

Engenuity INTELIPORT Line Powered 2W/4W Data Station Termination Model SDS5486SB Issue 2

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1. GENERAL

1.1 Document Purpose

This document describes the Engenuity INTELIPORT Line Powered 2W/4W Data Station Termination Model SDS5486SB Issue 2, shown in Figure 1.

- NOTE -

Hereafter, the Engenuity INTELIPORT Line Powered 2W/4W Data Station Termination Model SDS5486SB Issue 2 will be referred to as the "INTELIPORT" or the "SDS5486SB."

1.2 Document Status

Whenever this practice is updated, the reason will be stated in this paragraph. This practice, 001-01-000042 Rev. 002 provides corrections and clarifications to Paragraphs 3.6 and 7.5, Table 6, and Figure 3.

1.3 Purpose and Product Description

Engenuity's INTELIPORT Model SDS5486SB provides an interface between a 4-wire facility and a 600-ohm, 2W or 4W data modem. As a member of Engenuity's family of Intelligent Network Channel Terminating Equipment (INCTE), the SDS5486SB provides all the functions of a standard Data Station Termination (DST) but with additional features.

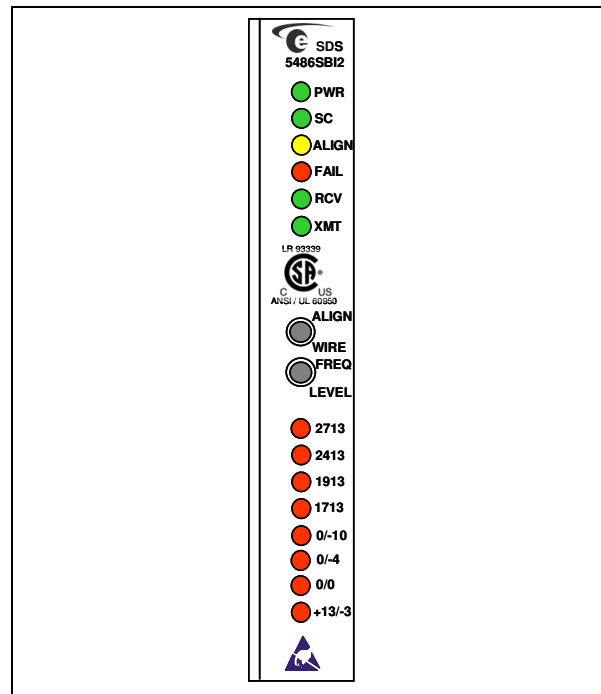


Figure 1. Front View of SDS5486SB Issue 2

1.4 Product Features

Issue 2 adds the capability for installers to set the frequency and levels from the front panel during the first 5 minutes after power up. The front panel on Issue 2 also has the additional leds to display frequency and level selection to assist in manual setting of these parameters and to display these states during operation of the unit at all times when sufficient power is available. Other enhanced features include remote and automatic alignment capability, choice of local or line power operation, and more.

The SDS5486SB is a microprocessor controlled unit. The integral microprocessor of the INTELIPORT controls the intelligent functions of the unit while the oscillator circuit generates test tones. Both circuits allow comprehensive remote alignment and testing of the circuit when activated from a remote Serving Test Center (STC). The SDS5486SB includes selection of 1713 Hz, 1913 Hz, 2413 Hz, and 2713 Hz Loopback/

Activation frequencies and selectable 0/0 dBm (as required by the FAA), and other equipment-side customer levels. In addition, the SDS5486SB offers the following features:

- Operates in either 2W or 4W data modem applications
- Microprocessor controlled.
- 200 Mechanics[®].
- Facility-side terminating impedance option (150, 600, 1200 Ohms); Equipment-side impedance is 600 Ohms, fixed.
- Internal Sealing Current circuit provides a termination for sealing current supplied from the distant end or supplies sealing current.
- Remote and automatic alignment capability. Auto align is fully backward compatible with all Engenuity field units.
- Capable of aligning the circuit with respect to TLP (Transmission Level Point) or DLP (Data Level Point).
- Automatically adjusts amplitude response characteristics (up to 12 dB) to meet C5 conditioning; Also provides acknowledgement tone of 3014 Hz.
- Automatically adjusts receive path for proper level coordination between facility and data modem.
- Front-panel push-button switch used to activate INTELIPORT's Wire Test mode for verifying station wiring or to activate INTELIPORT's Auto-Align feature from on-site.
- Front Panel push button switch used to manually step through loopback frequency and transmission level selection on-site.
- Manual or tone-activated loopback; Tone-activation provides choice of 2713 Hz (**Factory Setting**), 2413 Hz, 1713Hz or 1913 Hz.
- Front panel display of selected loopback frequency and levels during operation of the unit
- Selectable +13/-3 dBm (**Factory Setting**) (Standard) equipment-side levels or 0/0 dBm (FAA) levels or 0/-10, 0/-4, or user adjustable levels.
- 4-Tone Auto-Sweep or Full-range transponder operation with quiet termination mode permits remote testing of noise and tone level measurements.
- Local power operation: Operates from a local power source of -22 to -56 Vdc at 20 mA maximum, or from 20 to 28 Vac at 40 mA maximum.
- Line power operation: Can be line powered from the simplex leads when local power is not available.
- Non-volatile memory circuit retains programmed information in the event of a power loss.
- Meets UL 60950 requirements.
- 7-year warranty.

2. APPLICATIONS

INTELIPORT is used to interface a 4W facility with a 600-ohm, 2W or 4W data modem and is normally located on the same premises as the modem. INTELIPORT is an intelligent Data Station Termination that incorporates a microprocessor and oscillator circuit. Both circuits allow comprehensive remote testing of the circuit when activated from a manual or automated Serving Test Center (STC).

2.1 Command Mode Applications

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 ports for incoming frequencies and interprets these frequencies as commands to carry out specific functions.

INTELIPORT is designed to enter the command mode only by a specific tone sequence. Before the command mode can be activated the test person must first place INTELIPORT in loopback. This is accomplished by sending either 2713 Hz (**Factory Setting**), 2413, 1713 or 1913 Hz to INTELIPORT's RCV IN port (pins 7 and 13) for greater than 2 and less than 30 seconds, subsequently removing the tone. The frequency used is dependent on the WORD document. The command mode is then activated by sending either 2413 Hz (for 2713, 1713 or 1913 Hz) or 2713 Hz (for 2413 Hz) to INTELIPORT's RCV IN port for more than 15 seconds. After meeting this requirement, INTELIPORT responds with a steady 1014 Hz tone at +5 dBm (TLP) indicating command mode initiation.

While in command mode, the STC can access any one of INTELIPORT's intelligent functions: toggling from TLP reference to DLP reference, activating the remote or automatic alignment sequence, activating the quiet term/transponder mode of operation, or changing the loopback frequency and customer equipment levels. Details of each operating mode are discussed in this document.

2.2 Dual Powering Feature

The dual powering feature of Engenuity's SDS5486SB allows the unit to operate from either the Serving Office sealing current source or from a local power source. This feature is especially useful when local power is either missing or has been interrupted for whatever reason. The SDS5486SB automatically switches over to operate via the Line Powering option if the local power ever becomes absent. The unit maintains full functionality during maintenance testing, regardless of the powering option used. When both local and line power are present, the SDS5486SB will always operate from local power as its first choice. In this case, the internal sealing current circuit provides a termination for sealing current when supplied from the distant end.

3. CIRCUIT/FUNCTIONAL DESCRIPTION

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

3.1 LED Status Indicators

INTELIPOINT has fourteen, front-panel LEDs that provide a quick visual indication of the unit's status and mode. A brief description of the LED functions is provided in Table 1.

3.2 Command Mode

INTELIPOINT incorporates a command mode from which all functions, except manual wire check, manual tone-activated loopback and level select, and manual activation of the Auto-Align feature, are accessed. The command mode is the operational state in which INTELIPOINT monitors its transmission ports for incoming frequencies and interprets these frequencies as commands to carry out specific functions.

3.3 Command Mode Activation

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

INTELIPOINT is designed to enter the command mode only by a specific tone sequence. Before the normal command mode can be activated the test person must first place INTELIPOINT in loopback. This is accomplished by sending 2713, 2413, 1713 or 1913 Hz to INTELIPOINT's RCV IN port (pins 7 and 13) for greater than 2 seconds, subsequently removing the tone. The default frequency is 2713 Hz.

The command mode is then activated by sending either 2413 Hz (for 2713, 1713 or 1913 Hz) or 2713 Hz (for 2413 Hz) to INTELIPOINT's RCV IN port for more than 15 seconds. After meeting the above requirements, INTELIPOINT responds with a steady 1014 Hz tone at +5 dBm (TLP) indicating command mode initiation.

- NOTE -

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

While in command mode, the test person can access any one of INTELIPOINT's intelligent functions which include: toggling from TLP reference to DLP reference, activating the remote or automatic alignment sequence or initiating the maintenance function. Maintenance functions include a Loopback mode of operation for verifying alignment levels and a quiet term/transponder mode of operation for verifying noise and tone level measurements or to change the loopback frequency and customer equipment levels.

