

**BDA1250
BI-DIRECTIONAL
LINE AMPLIFIER
EQUIPMENT MANUAL**



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1 FCC NOTICE

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

Warning:

Changes or modifications not expressly approved by Kaval Telecom Inc. could void the user's authority to operate the equipment.

2 INTRODUCTION

2.1 Scope of the Manual

This manual covers the use, operation and installation of the BDA1250 Bi-directional Line amplifier. It consists of nine sections described below:

Section 1. FCC Notice: Note and warning.

Section 2. Introduction: Scope of the manual and overview of BDA system application.

Section 3. BDA1250 Amplifier description: Description and specifications of the BDA1250.

Section 4. BDA Installation: Details procedures for installing of BDA1250.

Section 5. Antenna Installation: Details procedures for installing antenna.

Section 6. Maintenance and Troubleshooting: Recommendation for maintenance BDA and resolving BDA problem.

Section 7. Standard Warranty: Warranty Schedule.

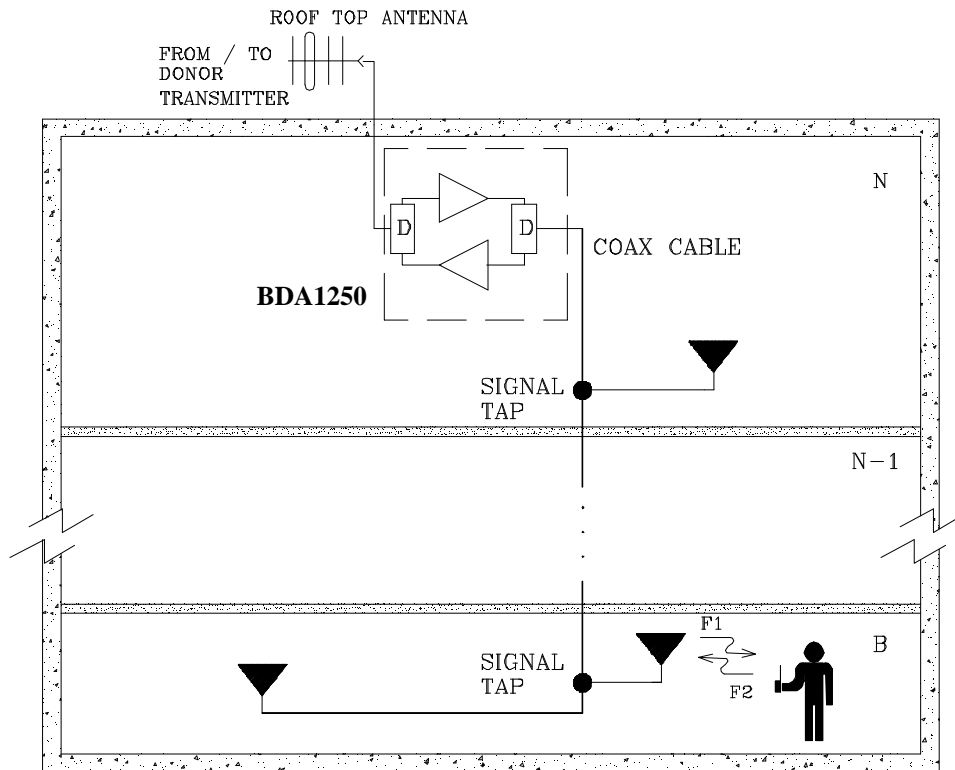
Section 8. Product Service Procedure: Return Material Authorization procedure.

Section 9. Ordering Parts and Accessories: Information ordering BDA parts and accessories.

2.2 “Off-the air” Amplifier System Application

The Bi-Directional Amplifier is intended to extend Cellular coverage into areas with coverage deficiency such as inside office buildings, shopping malls, hospitals etc. It is designed to be located independent of the donor site and must be equipped with its own antenna systems - one to communicate with the donor site and the other(s) to communicate with portables in the shadow zone.

