

Westell DST5434 Issue 4 2W/4W Data Station Termination Module with Loopback and Jacks

CLEI* Code: NCD3JU0DAA

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1. GENERAL

1.1 Document Purpose

This practice describes the Westell DST5434 Issue 4 2W/4W Data Station Termination (DST) Module with Loopback and Jacks, shown in Figure 1.

- NOTE -

Hereafter, the Westell DST 2W/4W Data Station Termination Module with Loopback and Jacks Model DST5434 Issue 4 may be referred to as the "DST5434," the "DST," or the "5434."

1.2 Document Status

Whenever this practice is updated, the reason will be stated in this paragraph. Revision B of this practice adds the CLEI code. Revision A reflected the Issue 4 equipment, which updated the Printed Circuit Board (PCB) to replace a manufacture discontinued relay.

1.3 Product Purpose and Description

The Westell Data Station Termination module, Model DST5434, provides a passive interface between a 4-wire facility and a 2- or 4-wire data modem. In the event of loss of power, the DST5434 maintains transmission of data because of the passive attenuation pads in the receive and transmit channels.

1.4 Product Mounting

The DST5434 mounts in one position of a Westell 400-type mounting assembly (or the equivalent).

1.5 Product Features

The DST5434 module offers the following features:

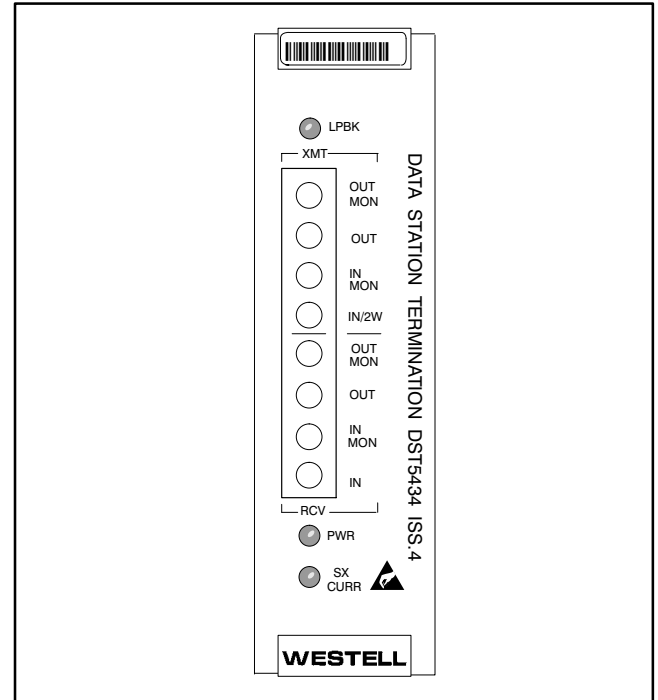


Figure 1. Front View of DST5434 Issue 4

- RCV and XMT ATTN DIP switches provide from 0 to 24 dB of loss in 0.1 dB increments for setting the receive and transmit paths to the proper operating levels
- Front-panel bantam test jacks for monitoring or direct access to the transmission paths during maintenance or testing procedures
- Switch-selectable termination impedance of 150/600/1200 ohms for matching the impedance of the facility
- Compatible with loaded or nonloaded cable facilities
- Switch-selectable 2W/4W operation
- Manual or tone-activated loopback capability for testing and maintenance purposes
- Six user selectable loopback activation tones (2313, 2413, 2513, 2713, 2813, and 2913 Hz)
- Tone- or switch-selectable, 4-minute or 20-minute automatic time-out release of loopback
- Equal-level loopback transmission capability via a switch-selectable 0 dB, 8 dB, or 16 dB level difference option