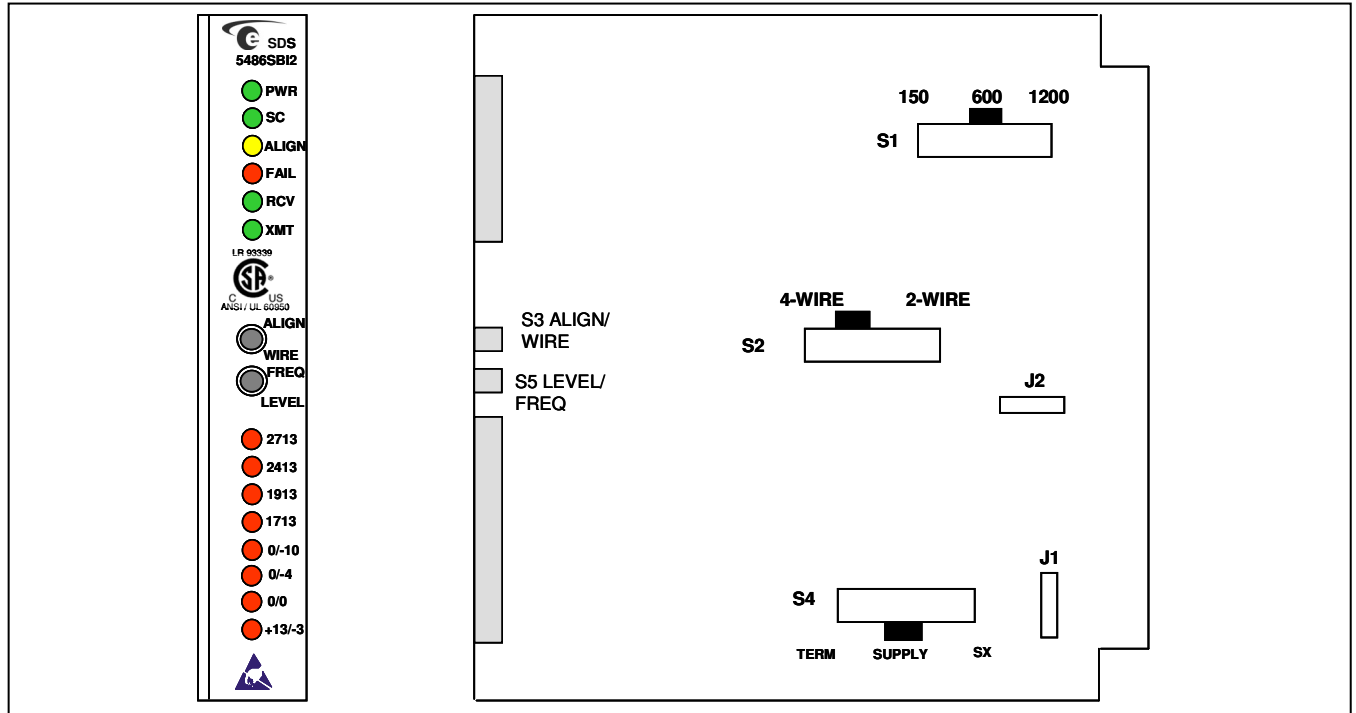
3.4 TLP/DLP Toggle (only available when XMT Out Port +5 dBm)

INTELIPOINT is initially programmed to align and transpond at TLP (Transmission Level Point). This feature can be changed to have the unit align and transpond at DLP (data level). When optioned for the TLP mode, INTELIPOINT outputs its respective tones at +5dBm. When optioned for the DLP mode, INTELIPOINT outputs its respective tones at -8 dBm.

Toggling from TLP to DLP is accomplished from the command mode by sending 2804 Hz for 15 seconds. Upon detecting 2804 Hz, INTELIPOINT toggles to the DLP mode, corrects the internal circuitry to accommodate the change in reference levels, then returns to command mode (takes approximately 15 seconds). The toggling function can be verified by monitoring the 1014Hz output level for a change of 13 dB. To return the circuit back to the TLP mode, the test person sends another 2804 Hz while in command mode.

-NOTE-

Each time INTELIPOINT returns to idle, the TLP/DLP circuit automatically returns to the TLP mode. Therefore, whenever the command mode is re-accessed from an idle state and testing or alignment is to be done at data level, the test person must send 2804 Hz to toggle the circuit to the DLP mode. If XMT OUT Port is not equal to +5 dBm, unit will send a reject tone of 600/2800 Hz.



5468SB Issue 2 front and side view

3.5 Changing Loopback/ Activation Frequency (2713 Hz, 1713 Hz, 1913 Hz, 2413 Hz)

INTELIPOINT can be programmed to respond to a loopback/ command mode activation tone of 1713 Hz, 1913 Hz, 2413Hz or 2713 Hz (Factory Setting). To activate the Level/Frequency Selection Mode, the STC must first enter the command mode. While in command mode, the test person sends 1604 Hz or 704 Hz.

Upon detecting 1604 Hz or 704 Hz INTELIPOINT returns a ramp up sequence then 3014Hz indicating the SDS5486SB is set for +13.0 (TLP) customer levels or a ramp down sequence then 714 Hz indicating the SDS5486SB is set for 0/0 (TLP) levels then sends a two second interrupted 1014Hz/XX50Hz tone holding on the XX50 Hz tone for up to five minutes. The XX50 Hz tone represents the current loopback/activation frequency (i.e., 1750 Hz = 1713 Hz, 2450 Hz = 2413 Hz, etc.)

- NOTE -

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

To change the loopback/activation frequency, the tester sends 404 Hz for 1713 Hz, 1004 Hz for 1913 Hz, 2804 Hz for 2413 Hz or 2713 Hz for 2713 Hz operation. Upon receiving 404, 1004, 2804, or 2713 Hz, the INTELIPOINT returns interrupted 1014/XX50 Hz and holds the XX50 Hz tone for five seconds then returns to command mode.

OPTION	POSITION	FUNCTION
S4	TERM SX	Select TERM when providing termination for sealing current. Select SX to turn off sealing current or to provide sealing current via SX leads.
	GEN	Select GEN when supplying sealing current to line.
S1	1200	Select when interfacing loaded cable.
	600	Select when interfacing short non-loaded cable.
	150	Select when interfacing long non-loaded cable.
S2	2W	Select when interfacing 2W data modem equipment.
	4W	Select when interfacing 4W data modem equipment
ALIGN/ (WIRE)	0-5 sec	Press for less than 5 seconds unit enters Wire Test mode. (Red FAIL LED is flashing.)
	5-10 sec	Press for more than five seconds but less than 10 to initiate Auto-Align mode. (Yellow ALIGN LED is on) align in a point-to-point application).
	S3 10+ sec	Press for more than ten seconds, to default unit to Factory Default. (Red FAIL and Yellow ALIGN LEDs are flashing).
FREQ/ LEVEL S5	Press less than 5 seconds Press and hold more than 5 seconds	Each time pressed sequences through next loopback/command frequency option and then each level option. If held continuously for more than 5 seconds, sequences through each loopback/command frequency and level options until released. At which point it holds the frequency and level shown.
LEDs		
PWR (GREEN)	ON-indicates Local Power is present OFF-indicates Local Power is not present (NOTE: Unit may be line powered. Verify status of SC LED).	
SC (GREEN)	If the SC LED and the PWR LED is ON, it indicates sealing current is present and the unit is being locally powered. If the SC LED is OFF, it indicates that sealing current is not present. If the SC LED is ON and the PWR LED is OFF, it indicates the unit is being powered via the simplex leads (line).	
ALIGN (YELLOW)	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 (RED)	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 (GREEN)	ON-indicates unit is receiving data from customer's equipment OFF-indicates unit is in the Idle state	
RCV (GREEN)	ON-indicates unit is sending data to the customer's equipment OFF-indicates unit is in the Idle state	
2713	ON indicates 2713 Hz is the current selected loopback and command mode frequency	
2413	ON indicates 2413 Hz is the current selected loopback and command mode frequency	
1913	ON indicates 1913 Hz is the current selected loopback and command mode frequency	
1713	ON indicates 1713 Hz is the current selected loopback and command mode frequency	
0/0	ON indicates unit is set to 0/0 (FAA) levels	
0/-4	ON solid indicates unit is set to 0/-4 (TLP) levels	
0/-10	ON indicates unit is set to 0/-10 (TLP) levels	
+13/-3	ON indicates unit is set to +13/-3 (TLP) levels (DLP 0/-16)	
JUMPERS		
J1	MNLB, Manual Loopback enabled J1 Pin 1 to 2; Disabled (Open) Pin 2 to 3.	
J2	MLBG, Card edge pin 19 to signal ground (J2 Pin 1 to 2) or Open (Pin 2 to 3)	

Table 1. SDS5486SBI2 Option Switch Settings and Front Panel LED Functions

3.6 Changing Customer Levels (+ 13/-3 or 0/0) (FACTORY DEFAULT -3 dBm RCV/ +13 dBm XMT)

INTELIPOINT can be programmed for standard customer interface levels of +13 dBm (TLP) XMT IN and -3 dBm (TLP) RCV OUT or FAA levels, 0 dBm XMT IN and 0 dBm RCV OUT, or other levels. To activate the Level/Frequency Selection Mode, the STC must first enter the command mode. While in command mode, the test person sends 1604 Hz or 704Hz. Upon detecting this tone INTELIPOINT returns a ramp up sequence then 3014 Hz indicating the SDS5486SB is set for + 13 dBm (TLP) customer levels or a ramp down sequence then 714 Hz indicating the SDS5486SB is set for 0/0 (TLP) levels then sends a two second interrupted 1014 HZ/XX50 Hz tone holding on the XX50 Hz tone for up to five minutes.

