PG-Flex*Plus*
ARB-96x ADSL/POTS
Edge Integrated Access Device NIDs
Technical Practice

Model	List	CLEI Code
ARB-963	L1B	VAMSMB0B~~
ARB-963	L1C	VAMSBB0B~~
ARB-963	L1E	VAMSCB0B~~
ARB-964	L1B	VAMSMC0B~~
ARB-964	L1C	VAMSBC0B~~
ARB-964	L1E	VAMSCC0B~~

ADC

REVISION HISTORY

Revision	Release Date	Revisions Made
01	April 22, 2003	Initial Release

USING THIS TECHNICAL PRACTICE

The following style conventions and terminology are used throughout this guide.

Reader Alert	Meaning
	Alerts you to supplementary information
IMPORTANT	Alerts you to supplementary information that is essential to the completion of a task
ATTENTION	Alerts you to possible equipment damage from electrostatic discharge
CAUTION	Alerts you to possible data loss, service-affecting procedures, or other similar type problems
WARNING	Alerts you that failure to take or avoid a specific action might result in hardware damage or loss of service
DANGER	Alerts you that failure to take or avoid a specific action might result in personal harm

INSPECTING YOUR SHIPMENT

Upon receipt of the equipment:

- Unpack each container and visually inspect the contents for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to ADC. Order replacement equipment, if necessary.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact ADC as described in Product Support on page 23. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

The PG-Flex[PlusTM] Edge Integrated Access Device (IAD) provides Asynchronous Digital Subscriber Line (ADSL) service to mulit-line subscribers over a single copper pair (Figure 1 on page 2). A Symmetric High-bit-rate Digital Subscriber Line (SHDSL) transports ADSL and Plain Old Telephone Service (POTS) between the Central Office Terminal (COT) Shelf and Network Interface Device (NID). The NID provides an ADSL connection and three or six Universal Voice Grade (UVG) Loop-Start/Ground-Start (LS/GS) POTS circuits to the subscriber.

FEATURES

Features supported by the ARB-96x NIDs include:

- Line-powered and environmentally hardened
- Uses non-interfering, industry standard SHDSL transmission technology
- Remote monitoring and provisioning
- 3 or 6 POTS and 1 ADSL circuit over one existing copper pair
- Backward compatibility with existing system COT shelves
- Standard DS1 voice and DS3/DS1 ATM UNI data interfaces
- NEBS Level 3 compliant
- Plug and play automated provisioning
- Seicor 7600 outdoor enclosure (L1B, L1C)
- Indoor enclosure (L1E)
- Gas tube protection on SHDSL link
- MLT and 4TEL compatible testing

DESCRIPTION

Each COT Shelf supports up to 16 ALU-935 Dual SHDSL Line Units and each ALU-935 supports two ARB-96x NIDs. Three to six POTS NIDs can be mixed on the same ALU-935.

Asynchronous Transfer Mode (ATM) data is transported between the COT Shelf and the ATM switch or Digital Subscriber Line Access Module (DSLAM) over a DS3 or DS1 circuit. For DS3, equipment protection is provided through the ASU-945. For DS1, equipment protection is provided by parallel backplane DSX-1 connections.

POTS channels are transported between the COT Shelf and the Class 5 switch over DSX-1 circuits. Equipment protection is provided through the COT Shelf backplane; the backplane terminates these circuits on both AMX-944/AMX943 ATM/TDM Multiplex Units. Refer to Figure 1 for AMX-944 application and Figure 2 on page 3 for AMX-943 application.

The AMU-912 Management Unit provides shelf management, performance monitoring, alarm, and test interface functions.

Versions of the ARB-963 and ARB-964 NIDs are environmentally hardened and can be mounted externally or internally at the subscriber location (Table 1 on page 3). NIDs are line-powered from the ALU-935.

The ARB-963 L1B and L1C NIDs combine the ADSL and POTS #1 circuits onto a single pair between the NID and the subscriber equipment. The customer must provide a splitter to separate these circuits if the terminal equipment requires these circuits to be on separate pairs.

