

Westell INTELIPORT® I 2W/4W Data Station Termination w/ Transmit Level Adjust and 3 or 4-Tone Alignment Model SDS5486LN (Issue 4)

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1. GENERAL

1.1 Document Purpose

This document describes the Westell INTELIPORT® I Model SDS5486LN Issue 4, shown in Figure 1.

- NOTE -

Hereafter, the Westell INTELIPORT I Model SDS5486LN Issue 4 will be referred to as the "SDS5486LN" or the "INTELIPORT."

1.2 Document Status

Revision A of this practice replaces the 057-029600 with 030-101328 and updates the company contact information. Whenever this practice is updated, the reason will be stated in this paragraph.

1.3 Product Purpose and Description

Westell's INTELIPORT I, Model SDS5486LN Issue 4, provides an interface between a 4-wire facility and a 2-wire or 4-wire data modem. As a member of Westell's family of Intelligent Network Channel Terminating Equipment (INCTE), the SDS5486LN provides all the functions of a standard DST but with additional features such as remote testing and alignment capability. The SDS5486LN contains an on-board microprocessor and precision oscillator circuits. These circuits allow comprehensive

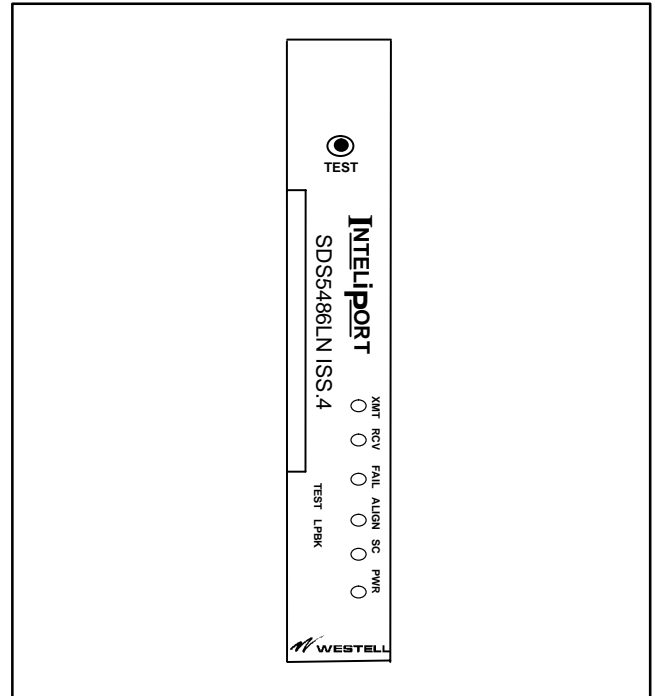


Figure 1. Front View of SDS5486LN

remote alignment and testing of INTELIPORT when activated from a Serving Test Center (STC).

1.4 Product Features

The SDS5486LN offers the following features.

- Operates in 2W or 4W applications.
- Microprocessor-controlled unit.
- Precision oscillator generates test tones during testing and alignment.
- Terminating impedance option of 150, 600, or 1200 Ohms to match the impedance of the 4-wire facility (switch-selectable).
- Remote (manual) 3 or 4 tone alignment capability.

- Automatic 4-tone alignment capability; Auto Align is activated via a front-panel TEST switch during the first five minutes of initial power-up or via command mode by sending 1804 Hz to INTELIPORT.
- Automatically adjusts amplitude response characteristics (up to 15.3 dB, referenced at 1004 Hz) to meet C5 conditioning requirements.
- Unit identification tone (alternating 1014 Hz/414 Hz) identifies unit being accessed for maintenance testing as INTELIPORT.
- Remotely adjustable XMT OUT Level setting in 0.5 dB (gain/loss) increments.
- Full-range transponder operation (300 to 3200 Hz) with quiet termination permits remote testing of noise and tone level measurements at TLP or DLP.
- Front-panel TEST switch used to activate INTELIPORT's wire test mode for verifying station wiring.
- Sealing current Supply/Off/Term operation.
- Non-volatile memory retains programmed information in the event of power loss.
- Mounts in one position of a Westell Type 550 (Type-400 equivalent) or 200 Mechanics® mounting.
- Operates from -22 to -56 Vdc at 95 mA maximum or from 20 to 28 Vac at 115 mA maximum.
- 7-year warranty.

2. APPLICATIONS

The SDS5486LN provides an interface between a 4-wire facility and a 600-ohm 2W or 4W data modem. The SDS5486LN is normally located on the same premises as the modem. The integral microprocessor circuit controls all functions of the unit. The precision oscillator circuit generates test tones during testing and alignment.

2.1 Command Mode

INTELIPORT incorporates a command mode from which all functions except manual and tone-activation of the loopback circuit 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 activated from the STC by sending 2713Hz for more than 30 seconds. INTELIPORT responds by sending 1014Hz indicating command mode initiation. If the tone is present for more than 2.0 seconds but less than 30 seconds, INTELIPORT sends a

1-second alternating tone of 1014Hz/414Hz and enters the loopback mode of operation.

2.2 XMT OUT Level Adjust

The operating levels for Westell's SDS5486LN are given in Table 1. The Transmit Out level can be remotely adjusted to accommodate any level from +7 to -16 dBm. The XMT OUT level can be adjusted by adding either gain or loss in 0.5dB increments or can be set to achieve a -16 dBm level (see paragraphs 3.13 thru 3.16).

PORT	LEVELS (IN DBM)	
	TLP	DLP
RCV IN	+5 to -10	-8 to -23
RCV OUT	-3	-16
XMT IN	+13	0
XMT OUT	+5	-8

**The XMT OUT level can be remotely adjusted for any level from +7 to -16 dBm (TLP) or -6 to -29 dBm (DLP)*

Table 1. Operating Levels

2.3 Alignment (Remote and Automatic)

The SDS5486LN features both remote and automatic alignment capability.

2.3.1 Remote Alignment

The Serving Test Center (STC) can align the circuit to either three tones or four tones.

- NOTE -

Four-tone alignment allows a more accurate alignment when interfacing long sections of loaded cable or a mixture of loaded and non-loaded cable facilities.

2.3.2 Automatic 4-tone Alignment

Auto-Align is activated from on-site via the front-panel TEST switch, during the first five minutes of initial power-up. Auto-Align is also activated via the command mode by sending 1804 Hz to INTELIPORT.

3. CIRCUIT/FUNCTIONAL OPERATION

Refer to Figure 2, SDS5486LN (Issue 4) Block Diagram.

3.1 LED Status Indicators

INTELIPORT has six, front-panel LEDs that provide a quick visual indication of the units status and mode. Table 2 provides a brief summary of the LED functions.

LED	ON	OFF	FLASHING
PWR	Power Applied	Power Not Applied	NA
SC	Sealing Current Applied	Sealing Current Not Applied	NA
ALIGN/ LPBK	Command Mode, Alignment Mode or Transponder Mode	Idle	Loopback Mode
FAIL/ TEST	Logic Failure	Idle	Test Mode
XMT	Receiving data from Equipment	Idle	NA
RCV	Transmitting data to Equipment	Idle	NA

Table 2. Operating Levels LED Status Indicators

3.2 Option Switches

The SDS5486LN contains three option switches that must be set to the required position before the unit is installed. Option switch S1 (Sealing Current) is used to select the appropriate sealing current configuration (Supply/Off/Term). Option switch S2 (Facility Impedance) is used to select the impedance of the unit (150/600/1200 Ohms) that will match the impedance of the 4-wire facility. Option switch S3 (2W/4W) is used to set INTELIPORT's internal circuitry to properly interface the 2-wire or 4-wire data modem equipment.

3.3 Unit Identification Tone

The SDS5486LN provides a unit identification feature that allows the Test Center to verify which unit is being accessed. Upon receiving 2713 Hz for more than two seconds, INTELIPORT outputs an I.D. tone (one second of alternating 1014Hz/414 Hz) identifying the circuit being accessed as Westell's INTELIPORT I, Model SDS5486LN (Issue 4). At this point, if the 2713 Hz tone is removed in less than 30 seconds INTELIPORT enters loopback. If 2713 Hz is applied for more than 30 seconds, INTELIPORT enters command mode.

