification test as INTELIPOORT automatically sweeps four tones. The Full-Range Transponder allows the tester to perform a more detailed level verification test over a range of frequencies from 304Hz to 3204Hz.

7.6 4-Tone Auto-Sweep

The 4-Tone Auto-sweep Transponder is activated from the quiet termination mode only by sending 404Hz as the first tone. Upon detecting 404Hz as the first tone, INTELIPOORT sweeps the tones of 410Hz, 1010Hz, 1810Hz and 2810Hz, each for 15 seconds. After sending the last tone, INTELIPOORT reapplies quiet termination and resets the 20-minute timer circuit. The 4-Tone Auto-Sweep Transponder can be restarted, as necessary, by sending 404Hz as the first tone during quiet termination.

7.7 Full-Range Transponder

The Full-Range Transponder is activated from the quiet termination mode by sending any tone from 304Hz to 3204Hz (except 404Hz and the loopback activation frequency). If 404Hz is sent the first tone, INTELIPOORT begins the Auto-Sweep Transponder. Please note, however, that 404Hz can be sent at any time after the transponder mode is started as long as it is not the first tone. The loopback frequency sent (i.e., 1713, 1913, 2413 or 2713Hz, depending on the frequency programmed) causes INTELIPOORT to return to Command mode. If the loopback frequency programmed is a 2413Hz tone, 1913, 2413, or 2713Hz can be sent. Likewise, if the loopback frequency is programmed is a 2713Hz tone, 1713, 1913, or 2413Hz can be sent.

During the Full-Range Transponder, tones sent to INTELIPOORT should be in increments of 100Hz. Upon detecting tone from the tester, INTELIPOORT responds by returning a similar tone (but at a slight off-set) for the same duration that tone is being received from the tester or for 15 seconds (whichever tone is longer). As each new tone is sent, INTELIPOORT responds to the new tone. As each tone is removed by the tester, INTELIPOORT resets the 20-minute timer circuit after the 15-second time frame.

Upon completion and if no other tone is sent by the tester, INTELIPOORT reapplies quiet termination and resets the 20-minute timer circuit. If no tone is sent to INTELIPOORT within the 20-minute time frame, INTELIPOORT drops out of the Quiet Termination/Transponder mode and returns to command mode. If release is desired before the 20-minute time frame expires, the tester sends the programmed loopback frequency for more than five seconds. Upon detecting the loopback tone, INTELIPOORT returns to Command mode. To release and return to idle, the tester re-sends the loopback

activation tone for more than five seconds. Detecting the loopback frequency a second time causes INTELIPOORT to return to idle.

7.8 RCV IN Port Transponder

In addition to the normal Quiet Term/Transponder mode of operation, INTELIPOORT features a RCV IN port Transponder test mode. The RCV IN port Transponder test mode allows the tester to perform a quick level verification test as INTELIPOORT sweeps four tones over the RCV IN port. To activate the RCV IN port transponder mode, the tester, after entering the quiet termination mode via 404Hz, sends 2600Hz as the first tone for greater than five seconds. Upon detecting 2600Hz, INTELIPOORT begins the test by sending 1010Hz for 60 seconds, followed by 60 seconds of quiet termination over the RCV IN port. After applying quiet termination for 60 seconds, INTELIPOORT sweeps the tones 410Hz, 1810Hz, and 2810Hz at 0 dBm, each for 30 seconds. After sending the last tone of 2810Hz, INTELIPOORT returns to Command mode. The RCV IN port Transponder test can be re-started by re-sending and removing the 504Hz tone.

NOTE

To bypass the 60-second quiet termination portion of the test and quickly enter the auto-sweep portion, send 1004Hz for five seconds (during quiet termination only). To abort this test and return to Command mode, send 2713Hz (during quiet termination only) for longer than five seconds.

7.9 Customer Interface 2W/4W Query

To query the customer interface setting, the tester must first enter the Command mode. While in Command mode, the tester sends 2804Hz. Upon detecting 2804Hz INTELIPOORT returns 2810Hz. The tester, upon receiving 2810Hz from INTELIPOORT, sends 2600Hz. INTELIPOORT, upon detecting 2600Hz, returns 1610Hz sub-menu tone. The tester then sends 404Hz to query the interface. Upon detecting 404Hz, INTELIPOORT returns a ramp-up sequence (holding on 3101Hz if the interface is set for 4W) or a ramp-down sequence (holding on 310Hz for five seconds if the interface is set for 2W). INTELIPOORT then returns to the 1610Hz sub-menu. To return to the 1010Hz command mode, send 2713Hz.

7.10 Alignment Query

To query the previous alignment performance, the tester must first enter the Command mode. While the Command mode, the tester sends 2804Hz. Upon detecting 2804Hz, INTELIPOORT returns 2810Hz. Upon detecting 2804Hz INTELIPOORT returns 2810Hz. The tester, upon receiving 2810Hz from INTELIPOORT, sends 2600Hz. INTELIPOORT, upon detecting 2600Hz, returns a 1610Hz sub-menu tone. The tester then sends 1004Hz to query the

alignment. Upon detecting 1004Hz, INTELIPORT returns a ramp-up sequence (holding on 3101Hz if the alignment meets C5 conditioning) or a ramp-down sequence (holding on 310Hz for five seconds if the INTELIPORT could not achieve an alignment). INTELIPORT then returns to the 1610Hz sub-menu. To return to the 1010Hz command mode, the tester sends 2713Hz.