The ARB-963 L1E and all models of ARB-964 provide separate pairs for the ADSL and POTS #1 circuits. The customer must provide a combiner at the NID location if only a single pair is available to transport the ADSL/POTS signal. Additionally, the customer must provide a splitter to separate these circuits if the terminal equipment requires these circuits to be on separate pairs.
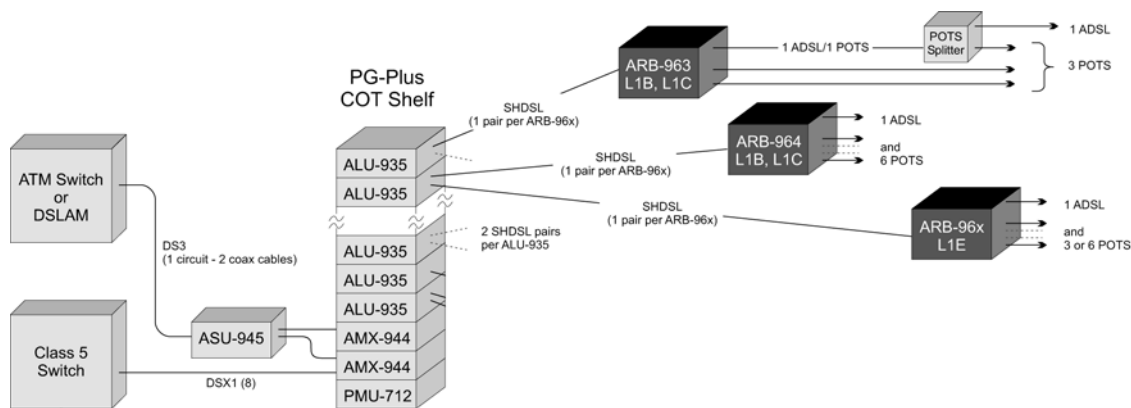
Figure 1. Edge IAD Architecture (AMX-944 application)
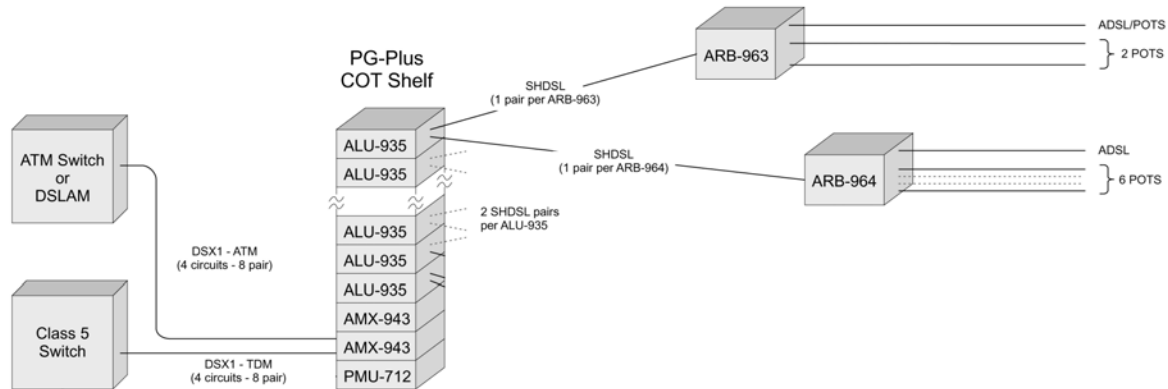
Figure 2. Edge IAD Architecture (AMX-943 application)

Table 1. ARB-96x Feature Matrix

	ARB-963			ARB-964		
Feature	**L1B**	**L1C**	**L1E**	**L1B**	**L1C**	**L1E**
Circuits:						
ADSL	1	1	1	1	1	1
POTS	3	3	3	6	6	6
External Splitter Where: C = Built-in Combiner S = Separate Voice and Data Leads	C[1]	C[1]	S[2]	S[2]	S[2]	S[2]
Protection:						
SHDSL	✔	✔		✔	✔	
ADSL	✔			✔		
POTS	✔			✔		
Mounting						
External	✔	✔		✔	✔	
Internal			✔			✔

[1] A splitter is required to separate the ADSL and POTS #1 circuits if the terminal equipment requires these circuits to be on separate pairs.

[2] A combiner is required at the NID location if only a single pair is available to transport the ADSL/POTS signal. Additionally, the customer must provide a splitter to separate these circuits if the terminal equipment requires these circuits to be on separate pairs.

SPECIFICATIONS

Table 2 lists the specifications for the ARB-96x NIDs.

Table 2. Specifications

Category	Item	Value
POTS Interface	Analog Impedance	600 Ω
	Supervisory Range	530 Ω (includes 430 Ω for station equipment)
	Ringing Voltage	40 VRMs
	Ringing Capacity	3 REN per POTS line
ADSL Interface	Format	Auto-sensing G.lite/G.dmt
	Rate	Programmable in 32 Kb increments

Terminations:
 	
        ADSL
        POTS
	L1B/L1C
	
	Binding Post
		L1E
		
		Insulation Displacement

Gas Tube Protection		
	SHDSL	ARB-963 L1B, L1C ARB-964 L1B, L1C
	ADSL	ARB-963 L1B, ARB-964 L1B
	POTS	ARB-963 L1B, ARB-964 L1B
Physical ARB-963 L1B ARB-963 L1C ARB-964 L1B ARB-964 L1C	Height	10.25 in. (26.0 cm.)
	Width	8.5 in. (21.6 cm.)
	Depth	4.75 in. (12.1 cm.)
	Weight	4.6 lbs. (2.1 kg.)
Physical ARB-963 L1E ARB-964 L1E	Height	9.0 in. (22.9 cm.)
	Width	6.0 in. (15.2 cm.)
	Depth	1.75 in. (4.4 cm.)
	Weight	2.1 lbs. (0.8 kg.)

SYSTEM CONFIGURATIONS

Table 3 summarizes the supported cards for the ARB-96x.