3.4 Command Mode

As mentioned, the command mode is activated by sending 2713Hz via the RCV IN port (RT and RR, pins 7 and 13, respectively) for more than 30 seconds. NOTE: If 2713Hz is removed in less than 30 seconds, INTELIPORT sends a 1-second alternating tone of 1014Hz/414Hz and enters loopback.

Upon detecting 2713Hz for more than 30 seconds, INTELIPORT enters the command mode and returns a steady 1014Hz tone at +5 dBm (TLP) via the XMT OUT port (TT and TR, pins 41 and 47, respectively) indicating command mode initiation.

STC, at this point, removes the 2713Hz tone being sent to INTELIPORT.

While in command mode, the STC can activate INTELIPORT's intelligent functions which include: XMT OUT Level Adjust mode, remote alignment mode, TLP or DLP Quiet Term/Transponder mode or the STC can exit the command mode and return to idle.

- NOTE -

The command mode is equipped with a 5-min timer circuit. If no tone is sent to INTELIPORT during the five minute time frame, INTELIPORT sends an error tone (ramp-down tone from 3014 Hz to 314 Hz; holding 314 Hz for 10 seconds) and returns to idle. The ramp-down tone, in this case, indicates the command mode has timed out via the 5-min time-out feature.

3.5 Alignment Mode

INTELIPORT features both remote and automatic alignment capability. Remote alignment is used to align INTELIPORT from the STC. Alignment is done at TLP and with respect to either three tones or four tones. Auto-Align is used to automatically align INTELIPORT with an intelligent ETO at the near end (ISQ4389LN2 or AUA441LN). Auto-Align is also done at TLP and with respect to four tones. Please note, however, that the auto-align feature is only initiated by pressing the front-panel TEST switch for more than five seconds and only during the first five minutes of initial power-up. Auto-Align is also activated from command mode by sending 1804Hz to INTELIPORT.

3.6 Auto-Align

As mentioned, Auto-Align is initiated during the first five minutes of initial power-up by pressing the front-panel TEST switch for more than five seconds or from command mode by sending 1804Hz to INTELIPORT. Upon initiating Auto-align mode, INTELIPORT then sends 2913Hz out the RCV IN port (pins 7,13) to the near end ETO. Upon entering command mode, the ETO will then return 1014Hz to INTELIPORT.

When 1014Hz is detected from the near end, INTELIPORT sends 1014Hz. Upon detecting 1014Hz from INTELIPORT, the near end returns 2814Hz. Upon detecting 2814Hz from the near end, INTELIPORT sends 2814Hz. Upon detecting 2814Hz from INTELIPORT, the near end returns 414Hz. Upon detecting 414Hz from the near end, INTELIPORT sends 414Hz.

At this point, if the near end has the capability of aligning to four tones, the near end, upon detecting 414Hz from INTELIPORT, returns 1814Hz to INTELIPORT. Upon detecting 1814Hz, INTELIPORT sends 1814Hz. Upon detecting 1814Hz from INTELIPORT, both ends align to four tones.

Upon completion of alignment (approximately two to three minutes), INTELIPORT returns to idle. The near end also returns to idle.

3.7 Remote (Manual) Alignment

While in command mode (1014Hz present), the STC should verify/record the level received. The STC then initiates manual alignment by sending 1004Hz to INTELIPORT. Upon detecting 1004Hz, INTELIPORT returns 2814Hz. The STC should verify/record the level received at 2814Hz, then sends 2804Hz to INTELIPORT. Upon detecting 2804Hz, INTELIPORT returns 414Hz. The STC should verify/record the level received at 414Hz, then sends 404Hz. Upon detecting 404Hz, INTELIPORT returns 1814Hz for 120 seconds. The STC should verify/record the level received at 1814Hz, then has the option of aligning the circuit to 3 tones or 4 tones.

- NOTE -

INTELIPORT provides a built-in five minute waiting period for each tone (1004, 2804, and 404Hz) to be returned by the STC. If no tone is sent to INTELIPORT during the 5-min time frame, INTELIPORT sends an error tone (ramp-down tone of 3014Hz to 314Hz; holding the 314Hz tone for 10 seconds) and returns to idle. The ramp-down tone, in this case, indicates the remote alignment mode has timed out via the 5-min time-out feature.

3.8 3-Tone Alignment

If a 3-tone alignment is required, the STC ignores the 1814Hz tone from INTELIPORT. After 120 seconds, the 1814Hz tone times out, INTELIPORT sets the alignment levels, sends a either a ramp-up or ramp-down tone (see paragraph 3.10), applies a quiet termination for approximately one second, then enters loopback (see paragraph 3.11). NOTE: The 120-second timer can be bypassed by sending 1004Hz to INTELIPORT during the 120-second time frame.

3.9 4-Tone Alignment

If a 4-tone alignment is required, the STC sends 1804Hz within the 120-second time frame to INTELIPORT. Upon detecting 1804Hz, INTELIPORT aligns to four tones, sends either a ramp-up or ramp-down tone (see paragraph 3.10), applies a quiet termination for approximately one second, then enters loopback (see paragraph 3.11).

Upon completing the alignment, INTELIPORT automatically outputs a level of +5 dBm (TLP) immediately following the alignment process. If a level other than +5 dBm (TLP) is required, see paragraphs 3.13 thru 3.16 for details on adjusting the XMT OUT level.

3.10 Ramp-Up/Ramp-Down Tone

The ramp-up tone, consisting of a series of tones ranging from 314Hz to 3014Hz in ascending order, indicates alignment is within the requirements of C5 conditioning. The ramp-up tone also occurs whenever a 20-minute timer circuit times out due to inactivity (that is, no tone sent to INTELIPORT during a test

function equipped with the 20-minute time-out feature). The ramp-down tone, consisting of a series of tones ranging from 3014Hz to 314Hz in descending order, indicates alignment is not within the requirements of C5 conditioning. The ramp-down tone also occurs whenever a 5-minute timer circuit times out due to inactivity (that is, no tone sent to INTELIPORT during a test function equipped with the 5-minute time-out feature).

The ramp-up or ramp-down tone sequence is applied for approximately three seconds with the last tone (3014Hz in the ramp-up sequence or 314Hz in the ramp-down sequence) being applied for approximately 10 seconds.

3.11 Loopback

Loopback permits verification of alignment settings. While in loopback, the STC sends tones (404, 1004, 1804 and 2804Hz), one at a time, to INTELIPORT. The STC should verify/record the level of each tone as it is looped back by INTELIPORT. The loopback circuit automatically inserts 16dB of gain to provide an equal-level loopback condition for verifying alignment settings.

- NOTE -

Loopback can be tone-activated from the idle state by sending 2713 Hz for more than two seconds but less than 30 seconds. Loopback can also be activated manually by placing a ground on the MNLB lead, pin 1.

3.12 Loopback Release

Loopback is equipped with a 20-minute time-out feature that automatically releases the loopback condition 20 minutes after initial activation.

When loopback is entered after the alignment mode and if release from loopback is desired before the 20-minute time frame, the STC can send 2713Hz for 0.9 seconds, minimum. INTELIPORT returns to command mode. At this point, if the STC removes and resends a second 2713Hz tone, INTELIPORT returns to idle.

When loopback is entered from an idle state, release from loopback is accomplished by sending 2713Hz for 0.9 seconds, minimum. INTELIPORT returns to idle upon detecting 2713Hz.

- NOTE -

When loopback is manually activated, neither automatic time out nor detection of 2713 Hz will effect loopback release. Release of a manually-activated, neither automatic time out nor detection of 2713 Hz will effect loopback release. Release of a manually-activated loopback condition can only occur by removing the ground.