- Data set disable leads (TEK5 and TEK6) are provided for disabling the data set during loopback for testing and maintenance functions
- Front-panel LEDs provide an indication of the operational status of loopback, sealing current, and power
- Switch-selectable Sealing Current supply/term/off operation
- Switch-selectable power source option from either an external source or via the simplex leads
- Switch-selectable, normal (NORM) or reverse (REV) simplex signaling
- Switch-selectable, normal (NORM) or simplex cut-through (SX/T) signaling capability
- Operational from -22 to -56 Vdc or 20 to 28 Vac power source at a current rating of 20 mA maximum
- 7-year warranty

2. APPLICATIONS

Westell's DST5417 is typically used to interface a 4-wire facility to a 2- or 4-wire data modem, and is normally located on the same premises as the modem. The transmission paths are passive to allow transmission of data signals in the event that loss of power occurs to the module. Power requirements are necessary only for the operation of loopback and sealing current supply.

The DST5434 is equipped with an internal sealing current circuit that can be optioned to supply a 20 mA source to the facility's simplex leads, provide a 20 mA regulated load for the facility's simplex leads, or can be disabled. When the sealing current circuit is disabled, the DST5434 can be optioned with simplex signaling on a cut-through basis and in either normal or reversed signaling applications. In addition, remote powering, by way of the simplex leads, can be accomplished via the proper positioning of switch S8 (NORM/SX PWR). With S8 in the SX PWR (simplex powering) position, the internal sealing current circuit and cut-through path (SX/T) is disconnected.

3. FUNCTIONAL OPERATION

Refer to Figure 2, the DST5434 Block Diagram, as needed, while reading the following functional description.

3.1 Receive Path

Signals received from the 4-wire facility enter the DST5434 via the RCV IN port, pins 7 and 13 (RT and RR, respectively) and are applied to switch S2. S2 provides for the selection of the proper termination impedance of the unit (150/600/1200 ohms) to match the impedance of the facility. The signal is then transformer-coupled to the RCV ATTN circuit which provides from 0 to 24 dB of loss in 0.1 dB increments for adjusting the incoming signal for proper level coordination with the 2- or 4-wire equipment. The adjusted signal is then applied to the RCV OUT port, pins 5 and 15 (DRT and DRR, respectively) in 4-wire applica-

tions (S11 set to 4W) or routed through the HYBRID circuit to the XMT IN/2W port, pins 55 and 49, in 2-wire applications (S11 set to 2W).

3.2 Transmit Path

Signals from the equipment (2-wire or 4-wire) enter the DST5434 via the XMT IN/2W port, pins 55 and 49 (DTT and DTR, respectively). In 2-wire applications (S11 set to 2W), the signal is transformer coupled into the HYBRID circuit which performs a 2-wire to 4-wire conversion and applies the resulting signal to the XMT ATTN circuit. In 4-wire applications (S11 set to 4W), the signal is applied directly to the XMT ATTN circuit. This circuit provides from 0 to 24 dB of loss in 0.1 dB increments for adjusting the transmit path to the proper output level. The adjusted signal is then transformer-coupled through switch S2 and provides a balanced output to the XMT OUT port, pins 41 and 47 (TT and TR, respectively) towards the 4-wire facility.

3.3 Loopback

The loopback function makes possible remote testing of signal levels. Data set disable leads (TEK5 and TEK6) are provided to disable the data set during the loopback condition. When used as a testing and troubleshooting device, the loopback circuit isolates the data modem from the facility and interconnects the transmit and receive directions of the facility. This allows testing of both the Data Station Termination and the facility to aid in identifying faulty equipment.

With the NORM/LPBK DIS switch (S201) in the NORM position, the loopback circuit can be activated upon detection of the selected tone sent from the facility and subsequent removal of the tone. When a second tone is detected, loopback will release. Automatic time-out of loopback (may be switch-disabled) will occur after 4 or 20 minutes (switch-selectable) should the second tone not be sent. Loopback path gains of 0dB, 8dB or 16dB are selectable to provide for equal-level transmission when the RCV OUT level is either 0, 8, or 16 dB less than the XMT IN level. Thus, for a RCV OUT level of -16 dBm and a XMT IN level of 0 dBm, the 16 dB switch of S1 is placed in the 16dB position. Similarly, for a RCV OUT level of -16 dBm and a XMT IN level of -8 dBm, the 8 dB switch of S1 is placed in the 8 dB position. If the levels are the same, place both the 8 and 16 dB switches to the 0 dB (OFF) position for 0 dB.

