

EXPANDABLE DIGITAL TO ANALOG CONVERTOR (EDAC)

Formerly the



Installation Guide

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Citel



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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 their 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.

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CHAPTER 1 — Product Description

Overview

The Expandable Digital to Analog Converter (EDAC), shown in Figure 1, allows users with Nortel, Lucent, Avaya NEC, Panasonic, Ericsson, Alcatel, 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 up 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 Converter (EDAC)

EDAC Compatibility

Different models within the EDAC product family support the digital telephone systems shown in Table 1. The shaded areas in the table indicate the telephone systems that are supported by the EDAC models described in this document. Other EDAC models are described in their respective installation guides.

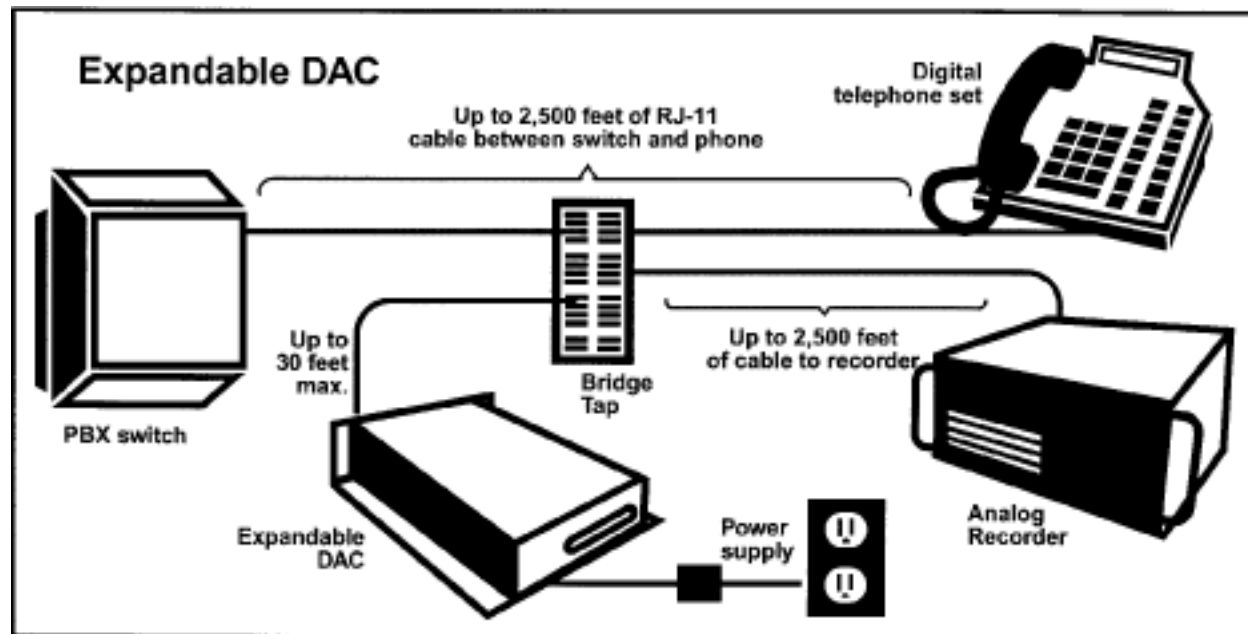
Table 1. EDAC Compatibility

MANUFACTURER	PBX TYPE	PHONE TYPES
Nortel	Norstar	M7100, M7208, M7310, M7324, T7100, T7208, T7316, T7316E
Nortel Standard	Meridian 1, SL-1, SL-100	M2006, M2008, M2009, M2012, M2216, M2616, M2250, M3904, M3905
Nortel Selective Record	Meridian 1 ONLY	M2216, M2616
Nortel Two-Button	Meridian 1 ONLY	M2216, M2616
Nortel Release Detect	Meridian 1 ONLY	M2006, M2008, M2009, M2012, M2216, M2616
NEC	NEAX 2000, NEAX 2400, NEAX 7400 (Line cards 16ELCH & 16ELCJ)	D ^{term} ® Series III & E
NEC	Electra Professional KSU	Electra Professional Series
NEC	8100, 8300 Series	DT310, DT330
Aspect	CallCenter	3010 & 3190 TeleSets
Avaya	Aura Comm Manager 6.2	All 1400 and 2400 Series
Avaya	Avaya IP Office	All 2400, 5400, 1400, 9500 Series
Lucent ***	Definity G3, G5, G6 (2-wire) (Line cards TN2181 & TN2224)	All 6400, 8400 Series, CallMaster III, IV, VI
Lucent ***	Definity (4-wire) (Line cards TN754)	7400 Series, CallMaster I, II, III, IV
Lucent	Merlin Magix	All 4400 Series
Siemens***	Hicom 150 E & 300 E – Ref 6.4 or later (150 E Line card: Q2901-X-G1/01) (300 E Line card: SLMO Q2158-X000) HICOM 100 E (Australia)	150: Office Point, Office Com, Office Pro 300 Optiset; Entry 69660, Basic 69668, Standard 69662, Advance+ 69663
Panasonic	DBS-824 PBX	VB4400
Ericsson	MD110	200 and 210 Series
Alcatel	4200 & 4400 PBX	Reflexes Series 4023, 4034, 4035

*** Compatibility is determined by the digital line card not by phone type.

EDAC Configuration

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



NOTE

Loop length is system dependent. See Cabling section 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.

Meridian 1 Release Detect

The Release Detect version of the EDAC operates much the same as other versions of the EDAC. The Release Detect EDAC turns on when the line becomes active (based on sensed activity in the B1 channel), and stays on until the call is released whereas the standard EDAC turns off when the B1 channel becomes idle.

The above feature prevents the EDAC from turning off during dialing; for instance, the EDAC will not turn off during ring back, etc., or times when the B1 channel may be idle. The EDAC/RD will also turn off when a call is placed on hold (by the local user). This product is compatible only with Meridian systems.

A typical application for this configuration would be an emergency dispatch center where a single headset is used by an attendant to communicate over the telephone system and radio console. For this application, the relay card can be used to automatically switch the headset from the radio to the telephone whenever an active call is detected. This relieves the operator from having to use a foot pedal or other manual device to toggle their headset.

Meridian 1 Selective Recording

The Selective Record version of the EDAC is similar to other versions except that certain lines are reserved for private use. The EDAC will not provide the analog output to the recorder for these lines. All other lines on the digital telephone will activate the recording equipment for both inbound and outbound calls. A typical application for this product 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 a private line. The EDAC/SR has been designed to interface to a Nortel Meridian 1 PBX, utilizing 16-button digital telephones (e.g. M2216, M2616).