3.13 XMT OUT Level Adjust Mode

INTELIPORT's operating levels are factory set for -3.0 dBm at the RCV OUT port, +13.0 dBm at the XMT IN port, and +5.0dBm at the XMT OUT port (refer to Table 1). The XMT

OUT level, however, can be adjusted for any level from +7.0dBm to -16.0dBm TLP (-6.0 to -29.0dBm DLP). The XMT OUT level can be adjusted by adding either gain or loss, in 0.5dB increments, to obtain the desired transmit output level. To access the XMT OUT Level Adjust mode, the STC sends 1704Hz while INTELIPORT is in the command mode. The STC can monitor the XMT OUT port to verify the change in levels.

- NOTE -

INTELIPORT's XMT OUT Level Adjust mode provides a built-in five minute waiting period for each tone to be returned by the STC. If no tone is sent to INTELIPORT during the five minute time frame, INTELIPORT sends an error tone (ramp-down tone of 3014 Hz to 314 Hz; holding the 314 Hz tone for 10 seconds) and returned to idle. The ramp-down tone, in this case, indicates the XMT OUT Level Adjust mode has timed out via the 5-minute time-out feature.

3.14 Adding Gain

The STC adds gain to the XMT OUT level by sending and removing a tone of 2222Hz. Upon detecting 2222Hz, INTELIPORT re-adjusts the output level by adding 0.5dB of gain. If more gain is required, the STC repeats the process of sending and removing 2222Hz. INTELIPORT re-adjusts the output level by 0.5dB each time 2222Hz is sent and removed. After obtaining the required XMT OUT level, the STC must send 2713Hz for 0.9 seconds minimum to return to command mode.

3.15 Adding Loss

The STC adds loss to the XMT OUT level by sending and removing a tone of 2111Hz. Upon detecting 2111Hz, INTELIPORT re-adjusts the output level by adding 0.5dB of loss. If more loss is required, the STC repeats the process of sending and removing 2111Hz. INTELIPORT re-adjusts the output level by 0.5dB each time 2111Hz is sent and removed. After obtaining the required XMT OUT level, the STC must send 2713Hz for 0.9 seconds minimum to return to command mode.

3.16 -16dBm Level

If desired, the STC can set the XMT OUT level for -16dBm by sending and removing a one-time tone of 2333Hz. Upon detecting 2333Hz, INTELIPORT re-adjusts its output level to -16.0dBm. From this point, the STC can add gain to obtain the desired XMT OUT level (see paragraph 3.13 and 3.14 above). After obtaining the required XMT OUT level, the STC must

send 2713Hz for 0.9 seconds minimum to return to command mode.

3.17 Quiet Term/Transponder Operation

INTELIPORT's Quiet Term/Transponder operation allows the STC to remotely conduct noise and tone level measurements. The Quiet Term/Transponder test can be conducted with levels referenced at either TLP or DLP (data level). In the TLP mode, INTELIPORT outputs its respective tones at +5dBm (TLP) or at the current XMT OUT level established via the XMT OUT Level Adjust mode. In the DLP mode, INTELIPORT outputs its respective tones at -8dBm (DLP) or at the current XMT OUT level established via the XMT OUT Level Adjust mode.

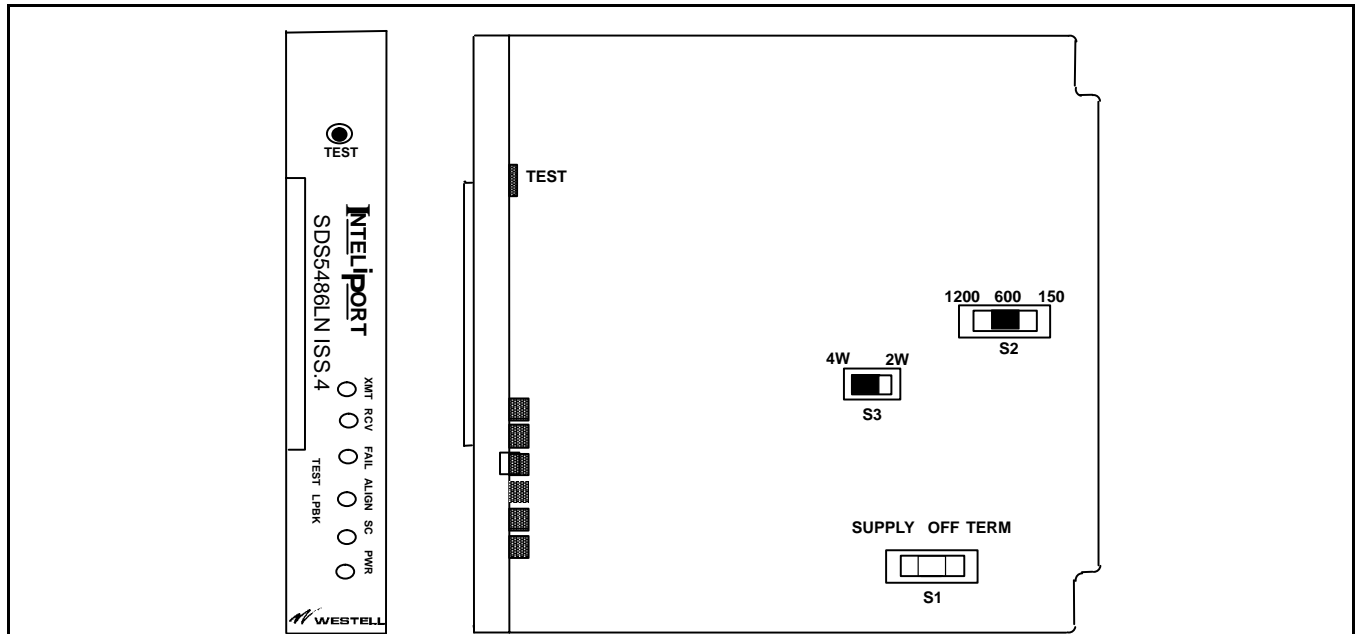
To activate the TLP Quiet Term/Transponder, the STC sends 804Hz while in command mode. To activate the DLP Quiet Term/Transponder, the STC sends 1304Hz while in command mode. Upon detecting 804Hz or 1304Hz, INTELIPORT applies a quiet termination over the XMT IN port and sets a 20-minute timer circuit. During quiet termination, STC performs noise measurements at the RCV OUT port.

- NOTE -

Quiet termination remains in effect for 20 minutes or until another tone (that is, to enter the transponder mode or return to command mode) is sent to INTELIPORT. If no tone is sent within the 20-minute time frame, INTELIPORT, after 20 minutes, sends a ramp-up tone (314 Hz to 3014 Hz; holding 3014 Hz for 10 seconds), then returns to idle. The ramp-up tone indicates the Quiet Term/Transponder mode has timed out via the 20-minute time-out feature.

3.18 Full-Range Transponder Mode

The full-range transponder mode allows the STC to perform a detailed level verification test over a range of frequencies from 304Hz to 3204Hz. The full-range transponder is accessed from the quiet termination mode only by sending any tone from 300Hz to 3200Hz (except 2700Hz) to INTELIPORT. Upon detecting tone from the STC, INTELIPORT responds by returning a similar tone (at a 10Hz off-set) for the same duration tone is received from the STC. Tones sent by the STC should be in increments of 100Hz. The STC should also verify/record the level of each tone as it is returned by INTELIPORT. Each time a new tone is sent, INTELIPORT responds to that tone. If no tone is sent to INTELIPORT (i.e., after removing a tone), INTELIPORT re-applies a quiet termination and re-sets the 20-minute time-out circuit.



OPTION	POSITION	FUNCTION
S1	SUPPLY	Select to have unit supply 20MA of sealing current to simplex leads
	OFF	Select to disable internal sealing current circuit
	TERM	Select to have unit provide termination for sealing current supplied from distant end
S2	1200	Select when interfacing loaded cable facility
	600	Select when interfacing short non-loaded cable facility
	150	Select when interfacing long non-loaded cable facility
S3	2W	Select when interfacing 2W data modem equipment
	4W	Select when interfacing 4W data modem equipment
TEST	PRESS (LESS THAN 5 SEC.)	Press for less than 5 seconds to activate INTELIPORT's Wire Test Mode. Press for a second time to end the Wire Test Mode. Note: The Wire Test Mode automatically times out one hour after initial activation if the TEST switch is not pressed a second time.
	PRESS (MORE THAN 5 SEC.)	Press for more than 5 seconds to activate INTELIPORT AUTO-ALIGN sequence from on-site. (NOTE: This feature is activated only during the first five minutes of initial power-up of the unit.)