3.4 Loopback Release

Two release modes for tone-activated loopback are provided: tone or automatic time-out. Tone release requires detection of the selected tone a second time for 0.7 seconds, nominal. The automatic time release of loopback occurs after 4 or 20 minutes (switch-selectable) to restore data line operation should testing personnel fail to remove the loopback condition manually or the circuit does not detect the second tone.

3.5 Manual Loopback

Manual loopback activation can be accomplished at any time by applying a ground on the MNLB lead, pin 1. When grounded, the automatic time-out feature will not affect loopback operation and the loopback condition will remain activated until the ground is removed.

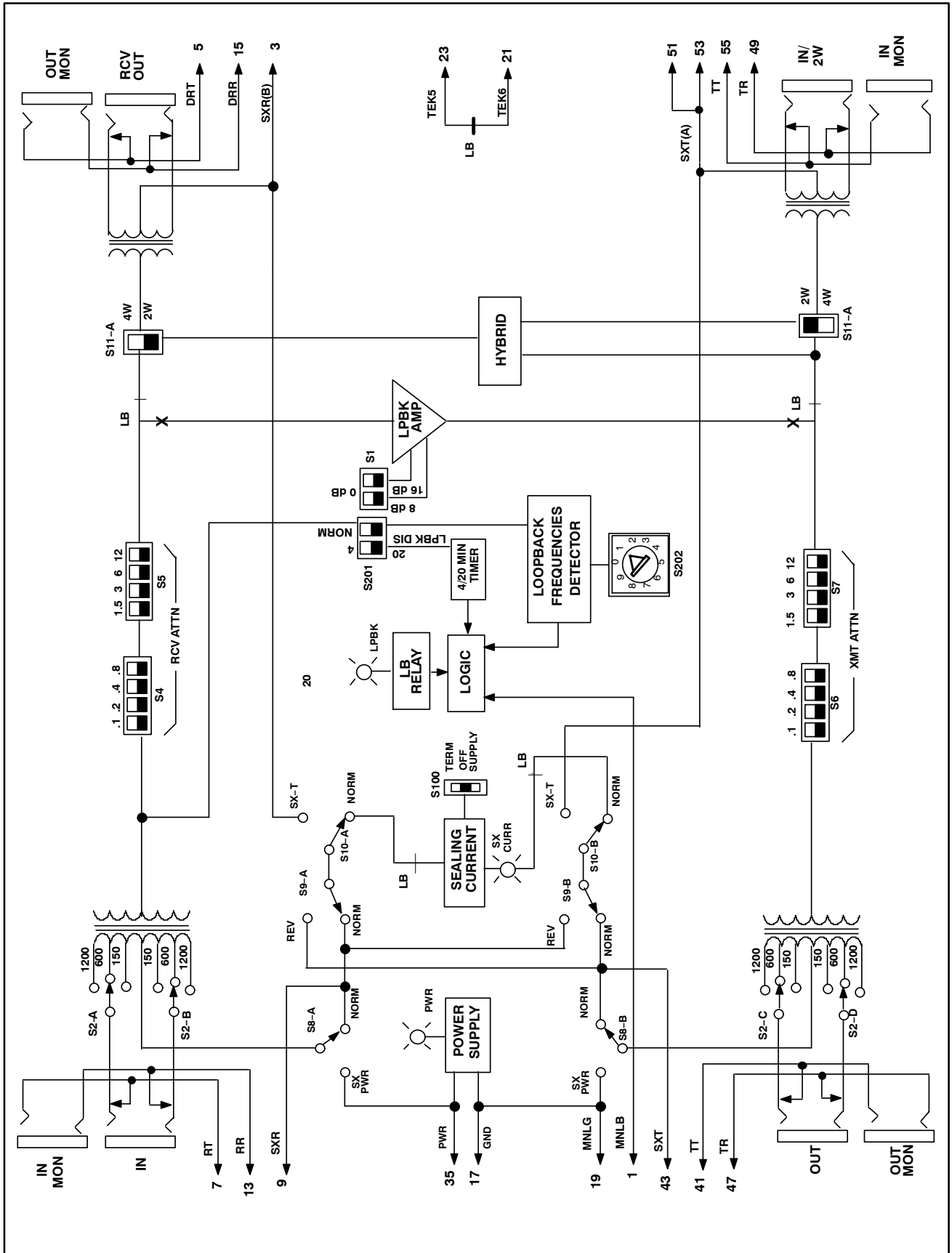


Figure 2. DST5434 Issue 4 Block Diagram

In all loopback conditions, the LB Relay will operate and the LPBK LED on the front panel illuminates to indicate that the circuitry is activated.

3.6 Simplex Control

Simplex signaling is controlled via option switches S8 (NORM/SX PWR), S9 (NORM/REV) and S10 (NORM/SX/T) and can be conditioned for either normal, reverse, normal simplex cut-through, or reversed simplex cut-through operation as required. Refer to Table 1 for a summary on the positioning of each option switch with respect to the applications desired.

OPTION	NORMAL	REVERSE	NORM CUT THRU	REV CUT THRU
S8* (NORM/SX/PWR)	NORM	NORM	NORM	NORM
S9 (NORM/REV)	NORM	REV	NORM	REV
S10 (NORM/SX/T)	NORM	NORM	SX/T	SX/T

**Note: With S8 in the SX PWR (Simplex Powering) position, simplex cut through (Normal and/or Reverse) and sealing current operation are disabled. Position SX PWR is used for remote powering applications via facility-side simplex leads.*

Table 1. Simplex Lead Control

3.7 Sealing Current

Sealing current is recommended on all metallic facilities to help prevent transmission path noise. Sealing current is a low-value of dc current (approx. 