7.11 Power Loss Query

To query the INTELIPORT to determine if the unit has power loss since the last query, the tester must first enter the Command mode. While in Command mode, the tester sends 2804Hz. Upon detecting 2804Hz, INTELIPORT returns 2810Hz. The tester, upon receiving 2810Hz from INTELIPORT, sends 2600Hz. INTELIPORT, upon detecting 2600Hz, returns a 1610Hz sub-menu tone. The tester then sends 2804Hz to query for power loss. Upon detecting 2804Hz, INTELIPORT returns a ramp-up sequence (holding on 3101Hz if the INTELIPORT has not loss power since the last query) or ramp-down sequence (holding on 310Hz for five seconds). If the INTELIPORT has power loss since the last query, INTELIPORT resets the power loss indicator and then returns to the 1610Hz sub-menu. To return to the 1010Hz command mode, the tester sends 2713Hz. The power loss query is helpful in determining locations in which local power is marginal and causing unexplained outages.

8. TESTING & TROUBLESHOOTING

8.1 Testing

Testing and alignment procedures (given in Table 5) may be performed after the SDS5486LB is installed and power is applied. The procedures outlined are intended only to ascertain proper operation of the unit and, if problems should occur, to isolate those problems to the most probable area. Testing consists of performing the standard test procedures for digital interface equipment using the KS-108/109 (or equivalent) receiver and transmitter data test sets. This equipment should not be field repaired. If the equipment is suspected of being faulty, replace it with another unit, optioned identically, and retest. If the replacement unit appears to operate correctly, the original unit may be faulty and should be returned to Enginuity for repair or replacement (Paragraph 10.2).

8.2 Troubleshooting

If trouble is encountered, verify all installer connections to the assembly and check that the CO power fuse is not blown. Also verify all module connections and option switch settings, and verify the modules are making a positive connection with the shelf connector. If trouble persists, replace the suspect unit and repeat procedures outlined. These procedures are not designed to effect repairs or modifications. Any tests beyond those outlined herein, or repairs made beyond replacing a faulty unit, are not recommended and may void the warranty.

STEP	ACTION															
1.	<p>INSTALLER'S PROCEDURES</p> <p>Set option switches as required per circuit Layout Record (CLR) card. Install unit and apply power.</p> <p>If unit is being locally powered, verify LOC PWR LED on, and ALIGN/LPBK and FAILJEST LEDs off.</p> <p>If unit is being powered via the simplex leads, verify LOC PWR LED off, SC/PWR LED on, and ALIGN/LPBK and FAIL/TEST LEDs off.</p> <p>Note: if FAIL/TEST LED is on steady, replace unit and repeat Step 1. If FAIL/TEST LED is flashing, momentarily press the recessed front-panel TEST switch.</p>															
2.	<p>Wire Test Mode</p> <p>CAUTION-INTELI PORT places 1010Hz tone on the transmission pairs when Wire Test mode is activated. Be sure INTELI-PORT is not connected to an in-service circuit where this tone may cause interference</p> <p>Momentarily press the front-panel TEST switch (less than five seconds) and release. If the TEST switch is pressed for longer than five seconds, INTELI-PORT enters the AUTO-ALIGN mode.</p> <p>Verify FAIL/TEST LED flashing. Connect TMS with built-in speaker, or other suitable listening device, to:</p> <table border="1" data-bbox="263 814 1482 966"> <thead> <tr> <th data-bbox="263 814 665 844">PORT</th> <th data-bbox="672 814 1136 844">4 W APPLICATIONS</th> <th data-bbox="1143 814 1482 844">2 W APPLICATIONS</th> </tr> </thead> <tbody> <tr> <td data-bbox="263 865 665 894">RCV IN pair at the cable entry point</td> <td data-bbox="672 865 1136 894">Continuous 1010 Hz</td> <td data-bbox="1143 865 1482 894">Continuous 1010 Hz</td> </tr> <tr> <td data-bbox="263 894 665 924">XMT OUT pair at cable entry point</td> <td data-bbox="672 894 1136 924">Interrupted 1010 Hz</td> <td data-bbox="1143 894 1482 924">Interrupted 1010 Hz</td> </tr> <tr> <td data-bbox="263 924 665 953">RCV OUT pair at demarcation point</td> <td data-bbox="672 924 1136 953">Continuous 1010 Hz</td> <td data-bbox="1143 924 1482 953"></td> </tr> <tr> <td data-bbox="263 953 665 982">XMT IN pair at demarcation point</td> <td data-bbox="672 953 1136 982">Interrupted 1010 Hz</td> <td data-bbox="1143 953 1482 982">Interrupted 1010 Hz</td> </tr> </tbody> </table> <p>When tones are verified, press TEST switch to end Wire Test mode. Verify FAIL/TEST LED off. If TEST switch is not pressed a second time, Wire Test mode automatically times out one hour after initial activation. If desired, STC can release the Wire Test mode by sending appropriate loopback frequency, 10 to 60 minutes after initial activation.</p> <p>After verifying the above, the installer can turn the circuit over to a tester at the STC and leave.</p>	PORT	4 W APPLICATIONS	2 W APPLICATIONS	RCV IN pair at the cable entry point	Continuous 1010 Hz	Continuous 1010 Hz	XMT OUT pair at cable entry point	Interrupted 1010 Hz	Interrupted 1010 Hz	RCV OUT pair at demarcation point	Continuous 1010 Hz		XMT IN pair at demarcation point	Interrupted 1010 Hz	Interrupted 1010 Hz
PORT	4 W APPLICATIONS	2 W APPLICATIONS														
RCV IN pair at the cable entry point	Continuous 1010 Hz	Continuous 1010 Hz														
XMT OUT pair at cable entry point	Interrupted 1010 Hz	Interrupted 1010 Hz														
RCV OUT pair at demarcation point	Continuous 1010 Hz															
XMT IN pair at demarcation point	Interrupted 1010 Hz	Interrupted 1010 Hz														

