

EXPANDABLE DIGITAL TO ANALOG CONVERTOR

Installation Guide

**Document Number 512-1090-001
Revision G**

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If this equipment is shipped with filtered phone line, data or power cords, they must be used in series with each equipped digital phone port. Failure to do so may jeopardize continued FCC Part 15 compliance.

Changes or modifications not expressly approved by Digital Techniques, Inc. could void the user's authority to operate the equipment.

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This product was designed and manufactured by DTI. It was designed to be attached to the Nortel Meridian 1, SL-1, SL-100 PBX or Norstar KSU systems, the NEC Electra Professional KSU or NEAX 2000 or 2400 PBX systems, the Lucent Definity PBX, or the Aspect CallCenter only. If you have any questions, please contact Digital Techniques. This product is not supported or warranted by Nortel, NEC, Lucent or Aspect.

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1.0 PRODUCT DESCRIPTION

1.1 Overview

The Expandable Digital to Analog Convertor (EDAC), shown in Figure 1, allows users with Nortel, Lucent, NEC, or Aspect digital telephone systems to record conversations onto standard analog recording equipment. In operation, the EDAC passively captures both sides of the telephone conversation and sends the audio to the recorder only when a call is active.

The EDAC consists of a base unit and plug-in port cards, which allow a single EDAC to handle from one to twelve telephone lines. Optional relay cards may also be installed in the base unit for recording systems which require contact closures to control start/stop recording. DIP switches on the EDAC provide the flexibility to configure the system for a variety of installations.

The EDAC utilizes a space saving design in a compact case measuring only 8 x 9.5 x 2.25 inches (20 x 24 x 6 cm). The unit can be installed as backroom equipment to prevent unauthorized disconnection from the recording equipment. The EDAC case has a flexible design which allows it to be mounted on a wall or within an equipment rack.



Figure 1. Expandable Digital to Analog Convertor (EDAC)

1.2 Operation

1.2.1 EDAC Compatibility

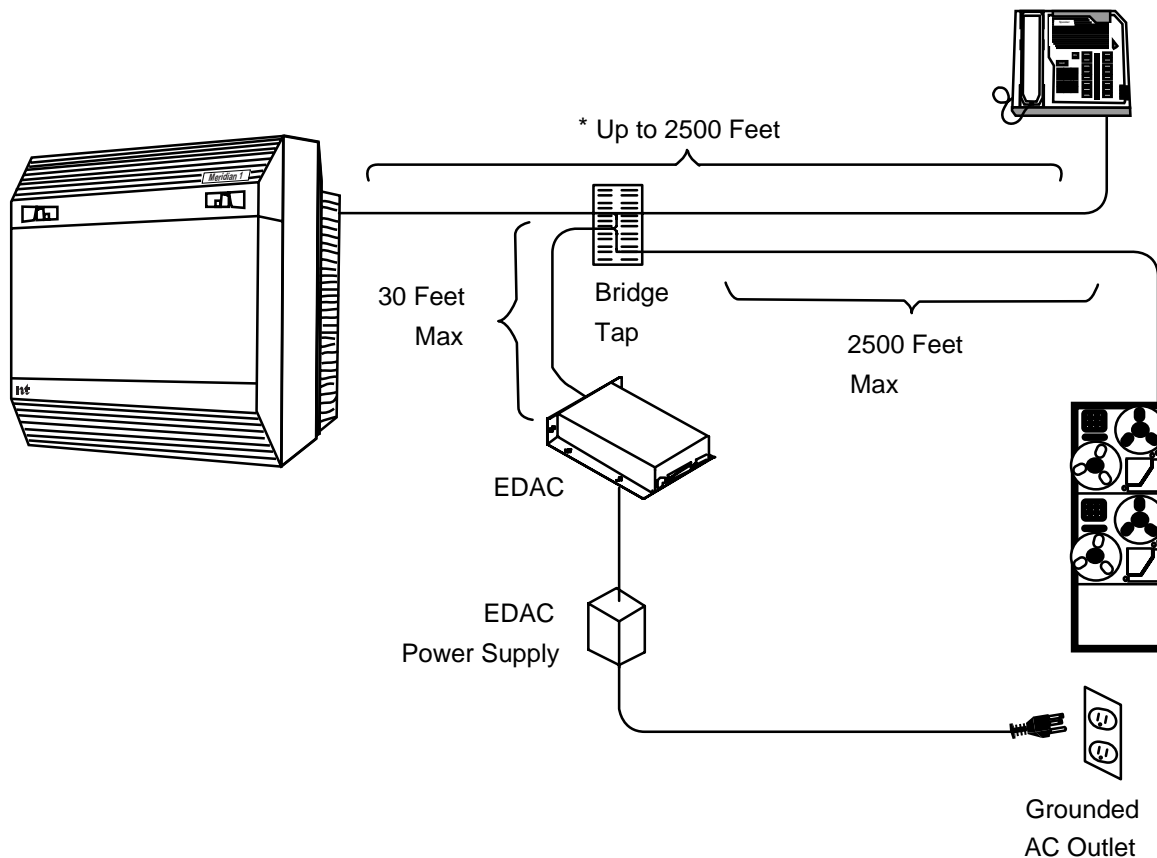
The EDAC product line supports the digital telephone systems shown in Table 1.

Table 1. EDAC Compatibility

MANUFACTURER	PBX TYPE	TELEPHONES SUPPORTED
Nortel	Meridian 1, SL-1, SL-100	M2000, M3000 series
	Norstar KSU	M7000 series
NEC	NEAX 2000, 2400, 7400	D ^{term} series III, series E
	Electra Professional KSU	Electra Professional Series Electra Elite
Aspect	Aspect Call Center	Aspect TeleSets
Lucent Technologies	Definity G3	6400 Series, 8400 Series (2-wire), CallMaster III (2-wire)

1.2.2 EDAC Configuration

Figure 2 demonstrates the connectivity between the EDAC and the digital telephone system. The EDAC bridges across each 2-wire digital telephone line to be recorded and provides a corresponding audio pair out to the recorder.



NOTE

*Loop length is system dependent. See section 3.8 for system specific distances.

Figure 2. EDAC Configuration Diagram

The EDAC monitors the digitized voice information carried on the telephone line and reformats the digitized information into standard 600 ohm analog format required by most recording equipment. The unit captures both sides of a conversation and sends audio to the recorder only when a call is active. This is especially useful with the search features of recorders that look for silent periods between conversations. Since there is no open microphone, as with simple recording systems, recording occurs only during active phone conversations. Therefore, office conversations held between calls are not recorded and remain private. Port and relay cards are user installed, which allows the system to be configured to meet site requirements, and later expanded as the need arises. External AC to DC power supplies support installations in most parts of the world.

1.2.3 Meridian 1 Selective Recording

The EDAC product line includes a special application option for the Nortel Meridian 1 PBX. The EDAC/Selective Recording (EDAC/SR) product allows for selective recording of conversations on a 16-button Meridian 1 digital telephone set (M2216, M2616) by designating a specific range of line appearances that **will not** generate output to the recorder. Specifically, any calls which are active on buttons 8 through 11, **will not** generate output to the recording equipment. All other lines on the digital telephone will activate the recording equipment for both inbound and outbound calls.

A typical application for the EDAC/SR would be in a call center, where an agent would record all business calls which were answered on incoming ACD lines, but not record personal calls which were originated on one of their private lines.

The EDAC/SR is implemented through the use of a base unit and ports cards that are designed specifically to provide the selective recording feature. The part numbers for all EDAC equipment, including the selective recording application, are provided in Section 1.3.

1.3 EDAC Product Numbers

Due to the numerous combinations of port, relay, and power requirements, EDAC components are sold individually. This allows the customer to purchase only the required components. Part numbers for the EDAC product line are listed below in Table 2.

Table 2. EDAC Product Numbers

ITEM	PART NUMBER
EDAC Base Unit	500-1090-001
EDAC Port Card (Nortel)	300-3030-001
EDAC NE1 Port Card (NEC)	300-3030-002
EDAC Aspect Port Card	300-3030-003
EDAC Base Unit (Lucent)	500-1092-001
EDAC Slave Port Card (Lucent)	300-3032-003
EDAC Master Port Card (Lucent)	300-3032-004
EDAC/SR Base Unit	500-1094-001
EDAC/SR Slave Port Card	300-3034-001
EDAC/SR Master Port Card	300-3034-002
EDAC Dual Relay Card	300-3020-001
EDAC Power Supply, Continental European	500-1120-001
EDAC Power Supply, North American	500-1120-002
EDAC Multi-Unit Power Supply, Continental European	500-1120-003
EDAC Multi-Unit Power Supply, North American	500-1120-005
EDAC Power Distribution Panel	500-1102-001
EDAC Power Distribution Module	500-1102-002
EDAC Power Distribution Cable	450-1102-001

NOTE

Power supplies are desktop style and come with mounting hardware.

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2.0 FUNCTIONAL DESCRIPTION

All connectors, controls and indicators are located on the front panel as shown in Figure 3. There are two connectors: a standard female 5-pin DIN connector for 5VDC and 12VDC power input and an RJ-21 (25-pair) male connector for port and recorder interfacing. Four DIP switches allow the EDAC to be configured for a wide variety of user needs. LEDs indicate power and port activity.