Table 3. SDS5486LN Switch Options

Upon completion if no tone is sent during the 20-minute time frame, INTELIPORT, after 20 minutes, sends a ramp-up tone, drops out of the Quiet Term/Transponder mode and returns to idle. If release is desired before the 20-minute time frame, send 2713Hz for 0.9 seconds minimum to return to command mode. Detection of a second 2713Hz tone causes INTELIPORT to return to idle.

3.19 Sealing Current

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

of sealing current helps prevent degradation of transmission performance.

The internal Sealing Current circuit is controlled by option switch S1. Switch S1 can be set to have the unit supply 20mA of balanced sealing current to the facility's simplex leads (SUPPLY), provide a termination for sealing current supplied from the distant end (TERM), or can be disabled (OFF) if sealing current is not required. NOTE: When sealing current is being supplied from the unit, the simplex leads at the distant end must be connected together to complete the path. Please also note that when INTELIPORT is supplying sealing current, a 24 Vac or -24 Vdc power source is adequate for a metallic facility loop of less than 1000 Ohms. For loops in excess of 1000 Ohms, a -48 Vdc power source is recommended.

4. OPTIONS

Westell's SDS5486LN provides three option switches that are used to condition the module for proper operation in a given application. Refer to Table 3 for the location and description of each option.

- NOTE -

The TEST switch, when pressed for less than five seconds, activates INTELIPORT's wire test mode for verifying station wiring. This switch is also used to activate INTELIPORT's automatic alignment mode, from on-site, when pressed for more than five seconds. Auto-Align is activated only during the first five minutes of initial power-up of the unit.

5. INSTALLATION

This section covers the physical installation of the SDS5486LN.

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 signalling 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 Westell (see Part 6 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 Westell. 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 unit in Westell's pre-wired USA Type-550 mounting (Type-400 equivalent), connections are made via 25-pair cables mating to the appropriate 25-pair cable connectors located on the rear of the shelf assembly. When installing the unit in Westell's un-wired Type-550 mounting (also Type-400 equivalent), connections are made by wire-wrapping the appropriate leads from the facility and data modem equipment to the proper pins of the appropriate 56-pin connector that is located on the rear of the shelf assembly. Pin identifications for proper wiring are listed in Table 4.

DESCRIPTION		PIN
RT-RCV IN Tip	Facility	7
RR - RCV IN Ring		13
TT - XMT OUT Tip		41
TR - XMT OUT Ring		47
DRT - Data RCV OUT Tip	Equipment	5
DRR - Data RCV OUT Ring		15
DTT - Data XMT IN/2W Tip		55
DTR - Data XMT IN/2W Ring		49
TEK5	Miscellaneous	23
TEK6		21
MNLB		1
MLBG		19
PWR		35
GND		17

Table 4. Installer Connections

5.2 Power

Power requirement for proper operation is -22 to -56 Vdc (-48V nominal) at 85 mA, or 20 to 28 Vac (24 V nominal) at 95 mA.

5.3 Wire Test Mode

Once the installer connections are complete, the option switches have been set, and the unit is installed (see Section 4 - OPTIONS), the installer should activate INTELIPORT's Wire Test mode to verify installation and station wiring. Momentarily pressing the front-panel TEST switch (less than five seconds) causes 1014Hz to be applied to the RCV and XMT transmission pairs. Station wiring is verified by connecting a Transmission Test Set with a built-in speaker or other suitable listening device to the RCV and XMT channel pairs at the cable connection and demarcation points, and listening for the appropriate tones (see Table 5). Once the tones are verified, the installer may press the TEST switch again to end the test mode.

- NOTE -

The Wire Test mode automatically times out one hour after initial activation if the TEST switch is not pressed a second time.

PORT		4W APPLICATIONS	2W APPLICATIONS
RT - RCV	verify	continuous 1014 Hz	continuous 1014 Hz
RR - RCV		continuous 1014 Hz	
TT - XMT		interrupted 1014 Hz	interrupted 1014 Hz
TR - XMT		interrupted 1014 Hz	interrupted 1014 Hz

**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 5. Wire Test Mode Tones

6. TESTING & TROUBLESHOOTING

6.1 Testing

Testing and alignment procedures (given in Table 6 through Table 9) may be performed after the unit is installed and powered up. 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 Westell for repair or replacement (Paragraph 8.2).

6.2 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 the unit and apply power. Verify PWR LED ON, SC LED ON (if applicable), and ALIGN/LPBK, FAIL/TEST, RCV and XMT LEDs are OFF. NOTE: If FAIL/TEST LED is flashing, press front-panel TEST switch. If FAIL/TEST LED is ON steady, replace unit and repeat procedures.</p>																				
2.	<p>Wire Test Mode</p> <p>CAUTION-INTELIPOINT places 1014Hz tone on the transmission pairs when TEST mode is activated. Be sure INTELIPOINT 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. Verify FAIL/TEST LED is flashing. Connect TMS with built-in speaker, or other suitable listening device, to:</p> <table border="1" data-bbox="256 562 1401 703"> <thead> <tr> <th data-bbox="256 562 354 590">PORT</th> <th data-bbox="354 562 630 590"></th> <th data-bbox="630 562 1105 590">4W APPLICATIONS</th> <th data-bbox="1105 562 1401 590">2W APPLICATIONS</th> </tr> </thead> <tbody> <tr> <td data-bbox="256 604 354 632">RCV IN</td> <td data-bbox="354 604 630 632">verify</td> <td data-bbox="630 604 1105 632">Continuous 1014 Hz</td> <td data-bbox="1105 604 1401 632">Continuous 1014 Hz</td> </tr> <tr> <td data-bbox="256 632 354 659">RCV OUT</td> <td data-bbox="354 632 630 659">verify</td> <td data-bbox="630 632 1105 659">Continuous 1014 Hz</td> <td data-bbox="1105 632 1401 659"></td> </tr> <tr> <td data-bbox="256 659 354 686">XMT IN</td> <td data-bbox="354 659 630 686">verify</td> <td data-bbox="630 659 1105 686">Interrupted 1014 Hz</td> <td data-bbox="1105 659 1401 686">Interrupted 1014 Hz</td> </tr> <tr> <td data-bbox="256 686 354 714">XMT OUT</td> <td data-bbox="354 686 630 714">verify</td> <td data-bbox="630 686 1105 714">Interrupted 1014 Hz</td> <td data-bbox="1105 686 1401 714">Interrupted 1014 Hz</td> </tr> </tbody> </table> <p>When tones are verified, press TEST switch to end test mode. Test mode automatically times out one hour after initial activation if switch is not pressed a second time. Note: In 2W applications RCV OUT and XMT IN port utilize same transmission pairs (XMT IN).</p>	PORT		4W APPLICATIONS	2W APPLICATIONS	RCV IN	verify	Continuous 1014 Hz	Continuous 1014 Hz	RCV OUT	verify	Continuous 1014 Hz		XMT IN	verify	Interrupted 1014 Hz	Interrupted 1014 Hz	XMT OUT	verify	Interrupted 1014 Hz	Interrupted 1014 Hz
PORT		4W APPLICATIONS	2W APPLICATIONS																		
RCV IN	verify	Continuous 1014 Hz	Continuous 1014 Hz																		
RCV OUT	verify	Continuous 1014 Hz																			
XMT IN	verify	Interrupted 1014 Hz	Interrupted 1014 Hz																		
XMT OUT	verify	Interrupted 1014 Hz	Interrupted 1014 Hz																		
3.	<p>Serving Test Center's Procedures</p> <p>Send 2713 Hz (>30 sec.*) at TLP to INTELIPOINT's RCV IN port. Verify steady 1014 Hz at +5dBm (TLP) from INTELIPOINT. remove 2713 Hz. Command mode initiated. Note: if 2713 Hz is present for two sec. but removed in less than 30 seconds, INTELIPOINT sends a 1-second alternating tone of 1014 Hz/414 Hz and enters loopback.</p>																				
4.	<p>Remote (Manual) Alignment Mode</p> <p>From command mode, verify/record level received at 1014 Hz, then send 1004 Hz to INTELIPOINT. Upon detecting 1004 Hz, INTELIPOINT returns 2814 Hz. Verify/record level received at 2814 Hz, then send 2804 Hz to INTELIPOINT Upon detecting 2804 Hz, INTELIPOINT returns 414 Hz. Verify/record level received at 414 Hz, then send 404 Hz to INTELIPOINT. Upon detecting 404 Hz, INTELIPOINT returns 1814 Hz for 120 seconds. Verify/record level received at 1814 Hz. At this point, STC has option of aligning to 3 tones or 4 tones.</p> <p>3-tone alignment: Ignore 1814 Hz tone. After 120 seconds, 11814 Hz tone from INTELIPOINT times out. INTELIPOINT aligns to 3 tones, returns a ramp-up or ramp-down tone*, applies quiet termination for one second, then enters loopback. NOTE: 120-second timer can be bypassed by sending 1004 Hz during the 120-second time frame.</p> <p>4-tone alignment: Send 1804 Hz in response to INTELIPOINT'S 1814 Hz in response to INTELIPOINT's 1814 Hz within the 120 time frame. INTELIPOINT aligns to 4 tones, returns a ramp-up or ramp-down*, applies quiet termination for one second, then enters loopback.</p> <p>NOTE: Upon completion, if a level other than +5dBm (TLP) is required at the XMT OUT port the STC should access the XMT OUT Level Adjust mode to set the desired output level. Note: Ramp-up tone (314 Hz to 3014 Hz) indicates alignment is within C5 conditioning. Ramp-down tone (3014 Hz to 314 Hz) indicates alignment is not within C5 conditioning.</p> <p>Auto-Align Mode</p> <p>Note: Auto-align is initiated by pressing the front-panel TEST switch (more than five seconds) during the first five minutes of initial power-up, or via command mode by sending 1804 Hz to INTELIPOINT.</p> <p>When activated, INTELIPOINT sends 2913 Hz out of the RCV IN port to near end to put near end into command mode. Near end, upon entering command mode, returns command mode tone to INTELIPOINT. With both Stations set, tones are automatically sent and received between both ends. Upon completion (approximately two to three minutes), INTELIPOINT returns to idle. Near end also returns to idle.</p>																				