To change the customer level interface, the tester can send 2600 Hz to toggle the current level, 704 Hz to set 0/0, 804 Hz to set 0/-4, or 904 Hz to set 0/-10 levels. Upon sending 2600 Hz to the SDS5486SB, the INTELIPOINT toggles the between +13/-3 and 0/0 and then returns a ramp-up sequence indicating the SDS5486SB is set for +13/-3 levels and then holds 3014 Hz for 60 seconds or a ramp-down sequence indicating the SDS5486SB is set for 0/0 levels and then holds 714 Hz for 60 seconds then returns to the command mode.

- NOTE -

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

4. SWITCH OPTIONS

4.1 Engenuity's SDS5486SB contains three board mounted option switches that are used to condition the unit for proper operation for a given application. Refer to Table 1 for the location and description of each option.

- NOTE -

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

The SDS5486SB is also equipped with two front-panel push-button switches.

4.2 The ALIGN/WIRE push-button switch is used by the Installer to activate INTELIPOINT's Wire Test mode for verifying station wiring after the unit is installed. The same push-button switch is also used to activate INTELIPOINT's automatic alignment feature.

4.3 The FREQ/LEVEL push button switch is used by the installer to manually set the loopback frequency and the transmission levels during the first 5 minutes after power up. The factory default set is 2713 Hz and +13/-3 dBm and will be displayed on the respective LEDs on the front panel after power up. Each successive press of this push button advances the level pair selection and then the frequency selected. If this push button is held in for more than 5 seconds, the level and frequency selected will step through successively every 0.5 second held and will hold the selection displayed when the button is released.

5. INSTALLATION

This section covers the physical installation of the SDS5486SB. Refer to Tables 2 and 5, 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 Engenuity (see Part 9 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 Engenuity. 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 un-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
Use caution when installing or modifying telephone lines.**

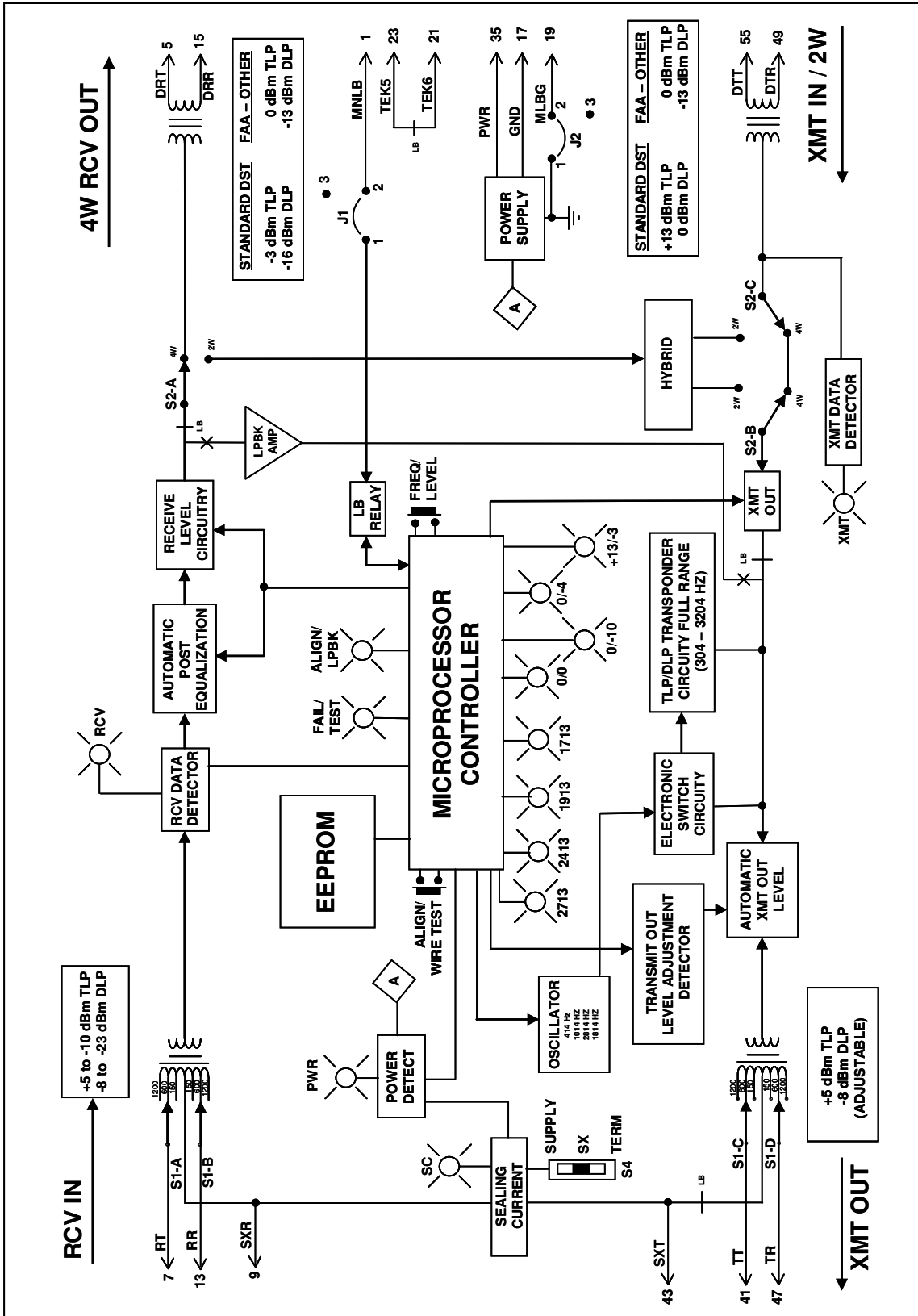


Figure 2. SDS5486SB Issue 2 Block Diagram

5.1 Installer Connections

When installing the SDS5486SB 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. When installing the unit in Westell's un-wired Type 550 mount (Type-400 equivalent), connections are made by wire-wrapping the appropriate leads from the facility and data modem to the proper pins of the appropriate 56-pin connector in which the module is to be installed. Pin identifications are listed in Table 2.

DESCRIPTION		PIN
RT-RCV IN (Tip)	Facility	7
RR - RCV IN (Ring)		13
TT - XMT OUT (Tip)		41
TR - XMT OUT (Ring)		47
SXR - Simplex RCV		9
SXT - Simplex XMT		43
DRT - 4W RCV OUT (Tip)	Modem	5
DRR - 4W RCV OUT (Ring)		15
DTT - XMT IN/2W (rip)		55
DTR - XMT IN/2W (Ring)		49
TEK5-Data Set Disable		23
TEK6-Data Set Disable		21
MNLB-Manual Loopback	Mux	1
MLBG-Manual Loopback		19
Ground		
PWR - Power		35
GND - Ground	17	

Table 2. SDS5486SB Pin Designations

5.2 Power Requirements

Power requirement for proper operation can be supplied as follows:

1. From a line powered source via the simplex leads at 8mA, or
2. From a local external power source of 20 to 28 Vac (24 Vac nominal) at 40 mA max.; or -22 to -56 Vdc (48 Vdc nominal) at 20 mA max.

5.3 Dual Power Feature

The Power Detect circuit monitors both the local power source (pins 35 and 17) and the simplex leads (pins 9 and 43). If the unit is being powered from a local power source, the internal Sealing Current circuit provides a termination for sealing current when sealing current is being supplied from the distant

end. If a local power source is not available, INTELIPORT will operate off the simplex current. If both local power and simplex power are present, INTELIPORT will always operate off the local power source as its first choice. And if local power is ever interrupted, for whatever reason, the Power Detect circuit automatically switches the internal circuitry so that INTELIPORT can operate off the line power source. Subsequently, when local power is restored, the internal circuitry automatically switches back to operate off the local power source.