The EDAC/SR monitors the digitized voice information carried on the Nortel Meridian digital telephone set. For all line appearances, **except buttons 8 through 11**, the EDAC/SR will capture both sides of the active conversation and reformat the digitized voice information into a standard 600 ohm analog format required by most recording equipment. Any calls which are active on buttons 8 through 11 **will not** generate output to the recording equipment.

The EDAC/SR monitors the state of the LCD lamps for buttons 8 through 11 and will interpret a solid lamp state on a button to indicate an active call. This solid lamp state will trigger the EDAC/SR to stop generating audio output to the recording device. Therefore, it is required that only single appearance lines be assigned to the buttons in this range. If a Multiple Appearance Directory Number (MADN) or Meridian 1 feature is assigned to any button in the range 8 through 11, then the audio output to the recorder will stop when the associated button LCD is solid (e.g. due to activation of the feature, or an off hook condition on one of the MADN phones).

Meridian 1 Three-Button Selective Recording

The Three-Button Selective Record Version of the EDAC is similar to the Selective Record version except for a few key differences. Whereas the Selective Record version provides audio for all lines(buttons) except 8 through 11, the Three-Button version provides audio only for lines (buttons) 0,1, and 2. No other line on the digital set will generate output to the recording equipment. A typical application for this product would be in a call center, where an agent would record all business calls which were answered on their ACD line (Button 0) and secondary lines (Button 1 and Button 2), but not record personal calls which were originated on a private line. The EDAC/3BSR has been designed to interface to a Nortel Meridian 1 PBX, utilizing 8-button or 16-button digital telephones (e.g. M2216, M2616).

The EDAC/3BSR controls the audio output, relays, and status LEDs by monitoring the lamp status for Buttons 0, 1, and 2 on the digital telephone. Based upon the state of the lamps for these three buttons, the EDAC responds as follows:

Table 2. EDAC/3BSR Button 0, 1, & 2 Lamp State

	Button 0, Button 1 and Button 2 Lamp State			
	OFF	SOLID	RING / OFF RING / RING	HOLD / OFF HOLD / RING HOLD / HOLD
Audio Out	OFF	ON	OFF	SILENCE
Relay	OFF	ON	OFF	ON
Status LED	OFF	ON	OFF	ON

This operation allows the relay to be used to designate accurate session marking, independent of whether the call was put on hold. The following example describes how the EDAC/3BSR would respond in a common call-handling situation.

An incoming call is presented on Button 0. When the agent answers the call, the EDAC relay is ON and the audio is sent to the call logger. If the agent puts the call on hold, then the relay remains ON, but silence is now sent out the audio path to the recorder. If the agent then selects line button 1 or 2 to make a consultation call, then the audio for his call will be sent to the call logger. When the consultation is complete and the caller on button 0 is reconnected, the audio from this call will again be sent to the logger. After the call is released, the relay will turn OFF and the audio to the recorder will also be OFF.

Here is another example, if the agent has a caller on hold on button 0 and then makes a private call on button 9, the audio from this private call will not be sent to the logger. In

this situation, the relay will remain in the ON position, until the caller on hold on button 0 is released.

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 3. The shaded areas in the table indicate the telephone systems that are supported by the EDAC models described in this document. Other EDAC models are described in their respective installation guides.

Table 3. EDAC Product Numbers

ITEM	PART NUMBER
EDAC Base Unit (Nortel, NEC, Aspect)	500-1090-001
EDAC Base Unit (Lucent 2-Wire)	500-1092-001
EDAC Base Unit (Lucent 4-Wire)	500-1092-002
EDAC Base Unit (Panasonic)	500-1092-003
EDAC Base Unit (Ericsson)	500-1092-004
EDAC Base Unit (Selective Record)	500-1094-001
EDAC Base Unit (3-Button Selective Record)	500-1094-201
EDAC Base Unit (Siemens)	500-1092-001
EDAC Base Unit (Release Detect)	500-1094-002
EDAC Base Unit (Alcatel)	500-1092-007
EDAC Port Card (Nortel)	300-3030-001
EDAC NE1 Port Card (NEC)	300-3030-002
EDAC Port Card (Aspect)	300-3030-003
EDAC Port Card (Lucent 2-Wire)	300-3032-003
EDAC Port Card (Lucent 4-Wire)	300-3032-007
EDAC Port Card (Panasonic)	300-3032-009
EDAC Port Card (Ericsson)	300-3032-010
EDAC Port Card (Siemens)	300-3032-005
EDAC Port Card (Alcatel)	300-3032-013
EDAC M1 Multi-Function Port Card (Selective Record, 3-Button Selective Record, Release Detect)	300-3034-001
EDAC Dual Relay Card (Multi Function)	300-3020-001
EDAC Power Supply, North American	500-1120-002
EDAC Multi-Unit Power Supply, North American	500-1120-005
EDAC Power Supply, Continental European	500-1120-001
EDAC Multi-Unit Power Supply, Continental European	500-1120-003
EDAC Power Distribution 19 inch Rack Mount Panel	500-1102-001
EDAC Power Distribution Wall Mount Module	500-1102-002
EDAC Power Distribution Cable	450-1102-001

NOTE: Power supplies are desktop style and come with mounting hardware.

Chapter 2

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.