Table 6. Testing and Alignment Procedures

5.	<p>Loopback (After Alignment) Upon entering loopback after alignment, STC sends tones, one at a time, to INTELIPORT. Record level of each tone as it is looped back by INTELIPORT.</p> <p>Loopback is equipped with an automatic time-out feature that releases loopback 20 minutes after activation. INTELIPORT returns to idle. If release is desired before the 20-minute time frame, send 2713 Hz (0.9 sec, min.). INTELIPORT returns to command mode. Remove and re-send 2713 Hz tone (0.9 sec, min.) to return to idle.</p> <p>Loopback (From Idle State) Send 2713 Hz for one or two sec. but less than 30 sec. Upon entering loopback, INTELIPORT returns a one second alternating tone of 1014 Hz/414 Hz, identifying the unit accessed as Westell's SDS5486LN, Issue 3. NOTE: At this point, if 2713 Hz is removed in less than 30 seconds, INTELIPORT enters loopback. If 2713 Hz is applied for more than 30 seconds, INTELIPORT enters command mode.</p>
6.	<p>XMT OUT Level Adjust Mode Upon completing alignment, the STC can adjust the XMT OUT level for any level from +7dBm to -16dBm (TLP), 0.5 dB increments. STC can monitor the XMT OUT port to verify the change in the output level. While in command mode, send 1704 Hz to enter XMT OUT Level Adjust mode. Once activated,</p> <p>To add Gain: send and remove 2222 Hz. INTELIPORT re-adjusts output level by adding 0.5 dB of gains. If more gain is required, repeat the process of sending and removing 2222 Hz until desired output level is obtained. INTELIPORT re-adjusts the output level by 0.5 dB each time 2222 Hz is detected and removed.</p> <p>To add Loss: Send and remove 2111 Hz. INTELIPORT re-adjusts output level by adding 0.5 dB of loss. If more loss is required, repeat the process of sending and removing 2111 Hz until desired output level is obtained. INTELIPORT re-adjusts the output level by 0.5 dB each time 2111 Hz is detected and removed.</p> <p>To Set Level For -16 dBm: send and remove 2333 Hz. INTELIPORT re-adjusts output level to -16 dBm. Upon completion, STC must send 2713 Hz (0.9 sec, min.) to return to command mode. A second 2713 Hz tone causes INTELIPORT to return to idle.</p> <p>NOTE: XMT OUT Level Adjust mode is equipped with a 5-minute automatic time-out feature that releases if no tone is sent within 5 minute time frame. INTELIPORT returns to idle.</p>
7.	<p>Transponder Mode (TLP/DLP) From command mode, send 804Hz to access TLP Transponder or 1304 Hz, INTELIPORT applies quiet termination over the XMT IN port and sets a 20-minute timer. During quiet termination, STC performs noise measurements at the RCV OUT port.</p> <p>While in quiet termination, the STC initiates the transponder mode by sending any tone from 300 Hz to 3200 Hz (except 2700 Hz), in 100 Hz increments. INTELIPORT returns similar tone (TLP or DLP) at a 10 Hz off-set for same duration tone is received.</p> <p>Upon completion and if no other tone is sent, INTELIPORT reapplies quiet termination and resets the timer circuit. If no tone is sent within the 20-minute time frame, INTELIPORT, after 20 minutes, drops out of the transponder mode and returns to idle. If release is desired before the 20-minute time frame, send 2713 Hz for 0.9 seconds, minimum. INTELIPORT RETURNS TO COMMAND MODE. A second 2713 Hz tone causes INTELIPORT to return to idle.</p>

Table 6. Testing and Alignment Procedures (Continued)

A	B	C	D*	E**
FREQUENCY	ALIGNMENT LEVELS	LOOPBACK LEVELS	COLUMN C MINUS COLUMN B	COLUMN D PLUS -16
1014 HZ				
2814 Hz				
414 Hz				
1814 Hz				

*Column D equals deviation from 0dBm (TLP)
**Column E equals Customer's RCV OUT level

Note: During this procedure, all tones from STC are sent at TLP.

- Send 2713 Hz for more than 30 seconds. After detecting 2713 Hz for more than two seconds, INTELIPORT returns a 1-second, alternating tone of 1014 Hz/414 Hz (Unit I.D. tone) indicating the unit being accessed as Westell's INTELIPORT 1, Model SDS5486LN.
- After detecting 2713 Hz for more than 30 seconds, INTELIPORT sends 1014 Hz at +5 dBm (TLP). Record level received in Column B. Remove 2713 Hz. Command mode initiated. (NOTE: if XMT OUT level requires adjustment it is accomplished after completing Steps 3 through 12. Procedures for adjusting XMT OUT level is given on page 15, under Optional Tests).

Remote Alignment Mode

- While in command mode, send 1004 Hz.
- INTELIPORT returns 2814 Hz
- Record level at 2814 Hz in Column B, then send 2804 Hz
- INTELIPORT returns 414 Hz.
- Record level at 414 Hz in Column B, then send 404 Hz
- INTELIPORT returns 1814 Hz for 120-seconds.
- Record level at 1814 Hz in Column B. STC has option of aligning the circuit to either 3 tones or 4 tones:

3-Tone Alignment Ignore 1814 Hz tone from INTELIPORT After 120 seconds*, 1814 Hz tone times out. INTELIPORT aligns to 3 tones, sends ramp-up or ramp-down tone, then enters loopback. *NOTE: Send 1004 Hz within 120-sec. time frame to bypass timer circuit..