5.4 Sealing Current/Simplex Power

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 termination for sealing current when sealing current is supplied from the distant end. When local power and sealing current are present, both the PWR LED and the SC LED will light. When local power is not present but sealing current is present, the PWR LED will be off but the SC 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 recessed front-panel pushbutton switch for less than five seconds (see NOTE below) causes 1014 Hz to be applied to the RCV channel ports and to the XMT channel 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 tones output by INTELIPORT 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 front-panel switch again to end the Wire Test mode. If the switch is not pressed a second time, the Wire Test mode automatically times out one hour after initial activation. If desired, the test person at the test center can release the Wire Test mode remotely by sending 2713 Hz for less than 2 seconds, 10 to 60 minutes after initial activation.

PORT	4W APPLICATIONS	2W APPLICATIONS
RCV IN PORT (Facility-Side)	Continuous 1014 Hz	Continuous 1014 Hz
XMT OUT PORT (Facility-Side)	Interrupted 1014 Hz	Interrupted 1014 Hz
RCV OUT PORT (Demarcation Side)	Continuous 1014 Hz	
XMT IN PORT (Demarcation Side)	Interrupted 1014 Hz	Interrupted 1014 Hz

*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. ALIGNMENT

The SDS5486SB features both remote (manual) and automatic alignment capability. Remote alignment is activated from command mode by sending 1004 Hz. Automatic alignment is used to automatically align INTELPORT with the distant end. Auto align can be activated from command mode by sending 1804 Hz, 1904 Hz, or can be activated by pressing the front-panel push-button switch for more than five seconds. In either the remote or automatic alignment mode, INTELPORT automatically adjusts the gain and equalization for proper level coordination between the facility and data modem equipment.

From command mode and before either Remote or Auto Align is activated, the test person must decide if alignment is to be done at TLP or DLP. The operating levels for the SDS5486SB are given in Table 4.

6.1 Automatic Alignment

The Automatic Alignment (Auto-Align) feature is used to automatically align INTELPORT 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). 3-tone alignment works best for FAA circuits due to the 3200 Hz roll off. 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 INTELPORT is in the command mode.

- NOTE -

Automatic-Alignments are performed using 2713 Hz activation only. The distant end DST must be set for 2713 Hz prior to beginning the automatic-alignment for proper operation. Once the alignment has been completed, the units should then be optioned for the proper Loopback/Activation Tone.

- NOTE -

Auto Align, when activated via the front panel switch, takes place at the TLP only.

- NOTE -

Auto-alignment will function if the card at the other end is another intelligent ETO card model 4386LDI2. Auto-alignment also works with another INTELIPORT, model SDS5486SB or SDS5486SBI2.

PORT	-3 RCV/ +13 XMT		0 RCV/ 0 XMT	
	TLP	DLP	TLP	DLP
RCV IN	+5 to-10	-8 to -23	+5 to -10	-8 to -23
RCV OUT	-3	- 16	0	- 13
XMT IN	+13	0	0	-13
XMT OUT	+5	-8	+5	-8

Table 4. Operating Levels

6.2 Auto-Align

Detecting the command to enter the Auto Align mode (1804 Hz, 1904 Hz, or via the front panel switch), causes INTELIPORT to send 2713 Hz followed by 2413 Hz to the distant end for 20 seconds until command mode tone (1004 Hz) is received from the distant end.

- NOTE -

If no response is detected from the distant end after sending the appropriate tones, INTELIPORT assumes the other end is equipped with a non-intelligent unit or the equipment is missing. In this case, INTELIPORT sends 2713 Hz to the distant end and returns to idle. If no response is the result, the test person may perform a remote alignment of the SDS5486SB.

Upon receiving command mode tone from the distant end and if INTELIPORT is programmed to align at DLP, INTELIPORT, after receiving command mode tone, sends 2814 Hz to toggle the distant end's circuitry to the DLP mode.

With both ends set for auto align, tones of 1014 Hz, 2814 Hz, 414Hz, and 1914 Hz are automatically sent and received between both ends. If the distant end is not capable of aligning to four tones, both ends automatically align to three tones. Upon completing this sequence, INTELIPORT returns an acknowledgement tone indicating alignment results. Gain and equalization is automatically set and alignment is complete.

- NOTE -

The Auto-Align sequence takes place in about two to four minutes.

6.3 Acknowledgement Tone

As mentioned, when the alignment sequence is done, INTELIPORT returns an acknowledgement tone. The acknowledgement tone indicates whether or not the cable pair, on the facility-side, was equalized.

A good alignment is indicated by an alternating tone of 414 Hz and 1014 Hz and indicates alignment is within the specified requirements to meet C5 conditioning. If correct alignment could not be achieved, INTELIPORT responds with an acknowledgement tone of 714 Hz for 60 seconds. After sending the acknowledgement tone, INTELIPORT resends 2713 Hz to the distant end and returns to idle. The distant end, upon detecting 2713 Hz from INTELIPORT, also returns to idle.

6.4 Remote (Manual) Alignment

From the command mode (1014 Hz present), the test person should record the level received at 1014 Hz first. The test person then initiates remote alignment by sending 1004 Hz or 704 Hz to INTELIPORT in response to INTELIPORT's 1014 Hz tone.

Upon receiving 1004 Hz, INTELIPORT returns 2814 Hz. The test person should record the level received at 2814 Hz, then send 2804 Hz to INTELIPORT. Upon receiving 2804 Hz, INTELIPORT returns 414 Hz. The test person should record the level received at 414 Hz, then send 404 Hz to INTELIPORT. Upon receiving 404 Hz, INTELIPORT returns 1914 Hz for 60 seconds. The test person should record the level received at 1914 Hz then has the option of aligning the circuit to either 3 tones or 4 tones.

NOTE

The fourth tone in the alignment sequence (1914 Hz) provides for a more accurate equalization when interfacing long section of loaded cable or a mixture of loaded and non-loaded cable.

6.5 3-Tone Alignment

If a 3-tone alignment is required, (*if loopback/activation tone is set to 1913 Hz, only 3-tone alignment is possible*) the test person can either ignore the 1914 Hz tone from INTELIPORT or can send 1004 Hz to INTELIPORT during the 60-second time frame. If the 1914Hz tone is ignored, INTELIPORT, after the 60-second time frame, drops the 1914 Hz tone and aligns the circuit to the three tones. By sending 1004 Hz in response to INTELIPORT's 1914Hz tone within the 60-second time frame, the 60-second timer circuit is bypassed. At this point the 1914 Hz tone drops and INTELIPORT aligns the circuit to three tones. Upon completion, INTELIPORT returns an acknowledgement tone then enters loopback to permit verification of alignment levels.

6.6 4-Tone Alignment

If a 4-tone alignment is required, the test person sends 1904 Hz in response to INTELIPORT's 1914 Hz tone within the 60-second time frame. Upon receiving 1904 Hz, INTELIPORT aligns to the four tones. Upon completion, INTELIPORT returns an acknowledgement tone then enters loopback to permit verification of alignment levels.

6.7 Loopback After Remote Alignment

While in loopback, the receive path is interconnected to the transmit path via a loopback amplifier. Loopback allows the test person to verify alignment settings and facility frequency response. The loopback circuit, when activated, automatically inserts 16dB or 0 dB of gain to provide an equal-level loopback condition.

6.8 Loopback Release

Loopback automatically releases 20 minutes after initial activation. If release is desired before the 20 minute time frame, the test person can send the Loopback/Activation tone for 0.9 seconds, minimum. Loopback releases upon detecting the release tone. The automatic timeout release feature ensures the transmission paths restore to normal operation if the appropriate release tone is not sent.

6.9 CUSTOMER LEVEL ADJUST MODE XMT IN Level Adjust Mode - Activate

To activate the XMT IN Level Adjust Mode, the tester sends 2204 Hz. The SDS5486SB, upon detecting 2204 Hz, returns 2814 Hz. Upon receiving 2814 Hz from SDS5486SB, the tester sends 2600 Hz. The SDS5486SB, upon receiving 2600 Hz, returns 1714 Hz. Upon receiving 1714 Hz from SDS5486SB, the tester sends 1004 Hz. The SDS5486SB, upon receiving 1004 Hz, sets the XMT IN and the XMT OUT levels to 0 dBm (TLP) and returns 1314 Hz. The 1314 Hz tone indicates the XMT IN adjustment mode is activated.

While in the XMT IN Level Adjust Mode and by monitoring the level from the XMT OUT port of the SDS5486SB, the tester can adjust the level from +7.0 dBm to -16.0 dBm by adjusting level of port, or reset the input level to 0 dBm (TLP).

6.9.1 To ADD 0.5dB of LOSS

The tester sends and removes 404 Hz. The SDS5486SB 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 404 Hz. The SDS5486SB's output level changes by 0.5 dB each time 404Hz is detected.

6.9.2 To ADD 5.0 dB of LOSS

The tester sends and removes 1004 Hz. The SDS5486SB changes the output level by adding 5.0 dB. If more loss is required, the tester repeats the process of sending and removing 1004 Hz. The SDS5486SB's output level changes by 5.0 dB each time 1004 Hz is detected.