20 mA) 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 sealing current circuit is controlled by option switch S100. With this switch in the SUPPLY position, the DST5434 will supply 20 mA of balanced sealing current to the simplex leads of the facility's receive and transmit ports. Simplex leads at the distant end must be connected together when the DST5434 is to supply sealing current to the facility. When sealing current is supplied from the distant end, place S100 in the TERM position to provide a 20 mA current-limited load to the facility simplex leads. In the OFF position, the internal sealing current circuit is disabled, rendering the simplex leads available for external use.

- NOTE -

When using sealing current from the DST5434, a 24 Vac or -24 Vdc power source is adequate for a metallic facility loop of less than 1000 ohms for 20 mA of current regulation. For loops in excess of 1000 ohms, a -48 Vdc power source is recommended. The DST may be remotely powered with -48 Vdc from the serving CO via the cable facility and associated simplex leads.

4. FEATURES AND OPTIONS

4.1 LED Status Indicators

The DST5434 is equipped with three front-panel LEDs that provide a quick visual indication of the unit's status and mode. Table 2 summarizes LED functions.

LED	ON	OFF
LPBK	Loopback Activated	Idle. Normal Operation
PWR	Power Applied	No Power Applied
SX CURR	Supplies 20 mA sealing current to simplex leads	Internal sealing current circuit is disabled

Table 2. DST5434 LED Status Indication

4.2 Switch Options

The DST5434 contains option switches that are used to condition the module for proper application and operation. Refer to Table 3 for the location and description of these options.

5. INSTALLATION

Installation consists of inspecting the equipment for damages, following proper safety precautions, setting the switch options or verifying the switch options are properly set, mounting the module in the proper slot of a mounting assembly, verifying the presence of power and signalling as indicated by the status LEDs and testing the installation. The following paragraphs provide detailed instructions for performing these procedures.

- 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 7.1 for telephone number).

Before installing the unit, please observe the following safety precautions and notes.