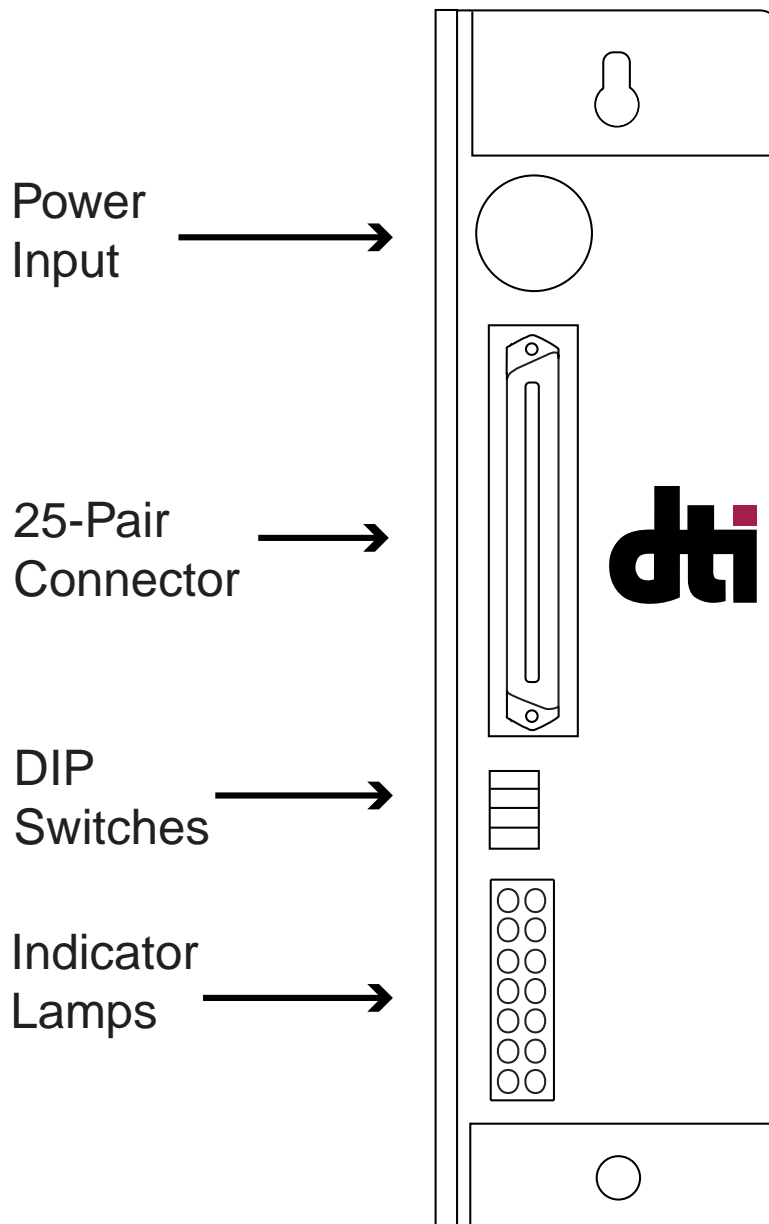


Figure 3. Front Panel

2.1 Power Input Receptacle

Table 3 and Figure 4 represent the EDAC power receptacle pins and their respective signals for the EDAC unit.

Table 3. Power Input Receptacle Pinout

PIN	SIGNAL
1	Common
2	Common
3	+5VDC
4	NC
5	+12VDC

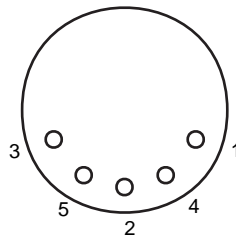


Figure 4. EDAC Power Input Receptacle Pin Diagram

WARNING

Use only Class 2 UL approved power supplies which mate to the pinout defined in Table 3 and Figure 4 (receptacles and input connectors must have mirrored pinouts). DTI strongly recommends the use of the power supplies identified in Table 2 and described in this manual. Use of unapproved power supplies may damage the EDAC unit and void warranty.

2.2 Single-Unit Power Supplies

A universal switch mode type power supply is used in the 500-1120-001 and 500-1120-002 power supplies. This desktop style supply comes with mounting hardware, accepts 90-260VAC input at 47-63Hz and provides regulated outputs of +5VDC @ 2A and +12VDC @ 800mA. An International Electric Code (IEC 320) connector attaches input power to the power supply. The 500-1120-002 includes a North American power cord, and the 500-1120-001 includes a Continental European (Schuko) power cord.

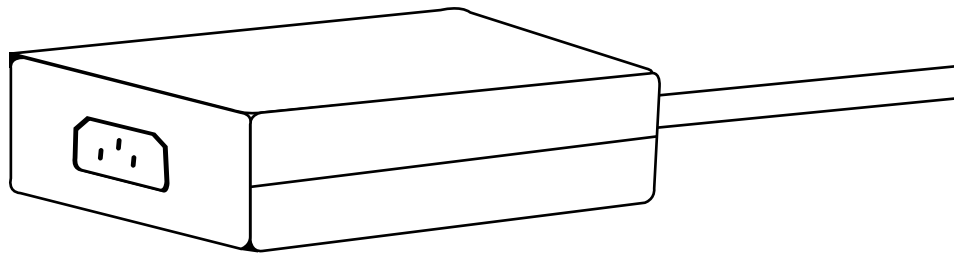


Figure 5. Single-Unit Power Supply

2.3 Multi-Unit Power Supplies

A universal switch mode type power supply is used in the 500-1120-003 and 500-1120-005 power supplies. This desktop style supply comes with mounting hardware, can power up to four fully loaded EDACs and is required for rack mount installation. It accepts 85-264VAC input at 47-440Hz frequency and supplies +5VDC @ 5A and +12VDC @ 3A. An International Electric Code (IEC 320) connector attaches input power to the power supply. The 500-1120-005 includes a North American power cord, and the 500-1120-003 includes a Continental European (Schuko) power cord. This supply is also useful when wall mounting multiple EDAC units (see section 4.5.1.3 for details).

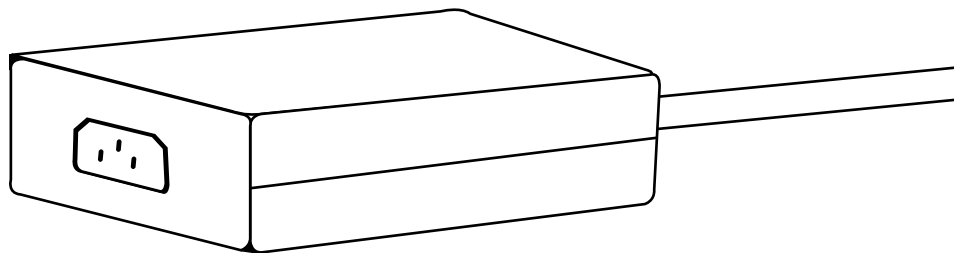


Figure 6. Multi-Unit Power Supply

2.4 Indicator Lamps

Two green lamps on the front of the unit indicate that the unit is receiving 5V and 12V power levels. The other 12 lamps are red and illuminate when the associated telephone set is off-hook. On the Aspect CallCenter, the red LED will illuminate when a call is active on the associated telephone. Figure 7 shows positions for each port's LED. LEDs may illuminate where port cards have been installed but are not cross-connected since port cards not cross-connected do not receive idle code. When relay cards are installed, the associated indicator lamp will not be lit.

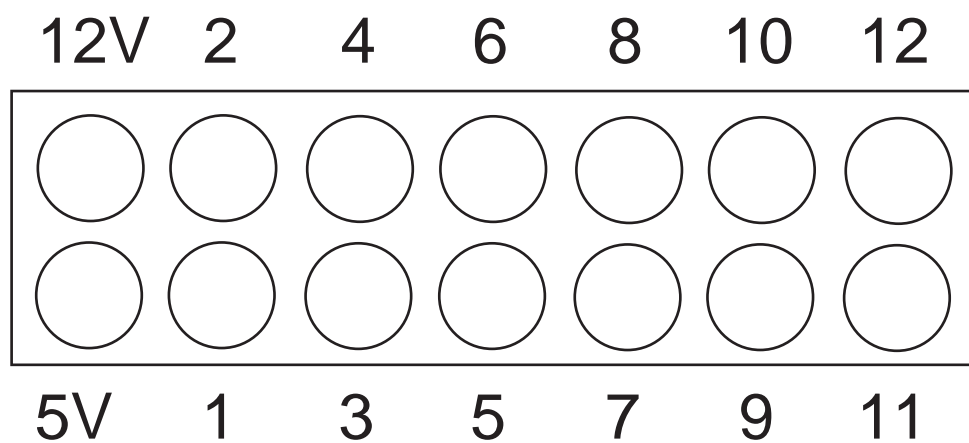


Figure 7. Indicator Lamps

2.5 RJ-21 (25-Pair) Connector

An RJ-21 (25-pair) male connector provides access to the EDAC's digital inputs, analog outputs and relay contact pairs.

2.6 Cabling

To attach the EDAC unit to a user-furnished cross-connect block, the user must provide a 25-pair, 24 AWG (0.5mm) standard twisted pair wire cable terminated with a female RJ-21 connector on one end.

2.7 Digital Input

The digital input of each port on the EDAC attaches in parallel to one digital telephone port. The unit may be attached to the digital telephone port anywhere along the loop between the switch and the telephone set. The distance between the line connection and the EDAC unit (tap length) should be no more than 30 feet (9 meters). There should be no line stubs (loose, non-terminated cables). Loop length limits range from 1,000 feet (305 meters) to 2,500 feet (762 meters) depending on the system. Refer to section 3.8 for more detail.

The EDAC interface adds very minimal loading of the digital telephone line and will not affect normal telephone operation. The EDAC digital input is cross-connected in parallel with the telephone's digital signaling pair.

SPECIAL NOTE FOR EDAC/SR USERS

The EDAC/SR provides selective recording for a 16-button Meridian 1 digital telephone set. The EDAC/SR will send audio to the recorder for all line appearances except buttons 8 through 11. For this application, it is required that only single appearance lines be assigned to buttons 8 through 11. Assigning Multiple Appearance Directory Numbers (MADN) or feature keys to buttons in this range may result in the EDAC/SR not performing properly.

2.8 Analog Output

The analog output of each port on the EDAC is cross-connected to the analog input of standard 600 ohm recording or monitoring equipment. The EDAC's analog output is a 600 ohm pair with a nominal level of -12dBm. Both ends of the conversation are included in the analog output.

The distance between the EDAC's analog output and the recording equipment may depend on the minimum input level required by the recorder. Typical recording equipment should operate at a distance of up to 2,500 feet (762 meters) from the EDAC with 24 AWG cable. It is recommended that the analog loop be as short as possible to reduce the possibility of noise from nearby electrical equipment that may cause interference in the recorded audio.