Table 4. SDS5486LB (Issue 3) Installation Procedures

1.	<p>TEST CENTER'S PROCEDURE</p> <p>COMMAND MODE Send appropriate activation tone of 1713, 1913, 2413, or 2713 Hz (Factory setting) for >30 seconds via RCV IN port (pins 7 and 13)</p> <p>INTELIPOINT returns steady 1010 Hz at +5 dBm (TLP). Command mode initiated. Remove activation tone.</p> <p>Note: If activation tone is removed in less than 30 seconds, INTELI PORT enters loopback.</p>
2.	<p>ACTIVATION FREQUENCY SELECTION</p> <p>From command mode send 2804 Hz (>5 sec.) INTELIPOINT returns 2810 Hz Upon receiving 2810 Hz from INTELI PORT, send 1004 Hz INTELIPOINT returns a Ramp-up of Ramp-Down sequence then two seconds of interrupted 1010/XX50 Hz then sends steady XX50 Hz. The XX50 Hz represents the current loopback/activation frequency. After receiving the steady XX50 Hz tone send 404 Hz for 1713 Hz operation, 1004 Hz for 1913 Hz, 2804 Hz for 2413 Hz or 2713 Hz for 2713 Hz operation. INTELIPOINT returns two seconds of interrupted 1010/XX50 Hz followed by steady XX50 Hz indicating the new operational frequency, then returns to the command mode.</p>
3.	<p>CUSTOMER LEVEL SELECTION</p> <p>From command mode send 2804 Hz (>5 sec.) INTELIPOINT returns 2810 Hz. Upon receiving 2810 Hz from INTELI PORT, send 1004 Hz. INTELIPOINT returns a Ramp-up sequence then two seconds of interrupted 1010/XX50 Hz then sends steady XX50 Hz. The XX50 Hz represents the current loopback/activation frequency. After receiving the steady XX50 Hz tone, send 2600 Hz to toggle the current level settings. INTELIPOINT returns either a ramp-up sequence indicating levels set for +13/-3 or a ramp-down sequence indicating levels set for 0/0, then returns to the command mode.</p>
4.	<p>REMOTE (MANUAL) ALIGNMENT</p> <p>From command mode (1010 Hz present), record level received, then send 1004 Hz to INTELIPOINT INTELIPOINT RETURNS 2810 Hz. Record level received then send 2804 Hz to INTELIPOINT. INTELIPOINT returns 410 Hz. Record level received. Tester has option: 4-Tone Alignment -Send 1804 Hz. INTELIPOINT returns 1810 Hz for 60 seconds followed by a second 410 Hz tone Tester records level of both frequencies then sends 404 Hz. INTELIPOINT aligns to 4 tones, sends ramp-up/ramp-down tone, then enters loopback.</p>
5.	<p>LOOPBACK</p> <p>While in loopback, send tones (404, 1004, 1804, and 2804 Hz), one at a time, to INTELIPOINT. Record level of each tone as it is looped back by INTELIPOINT</p> <p>Release from loopback. Automatically releases after 20 minutes. If release is desired before the 20-minute time frame, send the programmed activation tone for >0.9 sec.</p>
6.	<p>Auto-Align (Completion time two to three minutes)</p> <p>From command mode send 2804 Hz to INTELIPOINT. INTELIPOINT returns 2810 Hz. Send 2804 Hz again to INTELIPOINT INTELIPOINT initiates the Auto-Align sequence and sends 2713 Hz to Distant end until command mode tone is received. When command mode tone is received from distant end, automatic alignment continues.</p> <p>Tones are automatically sent and received between both ends. Gain and equalization is automatically set Upon completion, INTELIPOINT returns ramp-up tone or ramp-down tone After the ramping tone, INTELIPOINT sends 2713 Hz to distant end and returns to idle. Alignment is complete.</p>