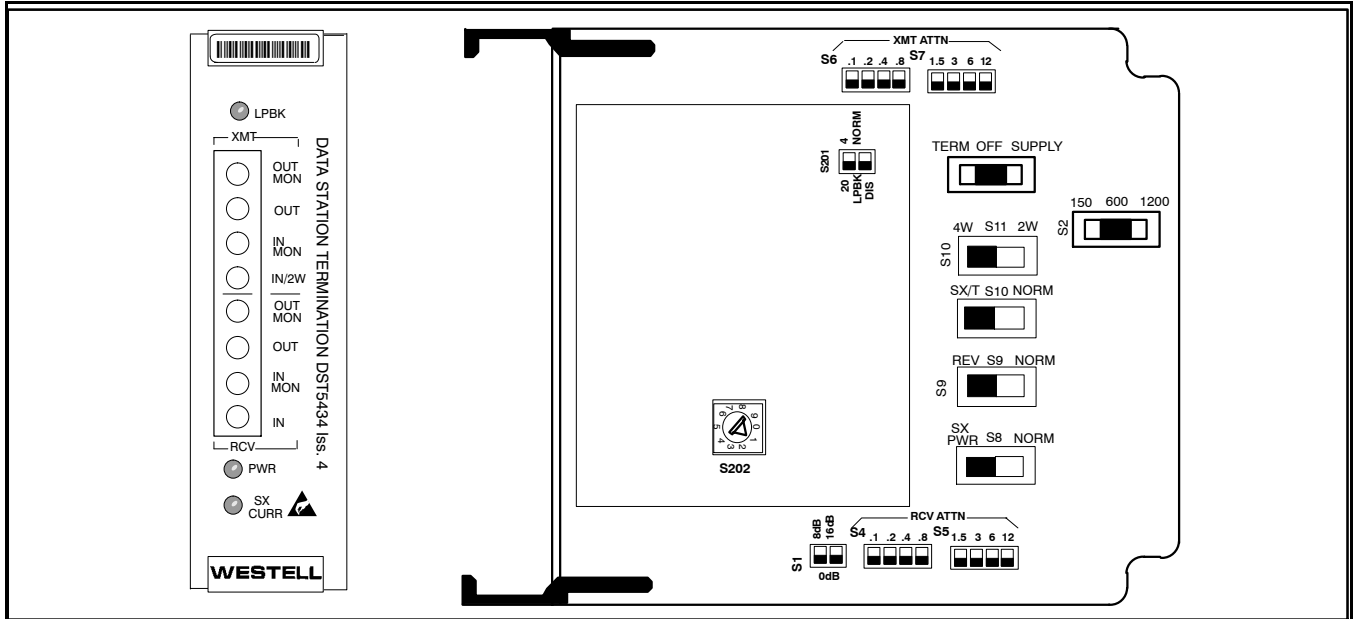
CAUTION - STATIC-SENSITIVE



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.
- ❑ This unit is intended to be used behind devices that provide primary lightning protection.