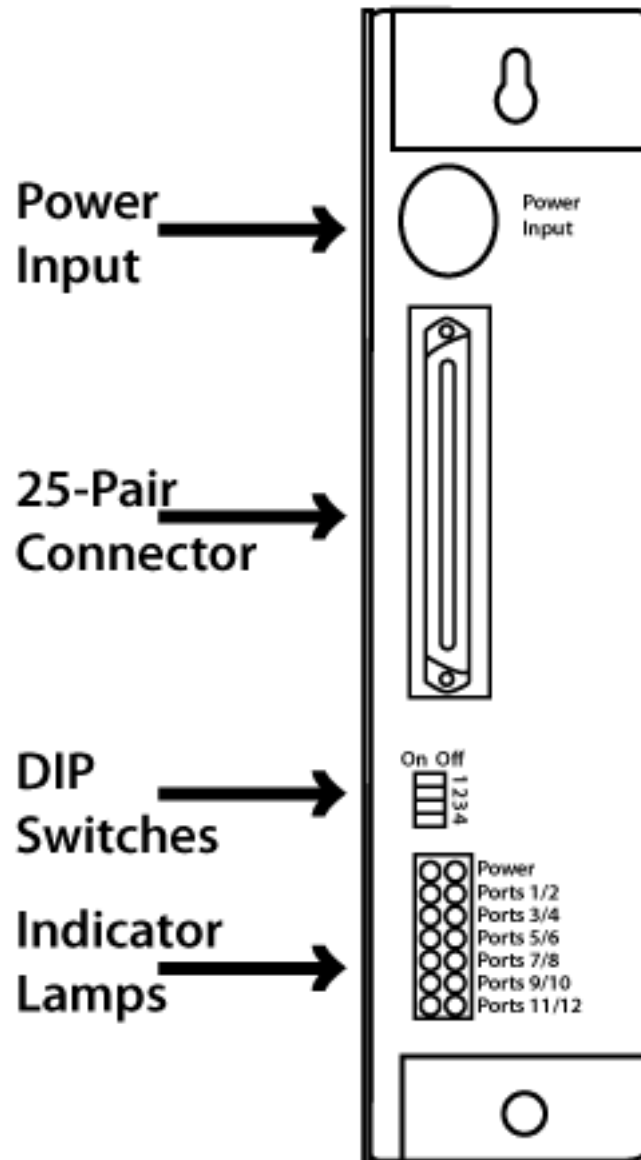


Figure 3. Front Panel

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 active.

Figure 4 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.

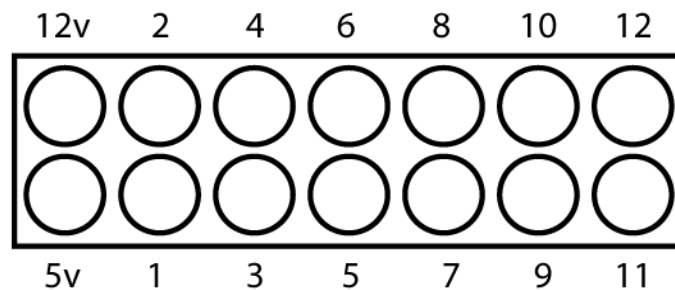


Figure 4. Indicator Lamps

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.

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.

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 Cabling section on page 37 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.

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.

EDAC Single Port Cards

Single port cards, shown in Figure 5, mount into the SIMM sockets, labeled JP1, JP2..., JP12, on the base board (see Figures 6 and 7 for 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.

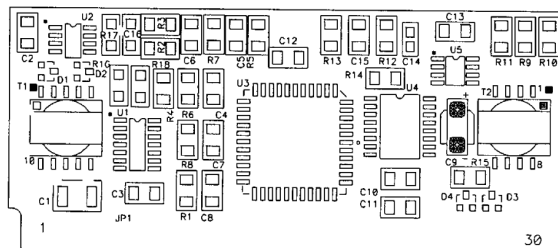


Figure 5. EDAC Single Port Card

EDAC Dual Relay Cards

EDAC dual relay cards, as illustrated in Figure 6, 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. For example, asix-port configuration will require 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.

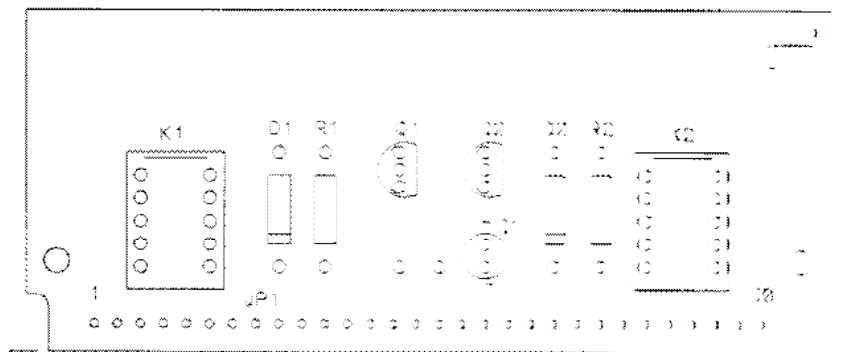


Figure 6. EDAC Dual Relay Card

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 Position	JP1 & JP2	JP3 & JP4	JP5 & JP6	JP7 & JP8

Base Board

The base board (Figure 7) 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.

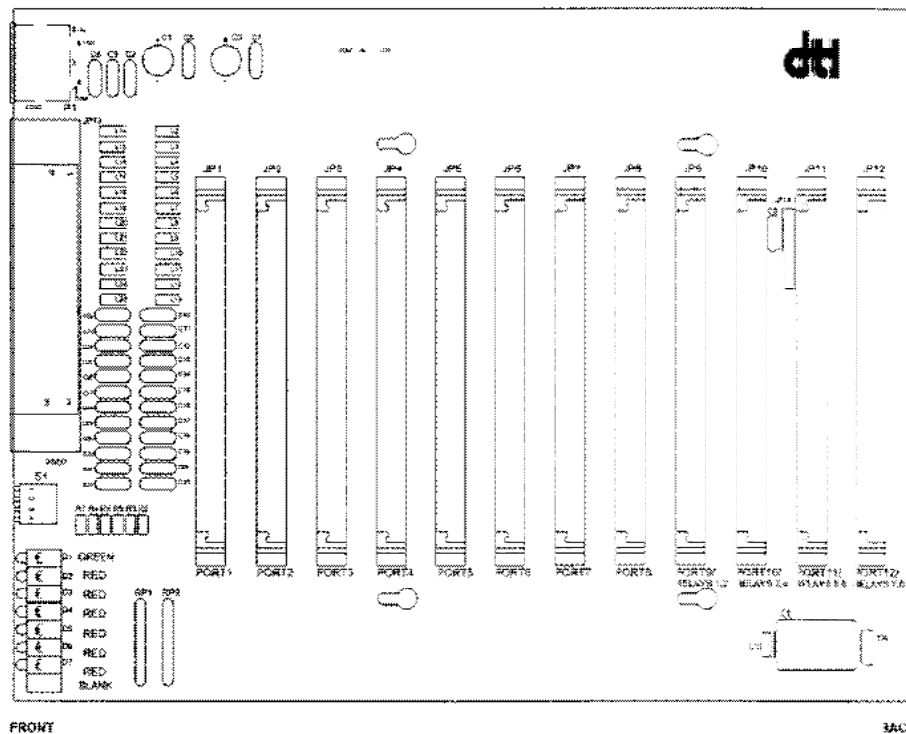


Figure 7. Base Board

EDAC Power Distribution Panel

The EDAC Power Distribution Panel 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 16 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.