Table 3. System Supported Shelf and Card Configurations

Catalog Number	Description
PG-Flex^{Plus} Shelf	
PCS-719 L1A	23" Shelf, Amphenol Connector
PCS-719 L2	23" Shelf with DS3 Splitter, Amphenol Connector
Management Options	
AMU-912 L1	Management Unit
T1 Multiplexer Options	
AMX-943 L1	4 DS1 ATM/4 DS1 TDM Multiplexer
AMX-944	DS3 ATM/8 DS1 TDM Multiplexer
Line Unit Options	
ALU-935 L1	Dual SHDSL CO Line Unit

PERFORMANCE MONITORING AND ALARM HISTORY

An ARB-96x provides extensive real-time, nondisruptive monitoring of SHDSL and ADSL transmission performance via the ALU-935. User selectable alarm thresholds for many of the performance monitoring measurements can be adjusted in the ALU-935 screen. These settings cause alarms to be activated at the designated setting. ADSL performance is monitored and some threshold settings can also be adjusted. The ARB-96x reports the raw ADSL statistics to the ALU-935 which accumulates and displays the information. Monitored parameters include the following:

- SHDSL- Rate, Noise Margin, Insertion Loss, Errored Second (ES), Unavailable Seconds (UAS)
- ADSL - Coding Type, Noise Margin, Rate, Attenuation, Interleave Delay, ES, Severely Errored Seconds (SES), UAS

ALARMS

An ARB-96x generates alarms for fault conditions on the SHDSL transmission facility and at the application interface.

All SHDSL alarms are suppressed when unit is initially installed and powered up. When the SHDSL circuit is synchronized and the ARB-96x and RT margins have stabilized, any outstanding alarms that had been suppressed are made active and reported to the Management Unit (based upon their provisioned alarm severities).

ADSL alarms are suppressed until the ADSL line synchronizes for the first time.

> During alarm suppression, alarms are not reported to the Management Unit for generating user alarms. Only the alarm history count is incremented for the ARB-96x parameters that are in alarm during alarm suppression and no alarms are reported to the Management Unit.

ALARM TYPES

Any alarm may be set to the following severities:

- Critical - CR
- Major - MJ
- Minor - MN
- Not Alarmed - NA
- Not Reported - NR

> An alarm type set to NA will accumulate history counts and send an SNMP trap message, but will not be passed to the management unit for further alarm processing. However, *Current* Status will show ACTIVE. An alarm set to NR will not be reported by the system.

HISTORY

Current cumulative counts of the past 24 hours and historical data in the form of a 24-hour history (in 15-minute increments) and a 7-day history (in 24-hour increments) are available to assist you in identifying problem sources.

- SHDSL Interface: 24-Hour (15-minute intervals) and 7-Day (24-hour intervals) for ES and UAS
- Alarm: Time stamp of first and last occurrence, number of occurrences for all enabled alarms
- ADSL: 15 minute and 3-Day for ES, SES and UAS

Refer to Table 4 for ARB-96x LED Indicators. Table 5 lists the LED indications for the ARB-96x diagnostic and maintenance modes.

Table 4. ARB-96x LED Indicators

LED	Color	State	Description
POWER	Green	On	Unit is powered and the SHDSL link is in sync and the margin is above the threshold
		Slow Flash	SHDSL link is attempting to sync
		Fast Flash	SHDSL link is in sync, but the margin is below the threshold or there is insufficient bandwidth to support all POTS circuits
		Off	Unit is not receiving power
VOICE	Green	On	One or more POTS circuits are off-hook
		Fast Flash	One of more POTS circuits are ringing
		Off	All POTS circuits are onhook and not ringing
DATA	Green	On	ADSL port is in sync
		Slow Flash	ADSL port is attempting to sync
		Fast Flash	ADSL is in sync, but the margin is below the threshold
		Off	ADSL port does not detect a modem or the ADSL link is not in sync

While the SHDSL link is in sync, the ADSL port attempts to synchronize with the ADSL modem for one minute, and then rests for five seconds. This process repeats indefinitely if the SHDSL link is in sync and the ARB-96x does not synchronize with the ADSL modem.

The Fast Flash rate is approximately 20 impulses per second (ips). The Slow Flash rate is approximately 2 ips.

Table 5. ARB-96x Diagnostic Indicators

LED State	Description	Action
POWER LED On, All other LEDs Flashing	ARB-96x is running in Boot Mode	Application software must be re-installed. Contact Product Support on page 23 for additional information.
PWR LED On, All other LEDs sequencing downward	Software download to ARB-96x	Wait for download to complete and ARB-96x to re-start

MOUNT THE NID

The ARB-963 List 1E and ARB-964 List 1E Indoor NIDs are to be installed in accordance with the applicable requirements of the National Electrical Code or Canadian Electric Code and the local authorities having jurisdiction. The ARB-963 and ARB-964 NIDs are to be installed by qualified service personnel only.

This section provides information for mounting the ARB-96x NIDs to wood surfaces. Since there are a wide variety of surfaces where the NIDs can be mounted, it is the responsibility of the installer to follow local practice and select appropriate hardware for mounting the NIDs.

LIST 1B AND LIST 1C OUTDOOR NID

The ARB-96x List 1B and List 1C NIDs are mounted on an exterior wall near the SHDSL drop and building entrance point. These NIDs include the following mounting hardware:

- (2) #10 x 1½" wood screws
- (2) #10 x 1" anchors
- (2) #10 flat washers

CAUTION *The ARB-96x List 1C does not provide primary protection for the ADSL or POTS circuits. These circuits are not to be exposed to the outside environment – all wiring must be inside the building or immediately enter the building from the NID.*

1. Refer to Figure 3 to mark the location of the mounting holes.

If more than one ARB-96x List 1B or List 1C is to be wall-mounted, allow 5½" between each unit to allow room for the cover to open.