A typical in-building coverage extension system is shown in Figure 1-2. The head-end subsystem, namely Kaval bi-directional amplifier, is responsible for the amplification of both incoming “off-the-air” downlink signal and outgoing uplink signals. The in-building distribution antenna system comprises of Coaxial cable, Signal taps, splitters and antennas to extend coverage on every floor, basement and underground parking garage.

Figure 1-2. Bi-Directional Amplifier in RF distribution System

This distributed antenna system is based on Kaval's patented "Tapped Radiator" RF signal distribution approach. The technology makes use of coaxial cable with Signal Taps strategically located and connected to Omni-directional ground plane antennas. This technology offers flexibility in system design, installation and optimization. Once the RF cable backbone has been installed, additional signal taps and antennas can quickly and easily be added to a live system, without the need to take the system out of service. Hence, new coverage areas can be added, or the system can easily be modified if the layout should change (e.g. modernization retrofits or process modifications).

3 BDA1250 Bi-directional Amplifier Description

3.1 BDA1250 Functional Description

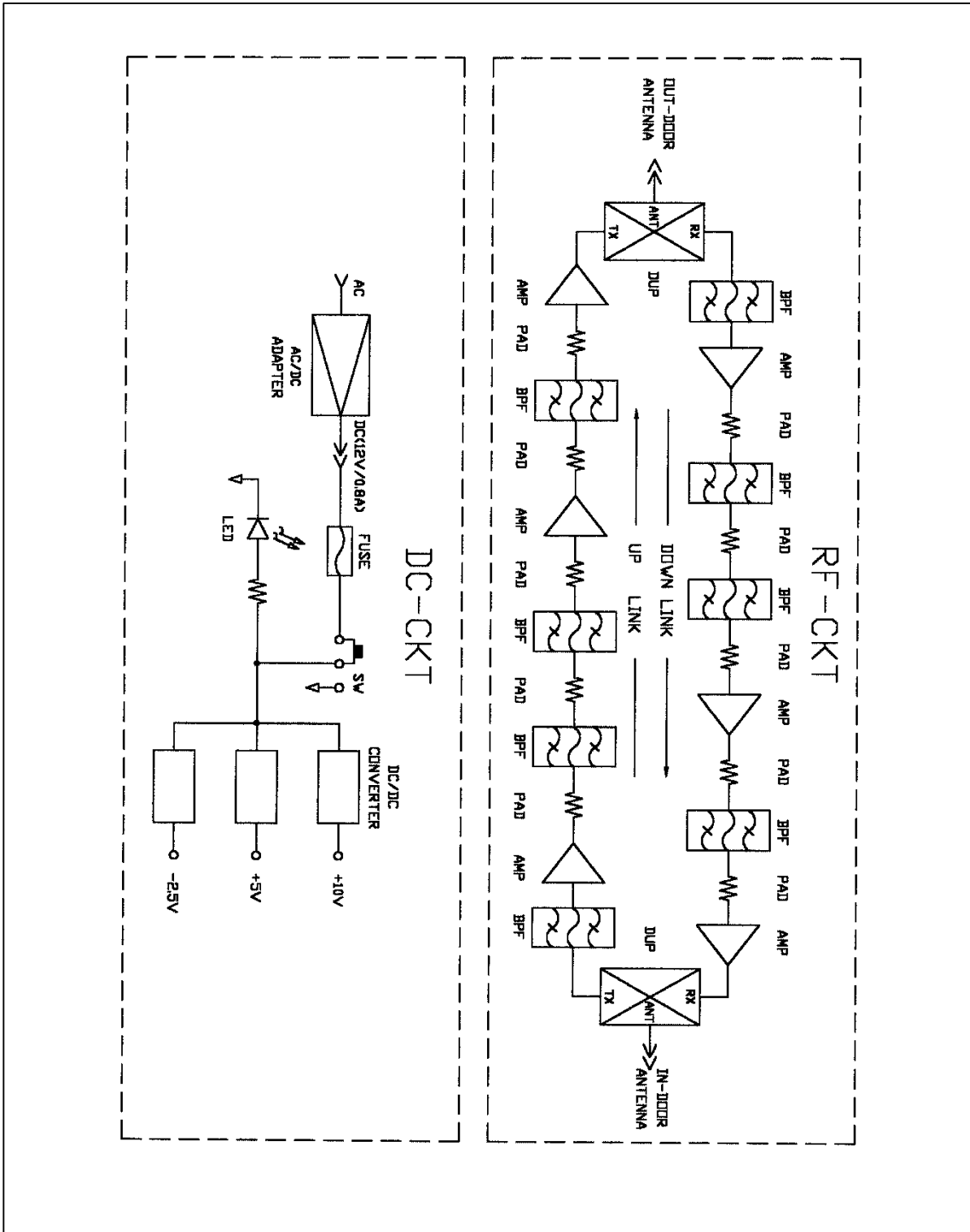
The BDA1250 series Amplifier is a compact wall mounted bi-directional Broadband amplifier. It can be mounted in false ceilings or closets.