4-Tone Alignment Send 1804 within 120-second time frame. INTELIPORT aligns to 4 tones, sends -up or ramp-down tone, then enters loopback.

Loopback

- Send 404 Hz. Record level received from INTELIPORT in Column C.
- Send 1004 Hz. Record level received from INTELIPORT in Column C.
- Send 2804 Hz. Record level received from INTELIPORT in Column C.
- (OPTIONAL) Send 1804 Hz. Record level received from INTELIPORT in Column C.
- Send 2713 Hz for 0.9 seconds. INTELIPORT returns to command mode. Remove 2713 Hz.
- Re-send 2713 Hz 0.9 seconds. INTELIPORT returns to idle. Remove 2713 Hz.
- Perform calculations for Columns D and E as required.

Table 7. SDS5486LN (INTELIPORT) ISSUE 4 ALIGNMENT

SDS5486LN OPTIONAL TESTS		
XMT OUT LEVEL ADJUSTMENT		
TO ADD GAIN	TO ADD LOSS	TO OBTAIN -16 dBm
1. From command mode, send 1704Hz	1. From command mode, send 1704Hz	1. From command mode, send 1704Hz
2. INTELIPORT sends 1014 Hz at +5 dBm (TLP)	2. INTELIPORT sends 1014 Hz at +5 dBm (TLP)	2. INTELIPORT sends 1014 Hz at +5 dBm (TLP)
3. STC sends and removes 2222 Hz	3. STC sends and removes 2111 Hz	3. STC sends and removes 2333 Hz
4. INTELIPORT adds 0.5 dB of gain to output level.	4. INTELIPORT adds 0.5 dB of gain to output level.	4. INTELIPORT re-adjusts output level to -16 dBm (TLP).
5. Repeat Steps 3 and 4 until desired output level is obtained.	5. Repeat Steps 3 and 4 until desired output level is obtained.	5. Send 2713 Hz for 0.9 seconds.
6. Send 2713 Hz for 0.9 seconds	6. Send 2713 Hz for 0.9 seconds	6. INTELIPORT returns to command mode
7. INTELIPORT returns to command mode	7. INTELIPORT returns to command mode	7. Send 2713 Hz for 0.9 seconds.
8. Send 2713 Hz for 0.9 seconds.	8. Send 2713 Hz for 0.9 seconds	8. INTELIPORT returns to idle.
9. INTELIPORT returns to idle.	9. INTELIPORT returns to idle	
<i>NOTE: Maximum output level is +7 dBm (TLP)</i>	<i>NOTE: Minimum output level is -16 dBm (TLP)</i>	
<p><i>NOTE: Optional tests are initiated from command mode. All tones sent from STC are TLP unless stated otherwise.</i></p> <p>TLP Transponder Mode (804 Hz Activated)</p> <ol style="list-style-type: none"> 1) While in command mode, send 804 Hz. 2) INTELIPORT applies quiet termination over the XMT IN port. 3) STC performs noise measurements at the RCV OUT port. 4) STC sends any tone from 300 Hz to 3200 Hz (except 2700 Hz), in 100 Hz increments, at TLP. 5) INTELIPORT returns similar tone (at a slight off-set) for same duration tone is received, at +5 dBm (TLP or at the current XMT OUT level established. 6) Repeat Steps 4 and 5 as required. 7) Upon completion and no other tone is sent by STC, INTELIPORT reapplies quiet termination and re-sets 20-min. timer. 8) Send 2713 Hz for 0.9 seconds. INTELIPORT returns to command mode. Remove 2713 Hz. 9) Re-send 2713 Hz for 0.9 seconds. INTELIPORT returns to idle. <p>DLP Transponder Mode (1304 Hz Activated)</p> <ol style="list-style-type: none"> 1) While in command mode, send 1304 Hz. 2) INTELIPORT applies quiet termination at the XMT IN port. 3) STC performs noise measurements at the XMT OUT port. 4) STC sends any tone from 300 Hz to 3200 Hz (except 2700 Hz), in 100 Hz increments, at DLP. 5) INTELIPORT returns similar tone for same duration tone is received, at -8 dBm (DLP) or at the current XMT OUT Level established. 6) Repeat Steps 4 and 5 as required. 7) Upon completion and no other tone is sent, INTELIPORT reapplies quiet termination and re-sets 20-Min. timer. 8) Send 2713 Hz for 0.9 seconds. INTELIPORT returns to command mode. Remove 2713 Hz. 9) Re-send 2713 Hz for 0.9 seconds. INTELIPORT returns to idle. 		

Table 8. SDS5486LN Optional Tests

6.3 Point-to-Point Remote Alignment Procedure

This procedure involves aligning an SDS5486LN at Station A then aligning SDS5486LN (or equivalent unit) at Station Z. An alignment chart is provided for recording measurements during alignment and for making the necessary calculations to determine the Drop-side signal level at the RCV demarcation point of Station A and Station Z.