Mount the ARB-96x List 1B and List 1C NIDs with all access openings facing down.

2. Use the two #10 x 1½" wood screws provided with these NIDs to attach the NID to the wall. When mounting the NID on stucco or other suitable surfaces, use the two #10 x 1" anchor nuts provided with the NID.

Figure 3. ARB-96x List 1B and List 1C Wall Mounting Dimensions

LIST 1E INDOOR NID

The ARB-96x List 1E is mounted on an interior surface in a restricted access area. The ARB-96x List 1E NID includes the following mounting hardware:

- (3) #6 x 1" wood screws
- (3) #6 x ¾" anchors

To facilitate mounting the List 1E NIDs, it is recommended that ¾" plywood be mounted to the wall using appropriate hardware and following local practice.

1. Refer to Figure 4 to mark the locations of the mounting holes.
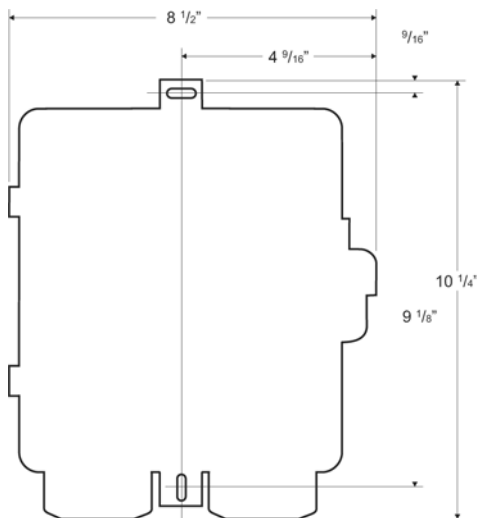
If more than one ARB-96x List 1E is to be wall mounted, allow 1" between each unit to allow room for the cover to open.

2. Use the two #6 x 1" wood screws provided with the ARB-96x List 1E to attach the NID to the wall. Leave the head of each screw out approximately 1/8" from the wall to allow room for the NID to slide over the screws.
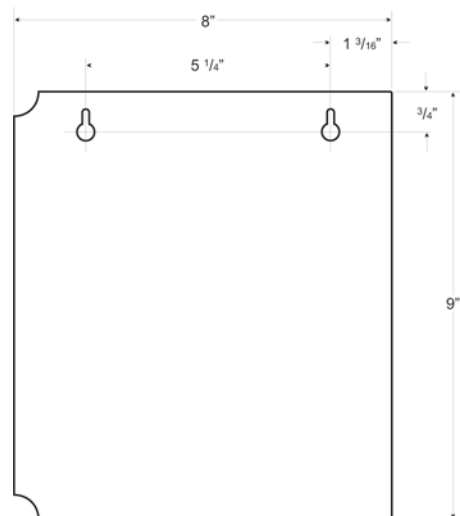
Figure 4. ARB-96x List 1E Wall Mounting Dimensions

WIRE THE NID

This section describes the terminations required for the ground, SHDSL, ADSL, and POTS connections to the NID.

CAUTION | *Always treat the SHDSL pair as if it were live with high voltage present. Use caution when installing a SHDSL pair that is already connected to a CO Line Unit because voltages up to ±135 Vdc (maximum) may be present on the SHDSL pair.*

The CO Line Unit, unless previously disabled by means of the craft interface, periodically attempts to power up the NID by applying ±100 Vdc to the SHDSL pair. The CO Line Unit also initiates a start-up after a momentary short is applied to the SHDSL pair. The CO Line Unit responds with start-up voltage (±100 Vdc) 3 seconds after removal of the short followed by ±130 Vdc if an RT is detected.

LIST 1B AND 1C OUTDOOR NID

1. Open the cover of the NID with a 216 tool (Figure 5).
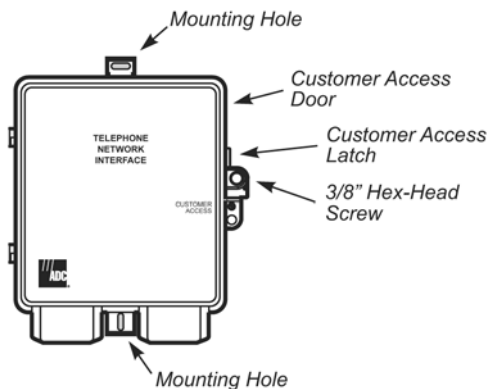
Figure 5. ARB-96x List 1B and 1C – Exterior

2. Open the Telco Access Door with a 216 tool to access the ground and SHDSL termination points (Figure 6).
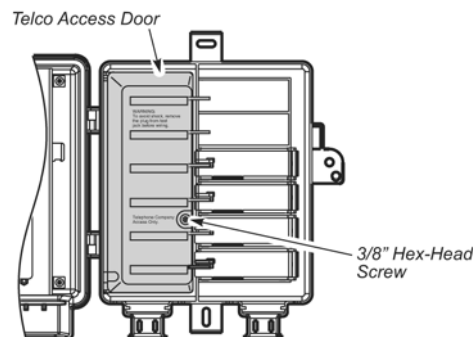
Figure 6. ARB-96x List L1B and 1C – Interior

Terminate the Ground

WARNING   The ground termination on the ARB-96x List L1B and 1C is also used for the primary gas-tube protectors for the SHDSL circuit and as a ground reference for ground-start circuits.