OPTION	POSITION	FUNCTION
S1	8 dB	Selected when RCV OUT level is 8 dB less than XMT IN level (16 dB switch in 0 dB position).
	16 dB	Selected when RCV OUT level is 16 dB less than XMT IN level (8 dB switch in 0 dB position).
	0 dB	Selected when RCV OUT and XMT IN levels are the same. To obtain 0 dB, place the 8 and 16 dB switches in 0 dB position.
S2	150	Selected when interfacing nonloaded cable with more than 3 dB of loss.
	600	Selected when interfacing nonloaded cable with less than 3 dB of loss.
	1200	Selected when interfacing loaded cable facilities.
(S4, S5) RCV ATTN	IN/OUT	Receive channel attenuation. Provides from 0 to 24 dB of loss in 0.1 dB increments for setting the receive path to the proper operating level (loss is inserted when the switch is placed towards the number).
(S6, S7) XMT ATTN	IN/OUT	Transmit channel attenuation. Provides from 0 to 24 dB of loss in 0.1 dB increments for setting the transmit path to the proper operating level (loss is inserted when the switch is placed towards the number).
S8	NORM	Selected when power is not being supplied via the simplex leads.
	SX PWR	Selected when power is being supplied via the simplex leads.
S9	NORM	Normal simplex configuration.
	REV	Reversed simplex configuration.
S10	NORM	Normal simplex signaling.
	SX/T	Simplex cut-through.
S11	2W	Selected when interfacing 2-wire equipment.
	4W	Selected when interfacing 4-wire equipment.
S100	TERM	Provides 20 mA regulated load to the facility's simplex leads when sealing current is supplied from the distant end.
	OFF	Sealing Current circuit is disabled.
	SUPPLY	Supplies 20 mA of balanced, regulated sealing current to the facility's simplex leads.
S201	4	Select for 4-minute automatic time-out release of loopback.
	20	Select for 20-minute automatic time-out release of loopback.
	NORM	Enables loopback circuitry for tone activation (2713 Hz).
	LPBK DIS	Disables loopback circuitry from tone activation.
S202	0 thru 9	Selects loopback frequency (0 = 2713, 1 = 2313, 2 = 2413, 3 = 2513, 4 = 2813, 5 = 2913, and 6 thru 9 = 2713 Hz).

Table 3. DST5434 Switch Option Diagram

- CAUTION -

Do not apply power until all wiring and the entire installation is complete.

- CAUTION -

Use care when installing and removing modules - do not force a module into place. If a module resists insertion, remove it and check for obstructions in or near the module's or shelf's connectors and mounting slots. The module may then be carefully aligned and gently re-inserted.

DESIGNATION		PIN
RT - 4W RCV IN Tip	To/From the Facility	7
RR - 4W RCV IN Ring		13
TT - 4W XMT OUT Tip		41
TR - 4W XMT OUT Ring		47
SXR - Simplex RCV		9
SXT - Simplex XMT		43
DRT - RCV OUT Tip	To/From the Data Modem	5
DRR - RCV OUT Ring		15
DTT - XMT IN Tip		55
DTR - XMT IN Ring		49
SXR (B) - Simplex Receive		3
SXT (A) - Simplex Transmit		51/53
TEK5 - Data Modem	Misc.	23
TEK6 - Disable Leads		21
MNLB - Manual Loopback		1
MLBG - Man. Lpbk. Ground		19
PWR - Power IN		35
GND - Ground		17

Table 4. DST5434 Installer Connections

- NOTE -

Set any/all manual option switches prior to installing the unit.

5.1 Mounting the Module

The DST5434 is a plug-in module that mounts in a 400-type mounting assembly (or equivalent mounting which matches the design and pin-out plan of the module).

STEP	ACTION
1.	Set Option Switches: Place all option switches on the main printed circuit board to the position as specified on the Circuit Layout Record (CLR) card. Place the RCV and XMT ATTN DIP switches in the OFF position.
2.	Receive Alignment: Connect a 600-ohm terminated TMS into the RCV OUT jack (in 4-wire applications) or into the XMT IN/2W jack (in 2-wire applications). Request the Serving Test Center (STC), or distant end, to transmit a 1004Hz tone at -13dBm0 and adjust the RCV ATTN switch-sections until the TMS indicates a level of -16dBm or the level specified on the CLR card.
3.	Transmit Alignment: Insert an oscillator, adjusted for 0dBm at 1004Hz, into the XMT IN/2W jack. Connect the TMS into the XMT OUT jack. Adjust the XMT ATTN switch-sections until the TMS indicates the level specified on the CLR (typically -8dB).

Table 5. DST5434 Alignment Procedures

5.2 Making Installer Connections

The module makes electrical connection when installed and properly seated in the card-edge connector of the mounting assembly. Installer connections to the unit are made by wirewrapping the leads onto the pins of the appropriate 56-pin connector of an unwired 400-type mounting assembly (or equivalent). If installing the DST5434 in Westell's USA-type mounting, connections can be made via 25-pair cables mating to the appropriate 25-pair cable connectors located on the rear of the assembly. Pin identifications for proper wiring are listed in Table 4.