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. A new desktop style supply was introduced in July 2013. This unit also comes with mounting hardware, accepts 100-240VAC at 50-60Hz and provides regulated outputs of +12VDC @ 4A and +12VDC @ 2A. 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.

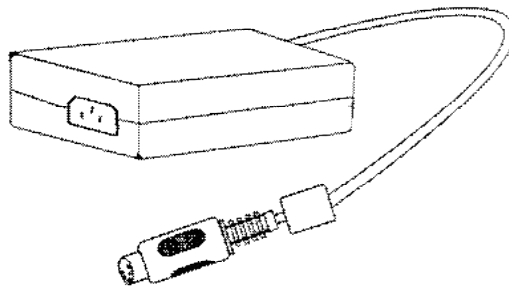


Figure 8. Single-Unit Power Supply

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 page 39 for details).

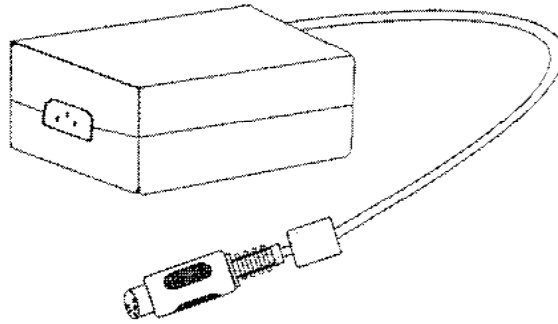


Figure 9. Multi-Unit Power Supply

Chapter 3

INSTALLATION

CAUTION

Citel Technologies recommends that you install this telecommunications device only in an access-restricted area such as a switch room. Restricted access to the unit should prevent accidental power interruptions. To avoid problems of power surges and brownouts, the use of a Uninterruptible Power Supply (UPS) is highly recommended

The EDAC base unit (DTI P/N 500-1090-001, 500-1092-001, 500-1092-003, 500-1092-004) 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 MCK 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.

Installing Port and Relay Cards

Single port card mounting should begin with slot JP1, and subsequent cards should be mounted sequentially.

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 10 when installing or removing port or relay cards.

To install the port and relay cards:

1. Open the base unit for card installation as follows:
 - 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. For assembly purposes, JP1 is near the front of the unit, and JP12 is near the rear of the unit.
2. Orient a card with edge contacts facing down and component side facing toward the front of the unit.
3. Place the card into the socket with the top angled approximately 60° toward the rear of the unit.
4. Ensure the contacts on the socket are aligned with the contact pads on the card.
5. Spread the tabs apart; with downward pressure, rotate the card to 90°.
6. Press the card down firmly to make sure it is properly seated to the base unit.
7. Release the tabs to secure the card in place.
8. Repeat steps 2-7 for all port and relay cards that you are installing. Refer to Figure 11 for an example of 4-port installation with relays.
9. After you have installed the cards, check the following:
 - a. Ensure that all cards are uniformly spaced
 - b. Ensure that all retainer tabs are properly locked
 - c. Ensure that all cards are securely mounted and latched
10. Remove any foreign objects from the unit.
11. Replace the cover.

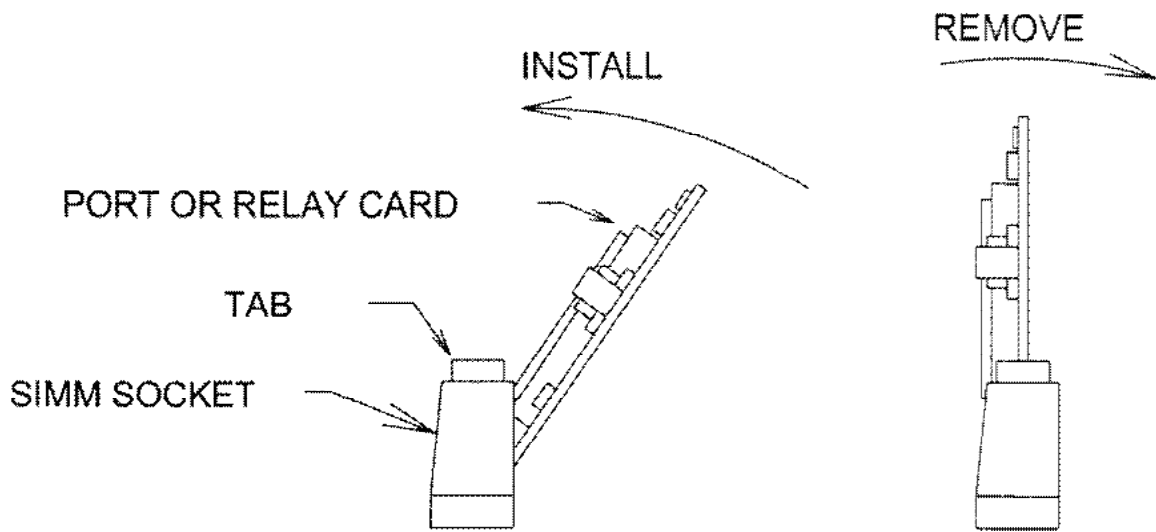


Figure 10. Card Installation and Removal

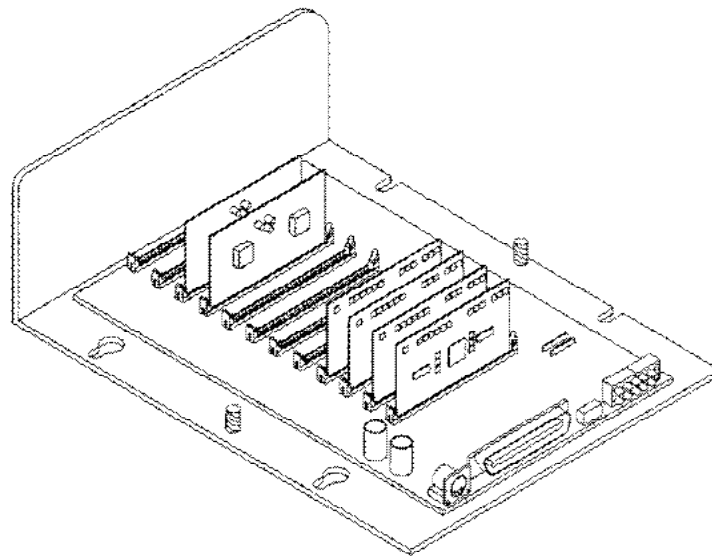


Figure 11. EDAC Configures for Four Ports with Relays

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.