Use #12 AWG wire to ensure a good ground connection to the ARB-96x List 1B and 1C.

1. Route the ground wire through the bottom left rubber grommet of the NID (Figure 7).
2. Use a 216 tool to remove the nut and the top two washers from the ground lug.
3. Loop the ground wire around the ground lug.
4. Replace the two washers and nut removed in step 2. Tighten the nut with a 216 tool.
5. Connect the other end of the ground wire to a suitable ground termination point such as a ground rod or cold water pipe following local practice.
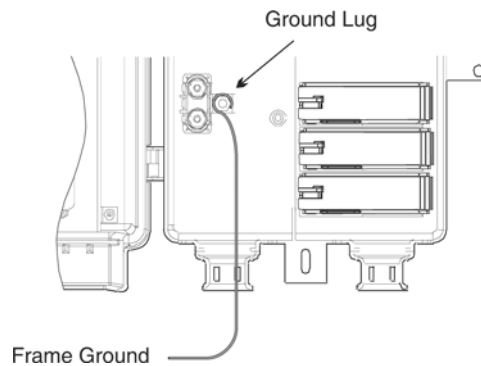
Figure 7. ARB-96x List 1B and 1C – Ground Wire

Terminate the SHDSL Circuit

CAUTION *Use insulated wire strippers and insulated needle nose pliers when working with the SHDSL conductors to prevent electrical shock.*

1. Route the service cable through the bottom left rubber grommet of the NID (Figure 8).
2. Use a 216 tool to loosen the nuts on the SHDSL tip and ring termination posts in the NID.
3. Prepare the SHDSL tip and ring conductors in the service cable using insulated wire strippers.
4. Use insulated needle nose pliers to loop the tip and ring conductors around the SHDSL tip and ring termination posts between the first and second washers.
5. Tighten the nuts with a 216 tool.
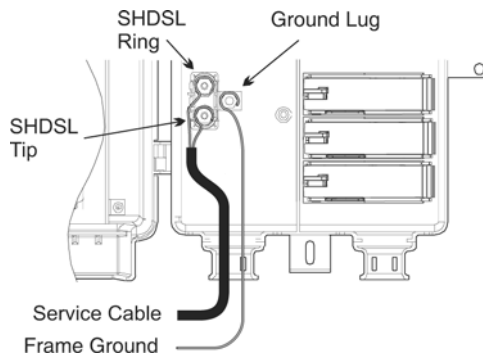

Figure 8. ARB-96x List 1B and 1C – SHDSL Wiring

Terminate the ADSL and POTS Circuits

Line modules are numbered from the bottom to the top in the ARB-96x List 1B and 1C NID.

1. Open the line module doors to access the binding posts on the line modules (Figure 9).
2. Route the ADSL and POTS subscriber wire pairs through the bottom right rubber grommet of the NID.
3. Route the ADSL wire pair through the cutout under the hinge on the right side of the bottom line module (#1).
4. For each POTS circuit being installed, route the POTS wire pair through the cutout under the hinge on the right side of the applicable line module. Line 4 through Line 6 are used with the ARB-964 List 1B and List 1C NIDs only.
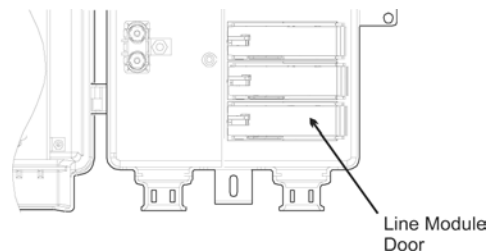
Figure 9. ARB-96x List 1B and 1C – Line Module Door

5. Terminate the ADSL and POTS #1 circuits:

ARB-963 List 1B and 1C: Refer to Figure 10 and terminate the ADSL/POTS #1 pair to the first line module.
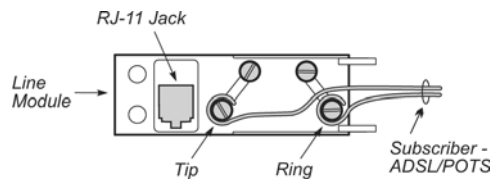
Figure 10. ARB-963 List 1B and 1C – Combined ADSL/POTS #1 Wiring

ARB-964 List 1B and 1C: Refer to Figure 11 and terminate the ADSL/POTS #1 pair to the first line module.
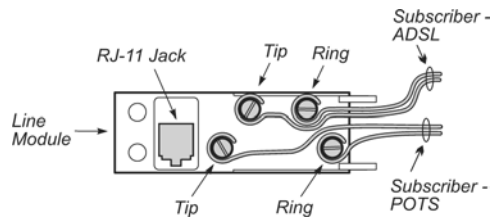
Figure 11. ARB-964 List 1B and 1C – Split ADSL/POTS #1 Wiring