The BDA1250 consists of the following functions:

- **BDA housing:** Rugged die-cast aluminum housing ensures long life and service.
- **1 Power Supply adapter:** Operates on 120/230VAC to provide 12V DC to amplifiers.

Figure 3-1 shows a block diagram of the BDA1250.

Figure 3-1 BDA1250 Block Diagram



3.2 BDA1250 Specifications

3.2.1 Electrical Specifications

RF Performance	Downlink	Uplink
Frequency Range	See model chart below	
Maximum Gain (nominal)	See model chart below	
Digital Gain Adjustment	See model chart below	
Gain Adjustment	20 dB	
3rd Order Intercept Point IP3	See model chart below	
Noise Figure	<8 dB	
Propagation Delay	<5 μ s	
Impedance	50 ohms	
VSWR	<2:1	
Input Impedance	50 ohms	
Electrical Specifications		
Primary Voltage	115/230VAC, 50-60Hz	
Primary Power	10 Watts	
Mechanical Characteristics		
Dimensions W x H x D	7.5" x 5.5" x 1.5"	
Weight	2 lbs. Approx.	
Housing	Rugged die-cast aluminum housing	
Connectors	N female	
Operating Temperature Range	-5°C to +50°C	

Table 3-1 BDA 1250 Series Model Chart

Model	Frequency (MHz)		Maximum Gain (dB)	1 dB Compression Point (dBm)		IP3 (dBm)	
	DL	UL		DL	UL	DL	UL
BDA1250-C	869-894	824-849	60	28	28	35	35
BDA1250-T	851-869	806-824	60	28	28	35	35

4 BDA Enclosure Installation

4.1 Preparation for the installation of BDA enclosures

a. Equipment and hardware required

- Each BDA is carefully packaged for air shipment. Any damage incurred during the transportation must be claimed from the shipper.
- Make sure the following necessary equipment and hardware are available and undamaged.
- 1 BDA1250 (supplied by Kaval)
- Jumper cable (not supplied by Kaval)
- AC adapter (supplied by Kaval)
- Mounting hardware such as: Four washers and four bolts (not supplied by Kaval)

b. Preparing the installation site

- Make sure the mounting area is large enough to accommodate for the installation of the BDA1250 (5.6"Wx1.6"Hx8.3"D) and free airflow is available around the unit.
- RF cables must be in place and labeled clearly as "Donor Cell Site" and "In-building".