Table 5. SDS5486LB (Issue 3) Testing and Alignment Procedures

<p>7.</p>	<p>XMT OUT LEVEL ADJUST MODE</p> <p>From command mode send 2804 Hz. INTELIPORT returns 2810 Hz. STC then sends 404 Hz. If the customer side is set to +13/-3, the INTELIPORT defaults to +5 dBm (TLP). Otherwise the unit maintains level and returns 1110 Hz. The 1110 Hz tone indicates XMT OUT Level Adjustment mode is activated. Monitor level received at XMT OUT port.</p> <p>From 1410 Hz sub-menu Tester then sends 404 Hz to enter the XMT OUT level adjust mode. Unit returns 1110Hz. The 1110 Hz tone indicates AMT OUT adjustment mode is activated. Monitor level received at XMT OUT port.</p> <p>To add gain Send and remove 2804 Hz. INTELIPORT changes output level by adding 0.5 dB of gain. If more gain is required, continue sending and removing 2804 Hz until desired output level is obtained. Output level changes by 0.5 dB each time 2804 Hz is sent and removed.</p> <p>To add loss Send and remove 404 Hz. INTELIPORT changes output level by adding 0.5 dB of loss. If more loss is required continue sending and removing 404 Hz until desired output level is obtained. Output level changes by 0.5 dB each time 404 Hz is sent and removed.</p> <p>To add loss in steps of -5.0 dB Send 1004 Hz. INTELIPORT readjusts the output level by -5.0 dB. From this point, tester can add either gain or loss in 0.5 dB increments indicated above.</p> <p>To RESET +5 dBm XMT OUT Level Send 2600 Hz. INTELIPORT readjusts the output level to +5 dBm and returns to the command mode.</p> <p>To return to the command mode after setting the XMT OUT level if entered from 2810 Hz sub-menu, send 2713 Hz to greater than five seconds. If entered from 1410 Hz sub-menu, send 2713 Hz to return to the 1410 Hz sub-menu then send 2713 Hz to return to the command mode.</p>
<p>8.</p>	<p>RCV OUT LEVEL ADJUST MODE</p> <p>To activate, send 2804 Hz. INTELIPORT returns 2810 Hz. Tester then sends 1004 Hz. INTELIPORT returns a ramp-up tone then XX50 Hz. Tester then sends 2600 INTELIPORT returns a ramp-down sequence then enters the 1410 Hz sub-menu. Tester then sends 2804 Hz to enter the RCV OUT level adjust mode which then returns 1510 Hz. The 1510 Hz tone indicates RCV OUT adjustment mode is activated. Monitor level received at XMT OUT port.</p> <p>To add 0.5 dB LOSS Send 404 Hz. INTELIPORT changes output level by adding 0.5 dB of loss. If more loss is required, continue sending and removing 2804 Hz until desired output level is obtained. Output level changes by 0.5 dB each time 404 Hz is sent and removed.</p> <p>To add 1.0 dB LOSS Send 2804 Hz. INTELIPORT changes output level by adding 1.0 dB of loss. If more loss is required, continue sending and removing 2804 Hz until desired output level is obtained. Output level changes by 1.0 dB each time 2804 Hz is sent and removed.</p> <p>To add 5.0 dB LOSS Send 1004 Hz. INTELIPORT readjusts the output level by adding 5.0 dB of loss.</p> <p>From this point, tester can add loss in 0.5 dB, 1.0 dB or 5.0 dB increments indicated above</p> <p>To RESET +7 dBm RCV OUT Level Send 2600 Hz. INTELIPORT readjusts the output level to +7 dBm and returns to the 1510 Hz sub-menu.</p> <p>To return to the 1410 Hz mode after setting the RCV OUT level, send 2713 Hz for greater than five seconds.</p>

Table 5. SDS5486LB (Issue 3) Testing and Alignment Procedures (Continued)

<p>9</p>	<p>XMT IN LEVEL ADJUST MODE</p> <p>To activate, send 2804 Hz. INTELIPORT returns 2810 Hz. The tester then sends 2600 Hz. INTELIPORT returns 1710 Hz. Tester then sends 2804 Hz. INTELIPORT then returns 1310 Hz. The 1310 Hz tone indicates XMT IN adjustment mode is activated. Monitor level received at XMT OUT port.</p> <p>To add 0.5 dB LOSS Send 404 Hz. INTELIPORT changes input level by adding 0.5 dB of loss. If more loss is required continue sending and removing 2804 Hz until desired input level is obtained. Input level changes by 0.5 dB each time 464 Hz is sent and removed.</p> <p>To add 1.0 dB LOSS Send 2804 Hz. INTELIPORT changes input level by adding 1.0 dB of loss. If more loss is required continue sending and removing 2804 Hz until desired input level is obtained. Input level changes by 1.0 dB each time 2804 Hz is sent and removed.</p> <p>To add 5.0 dB LOSS Send 104 Hz. INTELIPORT readjusts the input level by adding 2.0 dB of loss.</p> <p>From this point, the tester can add loss in 0.5 dB or 1.0 dB increments indicated above</p> <p>To RESET +7 dBm XMT IN Level Send 2600 Hz. INTELIPORT readjusts the input level to + 7 dBm and returns to the command mode.</p> <p>To return to the command mode after setting the XMT IN level, send 2713 Hz for greater than five seconds.</p>
<p>10.</p>	<p>QUIET TERM/TRANSPONDER OPERATION</p> <p>From command mode, send 404 Hz. INTELIPORT applies quiet termination over XMT IN port and sets 20-minute timer. STC performs noise measurements.</p> <p>Note: Quiet termination remains in effect for 20 minutes or until another tone (i.e. enter 4-tone auto or full-range transponder, or exit quiet termination and return to command mode/idle) is sent. If no tone is sent within 20-minute time frame, INTELIPORT times out and returns to command mode.</p> <p>From quiet termination, tester has option:</p> <p>Enter 4-Tone Auto-Sweep Transponder: Send 404 Hz as first tone while in quiet termination. Upon detecting 404 Hz, INTELIPORT sweeps 410,1010,181 0, and 2810 Hz, each for 15 seconds, then reapplies quiet termination and resets the 20-minute timer. If no tone is sent within 20-minute time frame, INTELIPORT, after 20 minutes, times out and returns to idle.</p> <p>Enter Full-Range Transponder Send any tone from 304 Hz to 3204 Hz (except 404, 1713, 1913, 2413, or 2713 Hz). Upon receiving tone, INTELIPORT returns similar tone (but at slight offset) for same duration tone is received or 15 sec. (whichever is longer).</p> <p>(Tones from STC should bin in 1004 Hz increments.)</p> <p>Upon completion and if no other tone is sent INTELIPORT reapplies quiet termination and resets the 20-minute timer. If no tone is sent within 20-minute time frame, INTELIPORT times out and returns to idle.</p> <p>Note: 404 Hz can be sent anytime (other than the first tone) after transponder mode is initiated. Detection of the programmed loopback activation tone 1713, 1913, 2413, or 2713 Hz, at any time, causes INTELIPORT to return to command mode.</p> <p>Release. By sending the programmed activation tone for >5 sec. (unit returns to command mode) or via 20-minute automatic time-out (unit returns to command mode).</p> <p>Return to idle, send loopback frequency a second time (>5 sec.)</p>