To remove port and relay cards:

1. Remove power from the unit.
2. 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.

3. To remove the card (see Figure 10) 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. If possible, dismount and lay the unit on a horizontal surface.
4. 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.
5. 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.

Setting DIP Switches

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

Switches 1, 2, and 4 select various features for various systems. Switch 3, in all applications, selects between μ -Law and A-Law. μ -Law is used primarily in North America and Japan; A-Law is used primarily in all other parts of the world.

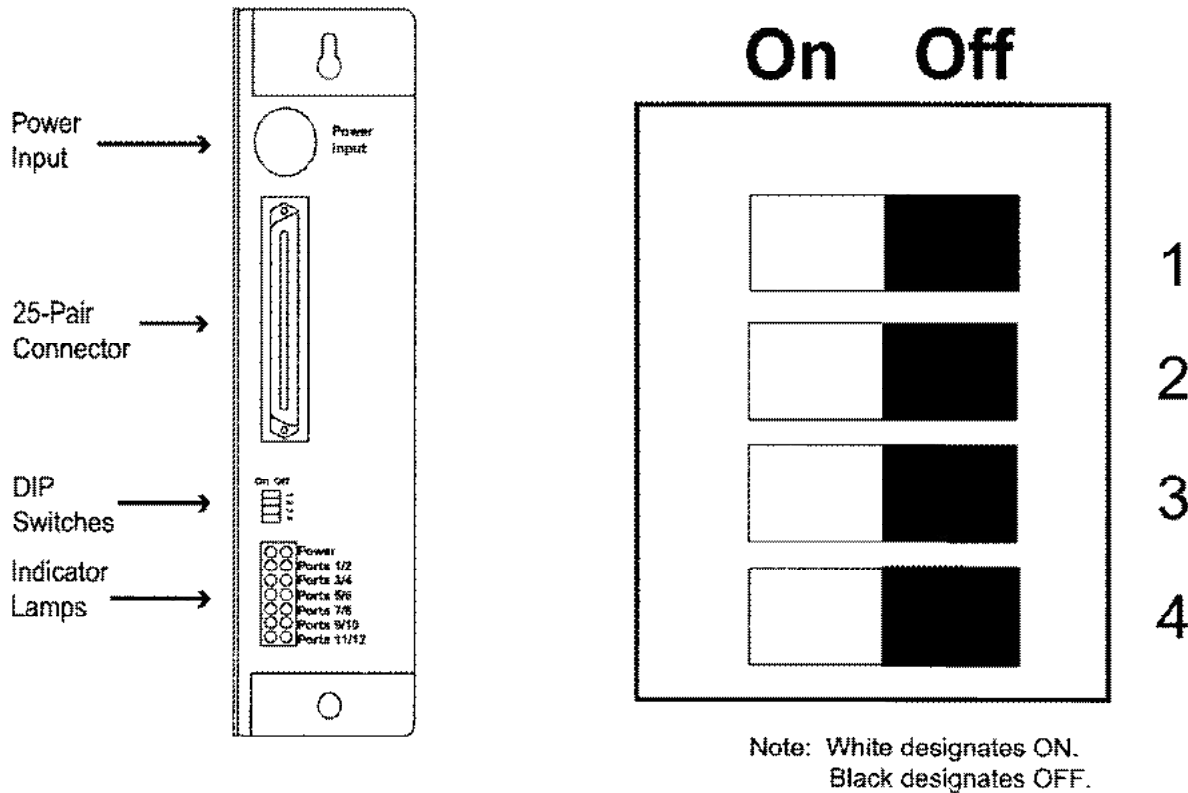


Figure 12. User Configured DIP Switches

Nortel Systems

Table 5. Switch Settings for Nortel SL-1, SL-100 or M-1 Systems

CONFIGURATION			SWITCH SETTING				
KSU	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
		A-Law	None	OFF	OFF	ON	OFF
		A-Law	8 Sec	OFF	OFF	ON	ON
	SL-100 or M-1 17.65 and Below	μ -Law	None	OFF	ON	OFF	OFF
		μ -Law	8 Sec	OFF	ON	OFF	ON
		A-Law	None	OFF	ON	ON	OFF
		A-Law	8 Sec	OFF	ON	ON	ON

¹ For systems connected to T-1 (E-1, ISDN) trunks, set Release Delay to 8 seconds so that echosuppression will not interfere with operation of the unit.

Table 6. Switch Settings for Nortel Norstar Systems and Avaya IP Office with TCM Card

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	OFF	ON	OFF
		8 Sec	ON	OFF	ON	ON

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

² For Norstar systems, switch 1 should always be ON, and switch 2 should always be OFF.

Specialty M-1

Table 7. Switch Settings for Specialty M-1

CONFIGURATION		SWITCH SETTING			
LAW CODING		1	2	3	4
μ -Law		OFF	OFF	OFF	OFF
A-Law		OFF	OFF	ON	OFF

NEC Systems

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

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

² Switches 1 and 2 are not used on NEC systems. The default position is OFF. The unit operates the same way for either position.

Aspect CallCenter

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

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

² Switch 1 is not used on the Aspect System. The unit operates the same way for either position.

³ Switch 2 selects the PBX silence code. The default (OFF) position is valid for most systems. For older Aspect systems, set the switch to ON.

Lucent Definity, Avaya IP Office and Avaya Aura Comm Manager

Table 10 identifies all switch selections for Lucent Definity, Avaya IP Office and Avaya Aura Comm Manager

Table 10. Switch Settings for Lucent Definity, Avaya IP Office and Avaya Aura Comm Manager

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

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

² Switches 1 and 2 are not used on Lucent Definity or Avaya IP Office and Aura Comm Manager systems. The default position is OFF. The unit operates the same way for either position.

Lucent Merlin Magix

Table 11 identifies all switch selections for Lucent Merlin Magix

Table 11 Switch Settings for Merlin Magix

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

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

² Switches 1 and 2 are not used on Lucent Merlin Magix systems. The default position is OFF. The unit operates the same way for either position.

Panasonic

Table 12 identifies all switch selections for Panasonic DBS-824 PBX.

Table 12. Switch Settings for Panasonic DBS-824 PBX

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

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

² Switches 1 and 2 are not used on Panasonic systems. The default position is OFF. The unit operates the same way for either position.

Siemens

Table 13 identifies all switch selections for the Siemens PBX.

Table 13. Switch Settings for Siemens PBX

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

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

² Switches 1 and 2 are not used on Siemens systems. The default position is OFF. The unit operates the same way for either position.

Ericsson

Table 14 identifies all switch selections for the Ericsson PBX.