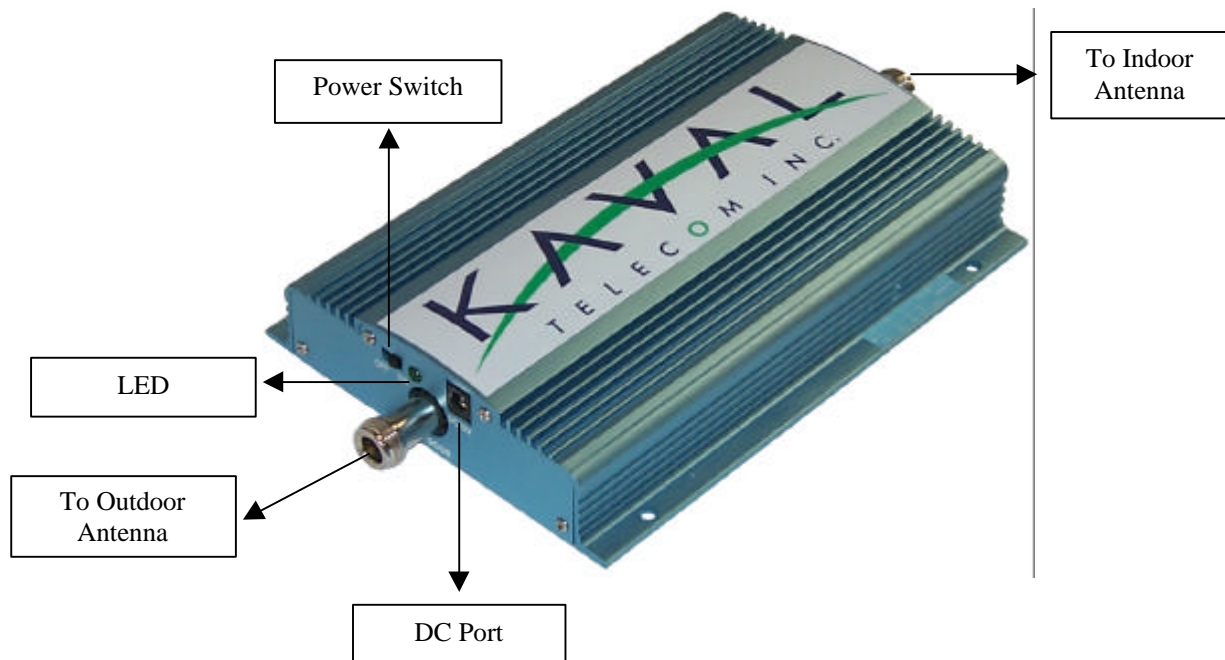
4.2 Mounting the BDA Enclosure

The physical installation is accomplished by mounting the BDA1250 in false ceilings, closets or on a vertical wall. Using four mounting holes on the enclosure (5.82" x 5.125", see figure 3-2) as a template insert four bolts to the wall. Make sure the bolts are capable of supporting at least 5 lbs

4.3 Connecting the Coaxial cables

Connectors of the BDA are located on the front and back of the BDA1250 (see figure 3-2). RF cables can be connected to these connectors using jumper cables as follows.

1. Connect one end of the first jumper cable to the BDA1250 connector marked "Outdoor"
2. Connect the other end of the first jumper cable to the connector marked "Donor Cell"
3. Connect one end of the second jumper cable to the BDA connector marked "Indoor"
4. Connect the other end of the second jumper cable to connector marked "In-building" cable

Figure 3-2. RF and DC Connections

4.4 Connecting the Power Cables

BDA1250 comes with AC adapter. Therefore an AC outlet providing 120 AC should be available with 4ft of the BDA1250. If AC outlet is to be installed, it is highly recommended that AC Power Wiring be performed by a qualified Electrician so as to ensure compliance with all National and Local Electrical Wiring Regulations. Connecting power cables can be done as follow:

1. Locate the on/off switch on the front of the BDA1250. Turn the switch to the OFF position.
2. Locate a nearby AC outlet and connect AC adapter to the AC outlet.
3. Connect the DC input jack of the AC adapter to the BDA12500.
4. Make sure the adapter cable is neatly tugged away.
5. Turn the BDA1250 power switch to the ON position. LED should be luminous to indicate the present of power.

5 Antenna Installation

- **All Antenna Installation is to be performed by Qualified Technical Personnel only.**
- **Antenna Installation Instructions** and locations below are for the purpose of satisfying **FCC RF Exposure Compliance** requirements.
- The **Roof Top Antenna** for linking to the *Donor Site* is a directional (high gain) Antenna fixed-mounted physically on the side or top of a building, or on a tower. The Antenna Gain must be no more than 10 dBi. The *Roof Top Antenna* location should be such that only Qualified Technical Personnel can access it, and that under normal operating conditions no other person can touch the Antenna, or approach within 10 meters of the Antenna.
- The **In-Building Antenna** connection is via a coaxial cable distribution system with Signal Taps at various points connected to the fixed-mounted **Indoor Antennae**. This is shown in the figure in the Introduction. The *Indoor Antennae* are simple 1/4 Wavelength (0 dBi Gain) types. They are used with Kaval 12, 16, or 20 dB Cable Taps. As such the maximum EIRP will be at the first Tapped Antenna, which will be 12 dB below the maximum signal level of the BDA1250; +28 dBm, or 0.63 Watts EIRP. These Antennae are to be installed such that no person can touch the Antenna, or approach within 0.2 Meters.