Table 5. SDS5486LB (Issue 3) Testing and Alignment Procedures (Continued)

11.	<p>FACTORY DEFAULT To activate, send 2804 Hz. INTELIPORT returns 2810 Hz. Tester then sends 2600 Hz. INTELIPORT returns 1610 Hz. The tester then sends 2804 Hz; Can also be activated by holding front panel button in > 10 seconds.</p> <p>INTELIPORT defaults XMT IN port to +13 dBm, RCV OUT port to -3 dBm (TLP), XMT OUT port to +5 dBm (TLP), Activation frequency to 2713 Hz, removes all equalization setting (FLAT), sends interrupted 1010 Hz for two seconds then returns to the 1010 Hz command mode.</p> <p>INTELIPORT is now in Factory Default settings ready for provisioning. All previous settings have been removed.</p>
12.	<p>4-TONE AUTO-SWEEP (RCV IN PORT)</p> <p>From command mode, send 404 Hz (>5 sec.) to enter quiet termination mode Upon entering quiet termination, send 2600 Hz (>5 sec) as the first tone to enter the RCV IN Transponder. Reverse SMAS configuration to measure tone of the transmit to field cable pair.</p> <p>INTELIPORT sends 1010 Hz via the RCV IN port for 60 seconds followed by 60 seconds of quiet termination, then sweeps 410, 1810, and 2810 at 0 dBm, each for 30 seconds, then returns to command mode.</p> <p>Note: STC can bypass the 60-second quiet termination portion and quickly enter the auto-sweep portion of the test, by sending 404 Hz (5 sec.), subsequently removing the tone. To escape and return to command mode, send 2713 Hz (>5 sec.).</p>
13.	<p>CUSTOMER INTERFACE 2W/4W QUERY</p> <p>To query from command mode send 2804 Hz. Upon detecting 2804 Hz, INTELIPORT returns 2810 Hz. The tester, upon receiving 2810 Hz from INTELIPORT, sends 2600 Hz. INTELIPORT, upon detecting 2600 Hz returns 1610 Hz sub-menu tone. Tester then sends 1004 Hz to query the alignment, Upon detecting 1004 Hz INTELIPORT returns a ramp-up sequence holding on 3010 Hz if the alignment met C5 conditioning or ramp-down sequence holding on 310 Hz for five seconds if the INTELIPORT could not achieve an alignment, then INTELIPORT returns to the 1610 Hz sub-menu. To return to the 1010 Hz command mode, send 2713 Hz.</p> <p>POWER LOSS QUERY</p> <p>To query, from the command mode tester sends 2804 Hz. Upon detecting 2804 Hz INTELIPORT returns 2810 Hz. the tester, upon receiving 2810 Hz from INTELIPORT, sends 2600 Hz. INTELIPORT, upon detecting 2600 Hz returns 1610 Hz sub-menu tone. Tester then sends 2804 Hz to query for power loss. Upon detecting 2804 Hz INTELIPORT returns a ramp-up sequence holding on 3101 Hz if the INTELIPORT has no loss of power since the last query or ramp-down sequence holding on 310 Hz for five seconds if the INTELIPORT has loss of power since the last query resets the power loss indicator, then INTELIPORT returns to the 1610 Hz sub-menu. To return to the 1010 Hz command mode, send 2713 Hz.</p>

Table 5. SDS5486LB (Issue 3) Testing and Alignment Procedures (Continued)

9. CUSTOMER & TECHNICAL SERVICES

9.1 Customer Service & Technical Assistance

If technical or customer assistance is required, contact Engenuity by calling or using one of the following options:

(630) 761-1892
(800) 980-3266
www.engenuitycommunications.com

10. WARRANTY & REPAIRS

10.1 Warranty

Engenuity warrants this product to be free of defects at the time of shipment. Engenuity also warrants this product to be fully functional for the time period specified by the terms and conditions governing the sale of the product. Any attempt to repair or modify the equipment by anyone other than an authorized Engenuity representative will void the warranty.

10.2 Repair and Return

Engenuity will repair or replace any defective Engenuity equipment without cost during the warranty period if the unit is defective for any reason other than abuse, improper use, or improper installation. Before returning the defective equipment, first request a Return Material Authorization (RMA) number from Engenuity. Once an RMA number is obtained, return the defective unit, freight prepaid, along with a brief description of the problem, to:

Engenuity Communications, Inc.
1251 Nagel Blvd.
Batavia, IL 60510

Replacements will be shipped in the fastest manner consistent with the urgency of the situation. Engenuity will continue to repair or replace faulty equipment beyond the warranty period for a nominal charge. Contact Engenuity for details.

11. SPECIFICATIONS

11.1 Ordering Specifications

To order units, call the telephone numbers shown in Paragraph 9.1, and please specify a specific model number shown in Table 6.

Part/Model #	Description & Comments
SDS5486LB (Issue 3)	INTELIPOINT 2W/4W Data Station Termination Interface CLEI Code: DST1KAP1AA
Technical Publication	001-01-000009 Rev. 003

*CLEI is a trademark of Telcordia Technologies.

Table 6. Ordering and Option Information

11.2 Electrical and Physical Specifications

The electrical and signaling specifications are listed below, and the physical specifications for the SDS5486LB are shown in Table 7.

A. Impedance: Facility-side, selectable for 150, 600 or 1200 Ohms; Equipment-side, (2W or 4W) 600 Ohms, fixed

B. RCV Level Range: Input -10 dBm to +5dBm (TLP), Output -3 dBm, 0 dBm (TLP) or +7 to -16 dBm (TLP). Factory-set for -3 dBm (TLP)

C. XMT Level Range: Input +13 dBm, 0 dBm or +7 to -16 dBm (TLP) Factory-set for +13 dBm (TLP), Output +5 dBm or +7 to -16 dBm (TLP) Factory-set for +5 dBm (TLP)

D. Wire Test Mode: Activated via front-panel TEST switch (<5 sec.). When activated, 1010Hz is applied to transmissions pairs; Release, pressing TEST switch again or automatic time-out after 1-hour.

