Version 1

COMPROD COMMUNICATIONS, LTD.

Customer Instruction Manual

VHF AMPLIFIER

Technical Manual

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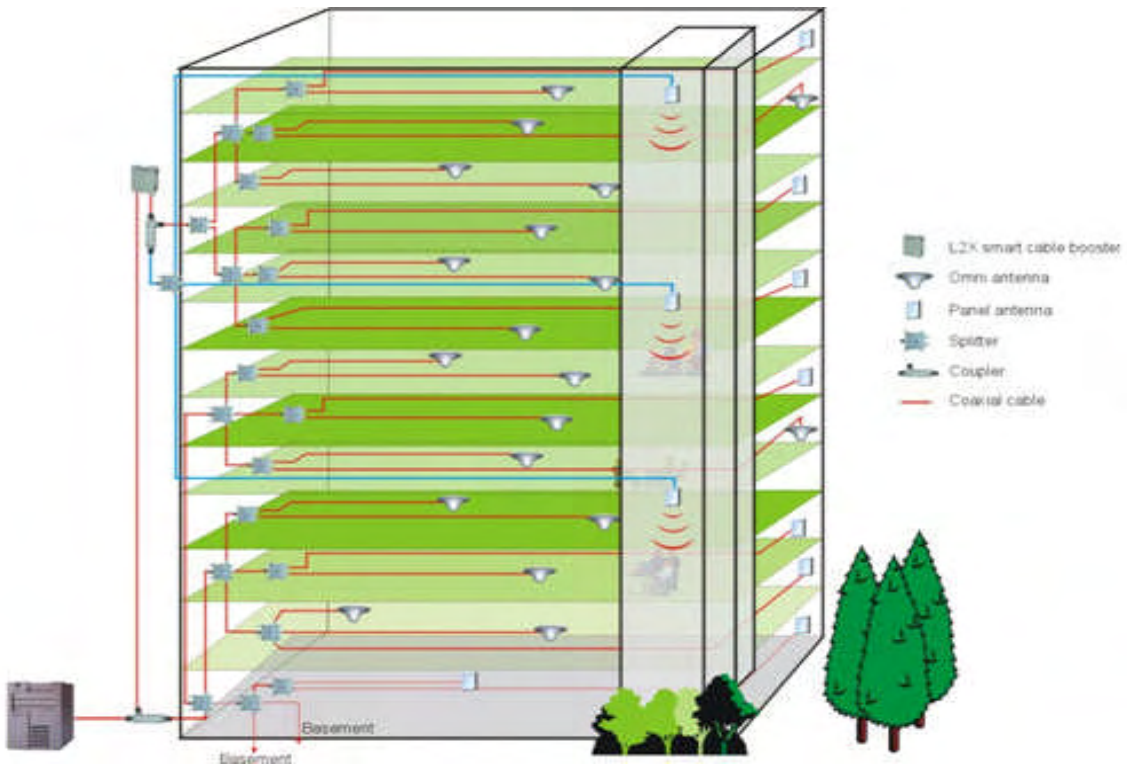
Class B Amplifier Box Description

1) This Amplifier is designed around the philosophy of Anytime, Anywhere, and Anyplace and uses only Class "A" Amplifiers, designed for a more constant and reliable Amplifier unit. Designed to be used in buildings, tunnel, government facilities, airports, providing the communication throughout. Typically, the Amp box will be connected to either radiant cable or a distributed antenna system. (Example below)

2) An Amplifier box is used increase the coverage of RF communications in buildings or places were RF is unable to penetrate from the base station site



Specifications

Our vhf amplifier have been designed with government agencies in mind. These are our highest level of performance and quality for continuous duty solutions while providing maximizing coverage.