6. Refer to Figure 12 and terminate each additional POTS pair to the applicable line module.
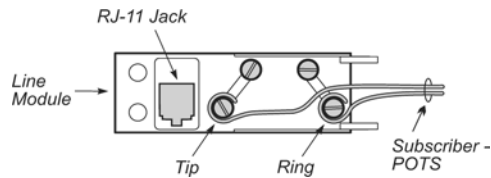
Figure 12. ARB-96x List 1C – POTS Wiring

7. After completing the wiring, go to Turn-up and Testing on page 17.

LIST 1E INDOOR NID

1. Open the cover of the List 1E NID by gently pressing on the latch on the right side of the access door and lifting the right side of the red cover (Figure 13).
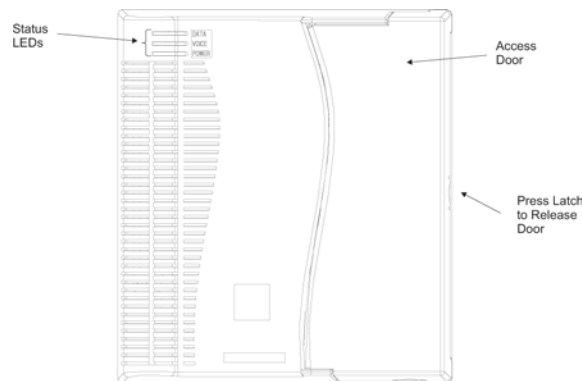
Figure 13. ARB-96x List 1E – Exterior

2. To access the SHDSL and ground termination points, use a slotted screwdriver to open the red cover over the SHDSL and ground screw terminals (Figure 14).

Figure 14. ARB-96x List 1E – Interior

CAUTION *The ARB-96x list 1E does not provide primary protectors on the SHDSL or subscriber pairs. The primary protection for the SHDSL pair must be an integral part of the premise wiring. If the subscriber wiring is routed outside the premises for any reason, then primary protection for subscriber pairs must also be an integral part of the premise wiring.*

Terminate the Ground

The ground termination on the ARB-96x List 1E is a ground reference for ground-start circuits.

1. Use a slotted screwdriver to loosen the GND screw on the screw terminal strip.
2. Use 1-pair #12 jumper wire for the ground connection.
3. Strip off approximately ¾" of insulation on each of the two conductors and twist them together.
4. Wrap the bare end (from step 2) of the jumper wire clockwise around the screw terminal (Figure 15).
5. Use a slotted screwdriver to tighten the GND screw.
6. Connect the other end of the ground wire to a suitable ground termination point such as a ground rod or cold water pipe following local practice.
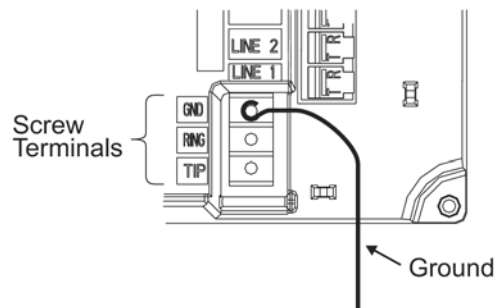
Figure 15. ARB-96x List 1E – Ground Wire

Terminate the SHDSL Circuit

CAUTION   *Use insulated wire strippers and insulated needle nose pliers when working with the SHDSL conductors to prevent electrical shock.*

1. Use a slotted screwdriver to loosen the TIP and RING screws on the screw terminal strip.
2. Prepare the SHDSL tip and ring conductors in the service cable using insulated wire strippers.
3. Use insulated needle nose pliers to loop the tip and ring conductors around the TIP and RING screw terminals (Figure 16).
4. Use a slotted screwdriver to tighten the TIP and RING screws.
5. Use a cable tie to secure the ground wire and the SHDSL service cable to the cable tie loop (Figure 16).
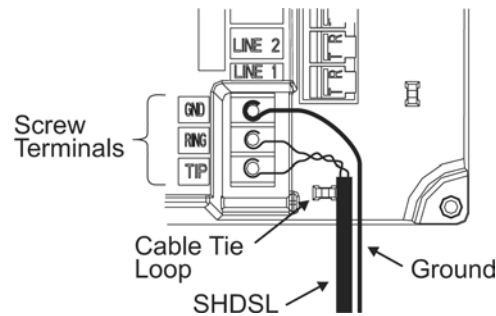
Figure 16. ARB-96x List 1E – SHDSL Wiring

Terminate the ADSL and POTS Circuits

Each wire entry hole in the Insulation Displacement Termination (IDT) strip accepts one un-stripped solid 22-24 AWG copper wire.

All ADSL and POTS subscriber terminations are made to the IDT strip, *not* the RJ-11T test jacks.

IDT strips are numbered from the bottom to the top in the ARB-96x List 1E NID.

Lines 4 through 6 are used with the ARB-964 List 1E NIDs only.

Refer to Figure 17 for the locations of the ADSL and POTS IDT strips.