NOTE

If switch is pressed for >5 seconds, IWELIPOINT enters Auto-Align.

E. Command Mode: Activated remotely by sending 1713, 1913, 2413 or 2713Hz (Default) for >30 seconds, INTELIPOINT returns steady 1010Hz at +5 dBm (TLP) or adjusted XMT OUT level indicating command mode is accessed; Release, 1713, 1913, 2413 or 2713Hz (>5 sec.) or 5-minute time-out if no tone sent

NOTE

If activation tone is removed in <30 seconds, INTELIPOINT enters loopback

F. Changing Loopback/Command Mode Activation Frequency: To change the Loopback/Command Mode Activation Frequency for 1713, 1913, 2413, or 2713Hz send 2804 Hz followed by 1004 Hz while in command mode. INTELIPORT will send a ramp-up or ramp-down sequence identifying the customer level settings then a 2 second interrupted 1010/XX50Hz holding on XX50 Hz to indicate current frequency. Send 404, 1004, 2804 or 2713Hz for 1713, 1913, 2413, or 2713Hz loopback/activation frequency, respectively.

G. Remote (Manual) Alignment: Activated from command mode by sending 1004Hz. Repeated with frequencies of 2804, 404, and 1804Hz in response to INTELIPORT's 2810, 410, and 1810Hz, respectively.

H. Auto-Alignment: Activated from command mode via 2804Hz followed by a second 2804Hz. Can also be activated via TEST switch being pressed for >5 seconds, but <10 seconds. Release, automatically returns to idle upon completion.

I. Equalization: Provides receive channel amplitude equalization (up to 15.3 dB, re: 1004Hz) to meet C5 conditioning requirements.

J. Tone-Activated Loopback: Tone-activated loopback can be activated by applying 1713, 1913, 2413, or 2713Hz (Default) for >2.5 seconds, but <30 seconds; ± 37 Hz must not operate. If applied for >30 seconds, INTELIPORT enters command mode; Release, 1713, 1913, 2413, or 2713Hz (>0.9 sec.) or automatic time-out.

K. Manual Loopback: Activated by grounding pin 1 (MNLB lead); Release, removal of ground only.

L. Loopback Transmission Level: Automatically inserts 16 dB (+ 13/-3), 0 dB (0/0) of gain or the gain/loss difference of the RCV OUT XMT IN ports to provide equal-level loopback condition.

M. Loopback Level: -24 dBm (typically -30).

N. Quiet Termination Mode: From command mode via 404 Hz, INTELIPORT applies quiet termination over XMT IN port and sets 20 minute timer; Release: Return to command mode, the programmed activation tone, (.5 sec.) or automatic time-out; Return to Idle, second programmed activation tone (>5 sec.).

O. 4-Tone Auto-Sweep Transponder Operation: Activated during quiet termination mode only via a404Hz as first tone. INTELIPORT sweeps 401, 1010, 1810 and 2810Hz, each for 15 seconds, then reapplies quiet termination and resets the 20-minute timer.

P. Full-Range Transponder Operation: Activated from quiet termination mode only via any tone from 304Hz to 3204Hz (except 404Hz or the activation tone). INTELIPORT returns similar tone (but at slight offset) for same duration tone is received for 15 seconds (whichever is longer). Tones sent from the STC should be in increments of 100Hz.

Q. RCV IN Port 4-Tone Auto-Sweep Transponder: Activated from quiet termination via 2600Hz. INTELIPORT sends 50 seconds of 1010Hz, 60 seconds of quiet term, then sweeps tones of 410, 1810, and 2810Hz each for 30 seconds, then returns to command mode; Return to command mode, 2713Hz for >5 sec during 60 seconds quiet termination.

R. Idle Noise: 17 dBnC0, max.

S. Trans-hybrid Loss: >30 dB, minimum; 45 dB typical

T. Power: (Simplex Power) the unit will operate via the simplex distant sealing current source.

U. Power (Local Source): -48 Vdc, nominal at 35 mA maximum in non-supply mode.

V. Meets UL1459 requirements.

Physical Feature	U.S.	Metric
Height	5.58 in.	14.17 cm
Width	1.42 in.	3.6 cm
Depth	5.9	15 cm
Weight (approx.)	1.0 lbs	0.48 kgs
Operating Environment	32 ^o F to +122 ^o F	0 ^o C to +50 ^o C
Operating Humidity	0 to 95% (non-condensing)	
Mounting	Teltrend's DAS290, or DAS295 for single module installation or in one position of a Westell USA Type 550 (Type-440 equivalent) mounting	