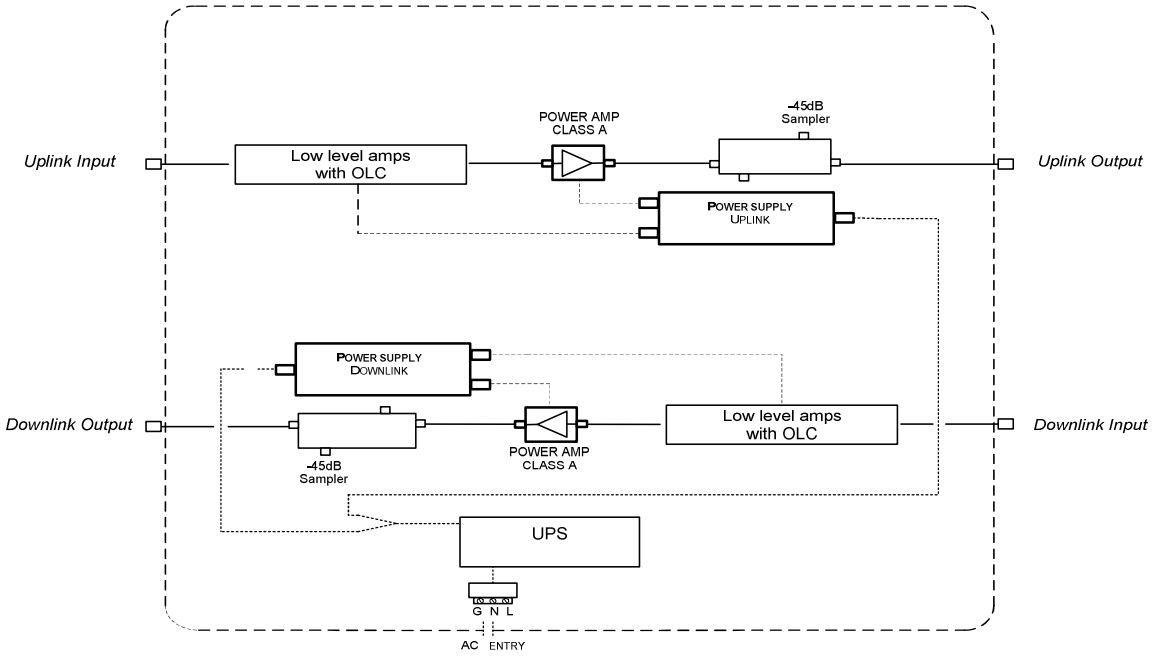
Available in rack mount, nema stainless steel, or painted steel nema enclosures.

Block Diagram Details

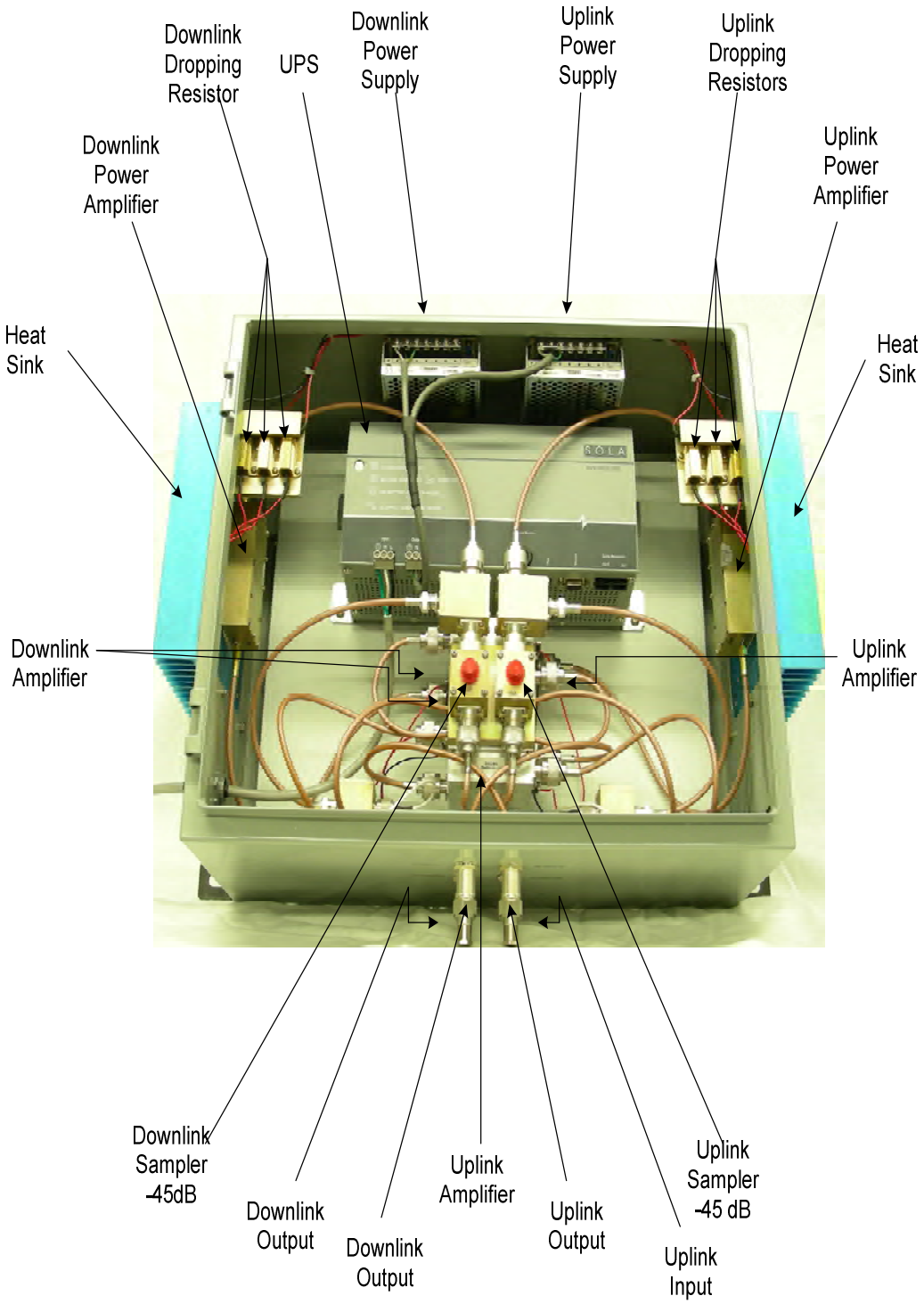
- The Uplink amplifier path receives signals form the donor antenna, and then amplifies them as they pass through the unit to the distribution system.
- The Downlink amplifier path receives signals from the distribution system, and then amplifies them as they pass through the unit to the donor antenna.
- An Output Level Control (OLC) allows attenuation to be automatically added to maintain proper factory set output signal. The output signal is sampled after the output power amplifier, then that RF signal is converted to a DC voltage and delivered to the OLC. A voltage chart is supplied with the unit for the user to identify input signal overload. A simple volt meter in needed.
- RF samplers are located just before the Output connectors to give indications of output level.
- The Factory installed UPS/Battery system is for inconsistency in the AC line power, Brown outs (low AC voltage for short intervals), Surge protection, short Black outs (30min or less), crossover time from line AC to Generator power, Circuit breaker for short circuit and over load protection.
- The first amplifiers in each of the input paths are low level preamps with low noise figures used to increase the gain of the signal.
- Power Amplifier Class A. This is amplifier is heat sink mounted and produces a high compression point and 3rd order Intercept point.
- 2 Power Supplies are used to separate the DC power consumption for Uplink and Downlink
- Dropping resisters are used to reduce the 24VDC from the power supplies to a safe range for the 2 low level amps and OLC. These are also separated for Uplink and Downlink.
- 3 and 6 dB pads are supplied for gain reduction in the event that the OLC is activated in the Uplink or Downlink paths.