  1. Remove approximately 1" of the outer jacket on the ADSL subscriber cable.
  2. The ADSL IDT connector is the second connector from the top (Figure 17). Pivot the IDT connector upward.
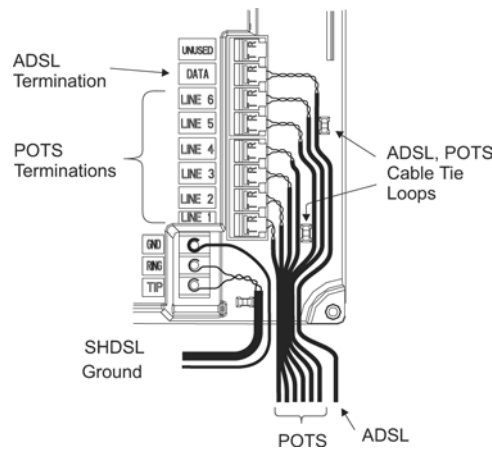
Figure 17. ARB-964 List 1E – ADSL and POTS Wiring

  3. Insert the wire pair through the tip and ring holes of the IDT connector (Figure 18).

The tip connector is toward the bottom of the IDT connector and the ring connector is toward the top of the IDT connector (Figure 18).

  4. Press the IDT connector downward until it is flush with the other connectors.
  5. For each POTS subscriber circuit being installed, remove approximately 1" of the outer jacket on the POTS subscriber cable. Pivot the POTS IDT connector upward. Insert the wire pair through the tip and ring holes of the IDT connector. Press the IDT connector downward until it is flush with the other connectors.
  6. Use cable ties to secure the ADSL and POTS subscriber cables to the cable tie loops (Figure 17).
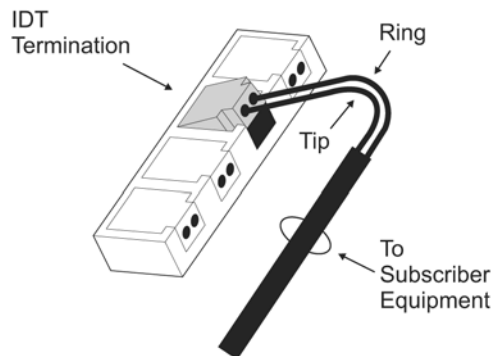
Figure 18. ARB-96x List 1E – IDT Wiring

TURN-UP AND TESTING

This section provides information on turning up and testing the ARB-96x NID. Refer to Table 4 on page 7 for ARB-96x LED Indicators and Table 5 on page 7 for the ARB-96x diagnostic and maintenance modes.

> The procedures in this section assume that an ALU-935 is installed in the COT shelf and is functioning correctly.

> If the LEDs do not provide the indications described in this section, go to Troubleshooting and Fault Isolation on page 18 for procedures on resolving problems.

Table 4 on page 7 provides a description of the ARB-96x LEDs.

1. If the POWER LED is on, go to step 5.
2. With a pair of insulated needle nose pliers, place a short across the SHDSL tip and ring terminations in the NID for 5 seconds, then remove the short.
3. Within 5 seconds, the POWER LED should begin to flash slowly indicating that the NID is attempting to synchronize with the ALU-935.
4. After approximately 2 minutes, the POWER LED should be on indicating that the NID has successfully powered up and has synchronized with the ALU-935.
5. Connect the subscriber's ADSL modem and verify that the modem has power applied and is turned on. The NID's DATA LED should begin to flash and then remain on within 30 seconds.
6. With a dial test set, test each of the POTS circuits:

   List 1B and List 1C NID: Connect the dial test set to the screw terminals on the line module, or insert a RJ-11 breakout adapter in the line module RJ-11 jack and connect the dial test set to the adapter.

> When the RJ-11 breakout adapter is installed in the line module RJ-11 jack, the subscriber drop is disconnected from the NID.

   List 1E NID: Insert a RJ-11 breakout adapter in the RJ-11T jack and connect the dial test set to the adapter.

> When the RJ-11 breakout adapter is installed in the RJ-11T jack, the subscriber drop is disconnected from the NID.

7. After successfully completing the turn-up procedure, close the NID:

   List 1B and List 1C NID: Close the Telco Access Door and secure it with a 216 tool. Close the NID cover and secure it with a 216 tool.

   List 1E NID: Close the red cover over the SHDSL and ground screw terminals and secure it with a slotted screwdriver. Close the red access door until it latches with the back of the NID.

CONFIGURATION, MAINTENANCE, AND TESTING

Refer to the ALU-935 technical practice for administrating, navigating, configuring, maintaining and testing the ARB-963.

TROUBLESHOOTING AND FAULT ISOLATION

Table 6 provides troubleshooting and fault isolation for the ARB-96x.

> To isolate the ADSL or POTS subscriber drop from the NID, insert a RJ-11 modular adapter into the RJ-11 jack of the ARB-96x List 1B or List 1C line module (see Figure 9) or into the RJ-11T jack of the ARB-96x List 1E (Figure 14 on page 14).

Additional information on system performance and alarms can be found by connecting a VT-100 terminal or PC running VT-100 emulation software to the RS-232 connector on the front panel of the AMU-912 and viewing the screens for the each of the units. Refer to the technical documentation for each unit for detailed information on accessing and interpreting these screens.

If you need additional assistance, contact Technical Support on page 23.