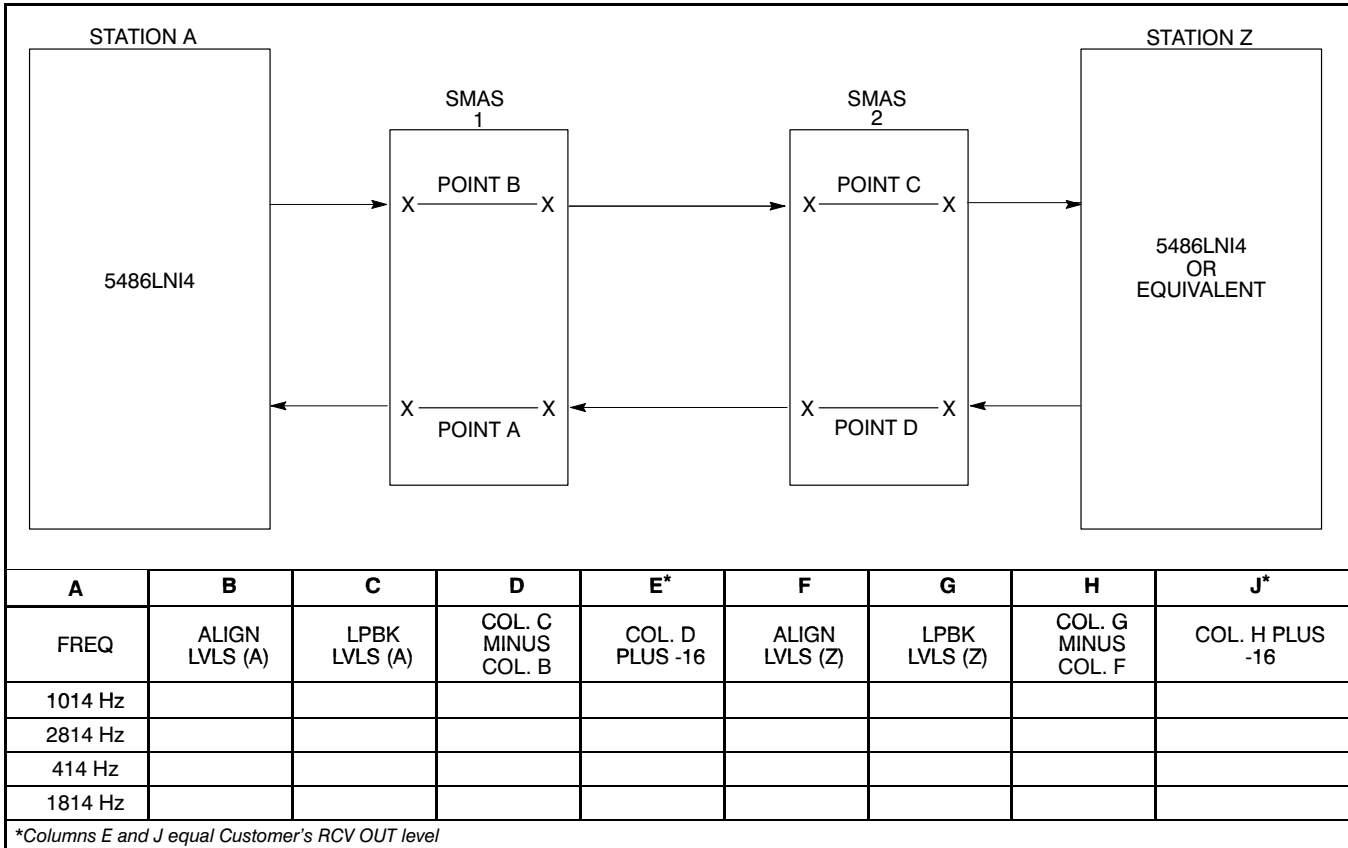


Table 9. SDS8486LN Point-Point Remote Alignment

1)	Open SMAS access at Point D to A to C.
2)	From SMAS Point A, send 2713 Hz at TLP for more than 30 seconds. Station A sends 1014 Hz to SMAS Point B.
3)	From SMAS Point C, send 2713 Hz at TLP for more than 30 seconds. Station Z sends 1014 Hz to SMAS Point D.
4)	From SMAS Point C, send 804 Hz at TLP. When SMAS Point D goes quiet, remove 804 Hz.
5)	Close SMAS access Point D to A.
6)	From SMAS Point B, measure level at 1014 Hz and record in Column B.
7)	From SMAS Point C, send 1004 Hz at TLP.
8)	SMAS Point B will change to 2814 Hz. Measure level and record in Column B.
9)	From SMAS Point C, send 2804 Hz at TLP.
10)	SMAS Point B will change to 414 Hz. Measure level and record in Column B.
11)	From SMAS Point C, send 404 Hz at TLP.
12)	SMAS Point B will change to 1814 Hz for 120 seconds. Measure level and record in Column B. STC now has option:
	Perform 3-Tone Alignment - Ignore 1814 Hz tone from INTELIPORT. After 120 seconds, 1814 tone times out. INTELIPORT (Station A) aligns to 3 tones, sends ramp-up or ramp-down tone, and enters loopback.
	Perform 4-Tone Alignment - From SMAS Point C, send 1804 Hz within 120 seconds. INTELIPORT (Station A) aligns to 4 tones, sends ramp-up or ramp-down tone, then enters loopback.
13)	From SMAS Point C, send 404 Hz, 2804 Hz, 1004 Hz and, if required, 1804 Hz, one at a time. Measure level of each tone looped back by INTELIPORT at Point B and record levels in appropriate spaces of Column C.
14)	From SMAS Point C, send 2713 Hz at TLP for 0.9 seconds minimum. Station Z returns to command mode.
15)	From SMAS Point A, send 2713 Hz at TLP for 0.9 seconds minimum. Station A returns to command mode.
16)	From SMAS Point A, send 804 Hz at TLP. When SMAS Point B goes quiet, remove 804 Hz.
17)	Close SMAS access Point B to C.
18)	From SMAS Point D, measure level at 1014 Hz and record in Column F.
19)	From SMAS Point A, send 1004 Hz at TLP.
20)	SMAS Point D will change to 2814 Hz. Measure and record level in Column F.
21)	From SMAS Point A, send 2804 Hz at TLP.
22)	SMAS Point D will change to 414 Hz. Measure and record level in Column F.
23)	From SMAS Point A, send 404 Hz at TLP.
24)	SMAS Point D will change to 1814 Hz for 120 seconds. Measure and record level in column F. STC now has option:
	Perform 3-Tone Alignment - Ignore 1814 Hz tone from INTELIPORT. After 120 seconds, 1814 tone times out. INTELIPORT or equivalent unit (Station Z) aligns to 3 tones, sends ramp-up or ramp-down tone, and enters loopback.
	Perform 4-Tone Alignment - From SMAS Point A, send 1804 Hz within 120 seconds. INTELIPORT or equivalent unit (Station Z) aligns to 4 tones, sends ramp-up or ramp-down tone, and enters loopback.
25)	From SMAS Point A, send 404 Hz, 2804 Hz, 1004 Hz and, if required, 1804 Hz, one at a time. Measure level of each tone looped back by INTELIPORT at Point D and record levels in appropriate spaces of Column G.
26)	From SMAS Point A, send 2713 Hz at TLP for 0.9 seconds minimum. Station A returns to command mode.
27)	From SMAS Point A, send 2713 Hz at TLP for 0.9 seconds minimum. Station A released.
28)	From SMAS Point C, send 2713 Hz at TLP for 0.9 seconds minimum. Station Z returns to command mode.
29)	From SMAS Point C, send 2713 Hz at TLP for 0.9 seconds minimum. Station Z released.
30)	Close SMAS access Point D to A and B to C.
31)	Perform calculations in Columns D, E, H, and J.
32)	Alignment complete.

Table 9. SDS8486LN Point-Point Remote Alignment (Continued)

7. CUSTOMER & TECHNICAL SERVICES

7.1 Customer Service & Technical Assistance

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

Voice: (630) 898-2500
 Voice: (800) 323-6883
 email: global_support@westell.com

Visit the Westell World Wide Web site at <http://www.westell.com> for additional information about Westell.

7.2 Part Numbers

This Westell 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/letter 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.

8. WARRANTY & REPAIRS

8.1 Warranty

Westell warrants this product to be free of defects at the time of shipment. Westell 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 Westell representative will void the warranty.

8.2 Repair and Return

Westell will repair or replace any defective Westell 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 Westell. Once an RMA number is obtained, return the defective unit, freight prepaid, along with a brief description of the problem, to:

Westell, Inc.
 ATTN: R.G.M. Department
 750 N. Commons Drive
 Aurora, IL 60504-7940

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

9. SPECIFICATIONS

9.1 Ordering Specifications

To order units, call the telephone numbers shown in Paragraph 7.1, and please specify a specific model number shown in Table 10.

Part/Model #	Description & Comments
SDS5486LN CLEI Code: DST1KDN1AA	INTELIPOINT "LN" (Issue 4)
Technical Publication	030-101328

**CLEI is a trademark of Telcordia Technologies.*

Table 10. Ordering and Option Information

9.2 Electrical and Physical Specifications

The electrical and signaling specifications are listed below, and the physical specifications for the SDS5486LN are shown in Table 11.

- A. RCV Level Range: Input, -10 to +5.0 dBm (TLP) or -23 to -8.0 dBm (DLP); Output, -3.0 dBm (TLP), -16.0 dBm.
- B. XMT Level Range: Input, +13 dBm (TLP) or 0 dBm (DLP); Output, +5.0 dBm (TLP) or -8.0 dBm (DLP).

- NOTE -

XMT OUT level can be adjusted (in 0.5 dB gain/loss increments) for any level from +7.0 to -16.0 dBm (TLP) or -6.0 to -29 dBm (DLP)

- C. Impedance: Facility-side, selectable for 150, 600, 1200 Ohms via option switch S2; Equipment-side (2W/4W), 600 Ohms, fixed.
- D. Test Mode: Activated by pressing front-panel TEST switch (<5 sec); Applies 1014 Hz to transmission ports when activated (see Table 4); Equipped with automatic release of one hour if switch not pressed a second time; TEST switch can also be used to activate INTELIPOINT's AUTO-ALIGN feature by pressing switch for >5 sec and only during first five minutes of initial power-up.
- E. Command Mode: Activated by sending 2713 Hz (>30 sec). INTELIPOINT returns 1014 Hz at +5dBm (TLP) indicating command mode initiation. NOTE: If 2713 Hz is removed in <30 sec, INTELIPOINT sends alternating 1014 Hz/414 Hz tone and enters loopback.
- F. Equalization: Automatically provides RCV channel amplitude equalization (up to 15dB, re: 1004 Hz) to meet C5 conditioning.
- G. Remote Alignment: Aligns to 3 or 4 tones, at TLP; Activated from command mode by sending 1004Hz in response to INTELIPOINT's 1014Hz (see para. 3.13 through 3.16 for details).
- H. Auto-Align: Automatically aligns to 4 tones, at TLP; Activated by pressing the front-panel TEST switch (>5 sec)

during the first five minutes of initial power-up or via command mode by sending 1804Hz to INTELIPORT (see paragraph 3.08 through 3.12 for details).