2.9 EDAC Power Distribution Panel

The EDAC Power Distribution Panel (Figure 8) allows up to eight EDAC units to be mounted on a 19 inch rack. Threaded inserts enable the user to mount the EDAC units on the front of the panel and two multi-unit power supplies on the back of the panel. The Power Distribution Module (refer to Figure 21 for detail) is attached to the panel and allows the output of each power supply to accommodate up to four EDAC units. Machine screws for EDAC unit and Power Distribution Panel installation are supplied.

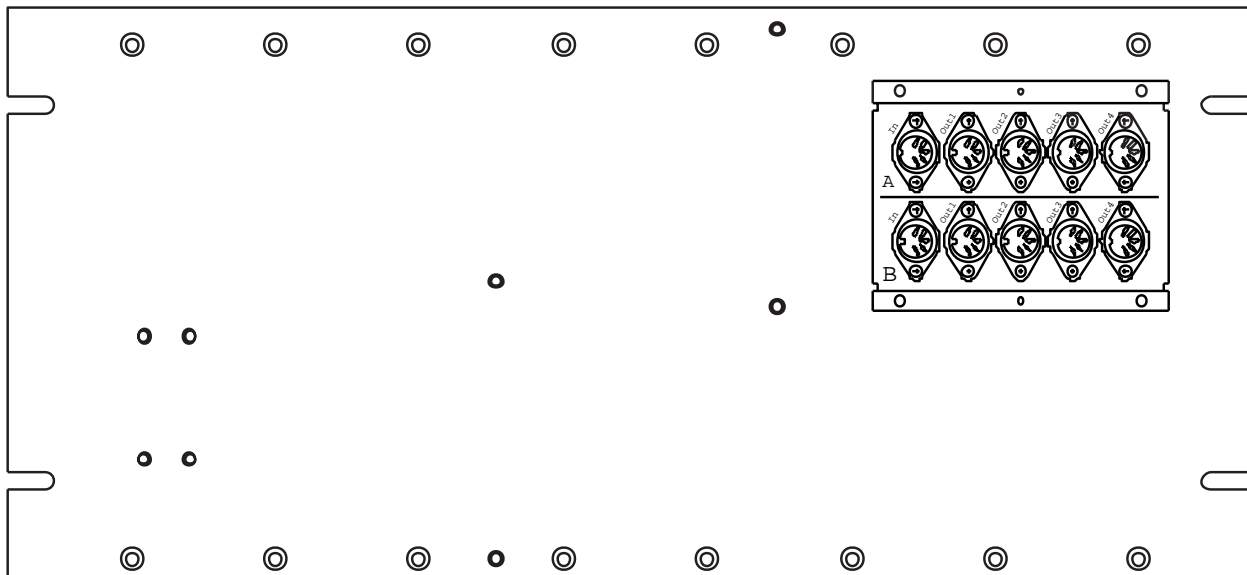


Figure 8. Power Distribution Panel with Module (Back View)

2.10 EDAC Single Port Cards

Single port cards, shown in Figure 9, mount into the SIMM sockets, labeled JP1, JP2, ..., JP12, on the base board (see Figures 16 and 17 more detail). Each port card services one port on the PBX or KSU. These cards provide the main functionality for the EDAC. Prior to installation or removal of cards, ensure that the unit power cord is disconnected.

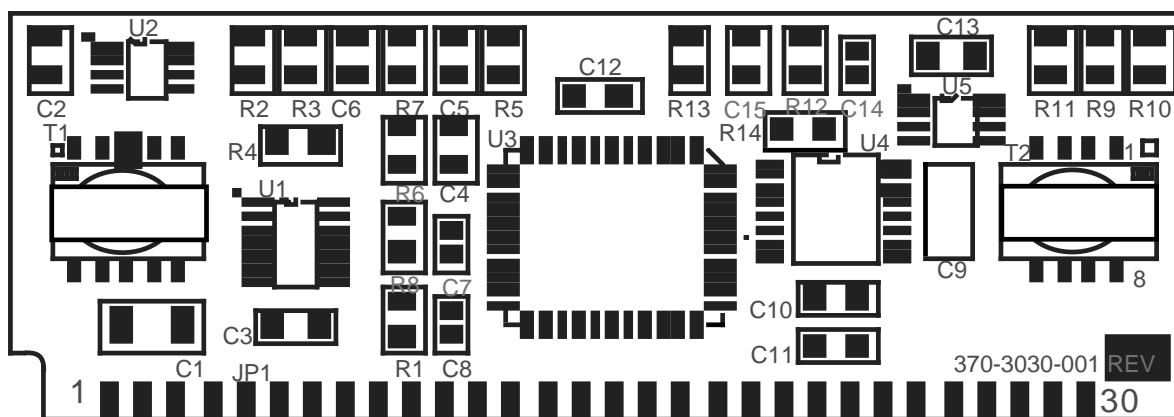


Figure 9. EDAC Single Port Card

SPECIAL NOTE FOR LUCENT USERS:

Two different types of port cards are provided for the Lucent Definity PBX: slave port cards (DTI P/N 300-3032-003) and master port cards (DTI P/N 300-3032-004). Exactly one master port card must be installed in each EDAC Base Unit (DTI P/N 500-1092-001). The remaining eleven slots will be occupied by the slave port cards. Both the master and slave port cards provide digital analog conversion for a single digital telephone.

SPECIAL NOTE FOR EDAC/SR USERS:

Two different types of port cards are provided for the EDAC/Selective Recording (EDAC/SR) application: slave port cards (DTI P/N 300-3034-001) and master port cards (DTI P/N 300-3034-002). Exactly one master port card must be installed in each EDAC/SR Base Unit (DTI P/N 500-1094-001). The remaining eleven slots will be occupied by the slave port cards. Both the master and slave port cards provide digital analog conversion for a single digital telephone.

2.11 EDAC Dual Relay Cards

EDAC dual relay cards, as illustrated in Figure 10, provide dry contact closures for installations where recording equipment is not voice activated and requires start/stop control. Each relay card has two relays allowing one relay card to support one or two ports. The quantity of relay cards needed is dependent on the number of ports configured. A six-port configuration, for example, requires three relay cards. When the recording device requires relay contacts, the maximum number of ports supported per EDAC base unit is eight. When there is no conversation on the line, relay contact pairs are normally open. When there is a conversation on the line, the relay contact closes to start the recorder. If relay closures are needed, port cards may be installed in sockets 1-8 and relay cards in sockets 9-12.

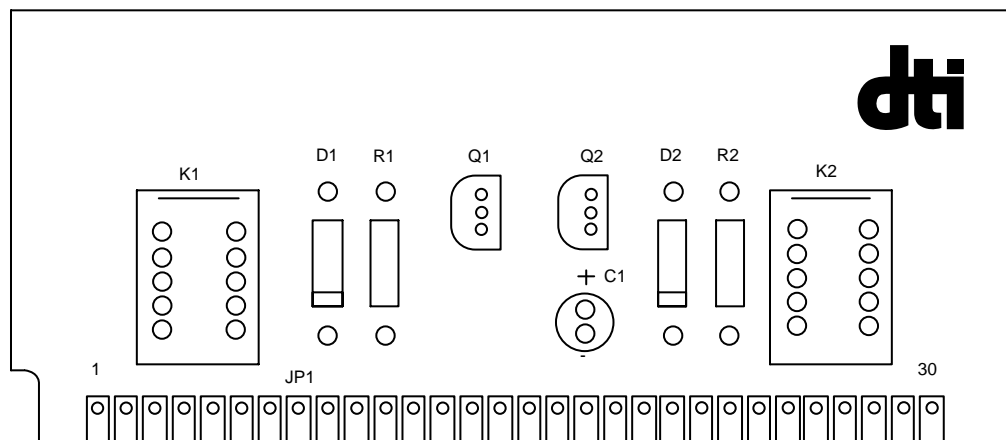


Figure 10. EDAC Dual Relay Card

WARNING

Relay cards are the same size and shape as port cards but should only be installed in sockets JP9 - JP12 on the base unit.

Table 4 shows the port locations on the base board served by each relay card.

Table 4. Relay and Port Card Position Assignments

Relay Card Position	JP9	JP10	JP11	JP12
Port Card Positions	JP1 & JP2	JP3 & JP4	JP5 & JP6	JP7 & JP8

2.12 Base Board

The base board (Figure 11) functions as a backplane for the port and relay cards. Single port cards mount in sockets JP1 through JP12. Relay cards mount only in sockets JP9 through JP12. It is recommended that port cards be mounted in order beginning with JP1. If relay cards are used, they should be mounted beginning with JP9 and should correspond to single port cards as indicated in Table 4.