5.3 Considering Power Requirements

Power requirement is -22 to -56 Vdc or from a 20 to 28 Vac power source at a current rating of 20 mA maximum.

6. TESTING & TROUBLESHOOTING

6.1 Alignment & Testing

The alignment procedures (shown in Table 5) may be performed after the DST5434 is installed and power is applied. Test equipment required to perform these procedures is as follows:

1. Transmission Measuring Set (TMS), HALCYON 704A2 Wide Band Test Set, HEWLETT PACKARD 3551 Transmission Test Set, or equivalent,
2. Variable Frequency Oscillator (VFO), if not contained within the TMS, and
3. Bantam to 310 test cords.

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, option switch settings and alignment adjustments, 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. Tests beyond those outlined herein, or repairs made beyond replacing a faulty unit, are not recommended and may void the warranty.

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 equipment is identified by a model number and a part number. The part number includes an equipment issue number as the last digit of the part number. Each time a change is made to the product which changes the form, fit, or function of the product, the issue number is incremented or advanced by one. Be sure to indicate the full part number shown in Table 6 when making inquiries about the equipment.

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 problem description 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 Electrical Specifications

The electrical and signalling specifications are listed below, and the physical specifications are shown in Table 6.

Receive And Transmit Channel

- A. **Operation:** Selectable for 2-wire or 4-wire equipment applications
- B. **Insertion Loss:** 1dB
- C. **Sealing Current:** Selectable to either supply a 20mA source to simplex leads (SUPPLY); provide a 20mA regulated load

to simplex leads when source is supplied from distant end (TERM); or can be disabled (OFF)

- D. **RCV And XMT ATTN:** Adjustable from 0 to 24dB of loss in switch-selectable increments of 0.1dB
- E. **Impedance:** Facility, switch-selectable for 150/600/1200 ohms Equipment, 600 ohms, fixed
- F. **Test Jacks:** Bantam-type monitor and module access for all transmission ports

Power

- G. **Input Voltage:** -22 to -56Vdc, or 20 to 28Vac, at current rating of 20mA maximum

Loopback

- H. **Frequency:** Selected frequency, $\pm 7\text{Hz}$ must operate; $\pm 37\text{Hz}$ must not operate. Circuit may be disabled from tone-activation via S201 (NORM/LPBK DIS). Circuit can be manually activated via grounding MNLB lead, pin 1
- I. **2713Hz Detector Threshold Level:** -30dBm to +3dBm
- J. **Detection Time:** 1.4 seconds operate; 0.7 seconds release, nominal
- K. **Time-out Option:** Selectable for either 4 or 20 minutes $\pm 5\%$ after loopback activation (may be switch-disabled). No affect when loopback circuit is manually activated
- L. **Signal To Guard Ratio:** 3 to 10dB
- M. **Transmission Level:** Equal-level ± 1 dB (facility), at 0dB, 8dB or 16dB level difference (switch-selectable) between RCV and XMT data levels

9.2 Ordering Specification

To order units, call the telephone number shown in paragraph 7.1 and please specify the model number show in Table 6.

Model #	Part #	Description & Comments
DST5434	543414	Westell 2W/4W Data Station Termination with Loopback and Jacks. CLEI* Code: NCD3JU0DAA. Barcode: 126394. CPR: T73816.

*CLEI is a trademark of Telcordia Technologies.

Table 6. Ordering and Option Information

9.3 Physical Specifications

The physical specifications are shown in Table 7.

Physical Feature	U.S.	Metric
Height	5.58 inches	14.17 cm.
Width	1.42 inches	3.60 cm.
Depth	5.90 inches	14.99 cm.
Weight (approx.)	1.25 lbs	0.57 Kg
Operating Temp.	32° to 122°F	0° to 50°C
Humidity	0 to 95% (non-condensing)	
Mounting	One slot of a Westell 400-type mounting assembly or shelf (or equivalent)	

Table 7. Physical Specifications