- I. XMT OUT Level Adjust: Initially set to provide a +5dBm (TLP) output but can be adjusted remotely for any level from +7 to -16dBm (TLP) in 0.5dB increments (see Table 1 and para. 3.23 through 3.26 for details).
- J. Unit I.D. Tone: Send 2713Hz (>2.0 sec.); INTELIPORT outputs one sec. of alternating 1014Hz/414Hz identifying unit being accessed as INTELIPORT.
- K. Loopback: Tone-activated from idle state by sending 2713Hz (± 7 Hz) for >2.0 but <30 sec (must detect to operate); ± 37 Hz must not operate; Release, 20-minute automatic time out or 2713Hz for 0.9 sec. min. which causes INTELIPORT to return to idle; When entered after alignment, release is accomplished via 20-minute automatic time out (unit returns to idle) or by sending 2713Hz for 0.9 sec. min. causing INTELIPORT to return to command mode (A second 2713Hz for 0.9 sec. min. returns INTELIPORT to idle); **Manual Activation**, by grounding MNLB lead, pin 1; **Release**, by removal of ground only.
- L. 2713Hz Detector Threshold Level: -24dBm (typically -30) to +5dBm.
- M. Loopback Gain: Automatically inserts 16dB to provide equal-level loopback condition.
- N. Quiet Term/Transponder Operation: TLP Transponder, activated from command mode by sending 804Hz; DLP Transponder, activated from command mode by sending 1304Hz. When activated, INTELIPORT applies quiet termination and sets 20 minute timer circuit. STC performs noise measurements; **Release**, 20-minute automatic time out (unit returns to idle), 2713Hz for 0.9 sec mini-

um (return to command mode), second 2713Hz for 0.9 sec minimum (return to idle).

- O. Transponder Mode: Activated from quiet termination mode only by sending any tone from 300Hz to 3200Hz (except 2700Hz) in 100Hz increments. INTELIPORT returns similar tone (10Hz off-set) for same duration tone is received. Upon completion and if no other tone sent, INTELIPORT reapplies quiet term and resets 20 minute timer; **Release**, 20-minute automatic time out (unit returns to idle), 2713Hz for 0.9 sec minimum (return to command mode), second 2713Hz for 0.9 sec minimum (return to idle).
- P. Idle Noise: <17dBmC0.
- Q. Transhybrid Loss: >30dB minimum; 45dB typical.
- R. Frequency Response: Receive Path, meets C5 requirements; Transmit Path, ± 0.5 dB from 300 to 3000Hz.
- S. Sealing Current: Can be set to supply 20mA of current (SUPPLY), provide current-limiting load (TERM), or disabled (OFF).
- T. Power: -22 to -56 Vdc (-48 V typical) at 85 mA or 20 to 28 Vac (24 V typical) at 95 mA.

Physical Feature	U.S.	Metric
Height	5.58 in.	14.2 cm
Width	1.4 in.	3.6 cm
Depth	5.9	15 cm
Weight (approx.)	1.4 lbs	0.68 kgs
Operating Environment	32°F to +122°F	0°C to +50°C
Operating Humidity	0 to 95% (non-condensing)	

Table 11. SDS5486LN Physical Specifications

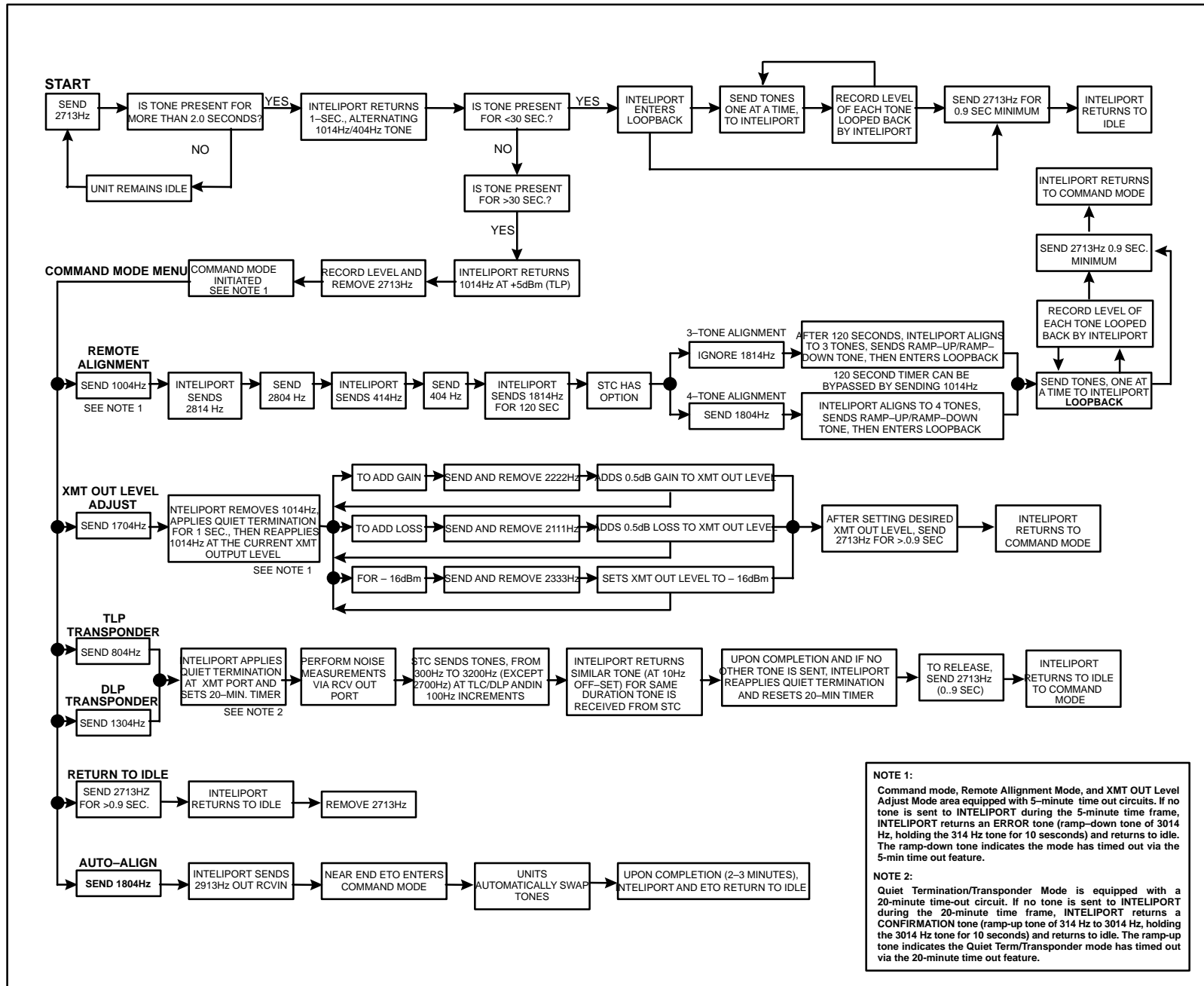


Figure 3. SDS5486LN (INTELIPORT 1, ISSUE 4) FLOWCHART

NOTE 1:
 Command mode, Remote Alignment Mode, and XMT OUT Level Adjust Mode are equipped with 5-minute time out circuits. If no tone is sent to INTELIPORT during the 5-minute time frame, INTELIPORT returns an ERROR tone (ramp-down tone of 3014 Hz, holding the 314 Hz tone for 10 seconds) and returns to idle. The ramp-down tone indicates the mode has timed out via the 5-min time out feature.

NOTE 2:
 Quiet Termination/Transponder Mode is equipped with a 20-minute time-out circuit. If no tone is sent to INTELIPORT during the 20-minute time frame, INTELIPORT returns a CONFIRMATION tone (ramp-up tone of 314 Hz to 3014 Hz, holding the 3014 Hz tone for 10 seconds) and returns to idle. The ramp-up tone indicates the Quiet Term/Transponder mode has timed out via the 20-minute time out feature.