ANTENNA INSTALLATION WARNING

ALL ANTENNA INSTALLATION IS TO BE PERFORMED BY QUALIFIED TECHNICAL PERSONNEL ONLY.

ANTENNA INSTALLATION INSTRUCTIONS AND LOCATIONS ARE FOR THE PURPOSE OF SATISFYING FCC RF EXPOSURE COMPLIANCE REQUIREMENTS, AND ARE NOT OPTIONAL.

ALL ROOF TOP ANTENNA INSTALLATION MUST BE SUCH THAT NO PERSON CAN TOUCH THE ANTENNA, OR APPROACH CLOSER THAN 10 METERS.

ALL IN-BUILDING ANTENNAE INSTALLATIONS MUST BE SUCH THAT NO PERSON CAN TOUCH THE ANTENNAE, OR APPROACH CLOSER THAN 0.2 METERS.

6 Troubleshooting and Maintenance

6.1 Maintenance

6.1.1 Maintenance & Safety

The BDA has been engineered for easy maintenance and for safe operation. This has been achieved as follows:

- BDA1250 provides fault monitoring and accurate status report through LED.
- The AC adaptor is over-rated for actual requirements.
- Components are easily removable via quick AC adaptor DC and RF connectors.

6.1.2 Maintenance Philosophy

Field maintenance should require a screwdriver, a multi-meter, spares AC adaptor and Portable Radio to monitor off the air signals. There is no requirement to have any test equipment to accomplish most service repairs.

- BDA component parts have been designed for reliable long life operation.
- Corrective action can often be taken without detailed technical knowledge or the need for any test equipment.