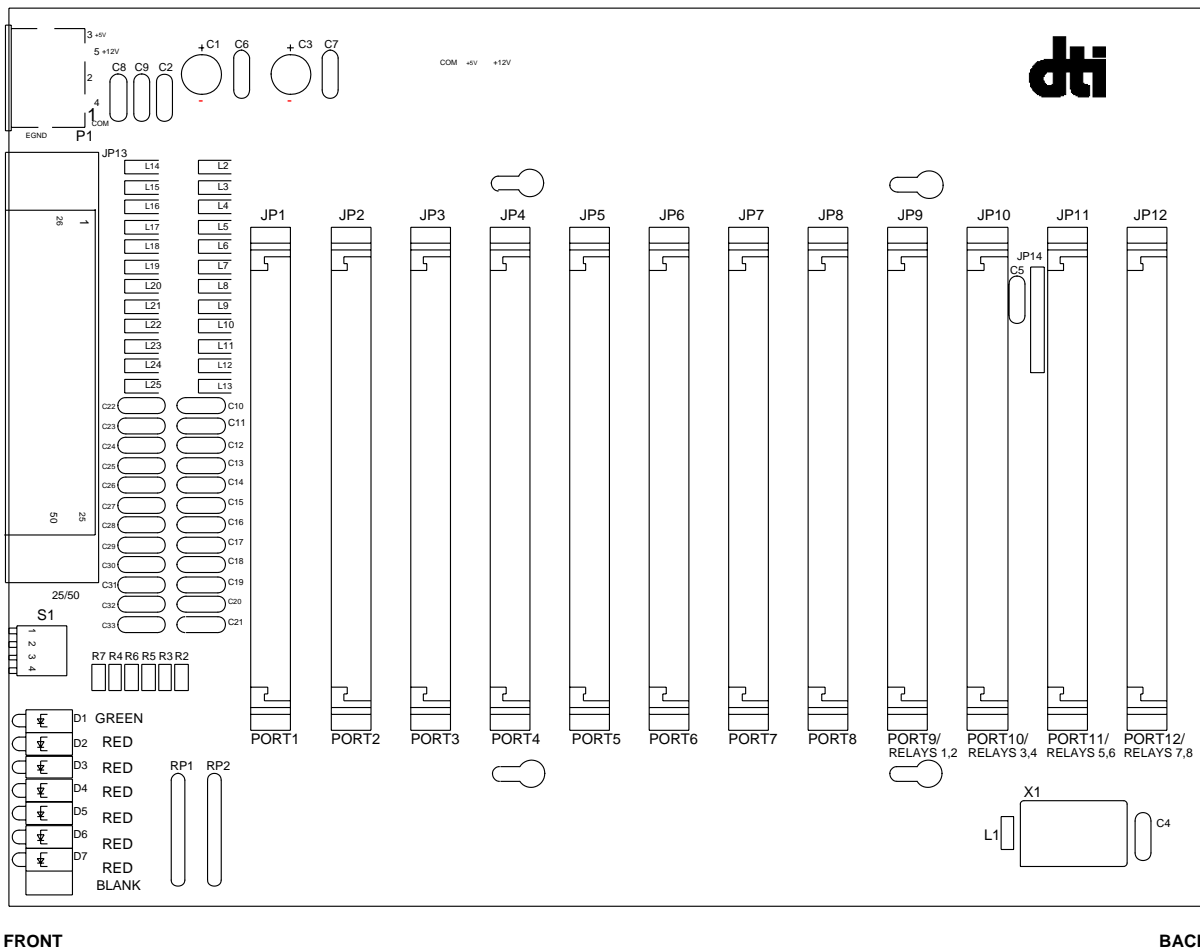


Figure 11. Base Board

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3.0 SPECIFICATIONS

3.1 Signaling

Input impedance > 1 M ohms

3.2 Analog

Output impedance 600 ohms
Output level -12 dBm nominal
Output Voltage 1Vrms

3.3 Power Consumption

Each Port Card +5V at 80mA per port and +12V at 21mA per port
EDAC with 12 Cards 8w max.; +5V at 1A max. and +12V at 250mA
max.
EDAC + 12 Cards + Power Supply 15w max.; 0.125A at 120VAC max.
4 EDACs, each + 12 Cards + Power Supply 70w max.; 0.58A at 120VAC max.

3.4 Relay

Type 2 Form C
UL/CSA Rating 1A @ 30VDC

3.5 Dimensions

Housing 8 x 9.5 x 2.25 inches (20.3 x 24.1 x 5.72 cm)
Port and Relay Cards 1.3 x 3.5 inches (3.3 X 8.9 cm)
Power Distribution Panel 19 x 8.7 x 1.5 inches (48.3 x 22.1 x 3.8 cm); 2.3 pounds (1 kg)
Power Distribution Module 4.5 x 3.5 x 1.5 inches (11.4 x 8.9 x 3.8 cm); 0.2 pounds (91 grams)
EDAC Unit Weight 4.1 pounds fully loaded (1.9 kg); 3.6 pounds empty (1.6 kg)

3.6 Environment

Temperature 0° to 50° C operating
Relative Humidity 5% to 95% non-condensing

3.7 Power Supplies

Multi-Unit Power Supply

Part Number	500-1120-003/-005
Type	Switch Mode
Input Rating	85-264VAC 47-440Hz
Output Rating	+5VDC @ 5A +12VDC @ 3A
Dimensions	7 x 3.75 x 2.25 inches
Cord Length (I/O)	48-72 inches (120-180 cm)
Weight	Approx. 2 pounds (0.9 kg)
Efficiency	65% minimum (for more detail, see section 3.3)

Single-Unit Power Supply

Part Number	500-1120-001/-002
Type	Switch Mode
Input Rating	90-260VAC 47-63Hz
Output Rating	+5VDC @ 2A +12VDC @ 800mA
Dimensions	5.1 x 3.1 x 1.2 inches
Cord Length (I/O)	72 inches (183 cm)
Weight	Approx. 1 pound (0.5 kg)
Efficiency	75% typical (for more detail, see section 3.3)

DIN Power Cable (see Figure 23)

Part Number	450-1102-001
Cord Length	48 inches (120 cm)

Power Cords

North American	72-96 inches (180-245 cm), black
Cont. European (Schuko)	72-96 inches (180-245 cm), black

3.8 Cabling

Wire Type for Cross Connections 24 AWG (0.5mm) Standard Twisted Wire

Loop Length (NEC) 2,500 feet (762 meters) max. for NEAX PBXs
1,000 feet (305 meters) max. for Electra Professional KSU
EDAC can bridge at any point along the loop between the switch and the station set. The EDAC may operate with longer loops if the bridge point is kept away from either end.

Loop Length (Nortel) 1,500 feet (457 meters) max. for Meridian PBXs
1,000 feet (305 meters) max. for Norstar KSU
EDAC can bridge at any point along the loop between the switch and the station set.

Loop Length (Aspect) 1,500 feet (457 meters) max. for Aspect CallCenter
EDAC can bridge at any point along the loop between the switch and the station set.

Loop Length (Lucent) 2,000 feet (610 meters) max. for Definity PBX
EDAC can bridge at any point along the loop between the switch and the station set.

Extended Loop Length (Nortel)

Up to 2,500 feet (762 meters) max. for Meridian PBXs. Extended distance may be maintained on Meridian PBXs only if the EDAC bridge point is no more than 1,300 feet (396 meters) from either end. Norstar loop length must not exceed 1,000 feet (305 meters).

EDAC to Recorder

2,500 feet (762 meters) max.

EDAC to Bridge (Tap Length)

30 feet (9 meters) max.

3.9 Regulatory

The EDAC meets the requirements of the EMC directive 89/336/EEC (CE Marking) which include the standards for safety, emissions and immunity shown in Table 5.

Table 5. Regulatory Compliance

TEST	SPECIFICATION	PROCEDURE
Safety	UL 1459	
Safety	CSA 22.2	
Conducted Emissions, Powerline 230V	EN 55022:1994	CISPR 22, Class A; FCC Part 15
Radiated Emissions, Electric 230V	EN 55022:1994	CISPR 22, Class A; FCC Part 15
Electrostatic Discharge (ESD) Immunity	EN 50082-1:1992	IEC 801-2:1991
Radiated Immunity, Electric	EN 50082-1:1992	IEC 801-3:1984 (1988)
Electrically Fast Transient (EFT) Immunity	EN 50082-1:1992	IEC 801-4:1988 (1990)

- Safety testing was completed in July 1994.
- Emissions testing was completed in August 1994.
- Emissions testing was repeated in August 1996 and December 1997.
- Immunity testing was completed in August 1996.
- Compliance applies to EDAC product revisions as shown below. Note that CE compatibility applies only to later revisions for base units and port cards.

PART	SAFETY UL 1459 / CSA 22.2	EMISSIONS EN 55022	IMMUNITY EN 50082
500-1090-001 Base Unit	All revisions	All revisions	Revisions K or later only
300-3030-001 Port Card	All revisions	All revisions	Revisions M or later only
300-3030-002 NE1 Port Card	All revisions	All revisions	All revisions
300-3030-003 Aspect Port Card	All revisions	All revisions	All revisions

4.0 INSTALLATION

CAUTION

Digital Techniques recommends that this telecommunications device be installed only in an access restricted area such as a switch room. Restricted access to the unit should prevent accidental power interruptions.

The EDAC base unit (DTI P/N 500-1090-001, 500-1092-001, 500-1094-001) is shipped with cards packaged separately. Upon receipt of the unit, inspect the condition of the contents for damage caused during shipping. If damage is detected, contact Digital Techniques prior to setup. If no damage is detected, the unit may be assembled as follows.

WARNING

Do not apply power to the unit unless the housing cover is securely attached. Use static sensitive device precautions during handling and installation of components.

4.1 Opening the Base Unit for Card Installation

- a. With the power disconnected, open the housing by removing the nut from each side of the unit and retain the hardware.
- b. Lift the end of the housing cover opposite the connectors just enough to clear the studs.
- c. Slide the cover past the connectors to remove.
- d. Observe the base board markings and the SIMM sockets. The port and the relay card sockets are numbered JP1 through JP12. See Figure 11. For assembly purposes, JP1 is near the front of the unit, and JP12 is near the rear of the unit.

4.2 Installing Port and Relay Cards

Single port card (DTI P/N 300-3030-001 (Nortel), 300-3030-002 (NEC), or 300-3030-003 (Aspect)) mounting should begin with slot JP1, and subsequent cards should be mounted sequentially.

For Lucent installations, a master port card (DTI P/N 300-3032-004) should be mounted in slot JP1, and subsequent slave cards (DTI P/N 300-3032-003) should be mounted in subsequent slots.

For EDAC/Selective recording (EDAC/SR) installations, a master port card (DTI P/N 300-3034-002) should be mounted in slot JP1, and subsequent slave cards (DTI P/N 300-3034-001) should be mounted in subsequent slots.

Dual relay cards (DTI P/N 300-3020-001) mount only in slots JP9 through JP12 and should be mounted sequentially beginning with slot JP9. Refer to Figure 12 when installing or removing port or relay cards.

To install, follow the steps below:

- a. Orient a card with edge contacts facing down and component side facing toward the front of the unit.
- b. Place the card into the socket with the top angled approximately 60° toward the rear of the unit.
- c. Ensure the contacts on the socket are aligned with the contact pads on the card.
- d. Spread the tabs apart; with downward pressure, rotate the card to 90°.
- e. Press the card down firmly to make sure it is properly seated to the base unit.
- f. Release the tabs to secure the card in place.
- g. Repeat this procedure for all port and relay cards to be installed. Refer to Figure 13 for an example of 4-port installation with relays.
- h. When card installation is complete, ensure that all cards are uniformly spaced, all retainer tabs are properly locked and all cards are securely mounted and latched.
- i. Remove any foreign objects from the unit, and replace the cover.

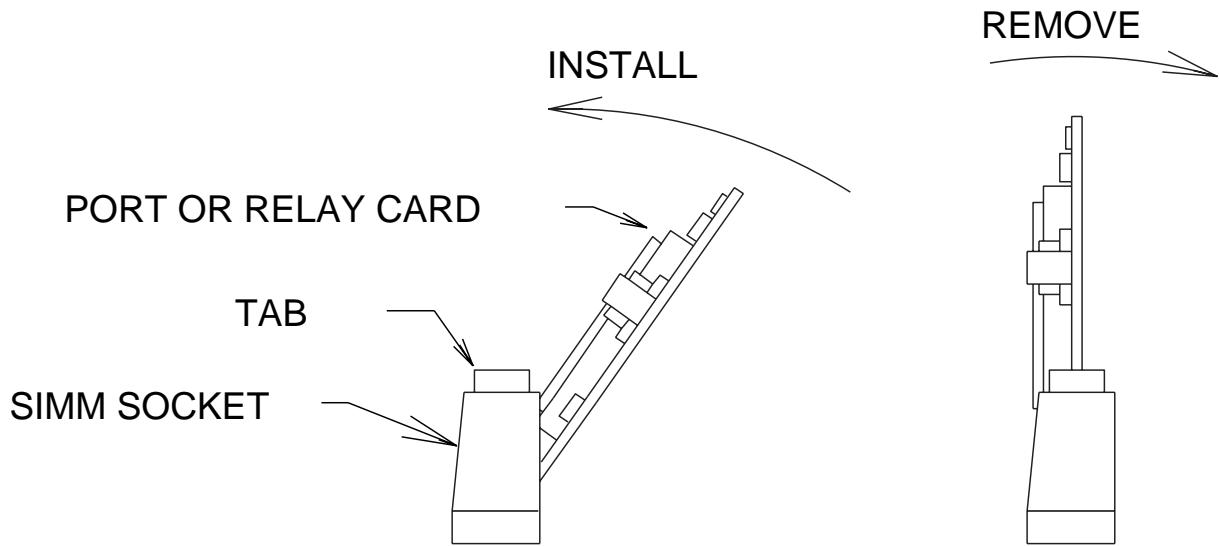


Figure 12. Card Installation and Removal

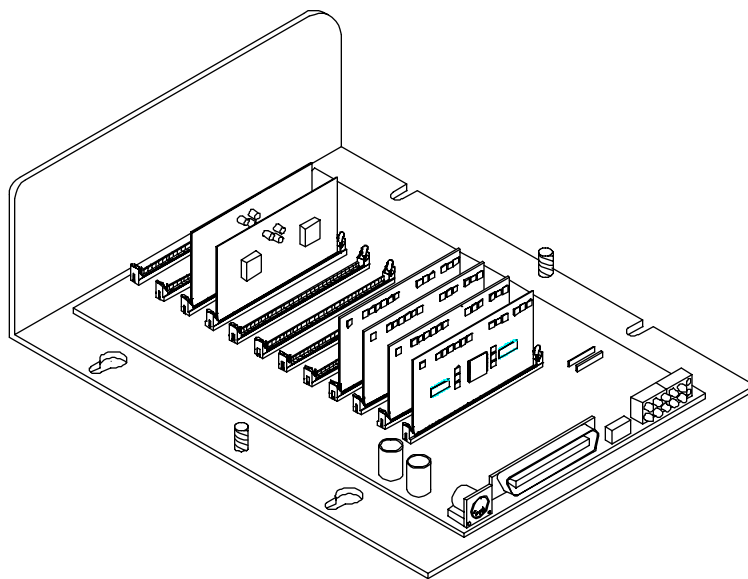


Figure 13 EDAC Configured for Four Ports with Relays

4.3 Removing Port and Relay Cards

CAUTION

Use static sensitive device precautions during handling and installation of components.

If removing the cards with the unit mounted, the cards can fall out of sockets once the retainer tabs are released.

WARNING

Do not try to force or pull on card to remove. Damage to card or socket could result.

- a. Remove power from the unit.
- b. If possible, dismount and lay the unit on a horizontal surface.

CAUTION

If power was just disconnected, components on the card may be hot. Allow the unit to cool for a few minutes.

- c. To remove the card (see Figure 12) pull the tabs on the retainer outward until the card is released. When the card releases, it will rotate toward the rear of the unit.
- d. Once the card rotates, gently ease the card out of the socket. Do not drag the pads of the card on the contacts of the socket.
- e. When the card is removed, place it back in the shipping container, if available, or in an anti-static container which will prevent the card from being damaged.

4.4 Setting DIP Switches

Set the DIP switches on the base unit to match the system environment, as indicated in the following sections.

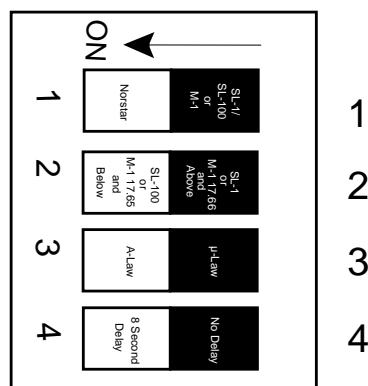
4.4.1 Nortel Systems

User configured DIP switches are accessible from the front of the unit. Switch selections are as follows.

- Switch 1 selects between a PBX (M-1, SL-1 and SL-100) or the Norstar KSU.
- Switch 2 selects the software revision if the PBX is used. If the Norstar KSU is used, the setting of switch 2 should be OFF for μ -Law or ON for A-Law.
- Switch 3 selects between A-Law and μ -Law pulse code modulation (PCM) coding. μ -Law is used primarily in the United States, Canada and Japan. A-Law is used in other parts of the world. If the Norstar KSU is used, the setting of switch 3 should be OFF for μ -Law or ON for A-Law.
- Switch 4 selects between standard and T-1 trunks. T-1 trunks have echo suppression which causes the EDAC to switch on and off during a conversation making the audio output sound choppy. When using the T-1 option, there will be an 8 second delay following line release. The delay keeps the analog output active for 8 seconds after the line has been released.

Figure 14 represents the switch settings as shipped with all switches set by factory default to the OFF position. Table 6 identifies switch selections used with a Meridian PBX, including the EDAC/SR application. Table 7 identifies switch settings used with a Norstar.

- Top of EDAC front panel as shown in Figure 3.



Note: White designates ON.
Black designates OFF.

Figure 14. User Configured DIP Switches (Nortel)

Table 6. Switch Settings for Nortel SL-1, SL-100 or M-1 Systems

CONFIGURATION			SWITCH SETTING					
PBX	SOFTWARE REVISION	LAW CODING	RELEASE DELAY*	1	2	3	4	
SL-1 SL-100 or M-1	SL-1 or M-1 17.66 and Above	μ -Law	None	OFF	OFF	OFF	OFF	
		μ -Law	8 Sec	OFF	OFF	OFF	ON	
	SL-100 or M-1 17.65 and Below	A-Law	None	OFF	OFF	ON	OFF	
		A-Law	8 Sec	OFF	OFF	ON	ON	
	SL-100 or M-1	SL-100 or M-1 17.65 and Below	μ -Law	None	OFF	ON	OFF	OFF
			μ -Law	8 Sec	OFF	ON	OFF	ON
		SL-100 or M-1 17.65 and Below	A-Law	None	OFF	ON	ON	OFF
			A-Law	8 Sec	OFF	ON	ON	ON

* For systems connected to T-1 trunks, set Release Delay to 8 seconds so that echo suppression will not interfere with operation of the unit.

Table 7. Switch Settings for Nortel Norstar Systems

CONFIGURATION			SWITCH SETTING			
KSU	LAW CODING	RELEASE DELAY*	1	2	3	4
Norstar	μ -Law	None	ON	OFF	OFF	OFF
		8 Sec	ON	OFF	OFF	ON
	A-law	None	ON	ON	ON	OFF
		8 Sec	ON	ON	ON	ON

* For systems connected to T-1 trunks, set Release Delay to 8 seconds so that echo suppression will not interfere with operation of the unit.

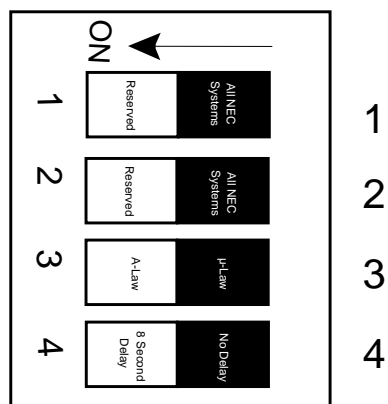
4.4.2 NEC Systems

User configured DIP switches are accessible from the front of the unit. Switch selections are as follows.

- Switches 1 and 2 should be set to OFF for use with NEC systems.
- Switch 3 selects between A-Law and μ -Law pulse code modulation (PCM) coding. μ -Law is used primarily in the United States, Canada and Japan. A-Law is used in other parts of the world.
- Switch 4 selects between standard and T-1 trunks. T-1 trunks have echo suppression which causes the EDAC to switch on and off during a conversation making the audio output sound choppy. When using the T-1 option, there will be an 8 second delay following line release. The delay keeps the analog output active for 8 seconds after the line has been released.

Figure 15 represents the switch settings as shipped with all switches set by factory default to the OFF position. Table 8 identifies all switch selections for NEC systems.

- Top of EDAC front panel as shown in Figure 3.



Note: White designates ON.
Black designates OFF.

Figure 15. User Configured DIP Switches (NEC)

Table 8. Switch Settings for NEC Systems

CONFIGURATION		SWITCH SETTING			
LAW CODING	RELEASE DELAY*	1	2	3	4
μ -Law	None	OFF	OFF	OFF	OFF
μ -Law	8 Sec	OFF	OFF	OFF	ON
A-Law	None	OFF	OFF	ON	OFF
A-Law	8 Sec	OFF	OFF	ON	ON

* For systems connected to T-1 trunks, set Release Delay to 8 seconds so that echo suppression will not interfere with operation of the unit.

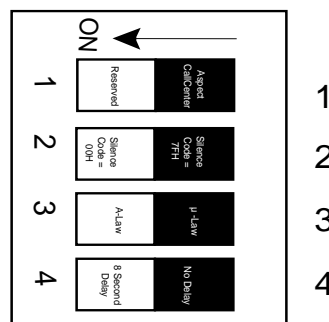
4.4.3 Aspect CallCenter

User configured DIP switches are accessible from the front of the unit. Switch selections are as follows.

- Switch 1 should be set to OFF for use with the Aspect CallCenter.
- Switch 2 selects the PBX silence code. The default (OFF) sets the silence code to 7FH and will be valid for most installations. For older versions of the Aspect CallCenter, set the switch to ON, which will set the idle code to 00H.
- Switch 3 selects between A-Law and μ -Law pulse code modulation (PCM) coding. μ -Law is used primarily in the United States, Canada and Japan. A-Law is used in other parts of the world.
- Switch 4 selects between standard and T-1 trunks. T-1 trunks have echo suppression which causes the EDAC to switch on and off during a conversation, making the audio output sound choppy. When using the T-1 option, there will be an 8 second delay following line release. The delay keeps the analog output active for 8 seconds after the line has been released.

Figure 16 represents the switch settings as shipped, with all switches set by factory default to the OFF position. Table 9 identifies all switch selections for the Aspect CallCenter.

- Top of EDAC front panel as shown in Figure 3.



Note: White designates ON.
Black designates OFF.

Figure 16. User Configured DIP Switches (Aspect)

Table 9. Switch Settings for Aspect CallCenter

CONFIGURATION			SWITCH SETTINGS			
SILENCE CODE	LAW CODING	RELEASE DELAY	1	2	3	4
7FH	μ-Law	None	OFF	OFF	OFF	OFF
7FH	μ-Law	8 Sec	OFF	OFF	OFF	ON
7FH	A-Law	None	OFF	OFF	ON	OFF
7FH	A-Law	8 Sec	OFF	OFF	ON	ON
00H	μ-Law	None	OFF	ON	OFF	OFF
00H	μ-Law	8 Sec	OFF	ON	OFF	ON
00H	A-Law	None	OFF	ON	ON	OFF
00H	A-Law	8 Sec	OFF	ON	ON	ON

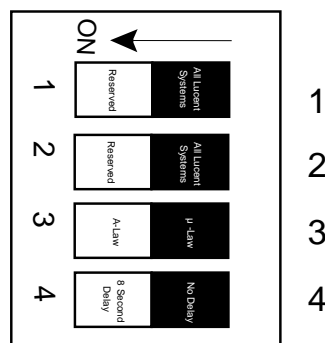
4.4.4 Lucent Definity

User configured DIP switches are accessible from the front of the unit. Switch selections are as follows.

- Switches 1 and 2 should be set to OFF for use with Lucent Definity.
- Switch 3 selects between A-Law and μ-Law pulse code modulation (PCM) coding. μ-Law is used primarily in the United States, Canada and Japan. A-Law is used in other parts of the world.
- Switch 4 selects between standard and T-1 trunks. T-1 trunks have echo suppression which causes the EDAC to switch on and off during a conversation making the audio output sound choppy. When using the T-1 option, there will be an 8 second delay following line release. The delay keeps the analog output active for 8 seconds after the line has been released.

Figure 17 represents the switch settings as shipped with all switches set by factory default to the OFF position. Table 10 identifies all switch selections for Lucent systems.

- Top of EDAC front panel as shown in Figure 3.



Note: White designates ON.
Black designates OFF.

Figure 17. User Configured DIP Switches (Lucent Definity)

Table 10. Switch Settings for Lucent Definity

CONFIGURATION		SWITCH SETTING			
LAW CODING	RELEASE DELAY*	1	2	3	4
μ -Law	None	OFF	OFF	OFF	OFF
μ -Law	8 Sec	OFF	OFF	OFF	ON
A-Law	None	OFF	OFF	ON	OFF
A-Law	8 Sec	OFF	OFF	ON	ON

* For systems connected to T-1 trunks, set Release Delay to 8 seconds so that echo suppression will not interfere with operation of the unit.

4.5 Installing the EDAC Unit

4.5.1 Mounting

4.5.1.1 Wall Mounting

For wall mount installations, the EDAC must be attached to 3/8 inch (minimum) plywood using standard wood screws. It may be mounted flat or vertically, extending from the surface. Normal wall mounting applications are shown in Figure 18. For instructions on wall mounting with power distribution, see section 4.5.1.3.

NOTE

Key shaped mounting holes must be at the top of the unit when wall mounting the EDAC.

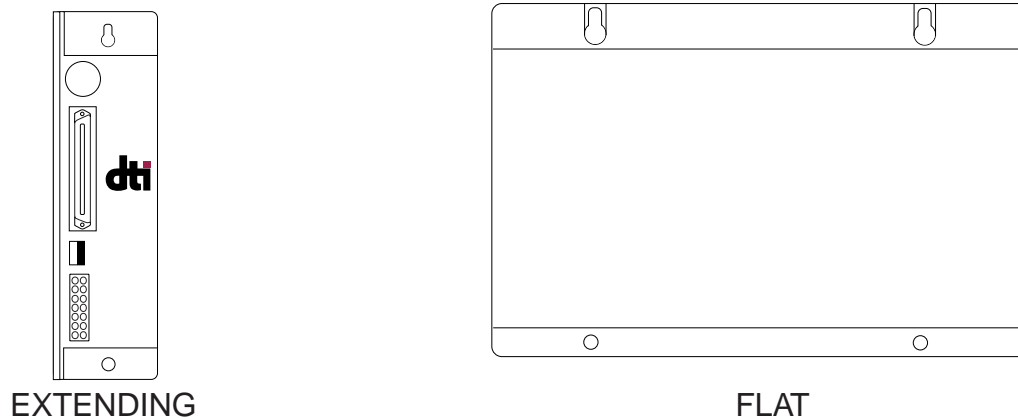


Figure 18. Recommended Wall Mounting

CAUTION

Do not mount the unit horizontally extending from the wall as shown in Figure 19.

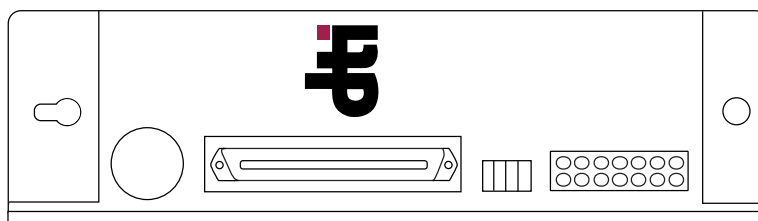


Figure 19. Non-Recommended Wall Mounting

4.5.1.2 Rack Mounting with Power Distribution

If rack mounting is preferred, the EDAC Power Distribution Panel (DTI P/N 500-1102-001) is used. Up to eight EDAC units and two power supplies can be mounted on one rack panel to a customer-furnished 19 inch rack. When rack mounting, EDAC units install on the front of the Power Distribution Panel, and power supplies mount on the back. Using Figures 20 and 21 and Table 11 as guides, install as follows utilizing the hardware supplied with the Power Distribution Panel.

- Mount Power Distribution Panel to either side (front or back) of rack.
- Mount EDAC units on the front of the Power Distribution Panel.
- Mount multi-unit power supplies to the back of Power Distribution Panel.
- Connect one power supply output (P/S #1, 5-pin connector) to Power Distribution Module input A.
- Connect one power supply output (P/S #2, 5-pin connector) to Power Distribution Module input B.

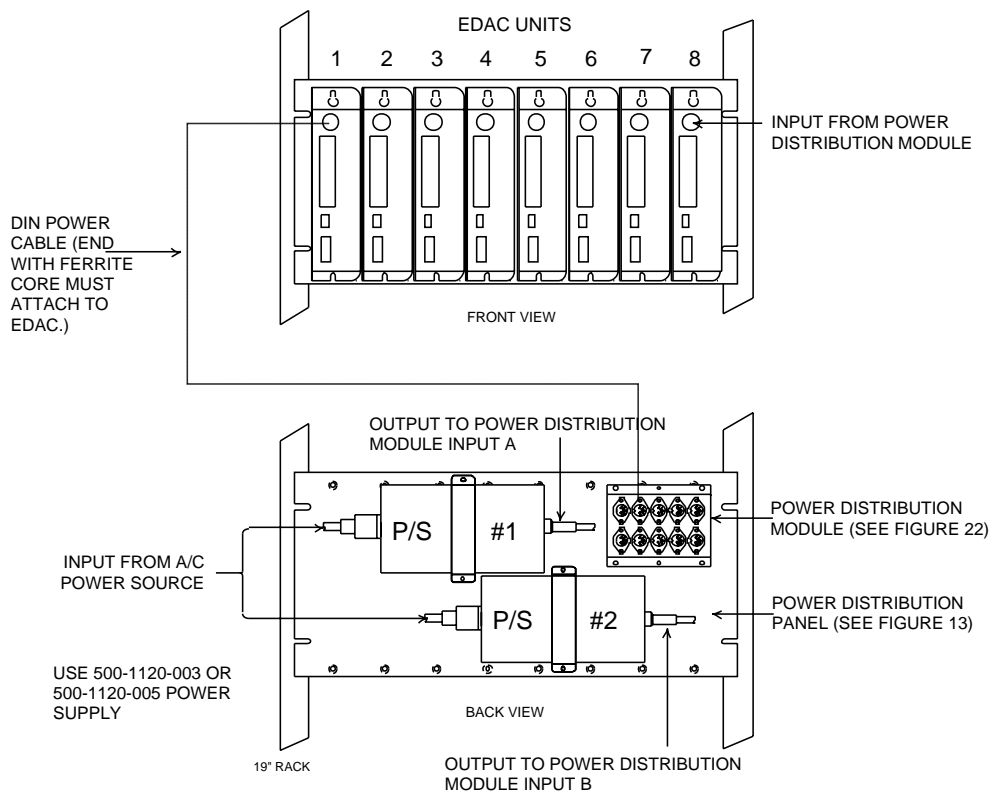


Figure 20. Front and Back View of Rack Mount Installation

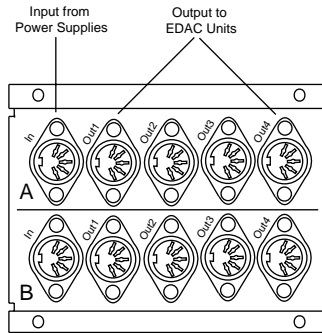


Figure 21. Power Distribution Module

- f. Connect DIN cables (Figure 22) according to chart in Table 11. Ferrite core end must attach to EDAC.
- g. Connect power supply AC cords to suitable AC power. DTI recommends the use of a surge suppressor.

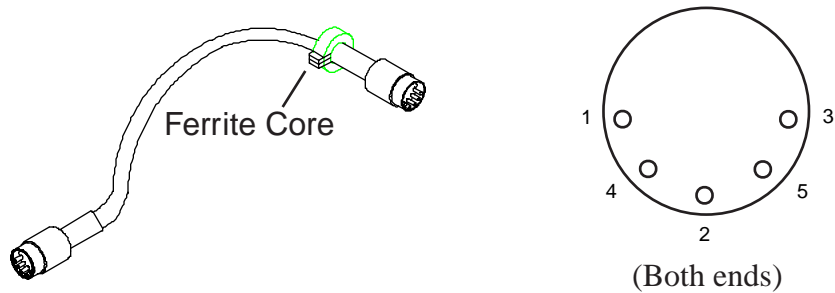


Figure 22. DIN Power Cable

Table 11. DIN Power Cable Connections

DIN CABLE	FROM POWER DISTRIBUTION MODULE OUTPUT	TO EDAC UNIT INPUT
1	A Out1	1
2	A Out2	2
3	A Out3	3
4	A Out4	4
5	B Out1	5
6	B Out2	6
7	B Out3	7
8	B Out4	8

4.5.1.3 Wall Mounting with Power Distribution

It is also possible to wall mount multiple EDAC units and power supplies using the Power Distribution Module (DTI P/N 500-1102-002). No minimum or maximum spacing between EDACs is required. Using Figures 21 and 23 and Table 11 as guides, install as follows.

- a. Mount Power Distribution Module to wall.
- b. Mount EDAC units according to section 4.5.1.1.
- c. Mount multi-unit power supplies to wall.
- d. Connect one power supply output (P/S #1, 5-pin connector) to Power Distribution Module input A.
- e. Connect one power supply output (P/S #2, 5-pin connector) to Power Distribution Module input B.
- f. Connect DIN cables (Figure 23) according to chart in Table 11. Ferrite core end must attach to EDAC.
- g. Connect power supply AC cords to suitable AC power. DTI recommends the use of a surge suppressor.

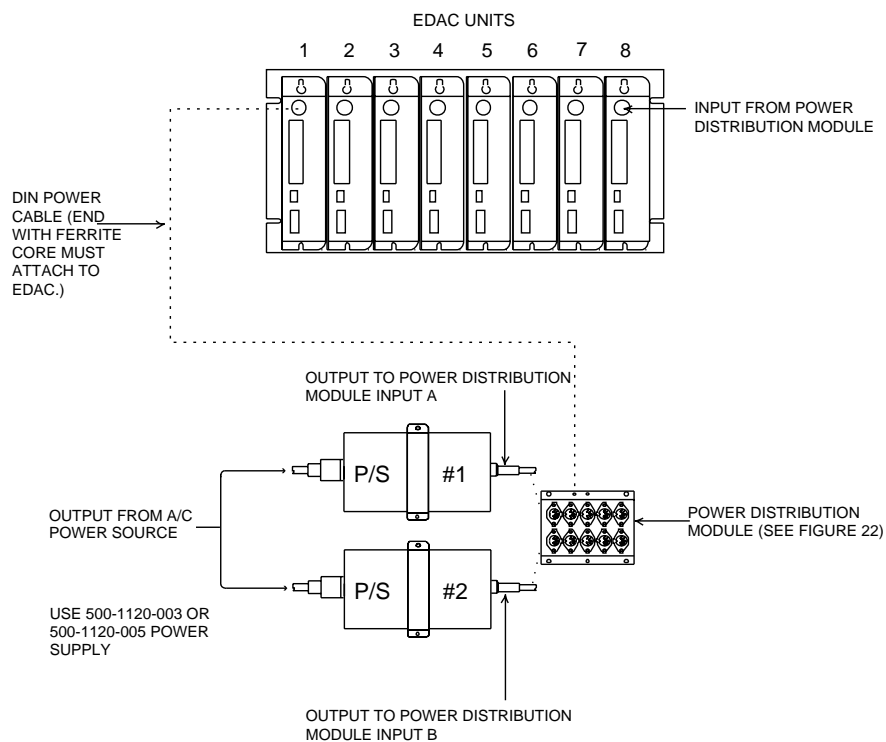


Figure 23. Wall Mount Installation with Power Distribution

4.5.2 Cross Connecting the Digital Input

- a. Plug a standard female RJ-21 (25-pair) cable connector (not supplied with the unit) into the front of the unit.
- b. Using Table 12 and Figure 24 as guides, cross connect the required quantity of EDAC digital input pairs in parallel with the digital telephones to be monitored. The EDAC digital input is not polarity sensitive, so “Tip to Tip” or “Tip to Ring” can be connected. Up to 12 digital telephones may be connected to the 25-pair connector if relay cards are not used or up to eight per connector if relay cards are required.

4.5.3 Cross Connecting the Analog Output

Cross connect the EDAC’s analog audio output pairs to the recording equipment’s analog input pairs. Refer to Table 10 for the wiring pinouts and color codes. The analog outputs are not polarity sensitive, so “Tip to Tip” or “Tip to Ring” may be connected.

4.5.4 Cross Connecting Relays

If relay cards are used, cross connect the relay contact pairs to the recording equipment contact closure pairs. Refer to Table 10 RJ-21 (25-pair) Connector Pinout. The relay contact outputs are not polarity sensitive, so “Tip to Tip” or “Tip to Ring” may be connected.

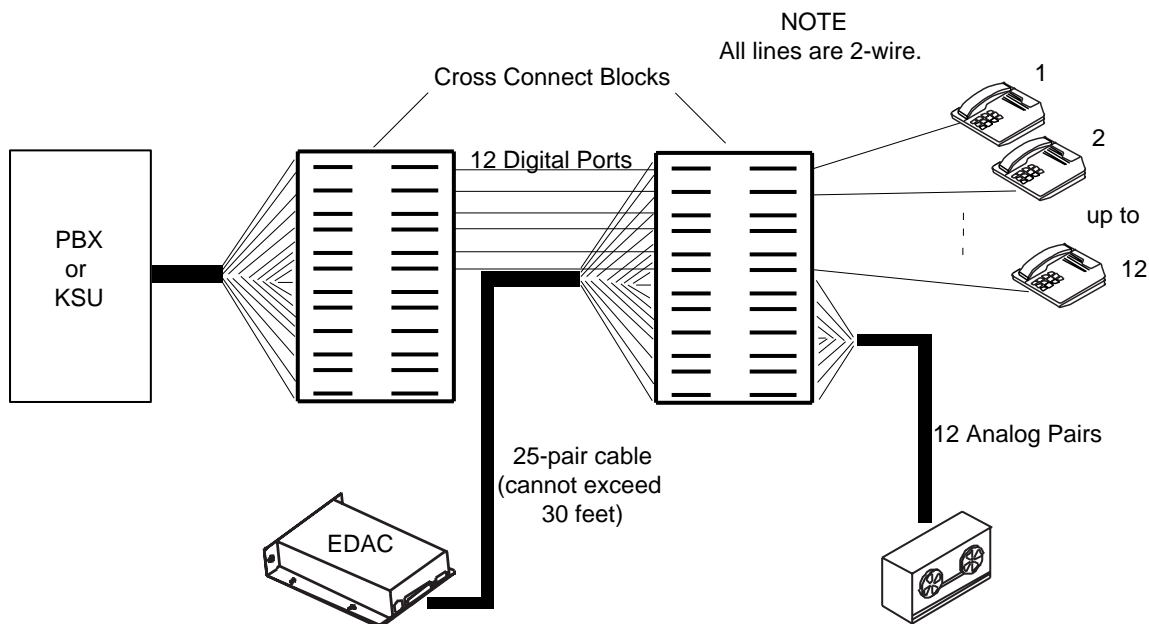


Figure 24. Typical Cross Connection Diagram for One Base Unit with 12 Port Cards

Table 12. RJ-21 (25-Pair) Connector Pinout

PAIR	PAIR COLOR	PINS	SIGNAL
1	wht-blu	1,26	Port 1 Digital Input Pair
2	wht-org	2,27	Port 2 Digital Input Pair
3	wht-grn	3,28	Port 3 Digital Input Pair
4	wht-brn	4,29	Port 4 Digital Input Pair
5	wht-slt	5,30	Port 5 Digital Input Pair
6	red-blu	6,31	Port 6 Digital Input Pair
7	red-org	7,32	Port 7 Digital Input Pair
8	red-grn	8,33	Port 8 Digital Input Pair
9	red-brn	9,34	Port 9 Digital Input Pair or Port 1 Relay Output Pair
10	red-slt	10,35	Port 10 Digital Input Pair or Port 2 Relay Output Pair
11	blk-blu	11,36	Port 11 Digital Input Pair or Port 3 Relay Output Pair
12	blk-org	12,37	Port 12 Digital Input Pair or Port 4 Relay Output Pair
13	blk-grn	13,38	Port 1 Analog Output Pair
14	blk-brn	14,39	Port 2 Analog Output Pair
15	blk-slt	15,40	Port 3 Analog Output Pair
16	yel-blu	16,41	Port 4 Analog Output Pair
17	yel-org	17,42	Port 5 Analog Output Pair
18	yel-grn	18,43	Port 6 Analog Output Pair
19	yel-brn	19,44	Port 7 Analog Output Pair
20	yel-slt	20,45	Port 8 Analog Output Pair
21	vio-blu	21,46	Port 9 Analog Output Pair or Port 5 Relay Output Pair
22	vio-org	22,47	Port 10 Analog Output Pair or Port 6 Relay Output Pair
23	vio-grn	23,48	Port 11 Analog Output Pair or Port 7 Relay Output Pair
24	vio-brn	24,49	Port 12 Analog Output Pair or Port 8 Relay Output Pair
25	vio-slt	25,50	Not Used

NOTE

Digital input pairs are not polarity sensitive. Pins 1 and 26 are just to the right of the power connector.

4.5.5 Connecting Power

NOTE

DTI recommends the use of surge suppressors.

WARNING!

Ferrite core end of the DIN power cable must connect to the EDAC to comply with CISPR 22.

4.5.5.1 Wall Mount

- a. Plug the 5-pin power supply connector from the power supply into the 5-pin power input receptacle on the front of the EDAC unit. Refer to Figures 22-24.
- b. Plug the power supply into a suitable AC power source.

4.5.5.2 Rack Mount/Wall Mount (Distributed Power)

- a. Connect one 5-pin power supply connector from one power supply to Power Distribution Module input A and the other to input B. Refer to Figures 21-23.
- b. Connect DIN cables (DTI P/N 450-1102-001) from module outputs to EDAC units as needed. The ferrite core end must connect to the EDAC (see Figure 23).
- c. Connect the power supplies to a suitable AC power source.

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5.0 Testing and Troubleshooting

5.1 Testing

Verify proper operation of the EDAC by observing the LED indicators. The green LEDs indicate the unit is receiving power. The red LEDs indicate when a port is active. Positions which are empty or where relay cards are installed will not light. Indicators may light where port cards are installed but are not cross-connected. Refer to Figure 7 for a view of the LED indicator positions.

Test each port. Make test recordings on each port. LEDs should be on when a line is seized. LEDs should be off when a line is released.

NOTE

Some systems send idle code during dialing and when placing a call on hold, so LEDs will be off and there will be no audio output.

5.2 Troubleshooting

Tables 13, 14, 15, and 16 demonstrate some possible solutions to problems encountered while using the EDAC.

For additional assistance, please contact your distributor or Digital Techniques' Technical Support Department at (800) 383-2477 or (972) 727-1200.

Table 13. Troubleshooting Guide for Nortel Systems

PROBLEM / SYMPTOM	POSSIBLE SOLUTION
<p>No Audio/No Analog Output Green lamps are off. Lamps are dim.</p>	<p>Check power connections. Try a power supply from another EDAC unit, if available. Check to see if red lamps follow hook activity. If no, check input line connections. Check to see if port is enabled. If yes, check output recorder connections. Check for improperly aligned or seated cards (see section 5.2.1). If system uses relays: Check cross connections to relays. Check to see if relay cards are in correct sockets. Listen for relays to close when telephone goes off-hook.</p>
<p>Audio Sounds Poor Output has a high pitched squeal. DAC follows hook activity, but it sounds distorted. Output sounds choppy.</p>	<p>Check PBX selection (see switch 1, section 4.4.1). Check Law coding selection (see switch 3, section 4.4.1). Check trunk selection (see switch 4, section 4.4.1). Check for improperly aligned or seated cards (see section 5.2.1). Check loop length (see section 3.8). Check tap length (cannot exceed 30 feet). Check for line stubs (loose, non-terminated cables). Check port pad settings of PBX/KSU; AGC should be set to N and level to ± 45. Check delay setting (see section 4.4.1).</p>
<p>Intermittence Audio or lamps function intermittently.</p>	<p>Check cross connections. Check power connections. Try a power supply from another EDAC unit, if available. Check to see if port cards are seated properly in SIMM sockets.</p>
<p>Red lamps are always on.</p>	<p>Check idle code selection (see switch 2, section 4.4.1). Check input cross connections. Lamps will always be on when there is no input signal.</p>
<p>Phone does not work (Norstar only).</p>	<p>Verify EDAC unit still has power.</p>
<p>Intermittence Audio or lamps function intermittently. (EDAC/SR only).</p>	<p>Verify that only single appearance lines are assigned to buttons 8 through 11 on the digital set.</p>
<p>No Audio/No Analog Output (EDAC/SR only)</p>	<p>Verify exactly one Master port card is installed in the base unit at position JP1.</p>

Table 14. Troubleshooting Guide for NEC Systems

PROBLEM / SYMPTOM	POSSIBLE SOLUTION
<p>No Audio/No Analog Output Green lamps are off. Lamps are dim.</p>	<p>Check power connections. Try a power supply from another EDAC unit, if available. Check to see if red lamps follow hook activity. If no, check input line connections. Check to see if port is enabled. If yes, check output recorder connections. Check for improperly aligned or seated cards (see section 5.2.1). If system uses relays: Check cross connections to relays. Check to see if relay cards are in correct sockets. Listen for relays to close when telephone goes off hook.</p>
<p>Audio Sounds Poor Output has a high pitched squeal. DAC follows hook activity, but it sounds distorted. Output sounds choppy.</p>	<p>Check Law coding selection (see switch 3, section 4.4.2). Check trunk selection (see switch 4, section 4.4.2). Check for improperly aligned or seated cards (see section 5.2.1). Check loop length (see section 3.8). Check tap length (cannot exceed 30 feet). Check for line stubs (loose, non-terminated cables). Check port pad settings of PBX/KSU. Check delay setting (see section 4.4.2).</p>
<p>Intermittence Audio or lamps function intermittently.</p>	<p>Check cross connections. Check power connections. Try a power supply from another EDAC unit, if available. Check to see if port cards are seated properly in SIMM sockets.</p>
<p>Red lamps are always on.</p>	<p>Check input cross connections. Lamps will always be on when there is no input signal.</p>

Table 15. Troubleshooting Guide for the Aspect CallCenter

PROBLEM / SYMPTOM	POSSIBLE SOLUTION
No Audio/No Analog Output Green lamps are off. Lamps are dim.	Check power connections. Try a power supply from another EDAC unit, if available. Check to see if red lamps follow hook activity. If no, check input line connections. Check to see if port is enabled. If yes, check output recorder connections. Check for improperly aligned or seated cards (see section 5.2.1). If system uses relays: Check cross connections to relays. Check to see if relay cards are in correct sockets. Listen for relays to close when telephone goes off hook.
Audio Sounds Poor Output has a high pitched squeal. DAC follows hook activity, but it sounds distorted. Output sounds choppy	Check Law coding selection (see switch 3, section 4.4.3). Check for improperly aligned or seated cards (see section 5.2.1). Check loop length (see section 3.8). Check tap length (cannot exceed 30 feet). Check for line stubs (loose, non-terminated cables). Check port pad settings of PBX/KSU.
Intermittence Audio or lamps function intermittently.	Check cross connections. Check power connections. Try a power supply from another EDAC unit, if available. Check to see if port cards are seated properly in SIMM sockets.
Red lamps are always on.	Check input cross connections. Lamps will always be on when there is no input signal. Check silence code selection. (See switch 2, section 4.4.3)

Table 16. Troubleshooting Guide for Lucent Definity

PROBLEM / SYMPTOM	POSSIBLE SOLUTION
<p>No Audio/No Analog Output Green lamps are off. Lamps are dim.</p>	<p>Check power connections. Try a power supply from another EDAC unit, if available. Check to see if red lamps follow hook activity. If no, check input line connections. Check to see if port is enabled. If yes, check output recorder connections. Check for improperly aligned or seated cards (see section 5.2.1). If system uses relays: Check cross connections to relays. Check to see if relay cards are in correct sockets. Listen for relays to close when telephone goes off hook. Verify exactly one master port card is installed in the base unit at position JP1.</p>
<p>Audio Sounds Poor Output has a high pitched squeal. DAC follows hook activity, but it sounds distorted. Output sounds choppy.</p>	<p>Check Law coding selection (see switch 3, section 4.4.4). Check trunk selection (see switch 4, section 4.4.4). Check for improperly aligned or seated cards (see section 5.2.1). Check loop length (see section 3.8). Check tap length (cannot exceed 30 feet). Check for line stubs (loose, non-terminated cables). Check port pad settings of PBX/KSU. Check delay setting (see section 4.4.4).</p>
<p>Intermittence Audio or lamps function intermittently.</p>	<p>Check cross connections. Check power connections. Try a power supply from another EDAC unit, if available. Check to see if port cards are seated properly in SIMM sockets.</p>
<p>Red lamps are always on.</p>	<p>Check input cross connections. Lamps will always be on when there is no input signal.</p>

5.2.1 Checking for Improperly Aligned or Seated Cards

Use the following procedure to check cards for improper alignment and seating.

- a. Remove power and 25-pair connector.
- b. Dismount unit from wall or rack.
- c. Remove cover.

CAUTION

If power was just disconnected, components on the card may be hot. Allow the unit to cool for a few minutes.

- d. Inspect for improperly aligned or seated cards.

6.0 WARRANTY

Digital Techniques warrants to the original purchaser that this product will be free from defects in material and workmanship for one year from date of purchase.

In the event of malfunction directly attributable to faulty workmanship or materials, Digital Techniques will, at its option, repair or replace the defective product to whatever extent it shall deem necessary to restore the product to proper operating condition, provided the purchaser sends with the defective product proof of the date of purchase of the product. Please note that Digital Techniques may replace the defective product with a unit of equal value, at the option of Digital Techniques.

IMPORTANT

Before returning a product for repair, the customer must call Digital Techniques for a return authorization number. This number must be included along with the customer's mailing address and telephone number when the product is returned.

During the first year, all labor and material will be provided without charge. DTI provides extended warranty contracts for parts and labor after the expiration of the initial warranty.

Units must be returned postage/freight prepaid. Units returned without proof of date of purchase or out of warranty units will be repaired or replaced, and the customer will be charged for parts and labor.

The customer shall be solely responsible for the failure of any Digital Techniques' product resulting from accident, abuse or misapplication of the product. Digital Techniques assumes no liability as a consequence of such events under the terms of this warranty.

This warranty is in lieu of all other express warranties which now or hereafter might otherwise arise with respect to this product.

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