Table 7. SDS5486LB Physical Specifications

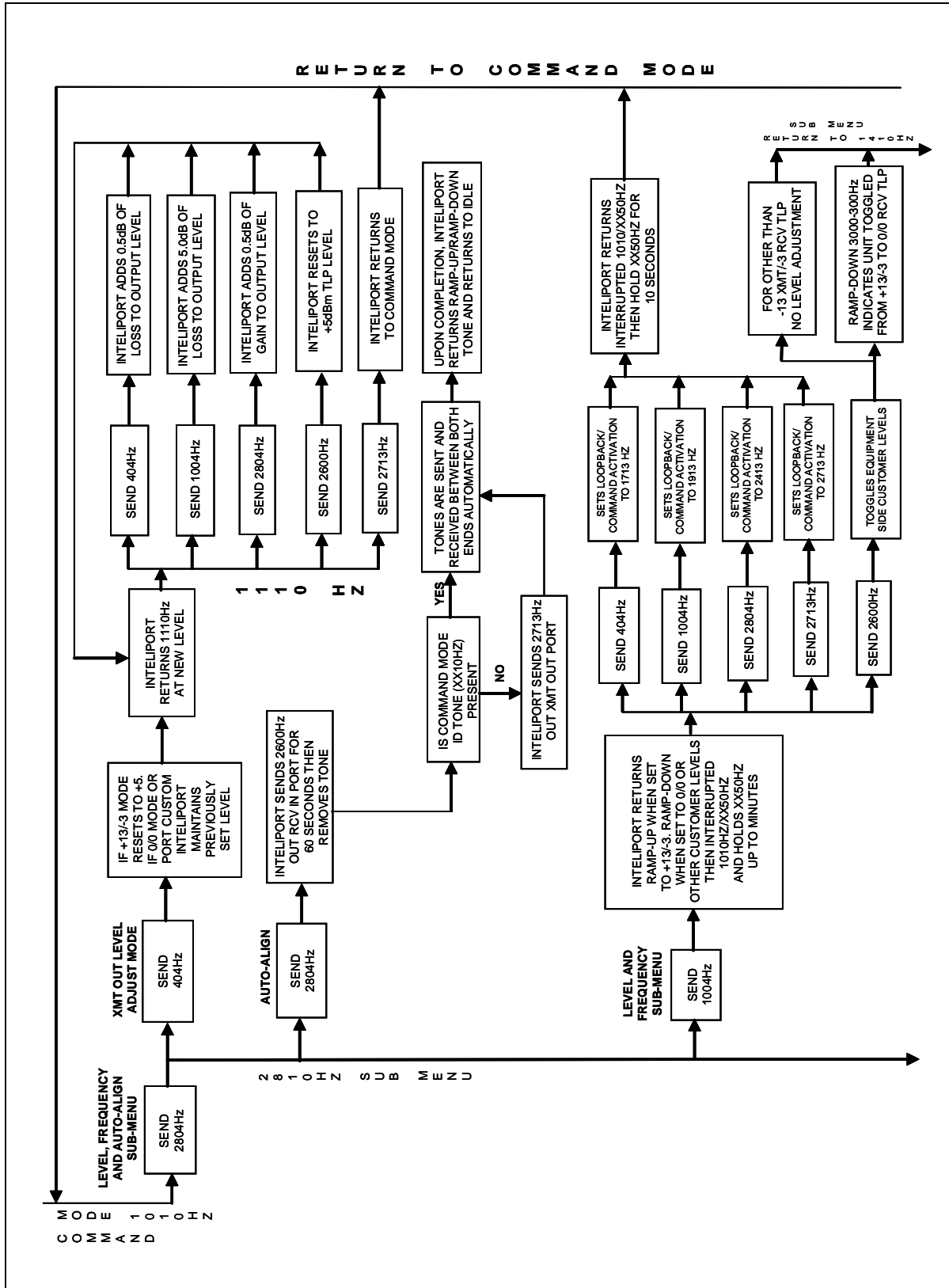


Figure 3. SDS5486LB INTELIPORT (Issue 3) FLOWCHART – cont.