Table 14. Switch Settings for Ericsson PBX

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

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

² Switches 1 and 2 are not used on Siemens systems. The default position is OFF. The unit operates the same way for either position.

Alcatel

Table 15 identifies all switch selections for the Alcatel PBX.

Table 15. Switch Settings for Alcatel PBX.

Switch	Up (off)	Down (on)	Function
1	Constant On	Silence Detection	Silence Detection Select
2	B3 Selection	B1 Selection	Audio Channel Select
3	μ -Law	A-Law	Law Coding Select
4	No Delay	8 Second Delay	On Hook Delay Select

DIP Switch #1: Bypass silence detection feature in EDAC cards and keep the codec always on.

DIP Switch #2: Depends on the PBX configuration, either B1 or B3 can be chosen as primary audio channel in the Alcatel protocol. The default will be B3, but if audio is noisy, this DIP Switch should be toggled to select B1.

DIP Switch #3: The default will be A-law.

Dip Switch #4: In order to ignore short silence periods during long delay, can be used to turn off codec 8 seconds after hanging up the phone. This feature won't be applicable when "Constant ON" (DIP Switch #1) is selected.

INSTALLING THE EDAC UNIT

Mounting

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 13. For instructions on wall mounting with power distribution, see Wall Mounting with Power Distribution section on page 40.

NOTE

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

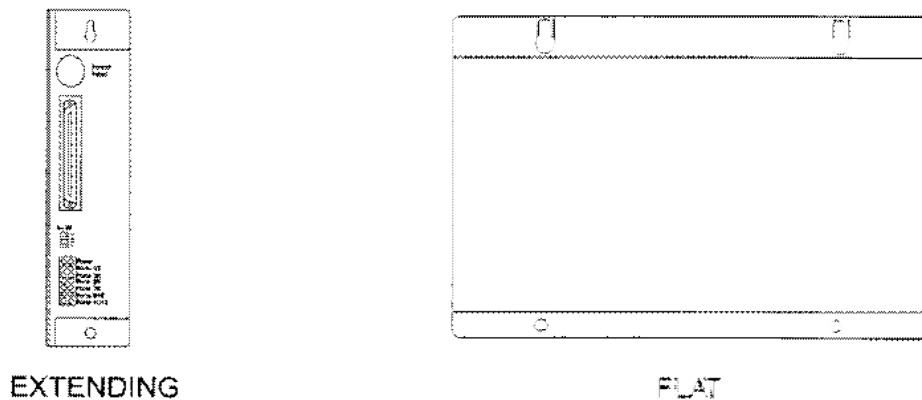


Figure 13. Recommended Wall Mounting

CAUTION

Do not mount the unit horizontally extending from the wall as shown in Figure 14.

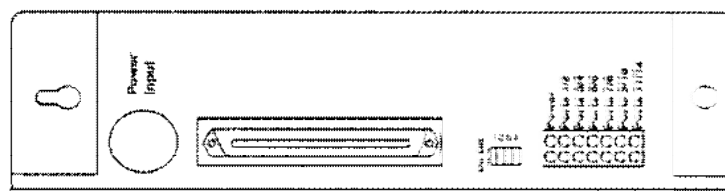


Figure 14. Non-Recommended Wall Mounting

Rack Mounting with Power Distribution

If rack mounting is preferred, the EDAC Power Distribution Panel (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 15 and 16 and Table 17 as guides, install as follows utilizing the hardware supplied with the Power Distribution Panel.

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

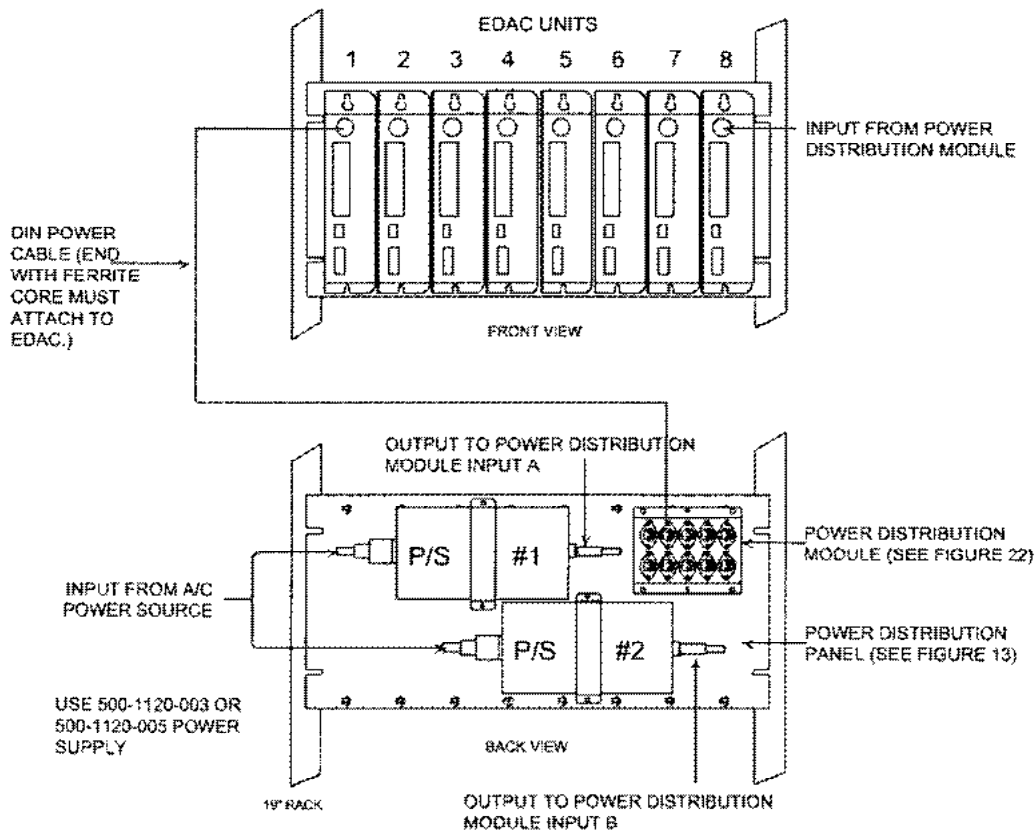


Figure 15. Front and Back View of Rack Mount Installation

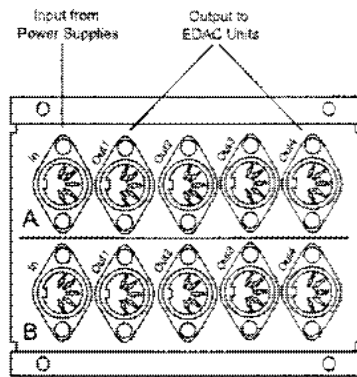


Figure 16. Power Distribution Module

6. Connect DIN cables (Figure 17) according to chart in Table 17. Ferrite core end must attach to EDAC.
7. Connect power supply AC cords to suitable AC power. Citel Technologies recommends the use of an Uninterruptible Power Supply or at least a surge suppressor.