Table 6. ARB-96x Troubleshooting and Fault Isolation

LED	State	Probable Cause	Solution
POWER	On	OK	
	Fast Flash	SHDSL link is in sync, but the margin is below the threshold or there is insufficient bandwidth to support all POTS circuits	Check SHDSL loop faults such as shorts or ground Verify loop length is not exceeded Replace the ALU-935, then the ARB-96x
	Slow Flash	SHDSL is attempting to sync	Check SHDSL loop faults such as shorts or ground Verify loop length is not exceeded Replace the ALU-935, then the ARB-96x
	Off	Unit is not receiving power	Verify the ALU-935 is installed in the COT shelf and it is operating correctly Verify ALU-935 GSHDSL power-up option is set to ENABLED Check SHDSL loop faults such as shorts or ground Verify loop length is not exceeded Replace the ALU-935, then the ARB-96x
VOICE	On	OK	
	Fast Flash	OK	
	Off	OK	

LED	State	Probable Cause	Solution
DATA	On	OK	
	Fast Flash	ADSL port is in sync, but the margin is below the threshold	Check ADSL loop faults such as shorts or ground Verify loop length is not exceeded Replace ADSL modem, then the ARB-96x
	Slow Flash	ADSL port is attempting to sync	Check ADSL loop faults such as shorts or ground Verify loop length is not exceeded Replace ADSL modem, then the ARB-96x
	Off	ADSL port does not detect a modem of the SHDSL link is not in sync	Verify ADSL modem is connected Verify POWER LED is On Check ADSL loop faults such as shorts or ground Verify loop length is not exceeded Replace ADSL modem, then the ARB-96x

ACRONYMS

A
ADSL – Asynchronous Digital Subscriber Line

ATM – Asynchronous Transfer Mode

AWG – American Wire Gauge

C
CO – Central Office

COLU – Central Office Line Unit

COT – Central Office Terminal

CPE – Customer Premises Equipment

D
DDL – Derived Data Link

DLC – Digital Loop Carrier

DS0 – Digital Signal Level 0

DS1 – Digital Signal Level 1

DS3 – Digital Signal Level 3

DSL – Digital Subscriber Line

DSLAM – Digital Subscriber Line Access Module

E
ES – Errored Seconds

I
IDLC – Integrated Digital Loop Carrier

IPS – Interrupts Per Second

L
LED – Light Emitting Diode

LS/GS – Loop-Start/Ground-Start

M
MLT – Mechanized Loop Testing

MU – Management Unit

MUX – Multiplexer

N
NEBS – Network Equipment Building System

NID – Network Interface Device

P
PMU – Management Unit

POTS – Plain Old Telephone Service

R
RAM – Remote Access Multiplexer

RMA – Return Material Authorization

RT – RemoteTerminal

S

SES – Severely Errored Seconds

SHDSL – Symmetric High-bit-rate Digital Subscriber Line

SNMP – Simple Network Management Protocol

SYNC – Synchronization

T

TDM – Time Divisioned Multiplexer

U

UVG – Universal Voice Grade

V

VF –Voice Frequency

PRODUCT SUPPORT

TECHNICAL SUPPORT

Technical Assistance is available 24 hours a day, 7 days a week by the contacting Customer Service Engineering group at:

Telephone:	800.366.3891 The 800 telephone support line is toll-free in the U.S. and Canada.
Email:	wsd_support@adc.com
Knowledge Base:	http://adc.com/Knowledge_Base/index.jsp
Web:	www.adc.com

LIMITED WARRANTY

Product warranty is determined by your service agreement. Refer to the ADC Warranty/Software Handbook for additional information, or contact your sales representative or Customer Service for details.

RETURNS

To return equipment to ADC:

1. Locate the number of the purchase order under which the equipment was purchased. To obtain a return authorization number, you need to provide the original purchase order number to ADC's Return Material Authorization (RMA) Department.

2. Call or write ADC's RMA Department to ask for an RMA number and any additional instructions. Use the telephone number, fax number or email address listed below:
   - Telephone: 800.366.3891
   - Email Address: rma@ADC.com

3. Include the following information, in writing, along with the equipment you are returning:
   - Company name and address
   - Contact name and telephone number
   - Shipping address to which ADC should return the repaired equipment
   - Original purchase order number
   - Description of the equipment that includes the model and part number of each unit being returned, as well as the number of units that you are returning.
   - Reason for the return. For example:
     – The equipment needs an ECO/ECN upgrade.
     – The equipment is defective.

> If the equipment is defective, please tell us what you observed just before the equipment malfunctioned. Be as detailed in your description as possible.
>
> If there is any other reason for returning the equipment, please let us know so we can determine how best to help you.

4. Pack the equipment in a shipping carton.

5. Write ADC's address and the RMA Number you received from the RMA Department clearly on the outside of the carton and return to:

ADC DSL Systems, Inc.
14402 Franklin Ave.
Tustin, CA 92780-7013

Attention: **RMA (Number)**

> All shipments are to be returned prepaid. ADC will not accept any collect shipments.

FCC CLASS A COMPLIANCE

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 radio 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 use will be required to correct the interference at his own expense.

MODIFICATIONS

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by ADC voids the user's warranty.

All wiring external to the product(s) should follow the provisions of the current edition of the National Electrical Code.

World Headquarters:

ADC Telecommunications, Inc.
12501 Whitewater Drive
Minnetonka, Minnesota USA 55343

For Technical Assistance:

800.366.3891

ISO 9001

DNV

DNV Certification, Inc.
Certificated Firm

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