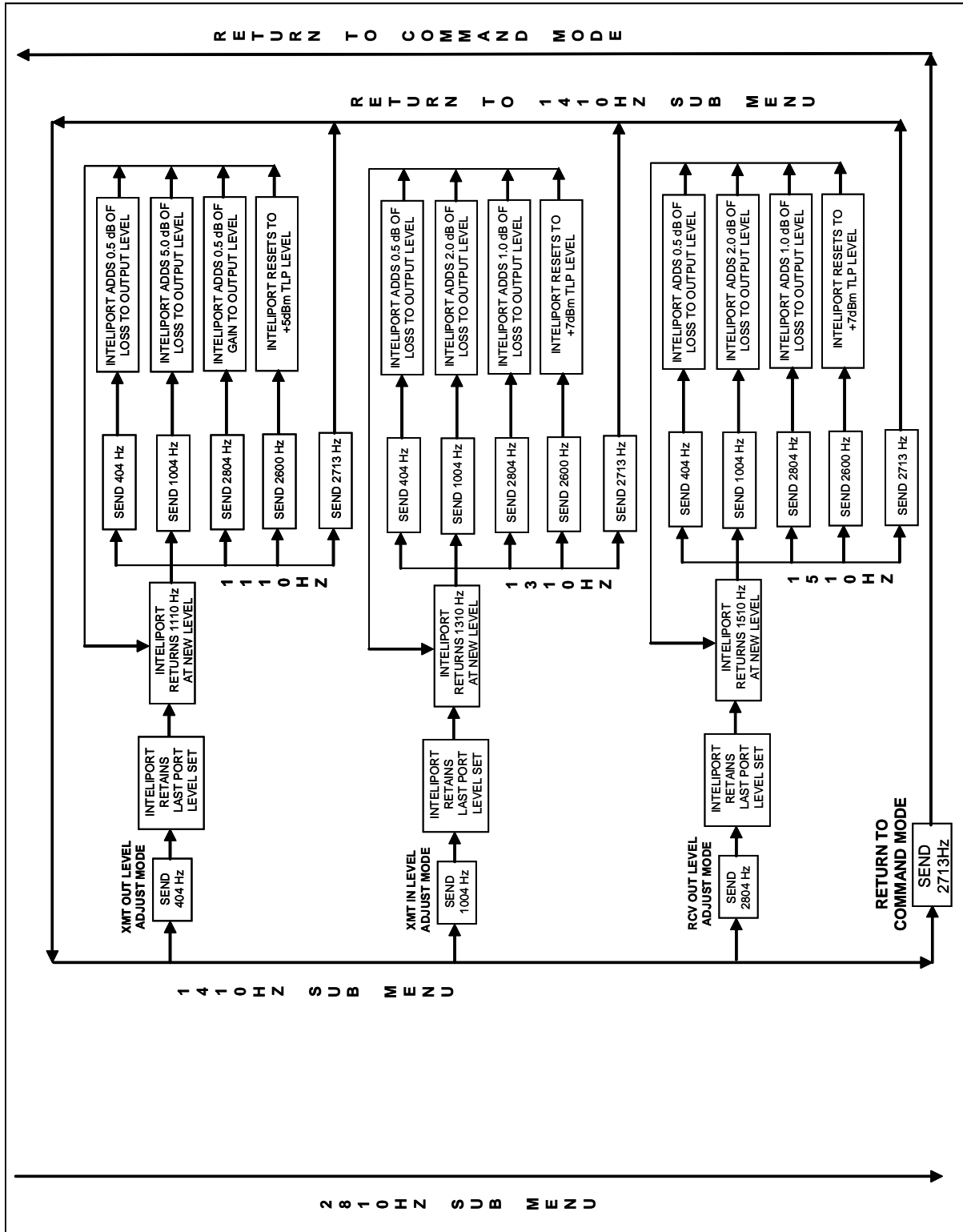


Figure 3. SDS5486LB INTELIPORT (ISSUE 3) FLOWCHART – cont.

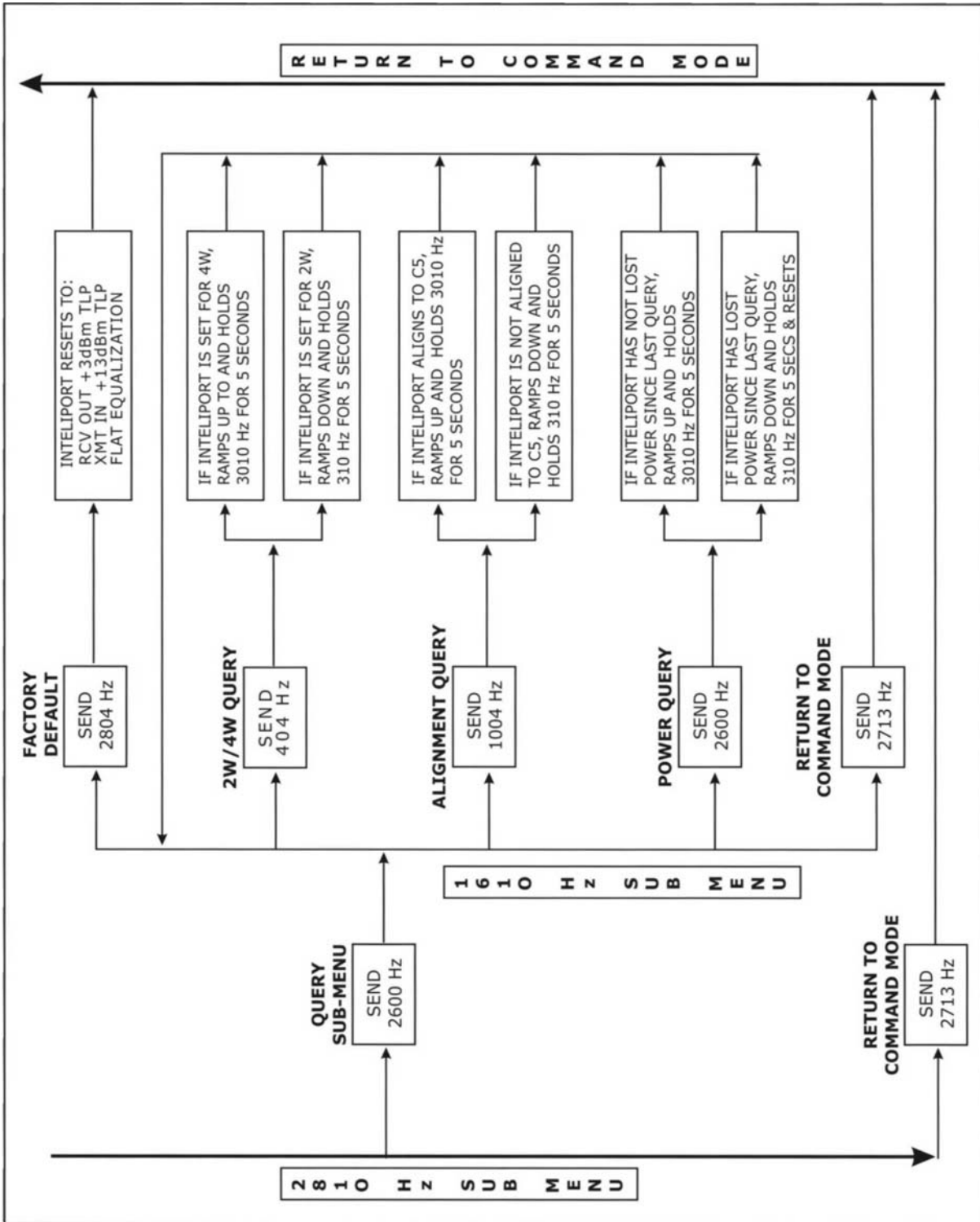


Figure 3. SDS5486LB INTELIPOORT (ISSUE 3) FLOW CHART - cont.