6.9.3 To ADD 0.5dB of GAIN

The tester sends and removes 2804 Hz. The SDS5486SB changes the output level by adding 0.5 dB. The SDS5486SB's output level changes by 0.5 dB each time 2804 Hz is detected.

6.9.4 To RESET 0 dBm (Standard) Input Level

The tester sends and removes 2600 Hz. The SDS5486SB changes the output level to 0 dBm (TLP) then returns 1310 Hz. The level at the test point returns to the level first measured.

6.10 XMT IN Level Adjust Mode - Release

After setting the required input level, the tester sends loopback frequency (1713, 1913, 2413, or 2713 Hz) for more than five seconds. Upon detecting the loopback frequency, the SDS5486SB releases from the XMT IN adjust mode and returns to the command mode.

- NOTE -

Once the XMT IN is set, the input will remain at the level programmed. However, each time the XMT IN adjust mode is re-accessed, SDS5486SB automatically reverts to the 0.0 dBm (TLP) factory Preset level

6.10.1 RCV OUT Level Adjust Mode – Activate

To activate the RCV OUT level adjust mode, the tester sends 2204 Hz. The SDS5486SB, upon detecting 2204 Hz, returns 2814 Hz. Upon receiving 2814 Hz from the SDS5486SB, the tester sends 2600 Hz. The SDS5486SB, upon receiving 2600 Hz, returns 1714 Hz. Upon receiving 1714 Hz from the SDS5486SB, the tester sends 2804 Hz. The SDS5486SB, upon receiving 2804Hz, sets the RCV OUT and the XMT IN levels to 0.0 dBm (TLP) and returns 1514 Hz. The 1514 Hz tone indicates the RCV OUT adjustment mode is activated.

While in the RCV OUT Adjust mode and by monitoring the level at the XMT OUT port from the SDS5486SB, the tester can adjust the level from 0.0 to -10.0 dBm by adding loss to the output level, or reset the output level to 0.0 dBm (TLP).

6.10.2 To ADD 0.5 dB of LOSS

The tester sends and removes 404 Hz. The SDS5486SB 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 404 Hz. The SDS5486SB'S output level changes by 0.5 dB each time 404Hz is detected.

6.10.3 To ADD 5.0 dB of LOSS

The tester sends and removes 1004 Hz. The SDS5486SB changes the output level by adding 5.0 dB. If more loss is required, the tester repeats the process of sending and removing 1004 Hz. The SDS5486SB'S output level changes by 5.0 dB each time 1004 Hz is detected.

6.10.4 To ADD 0.5 dB of GAIN

The tester sends and removes 2804 Hz. The SDS5486SB changes the output level by adding 0.5 dB. The SDS5486SB'S output level changes by 0.5 dB each time 2804 Hz is detected.

To Reset 0 dBm (Standard) Output Level

The tester sends 2600 Hz. The SDS5486SB changes the output level to 0.0 dBm (TLP) then returns 1510 Hz. The level at the test point returns to the level first measured.

6.11 RCV OUT Level Adjust Mode - Release

The tester sends 2600 Hz. The SDS5486SB changes the output level to 0.0 dBm (TLP) then returns 1510 Hz. The level at the test point returns to the level first measured.

- NOTE -

Once the RCV OUT level is set, the output level will remain at the level programmed. However, each time the RCV OUT Level Adjust mode is re-accessed, the SDS5486SB automatically reverts to the 0.0 dBm (TLP) default level.

6.12 XMT OUT Level

The SDS5486SB'S XMT OUT level is factory set to provide an output level of +5.0 dBm (TLP). After setting the customer levels (XMT IN, RCV OUT), the XMT OUT output can be re-programmed for any level from +7.0 dBm to -16.0 dBm. While in command mode, the tester can change the output level remotely by adding either loss in 0.5 dB or 5.0 dB increments up to 21 dB of loss, or gain in 0.5 dB increments up to +7.0 dB.

6.13 XMT OUT Level Adjust Mode – Activate

To activate the XMT OUT adjust mode, the tester sends 2204Hz. The SDS5486SB, upon detecting 2204 Hz, returns 2810 Hz. Upon receiving 2810 Hz from the SDS5486SB, the tester sends 404 Hz. The SDS5486SB, upon receiving 404 Hz, returns 1110 Hz and sets the output level to 5.0 (TLP). The 1110 Hz tone indicates the XMT OUT adjustment mode is activated.

While in the XMT OUT adjust mode and by monitoring the level at the XMT OUT port from SDS5486SB, the tester can add either gain or loss to the output level.

6.13.1 To ADD 0.5 dB of GAIN

The tester sends and removes 2804 Hz. The SDS5486SB 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. The SDS5486SB'S output level changes by 0.5 dB each time 2804 Hz is detected.

6.13.2 To ADD 0.5 dB of LOSS

The tester sends and removes 404Hz. The SDS5486SB automatically changes the output level by adding 0.5dB of loss. If more loss is required, the tester repeats the process of sending and removing 404 Hz. The SDS5486SB's output level changes by 0.5dB each time 404 Hz is detected.

6.13.3 To ADD 5.0 dB of LOSS

The tester sends and removes 1004 Hz. The SDS5486SB 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 1004 Hz. The SDS5486SB's output level changes by 5.0 dB each time 1004 Hz is detected.

6.13.4 To SET +5.0dB Output Level

The tester sends 2600 Hz. The SDS5486SB changes the output level to +5 dBm (TLP) then returns 1110 Hz. The level the test point returns is relative to the level first measured.

6.14 XMT OUT Adjust Level - Release

After setting the required output level, the STC must send the appropriate loopback activation frequency (1713, 1913, 2413 or 2713 Hz) for more than five seconds. Upon detecting the loopback activation frequency, the SDS5486SB releases from the XMT OUT Level Adjust mode and returns to the command mode. The output level of the command mode is 1010 Hz at the offset level programmed.

NOTE

Once the XMT OUT level is set for a level other than +5dBm, the output level will remain at the level programmed. However, each time the XMT OUT Level Adjust mode is re-accessed, SDS5486SB automatically reverts to the +5.0 dBm (TLP) factory level.

7. MAINTENANCE AND TESTING

The SDS5486SB's testing and maintenance features include Loopback (both tone-activate and manual) and a Quiet Term/Transponder mode of operation. Loopback allows the test person at the STC to verify the alignment settings established during alignment. The Quiet Term/Transponder allows the test person to perform noise and tone level measurements.

7.1 Loopback from Idle State

Loopback can be initiated any time the unit is idle by applying the appropriate Loopback/Activation tone to INTELIPORT's RCV IN port for more than 2.0 seconds, subsequently removing the tone.

While in loopback, the test person sends tones (404, 1004, 1904, and 2804 Hz), one at a time, to INTELIPORT. The test person should verify/record the level of each tone as it is looped back by INTELIPORT. Loopback automatically releases 20 minutes after initial activation. If release is desired before the 20-minute time frame, send the appropriate Loopback/Activation tone for 0.9 seconds, or longer.

7.2 Manual Loopback Activation

The SDS5486SB can be looped back manually. Manual loopback is accomplished by placing a ground on the MNLB lead, pin 1. When loopback is activated manually, neither automatic time-out nor detection of 2713, 2413, 1713 or 1913 Hz will effect loopback release. Release of a manually activated loopback condition can only occur by removing the ground from pin 1.

7.3 Quiet Term Transponder

INTELIPORT's Quiet Term/ Transponder mode of operation allows the test person to remotely conduct noise and tone level measurements. From the command mode, the Quiet Term/Transponder is activated by sending 404 Hz, 804, or 1304 Hz to INTELIPORT via the RCV IN port. Upon detecting 404, 804, or 1304 Hz, INTELIPORT applies a quiet termination over the XMT IN port and isolates signals from the data modem. During quiet termination, the test person performs noise measurements via the RCV OUT pair. Quiet termination remains in effect for 20 minutes or until another tone (i.e., to enter the transponder mode of operation, return to command mode, or return to idle) is sent. If no tone is sent to INTELIPORT with the 20-minute time frame, INTELIPORT, after 20 minutes of no activity, times out and returns to command mode. Escape and return to command mode can be done, at any time, by sending the appropriate Loopback/Activation tone for more than five seconds.

7.4 Transponder Mode of Operation

INTELIPORT features a 4-Tone automatic sweep Transponder and a Full Range Transponder mode of operation. The 4-Tone Auto-Sweep allows the test person to perform a quick tone level verification test as INTELIPORT automatically sweeps four tones. The Full-Range Transponder allows the test person to perform a more detailed tone level verification test over a range of frequencies from 304 Hz to 3204 Hz. Both transponder modes of operation are activated from the quiet termination mode only.

7.5 4 -Tone Auto Sweep

To activate the 4-Tone Auto-Sweep Transponder, the test person sends a tone of 1504 Hz as the first tone while in quiet termination. Upon detecting 1504 Hz, INTELIPORT sweeps 414, 1014, 1814, 2814 each for 15 sec returns to quiet term and resets 20 min timer, over the XMT OUT port.