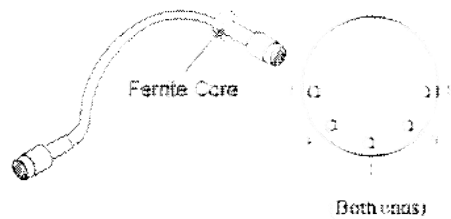


Figure 17. DIN Power Cable

Table 17. 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

Wall Mounting with Power Distribution

It is also possible to wall mount multiple EDAC units and power supplies using the Power Distribution Module (P/N 500-1102-002). No minimum or maximum spacing between EDACs is required. Using Figures 17 and 18 and Table 17 as guides, install as follows.

1. Mount Power Distribution Module to wall.
2. Mount EDAC units according to Wall Mounting section on page 38.
3. Mount multi-unit power supplies to wall.
4. Connect one power supply output (P/S #1, 5-pin connector) to Power Distribution Module input A.
5. Connect one power supply output (P/S #2, 5-pin connector) to Power Distribution Module input B.
6. Connect DIN cables (Figure 17) according to chart in Table 17. Ferrite core end must attach to EDAC.
7. Connect power supply AC cords to suitable AC power. Citel Technologies recommends the use of an Uninterruptible Power Supply or at least a surge suppressor.

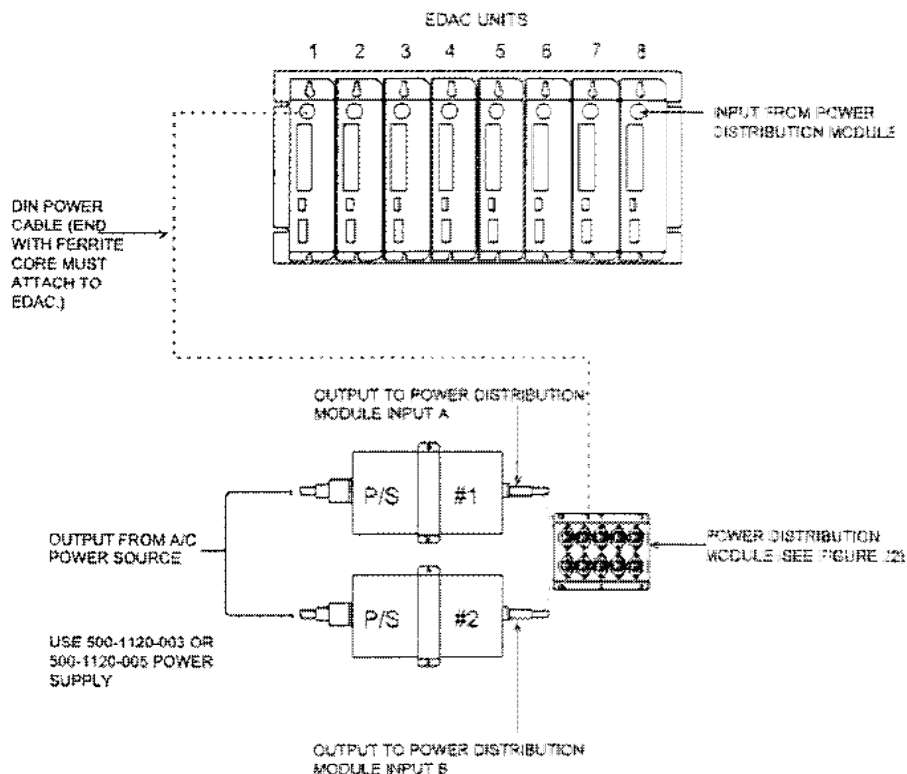


Figure 18. Wall Mount Installation with PowerDistribution

Cross Connecting the Digital Input

1. Plug a standard female RJ-21 (25-pair) cable connector (not supplied with the unit) into the front of the unit.
2. Using Table 17 and Figure 19 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.

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 17 for the wiring pin outs and color codes. The analog outputs are not polarity sensitive, so “Tip to Tip” or “Tip to Ring” may be connected. Specific attention must be applied to 4 wire systems. The analog output of each pair of port cards for a specific 4 wire phone must be wired in series.

Cross Connecting Relays

If relay cards are used, cross connect the relay contact pairs to the recording equipment contact closure pairs. Refer to Table 17 RJ-21 (25-pair) Connector Pin out. The relay contact outputs are not polarity sensitive, so “Tip to Tip” or “Tip to Ring” may be connected.

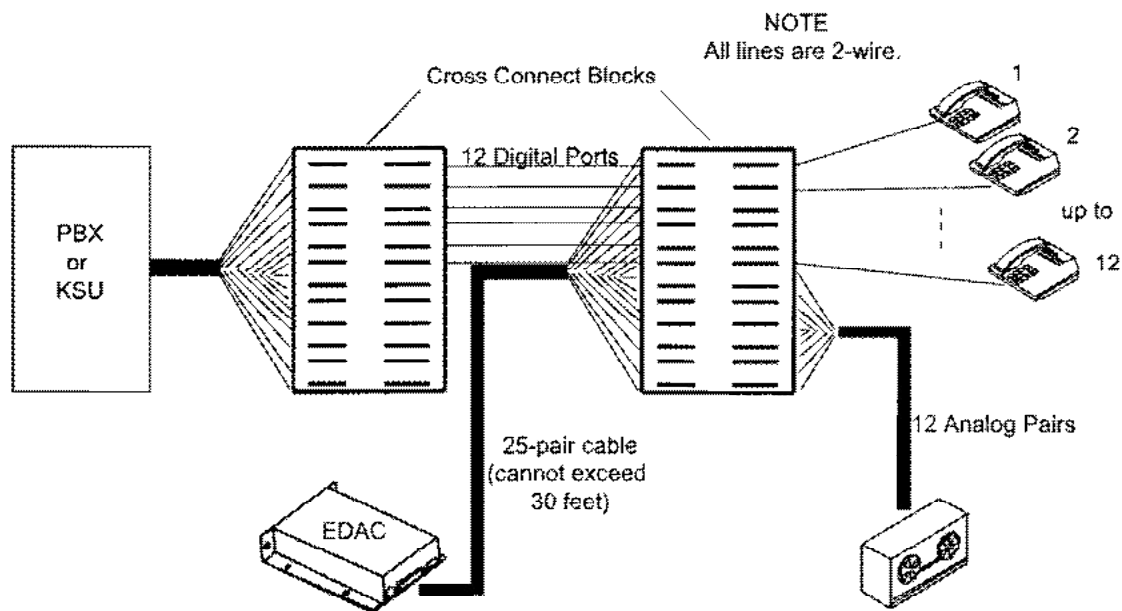


Figure 19. Typical Cross Connection Diagram for One Base Unit with 12 Port Cards

Table 17. 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.