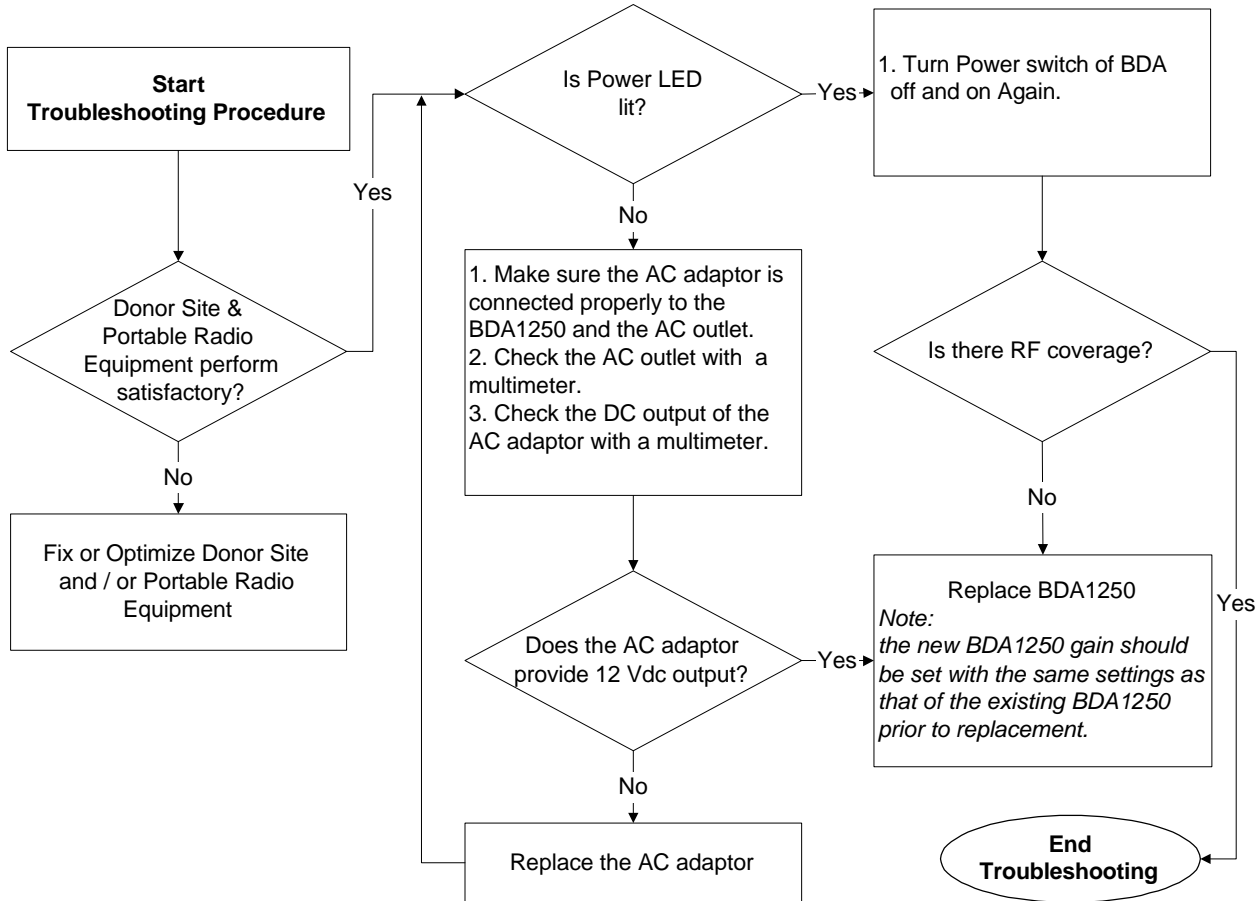
6.2 Troubleshooting Procedure

1. Before attempting to troubleshoot the BDA, you should study the troubleshooting flowchart carefully.
2. Always observe personal and equipment safety practices during troubleshooting.
3. Follow each step of the troubleshooting flowchart to check for the fault and to replace the recommended component.
4. Recommended Test Equipment:
 - Multimeter
 - Spare AC adaptor for substitution.
 - Phillips screwdrivers



Note: If you are not familiar with electronic system troubleshooting, Please contact Kaval at 1-888-86-KAVAL for assistance or ask for a RMA (Return Material Authorization) before sending BDA unit to an authorized service agent

TROUBLESHOOTING FLOWCHART



7 STANDARD WARRANTY

Products manufactured by Kaval Telecom Inc. are warranted to be free under normal use and service from defect in workmanship or materials for a period of one year from the date of shipment to the original purchaser. This warranty supersedes and voids any and all other warranties expressed or implied.

In no event shall Kaval Telecom Inc. be liable for incidental or consequential damages arising from the use, misuse, failure to operate or improper operation of any Kaval product or product accessory.

Specifically excluded from this warranty is any claim of merchantability or fitness for a particular purpose or application.

This warranty is void if the product has been subject to misuse, neglect, accidental damage, damage of a cosmetic nature, misapplication, extreme environmental conditions, unauthorized repair or alteration.

Customer must contact Kaval Telecom before shipping a product for warranty services to obtain a Returned Material Authorization. Shipping charges for returned products must be PREPAID. A return shipping fee will be charged if a returned item is found by Kaval not to be defective or defective for a reason that voids the warranty.

8 Product Service Procedure

Return and Repair Procedures

BDA1250 Line amplifier can be returned for repair by the following procedures:

- Contact Kaval Telecom Inc. at 1888-86-KAVAL for a Return Materials Authorization (RMA) number. Please provide serial number and model number.
- Ship the defective part prepaid in the original shipping box to:

Kaval Telecom Inc.

ATTN: Returned Part; RMA number:XXXX

60 Gough Road

Markham, On

L3R 8X7

Canada

9 Ordering Parts and Accessories

Parts ordering information

Parts and accessories for the BDA1250 Line amplifier can be purchased by contacting Kaval Telecom Inc. at 1888-86-KAVAL for prices and delivery. When ordering a replacement part, please provide model number, serial number and software version number (See BDA Controller Settings-“As-Built” list).