7.6 Full Range Transponder

To activate the Full-Range Transponder, the test person sends any tone from 304 Hz to 3204 Hz (except the current Loopback/Activation Frequency, 1504 Hz or 2713 Hz) as the first tone while in quiet termination. If 1504 Hz is detected as the first tone, INTELIPORT interprets this as a command to begin the 4-Tone Auto-Sweep Transponder. However, 1504 Hz can be sent any time after the transponder test has begun. If the loopback/activation tone is detected at any time, INTELIPORT interprets this as a command to return to the command mode.

During the Full-Range Transponder mode, each tone sent to INTELIPORT should be in increments of 100 Hz. As tone is received, INTELIPORT responds by returning a similar tone (but at a slight offset) for the same duration tone is received or for 15 seconds (whichever is longer). After removing a tone and if no other tone is sent by the test person, INTELIPORT reapplies quiet termination and resets the 20 minute timer circuit. If no tone is sent to INTELIPORT within the 20-minute time frame, INTELIPORT returns to command mode. If release is desired before the 20-minute time frame, send the Loopback/Activation tone for five seconds to return to command mode. Send the Loopback/Activation tone a second time for greater than five seconds to return to idle.

7.7 Testing Procedure

The Testing and Alignment procedures, shown in Table 6, may be completed after the unit 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. These procedures are not designed to effect repairs or modifications. Tests beyond those outlined, or repairs made beyond replacing a faulty unit, are not recommended and may void the warranty.

If trouble is encountered, please make sure all installer connections have been made correctly and that the unit is properly seated in, and making a positive connection with, the backplane connector. Please also check that the option switches are set to the correct position. After verifying the above conditions, retest the module.

8. TEST AND TROUBLESHOOTING

8.1 Testing

Testing and alignment procedures (given in Table 6) may be performed after the SDS5486SB 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 Engenuity 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 PWR LED on, and ALIGN and FAIL LEDs off.</p> <p>If unit is being powered via the simplex leads, verify PWR LED off, SC LED on, and ALIGN and FAIL LEDs off.</p> <p>Note: If FAIL LED is on steady, replace unit and repeat Step 1. If FAIL LED is flashing, momentarily press the recessed front-panel WIRE CHECK test switch.</p>															
2	<p>WIRE CHECK TEST MODE</p> <p>CAUTION-INTELI PORT places 1010 Hz tone on the transmission pairs when Wire Check 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 WIRE switch (less than five seconds) and release. If the WIRE CHECK TEST switch is pressed for longer than five seconds, INTELI PORT enters the AUTO-ALIGN mode. If pressed for longer than 10 seconds, the unit default to factory default settings.</p> <p>Verify FAIL LED flashing. Connect TMS with built-in speaker or other suitable listening device to:</p> <table border="0" data-bbox="293 829 1299 949"> <thead> <tr> <th data-bbox="293 829 706 856">PORT</th> <th data-bbox="706 829 1096 856">4W Applications</th> <th data-bbox="1096 829 1299 856">2W Applications</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 856 706 884">RCV IN pair at the cable entry point</td> <td data-bbox="706 856 1096 884">Continuous 1234 Hz</td> <td data-bbox="1096 856 1299 884">Continuous 1234 Hz</td> </tr> <tr> <td data-bbox="293 884 706 911">XMT OUT pair at cable entry point</td> <td data-bbox="706 884 1096 911">Interrupted 1234 Hz</td> <td data-bbox="1096 884 1299 911">Interrupted 1234 Hz</td> </tr> <tr> <td data-bbox="293 911 706 938">RCV OUT pair at demarcation point</td> <td data-bbox="706 911 1096 938">Continuous 1234 Hz</td> <td data-bbox="1096 911 1299 938"></td> </tr> <tr> <td data-bbox="293 938 706 966">XMT IN pair at demarcation point</td> <td data-bbox="706 938 1096 966">Interrupted 1234 Hz</td> <td data-bbox="1096 938 1299 966">Interrupted 1234 Hz</td> </tr> </tbody> </table> <p>When tones are verified, press WIRE CHECK test switch to end Wire Test mode. Verify FAIL LED off. If WIRE switch is not pressed a second time, Wire Check Test mode automatically times out one hour after initial activation. If desired, STC can release the Wire Test mode by sending appropriate loopback tone > 5 seconds, 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. NOTE: In 2W applications RCV and XMT IN ports utilize the same transmission pairs (T & R, pins 55 and 49).</p>	PORT	4W Applications	2W Applications	RCV IN pair at the cable entry point	Continuous 1234 Hz	Continuous 1234 Hz	XMT OUT pair at cable entry point	Interrupted 1234 Hz	Interrupted 1234 Hz	RCV OUT pair at demarcation point	Continuous 1234 Hz		XMT IN pair at demarcation point	Interrupted 1234 Hz	Interrupted 1234 Hz
PORT	4W Applications	2W Applications														
RCV IN pair at the cable entry point	Continuous 1234 Hz	Continuous 1234 Hz														
XMT OUT pair at cable entry point	Interrupted 1234 Hz	Interrupted 1234 Hz														
RCV OUT pair at demarcation point	Continuous 1234 Hz															
XMT IN pair at demarcation point	Interrupted 1234 Hz	Interrupted 1234 Hz														

Table 5. SDS5486SB Issue 2 Installation Procedures

STEP	ACTION
1	<p>TEST CENTER'S PROCEDURES</p> <p>COMMAND MODE Send appropriate activation tone of 1713, 1913, 2413, or 2713 Hz (Factory setting) to INTELIPORT for (> 2 seconds and < 30 seconds) via RCV IN port (pins 7 and 13). INTELIPORT re-enter loopback.</p> <p>After unit enters Loopback send 2413 (for 2713, 1713, or 1913 Hz) or 2713 (for 2413 Hz) to INTELIPORT for > 15 seconds. INTELIPORT returns 1014 Hz at +5 dB (TLP). STC removes tone. Command mode initiated.</p>
2	<p>TLP/DLP (Perform this step only if aligning at DLP) From command mode send 2804 Hz for 15 seconds. INTELIPORT toggles to DLP mode, then returns to command mode. Toggling is verified by monitoring 1014 Hz output level for a change of 13 dB. To toggle back to TLP, send another 2804 Hz while in command mode.</p> <p>NOTE: Circuit automatically returns to TLP mode whenever unit returns to idle. Therefore, when aligning at data level, unit must be reset to DLP mode</p> <p>NOTE: If the XMT OUT port is not equal to +5dBm, the unit will send a reject tone (600/2800 Hz) and return to command mode.</p>
3	<p>ACTIVATION FREQUENCY SELECTION From command mode, send 1604 Hz (>5 sec.)</p> <p>INTELIPORT returns a Ramp-up or Ramp-Down sequence and then for 40 seconds 3014 Hz (for +13/-3) or 714 Hz (for FAA 0/0) or 814 Hz (for 0/-4) or 914 Hz (for 0/-10), then two seconds of interrupted 1014/XX50 Hz then sends steady XX50 Hz. A Ramp-up tone indicates the Customer Levels are + 13/-3 and a Ramp-Down tone indicates the Customer Levels are 0/0. 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. INTELIPORT returns two seconds of interrupted 1014/XX50 Hz followed by steady XX50 Hz for 40 seconds indicating the new operational frequency, then returns to the command mode.</p>
4	<p>CUSTOMER LEVEL SELECTION From command mode, send 1604Hz (>5 sec.).INTELIPORT returns a Ramp-Up or Ramp-down sequence and then for 40 seconds 3014 Hz (for +13/-3) or 714 Hz (for FAA, 0/0) or 814 Hz (for 0/-4) or 914 Hz (for 0/-10), then two seconds of interrupted 1014/XX50Hz then sends steady XX50Hz. A Ramp-Up tone indicates the Customer Levels are + 13/-3 and a Ramp-Down tone indicates the Customer Levels are 0/0. After receiving the steady XX50Hz tone, send 2600 Hz to toggle the current level settings between +13/-3 and 0/0 or send 704 Hz to set customer levels directly to 0/0, 804 to set to 0/-4, or 904 to set to 0/-10. INTELIPORT for the toggle returns either a ramp-up sequence followed by 3014 for 40 seconds indicating levels set for +13/-3 or a ramp-down sequence followed by 714 Hz for 40 seconds indicating levels set for 0/0, then returns to the command mode. For set to 0/-4 unit returns 714 Hz for 40 seconds without ramping first then returns to command mode; for 0/-10 unit returns 3014 Hz for 40 seconds without ramping first then returns to command mode.</p>
5	<p>REMOTE (MANUAL) ALIGNMENT From command mode (1014 Hz present), record level received then send 1004Hz to INTELIPORT. INTELIPORT sends 2814 Hz. Record level received then send 2804 Hz to INTELIPORT. INTELIPORT sends 414 Hz. Record level received, then send 404 Hz to INTELIPORT. INTELIPORT sends 1914 Hz for 60 seconds. Record level received. STC has option:4-Tone Alignment-Send 1904Hz within 60 seconds. INTELIPORT aligns to 4 tones, sends acknowledgement tone then enters loopback.3-Tone Alignment-ignore 1914Hz request. 1914 Hz tone times out after 60 seconds. INTELIPORT aligns to 3 tones, sends acknowledgement tone, then enters loopback.</p> <p>NOTE: 1004 Hz may be sent instead of 1904 Hz to bypass the 60 seconds of 1914 Hz and align to 3-tones</p>
6	<p>LOOPBACK While in loopback, STC sends tones (404, 1004, 1904 and 2804Hz), one at a time, to INTELIPORT. The STC should record the level of each tone as it is looped back by INTELIPORT.</p> <p>Release from loopback. Automatically releases after 20 minutes. INTELIPORT returns to idle. If release is desired before the 20-minute time frame, send the appropriate Loopback/Activation tone for >0.9 sec. INTELIPORT returns to idle upon detecting the release tone.</p>
7	<p>Auto-Align (Completion time is three to five minutes) From command mode, send 1804Hz to INTELIPORT, then perform Step 4 (if required).INTELIPORT sends 2713Hz followed by 2413Hz to Distant end for two minutes or until command mode tone is received.</p> <p>NOTE: If no response is detected, INTELIPORT re-sends 2713Hz to distant end and returns to idle. In this case, test person may want to perform remote alignment (see Step 6).</p> <p>When both ends are set, tones are automatically sent and received between both ends. Upon completion, INTELIPORT returns acknowledgement tone. (alternating 414/1014Hz indicates good alignment. Return of 714Hz indicates correct alignment could not be achieved). Gain and equalization is automatically set.</p> <p>Upon completion, INTELIPORT sends the appropriate release tone of 2713Hz to distant end and returns to idle. Alignment is complete.</p>