Connecting Power

NOTE

Citel Technologies recommends the use of Uninterruptible Power Supplies or, at a minimum, surge suppressors.

WARNING

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

Wall Mount

1. 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 13-17.
2. Plug the power supply into a suitable AC power source.

Rack Mount/Wall Mount (Distributed Power)

1. 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 15-17.
2. Connect DIN cables (P/N 450-1102-001) from module outputs to EDAC units as needed. The ferrite core end must connect to the EDAC (see Figure 17).
3. Connect the power supplies to a suitable AC power source.

Chapter 4

TESTING AND TROUBLESHOOTING

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 4 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.

Troubleshooting

Table 18 demonstrates some possible solutions to problems encountered while using the EDAC.

For additional assistance, please contact the Technical Support Department at Citel Technologies at support@citel.com or by telephone at (888)-248-3587.

Table 18. Troubleshooting Guide

PROBLEM/SYMPTON	POSSIBLE SOLUTION
No Audio/No Analog Output. Green lamps are off or 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 the input line connections. Check to see if this port is enabled If yes, check output recorder connections. Check for improperly aligned or seated cards. 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. EDAC follows hook activity, but it sounds distorted. Output sounds choppy.	Check PBX selection (see switch 1) Check Law coding selection (see switch 3) Check trunk selection (see switch 4) Check for improperly aligned or seated cards. Check loop length (see Cabling section) 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.
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 idle code selection (see switch 2) Check input cross connections. Lamps may always be one when there is no input signal.
Phone does not work. (Norstar Only)	Verify EDAC unit still has power.

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.

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Chapter 5 WARRANTY

Citel Technologies 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, Citel Technologies 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 Citel Technologies may replace the defective product with a unit of equal value, at the option of Citel Technologies.

IMPORTANT

Before returning a product for repair, the customer must call Citel Technologies for a Return Materials Authorization (RMA) 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. Citel Technologies 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 Citel Technologies' product resulting from accident, abuse or misapplication of the product. Citel Technologies 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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Chapter 6 SPECIFICATIONS

Signaling

Input impedance > 1 M ohms

Analog

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

Power Consumption

Each Port Card	+5V at 80mA per port and +12V at 21mA per port
EDAC with 12 Cards max.	8w max.; +5V at 1A max. and +12V at 250mA
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.

Relay

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

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)

Environment

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

Power Supplies

Multi-Unit Power Supplies

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 48-72 inches (120-180
 (I/O) cm)
 Weight Approx. 2 pounds (0.9
 kg)
 Efficiency 65% minimum (see
 Power Consumption,
 page 13)

**Single-Unit Power Supply
 (prior to July 2013)**

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 72 inches (183 cm)
 (I/O)
 Weight Approx. 1 pound (0.5
 kg)
 Efficiency 75% typical (see
 Power Consumption,
 page 35)

**Single-Unit Power Supply
 (after July 2013)**

Part Number 500-1120-001/-002
 Type Switch Mode
 Input Rating 100-240VAC 50-60Hz
 Output Rating +5VDC @ 4A
 +12VDC @ 2A
 Dimensions 5.75 x 3 x 1.75 inches
 Cord Length 44 inches (111 cm)
 (I/O)
 Weight Approx. 1.4 pounds
 (0.63 kg)
 Efficiency 70%

DIN Power Cable (see Figure 17)

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

Power Cords

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

Power Cords

North 60 inches
 American (152 cm), black
 Cont. 96 inches
 European (244 cm), black
 (Schucko)

Table 19. Power Input Receptacle Pinout

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

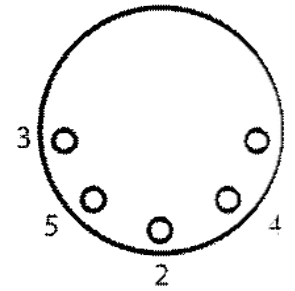


Figure 20. EDAC Power Input Receptacle Pin Diagram

WARNING

Use only Class 2 UL approved power supplies which mate to the pin out defined in Table 17 and Figure 20 (receptacles and input connectors must have mirrored pin outs). MCK Communications strongly recommends the use of the power supplies identified in Table 3 and described in this manual. Use of unapproved power supplies may damage the EDAC unit and void warranty.

Cabling

Wire Type for Cross Connections	24 AWG (0.5mm) Standard Twisted Wire
Loop Length (Aspect)	1,400 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 / Avaya)	2,000 feet (610 meters) max. EDAC can bridge at any point along the loop between the switch and the station set.
Loop Length (Lucent – Merlin Magix)	1,000 feet (305 meters) max. EDAC can bridge at any point along the loop between the switch and the station set.
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.
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).
Loop Length (Panasonic)	1,800 feet (548 meters) max. for Panasonic DBS-824 PBX EDAC can bridge at any point along the loop between the switch and the station set.

Loop Length (Siemens)	2,000 feet (610 meters) max. for SIEMENS PBX EDAC can bridge at any point along the loop between the switch and the station set.
Loop Length (Ericsson)	1,000 feet (305 meters) max. for Ericsson MD110 PBX EDAC can bridge at any point along the loop between the switch and the station set.
Loop Length (Alcatel)	1,000 feet (305 meters) max. for Alcatel 4200/4400 PBX EDAC can bridge at any point along the loop between the switch and the station set.
EDAC to Recorder	2,500 feet (762 meters) max.
EDAC to Bridge (Tap Length)	30 feet (9 meters) max.

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 18.

Table 20. 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.
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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 NE 1 Port Card	All Revisions	All Revisions	All Revisions
300-3030-003 Aspect Port Card	All Revisions	All Revisions	All Revisions

VENDOR	TEST	RESULTS/REPORT
Lucent Technologies	System Interoperability	SIL Doc No. MY09-98