Output Level Control Detail

- The OLC will control the output level of the amplifier box, this is done by using a sampled portion of the RF signal and converting it to DC voltage. This voltage is compared to the preset level of the OLC circuit. The preset level is Factory set with a 2 carrier input while monitoring IM products, not exceeding -13 dBm specification. The OLC voltage is then set to control the output signal levels. The OLC cannot discriminate between the amount of RF carriers or power input power levels, the OLC see's all the power levels as a single (composite) voltage and will add attenuation in the RF line to keep the OLC voltage from exceeding the preset level. Controlling the output signal for 1 or more carriers in this fashion will also maintain the IM products levels -13 dBm or below to comply with the FCC and Industry Canada specification.



SPECIFICATIONS	UPLINK / DOWNLINK
Frequency Range	138-174 MHz
Number of Passbands	2
Output Level Control	Yes
Maximun Gain	+ 88 dB Typical / +90.5 dB Max
Gain Set Method	3dB & 6dB pads
Gain Adjust Range	0,-3,-6,-9 dB
1 dB Compression Point	+38 dBm min
3rd Order Output IP	+49 dBm min
Output RF Sampler	-45 dB +/-2dB
System Noise Figure	-3 dB typical
Temperature Range	-30 to -60 C
Nominal Impedance	50 Ohms
VSWR	1.5:1
Max power Input (olc not active)	-55 dBm single carrier
	-60 dBm two carrier
	-62.9 dBm three carrier
Max power Input (olc active)	-12.9 dBm single carrier
	-15.3 dBm two carrier
Max Power Output	+34.6 dBm one carrier
	+28 dBm two carrier
	+26.3 dBm three carrier
OLC range	40dB typical
Input/Output Connectors	N – female
RF Sampler Port Connectors	BNC – female
AC Power Input	120 VAC / 240VAC Option
Unit Current Draw	DC 6.0 amps
Housing	Painted Steel NEMA
	Stainless Steel NEMA
	19" Rack Mount
Nominal Size	Enclosure : 16"H x 23.25"W x 8.25"D