Table 6. Testing and Alignment Procedures

STEP	ACTION
8	<p>Quiet Term/Transponder Operation</p> <p>From command mode, send 404Hz. INTELIPORT applies quiet termination over the 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) is sent. If no tone is sent within 20-minute time frame, INTELIPORT, after 20 minutes, times out and returns to idle. From quiet termination, STC has option:</p> <p>Enter 4-Tone Auto-Sweep Transponder. Send 1504Hz as first tone while in quiet termination. Upon detecting 1504Hz, INTELIPORT sweeps 414, 1014, 1814, and 2814 each for 15 seconds then returns to quiet term, resets 20 minute timer and returns to idle.</p> <p>Enter Full-Range Transponder. Send any tone from 304Hz to 3204Hz (except the current Loopback/Activation tone, 1504Hz and 2713Hz - see Note). Upon detecting tone, INTELIPORT returns similar tone (at XX14Hz offset) for same duration tone is received or 15 sec. (whichever is longer). Tones from the STC should be sent in 100 Hz increments. Upon completion and if no other tone is sent from the STC, INTELIPORT 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>NOTE: 1504Hz can be sent any time after transponder mode is initiated. Detection of the appropriate activation tone at any time, causes INTELIPORT to return to command mode.</p> <p>Release. Accomplished via 20-minute automatic timeout feature (unit returns to idle), or by sending the appropriate activation tone for >5 sec. (unit returns to command mode). Release to idle, send second application of the activation tone >5 sec.)</p>

Table 6. Testing and Alignment Procedures (continued)

9. CUSTOMER and 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:

1-630 444-0778 (Voice)
1-800-980 ECOM (1-800-980-3266)
1-630-444-0779 (Fax)
www.engenuitycom.com

9.2 Part Numbers

This Engenuity equipment is identified by a model number and an issue level. Each time a change is made to the product which changes the form, fit, or function of the product, the issue level/number is incremented or advanced by one. Be sure to indicate the issue level as well as the model number when making inquiries about the product.

10. WARRANTY and 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.
3545 Stern Avenue
St. Charles, IL 60174
R.G.M Department

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 7.

Part/Model #	Description & Comments
SDS5486SB Issue 2	INTELIPOINT 2W/4W Data Station Termination Interface <i>CLEI Code: NCC1HPHEAA</i>
Technical Publication	001-01-000042

Table 7. Ordering and Option Information

11.2 Electrical and Physical Specifications

The SDS5486SB's electrical and signaling specifications are listed below, and the physical and environmental specifications are shown in Table 8.

- 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 to +5 dBm (TLP), -23 to -8 dBm (DLP); Output, -3 dBm (TLP), -16 dBm (DLP) (Standard) or 0 dBm (TLP), -13 dBm (DLP) (FAA), ± 0.5 dB or any levels in between (+7 to -16) as unit is fully adjustable; factory default levels available from command mode or front panel by holding align button > 10 seconds; when reset to factory default red and yellow LED on front panel flash in alternating pattern.
- C. XMT Level Range: Input, +13.0 dBm (TLP), 0.0 dBm (DLP) (Standard) or 0 dBm (TLP), -13 dBm (DLP)(FAA); Output, +5 dBm (TLP), -8 dBm (DLP), ± 0.5 dB or any level in between (+7 to -16) as unit is fully adjustable; factory default levels available from command mode or front panel by holding align button > 10 seconds; when reset to factory default red and yellow LED on front panel flash in alternating pattern.
- D. Wire Test Mode: Activated by pressing front-panel switch (<5 sec.). When pressed in this manner, 1014 Hz tone is applied to transmission pairs (see Table 2); Release, Switch pressed second time, releases automatically after 1-hour, or can be released from STC, 10 to 60 minutes after activation by sending the appropriate Loopback/Activation tone > 5 seconds. (NOTE: If switch pressed for >5 sec., INTELIPOINT enters AUTO-ALIGN)

- E. Tone-Activated Loopback:** Activated from idle state by sending either 2713 (Factory Setting), 2413, 1713 or 1913 Hz (± 7 Hz) for >2.5 sec. followed by removal of tone; $+37$ Hz must not operate. Activation tone is determined by the soft-switched option as prescribed by the WORD document. Manual Loopback, activated by grounding pin 1 (MNLB lead); Release, if tone activated, by sending the appropriate release tone (>0.9 sec.) or 20-minute automatic timeout release feature. If manually activated, removal of ground only
- F. Loopback Transmission Level:** Automatically inserts 16 dB of gain (+13/-3) or 0 dB (0/0) to provide equal-level loopback condition
- G. Loopback Level:** -24 dBm (typically -30) to -3 dBm
- H. Command Mode:** Activated from the loopback mode only by sending 2413 Hz (for 2713 (Factory Setting), 1713 or 1913 Hz) or 2713 Hz (for 2413 Hz). INTELIPORT returns steady 1014 Hz indicating command mode initiation; Release, the appropriate activation frequency (>5 sec.), or 5-minute timeout if no tone sent (release tone is the same as the activation tone)
- I. TLP/DLP:** Unit is factory programmed to align at TLP but can be programmed to align at data level (DLP). To toggle, send 2804 Hz while in command mode. (NOTE: Circuit automatically returns to TLP whenever unit returns to idle)
- J. Remote (Manual) Alignment:** Activated from command mode by sending 1004 Hz in response to INTELIPORT's 1014 Hz. Tones between INTELIPORT and the tester are repeated with frequencies of 2804, 404 and 1904 Hz in response to INTELIPORT's 2814, 414 and 1914 Hz, respectively.
- K. Auto-Alignment:** Activated from command mode via 1804 Hz. (See Note in Section 6.1). Can also be activated via front-panel switch when pressed and held for >5 sec. When activated from command mode, alignment at TLP or DLP can take place. When activated via front-panel switch, alignment at TLP only takes place; Release, automatically returns to idle upon completion (Auto-Align takes about 3 to 5 minutes to complete).
- L. Equalization:** Provides receive channel amplitude equalization (up to 12 dB, re: 1004 Hz) for 3- or 4-tone alignment to meet C5 conditioning requirements
- M. Quiet Termination Mode:** Activated from command mode via 404 Hz. INTELIPORT applies quiet termination over XMT IN port and sets 20 minute timer. STC performs noise measurements; Release: Return to command mode, 2713 Hz (>5 sec.) or 20-minute automatic timeout if no tone sent
- N. 4-Tone Auto-Sweep Transponder:** Activated from quiet termination mode only via 1504 Hz as first tone. INTELIPORT sweeps tones of 414, 1014, 1814, 2814 each for 15 seconds then returns to quiet term, resets 20 minute timer and then returns to idle.
- O. Full-Range Transponder Operation:** Activated from quiet termination mode only via any tone from 304 Hz to 3204Hz (except the Loopback/Activation tone, 1504 Hz and 2713 Hz). INTELIPORT responds by returning a similar tone (but at slight offset) for same duration tone is received or for 15 sec. (whichever is longer). Tones from the STC should be in increments of 100 Hz. Upon completion and if no other tone is sent from the STC, INTELIPORT reapplies quiet termination and resets the 20-minute timer; Unit returns to idle if no tone is sent
- P. Idle Noise:** 17 dBmC0, max.
- Q. Frequency Response:** Receive path, meets C5 conditioning
- R. Local Power:** -22 to -56 Vdc (48 Vdc, nominal) at 20 mA, maximum; or 20 to 28 Vac (24 Vac, nominal) at 40 mA, maximum
- S. Simplex Power:** Operates via simplex leads at less than 180 mW
- T. Sealing Current:** Automatically provides a termination for sealing current supplied from the distant end.
- U. Meets UL 60950 requirements.**

Physical Feature	U.S.	Metric
Height	5.58 in	14.17 cm
Width	1.42 in.	3.6 cm
Depth	5.9 in.	15 cm
Weight (approx.)	1.4 lbs	0.63 kgs
Operating Environment	-40°F to +185°F	-40°C to + 85°C
Operating Humidity	0 to 95% (non-condensing)	
Mounting	Westell's DAS290, or DAS295 for single module installation or in one position of a Westell USA Type 550 (Type-400 equivalent) mounting	

Table 8. SDS5486SB Physical Specifications

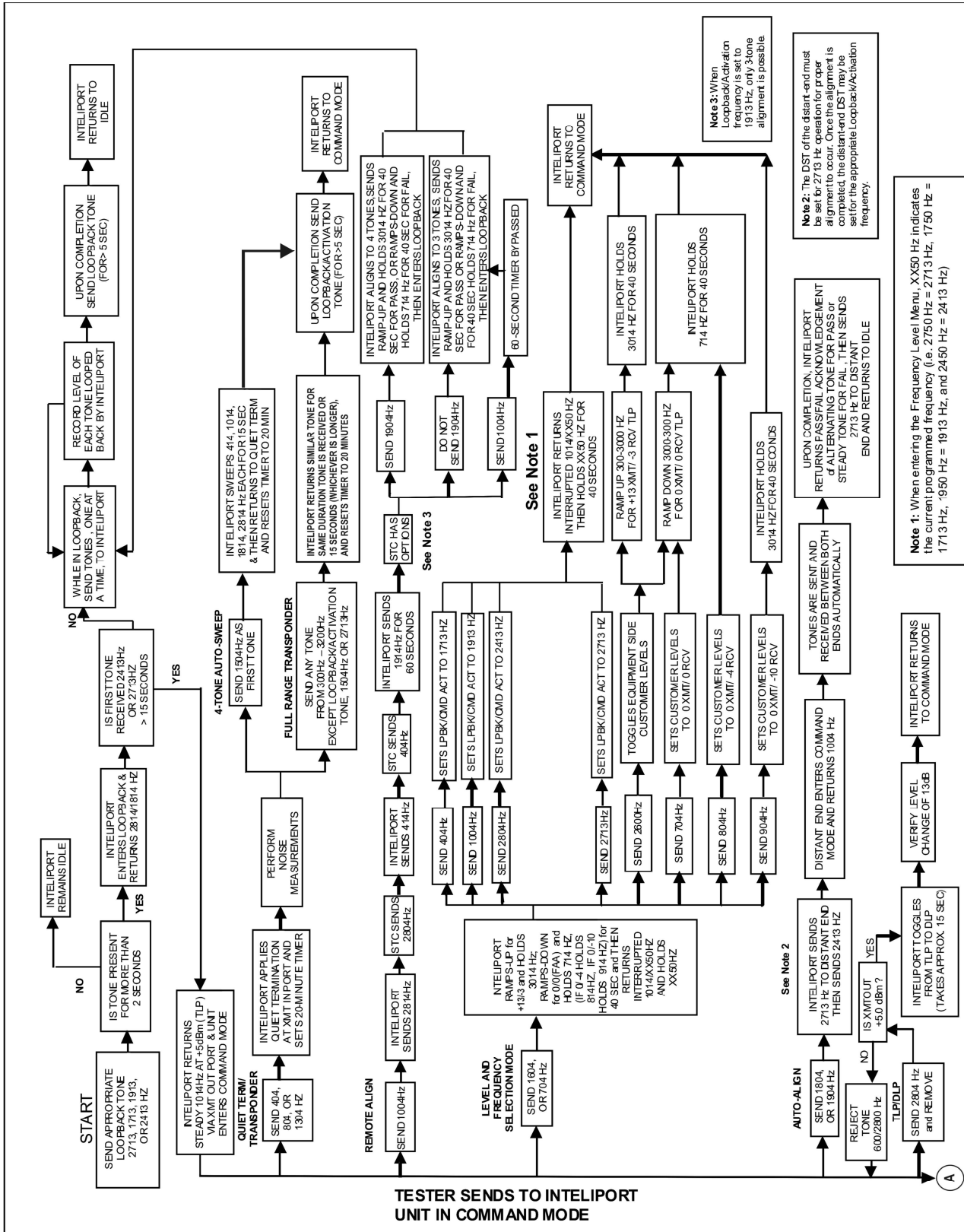


Figure 3. SDS5486SB Issue 2 INTELIPOINT FLOWCHART

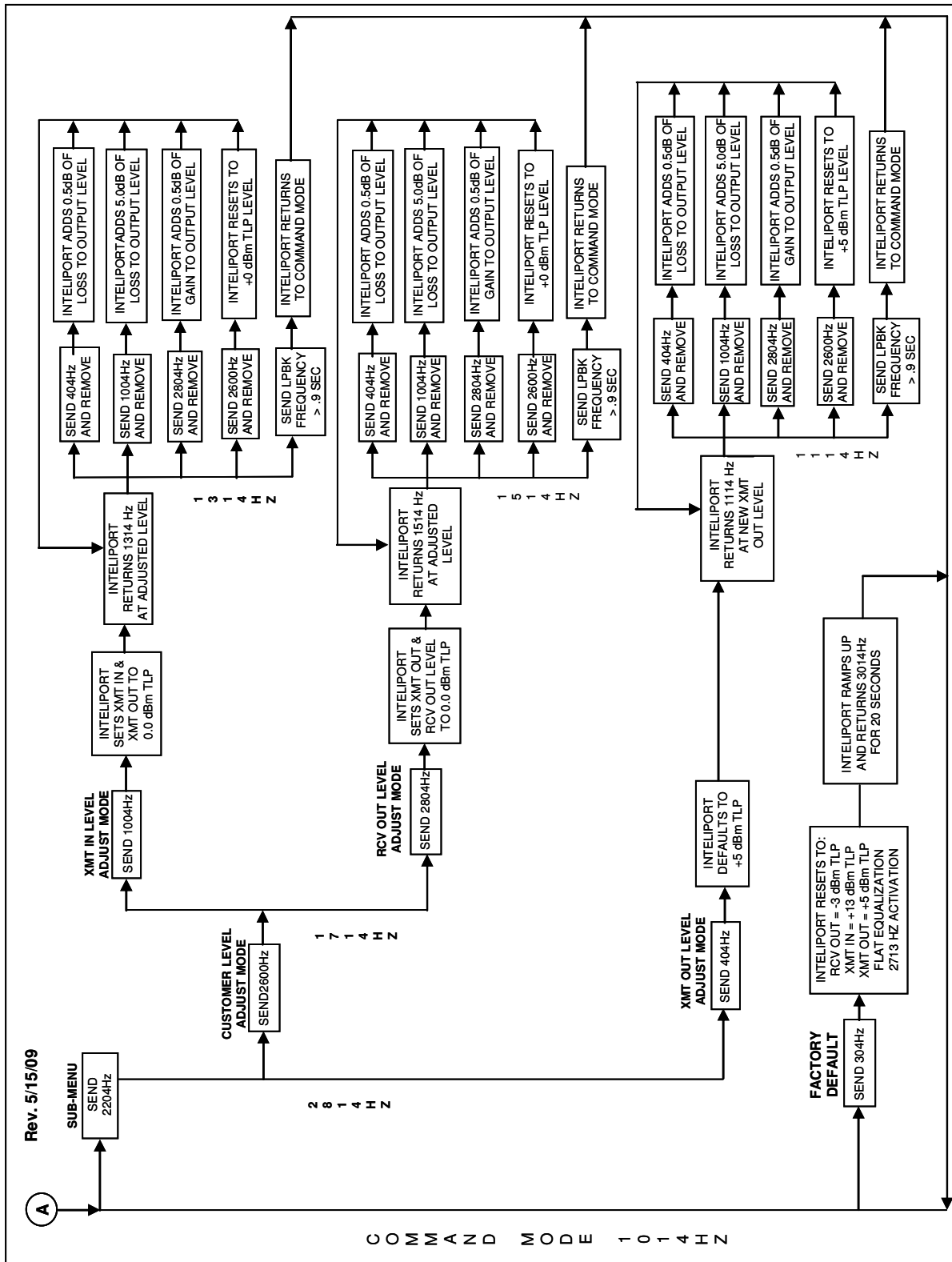


Figure 3. SDS5486SB Issue 2 INTELIPOINT FLOWCHART - cont.