Downlink Dropping Resistor
UPS
Downlink Power Supply
Uplink Power Supply
Uplink Dropping Resistors
Downlink Power Amplifier
Uplink Power Amplifier
Heat Sink
Heat Sink
Downlink Amplifier
Uplink Amplifier
Downlink Sampler -45dB
Downlink Output
Downlink Output
Uplink Amplifier
Uplink Output
Uplink Sampler -45 dB
Uplink Input

Unpacking

1) The VHF BDA should be unpacked soon after delivery and carefully inspected for possible shipping damage. It is the customer's responsibility to file claims with the freight carrier if damage is suspected and is usually limited to a certain time period after delivery.

2) Carefully compare the packing slip(s) against the package contents to verify the receipt of all expected items.

3) Retain all product documentation and make sure that manuals are forwarded to the appropriate site management, installation and service personnel.

Accessories

1) The major accessory commonly supplied with the VHF BDA is attenuator pads. They are used for padding the power on the BDA, reducing its output level. Based on the size, cable, and location of the antennas, you can optimize the output of the BDA by using the 3dB and 6 dB supplied pads.

Lightning Protection

1) Although relatively rugged, lightning can damage the internal working mechanisms inside the BDA. We recommend the installation of a lightning surge suppressor in the transmission line where it enters the building prior to the BDA. The suppressor should be grounded to the building ground buss at the transmission line entry point. Chose a suppressor that will handle the expected amount of input power from the BDA to the donor antenna.

Amplifier Installation

1) Verify that the frequencies listed on the Amplifier Box label agree with the channel assignments for the Duplexer Box. If they are not the same, contact the factory for advice and instructions. Please read the Warnings and Notices at the bottom of the next page before proceeding.

2) Mount the Amplifier in a grounded rack, cabinet or wall. The Amplifier Box is all-metal and the mounting screws can be used as attachment points for a ground wire.

3) Check the Isolation between the donor antenna and the Distribution antennas is 20dB above the Gain of the Amplifier.

4) Connect the Donor Antenna Port and Antenna Output to Distribution Network port through the Duplexer Box using solid-shield or double-braided 50 ohm coaxial cable

with suitable connectors.

5) Connect to AC power source. Press and hold (5 seconds) the button on the UPS unit inside the Amplifier box to tune the unit on. The green light will be lit; if AC voltage is not present the amber light and a beeping alarm will be on, showing the unit is in temporary battery back up.

6) After the unit is on: reference the OLC with a multi-meter to identify if the OLC is activated. It should no be active unless there is a strong portable using the system or the antennas are not spaced properly (donor to Distribution. Refer to Data sheet for voltage readings.

7) Installation is now complete, Optimize unit to the specific Distribution system environment.

Antenna Installation

Buildings that are not designed or upgraded for antenna systems need special attention for antenna mountings, equipment installation and Cable runs. There are many variables involved in the design of a DAS system (distributed antenna system).

-Structural requirements for the location of the outdoor antenna (Donor); masts towers, building structure for the wind and ice loading.

-Protection of antennas and cables from building occupants and general human interaction.
- Installers/designers must be aware of general seating, foot traffic areas and different access points.
- All Antennas must be 66cm (26 Inches) or greater to meet exposure requirements.

-The Donor antenna and distribution antennas must be have 20 dB + the Maximum gain of the amplifier of isolation between them. Less Isolation will cause the amplifier to overload and oscillation will occur which may result in damage to the Amplifier.

- Antennas should be mounted following the manufactures guild lines for RF connection and being affixed to the building or location of desired signal.
- All cables used in the DAS system shall be 50 ohms and clamped properly to insure the cables 50 ohm impedance characteristics. Improper clamps will change the impedance of the cable at that location thus changing the efficiency of the system.

- Antenna placement through the DAS system is important to impose a balanced distributed signal. The use of proper valued (dB) decouples, power dividers, and signal taps is important to promote a balanced system.

Warnings and Notices

WARNING: Changes or modifications not expressly approved by Comprod Communications could void the user's authority to operate the equipment

⚠ *WARNING*: *To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 66 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended.*

Notice:
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.

Notice:
"This device has been designed to operate with the antennas listed below, and having a maximum gain of 3.5 dBd or 5.65 dBi. Antennas not included in this list or having a gain greater than 3.5 dBd or 5.65 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms."

"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication