OPERATION AND MAINTENANCE MANUAL
For the
MODEL 2400
DISTRIBUTION LINE AMPLIFIER

MANUAL NO. 385700-4006
REVISION 6

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SAFETY SUMMARY

High voltage is used in the operation of this equipment. Death on contact may result, if personnel fail to observe the following safety precautions:

- Do not be misled by the term “Low Voltage.” Potentials as low as 50 Volts may cause death under adverse conditions.
- Do not crush, puncture, disassemble or otherwise mutilate batteries. Leaking batteries can cause serious damage to equipment and injury to personnel.
- Do not remove covers or access plates on the equipment, unless you are authorized to do so.
- Do not work on electronic equipment unless there is another person nearby who is familiar with the operation of the equipment and is trained in administering first aid.
- Whenever possible, disconnect the equipment from the power source before beginning maintenance.
- To prevent electrical shock or damage to the equipment, do not operate it until you thoroughly understand the operation and function of all controls, indicators, and connectors.
- Turn off all power to the equipment before replacing any fuses.

FIRST AID

In case of electrical shock:

- Do not try to pull or grab the individual.
- If possible, turn off the electrical power.
- If you cannot turn off the electrical power, pull, push, or lift the person to safety using a dry wooden pole, a dry rope, or some other insulating material.
- Send for help as soon as possible.
- After the injured person is no longer in contact with the source of electrical shock, move the person a short distance away and immediately administer first aid and artificial resuscitation as required.

WARNING

The Distribution Line Amplifier is an unlicensed device operating under the conditions of FCC part 15 regulations. This equipment is intended to be installed and operated by professional parties. It is the responsibility of those parties to insure that the equipment is operated in compliance with the applicable FCC part 15 specifications.

LIST OF ABBREVIATIONS AND ACRONYMS

NOTE

All abbreviations/acronyms used in this manual, other than those listed on this page, are used per MIL-STD-12D.

BDR	Base Data Radio
USER	Communications-Based Train Control
DLA	Distribution Line Amplifier
ESDS	Electrostatic Discharge Sensitive
FWD	Forward
LRU	Line Replaceable Unit
MDR	Mobile Data Radio
PC	Personal Computer
RCS	Radio Communication Subsystem
RF	Radio Frequency
RVS	Reverse
SSR	Spread Spectrum Radio

LIST OF REFERENCE DOCUMENTS

Andrew Catalog 37 (or latest version)

Drawings:

Assembly, Line Amplifier	385700-4000

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CHAPTER 1
INTRODUCTION

1.1 GENERAL MANUAL INFORMATION

This manual contains instructions for the operation, maintenance, and support of the Distribution Line Amplifier (DLA) assembly. This manual describes the amplifier assembly in detail. It provides the necessary information for qualified technical personnel to install, repair, and maintain the Distribution Line Amplifier to the line replaceable unit (LRU).

This manual is divided into seven chapters, which consist of sections to describe the information or procedures in detail. The five chapters are as follows:

- Chapter 1 outlines the contents of this manual and provides a basic equipment description of the Distribution Line Amplifier.
- Chapter 2 provides preparation for use and installation information.
- Chapter 3 provides operating procedures for the equipment.
- Chapter 4 provides preventive and corrective maintenance of the Distribution Line Amplifier assembly.
- Chapter 5 contains a vendor list and parts list for procurement of replacement parts.
- Chapter 6 provides mechanical outline information
- Chapter 7 contains a schematic of a test fixture for the Alarm/Control interface.

1.2 PREPARATION FOR STORAGE OR SHIPMENT

The following paragraphs describe guidelines for long term storage and the shipment of the equipment.

1.2.1 Storage

Before storage, wrap the equipment in static shielding bubble wrap. Bubble wrap protects internal electrostatic discharge sensitive (ESDS) assemblies, external panels, and connectors. Place wrapped equipment in the original shipping containers and seal. Store in a cool dry place, away from the elements.

1.2.2 Shipment

Ship equipment in the original shipping containers or in a container that provides sufficient protection for ESDS equipment. Pack the equipment in a manner that provides protection for all external switches and mountings, because these items are most vulnerable to damage during shipment.

1.3 DESCRIPTION OF EQUIPMENT

The Radio Communications Network consists of Base and Mobile Radio Communication Systems (RCS) and a Wayside Antenna System. The Distribution Line Amplifier (DLA) is part of the distributed Wayside Antenna System based on leaky-feeder cable RADIAX®. DLA's are used to compensate for attenuation losses in the cable by providing bi-directional amplification of signals. The DLA also includes a direction control signal and status signals to monitor amplifier operation.

1.3.1 Type of Equipment

The DLA is a FCC approved bi-directional amplifier that is used with spread spectrum transceivers that operate in the ISM 2400-2483.5 MHz frequency band. The 4 versions of the DLA are shown in Table 1-1. The models differ in the number of RF ports and the type of control interface.

Part Number	Description
385700-4000-001	4 port amplifier with LONWorks™ Interface
385700-4000-002	4 port amplifier with dry contact Interface
385700-4000-003	2 port amplifier with LONWorks™ Interface
385700-4000-004	2 port amplifier with dry contact Interface

Table 1-1 – DLA Part Numbers

1.3.2 Purpose of the Equipment

The Distribution Line Amplifier provides selective frequency range amplification of both a forward (downlink) and reverse (uplink) direction signals in RADIAX® cable. Forward is defined as the direction of RF energy from the BDR at the wayside to the MDR. Reverse direction is defined as the direction of RF energy from the MDR to the BDR. The signals that appear on the line amplifier RF ports are determined by the USER controlled direction signal.

1.4 LOCATIONS AND DESCRIPTIONS OF MAJOR COMPONENTS

Refer to Figure 1-1 Distribution Line Amplifier (4 port) for a view of the external connections of the 4 port DLA. The 2 port DLA does not include J5 or J6. The mechanical outline of the DLA is given in CHAPTER 6. The following paragraphs contain the description of the Distribution Line Amplifier.

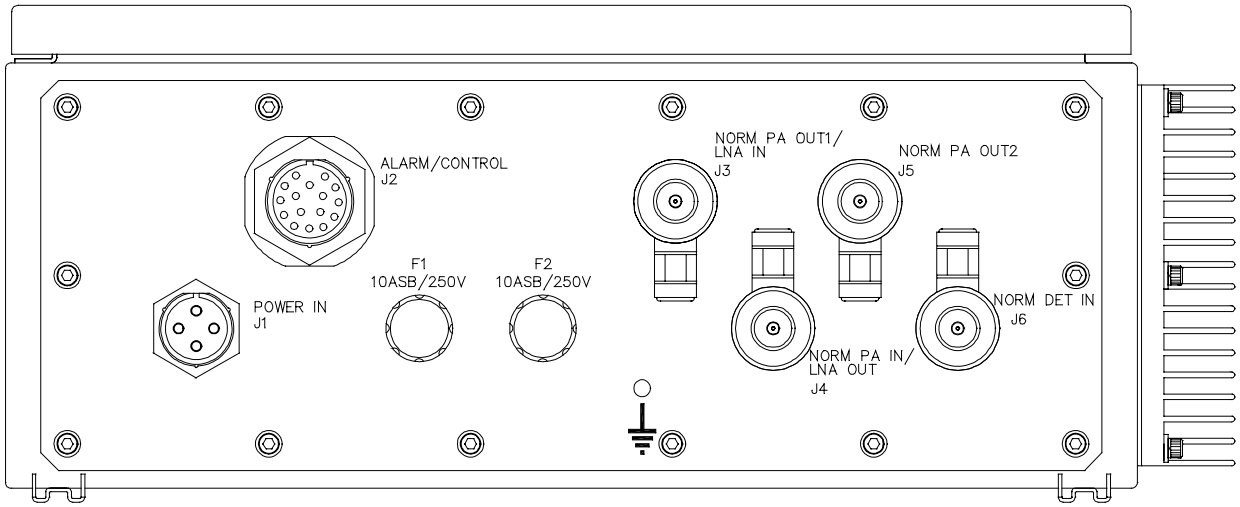


Figure 1-1 Distribution Line Amplifier (4 port)

1.4.1 Distribution Line Amplifier Principles of Operation

The bi-directional Distribution Line Amplifier operates within two sub-regions of the 2400 – 2483.5 MHz ISM band. It filters and amplifies at the BDR center frequency of 2416.64 MHz. in one direction (FWD) and at the MDR center frequency of 2467.86 MHz in another direction (RVS).

The RF signal at each amplifier is routed through a diplexer (filter) to divide the signal into two paths: forward and reverse. The DLA has a direction control switch which changes the signal path to the opposite direction upon the command from the user control equipment network data interface via the alarm and control interface board. The internal status of the DLA is monitored by the Amplifier Alarm Detectors. The status signals are sent to the USER control equipment network data interface via the alarm and control interface.

The BDR path, also referred to as the PA channel or channel 1, contains a power amplifier. The maximum PA output of the 4 port DLA is < +27 dBm per output port. The PA output port of the 2 port DLA is < +30 dBm. The PA channel maintains a constant output power over a user adjustable range. See Table 1-2 Distribution Line Amplifier Specifications for the input range over which the output power is adjustable. The PA channel also contains an input

power level alarm as well as an output power alarm. The alarm levels are user adjustable.

The MDR path is also referred to as the LNA channel or channel 2. The LNA channel is referenced to a pilot tone within the Distribution Line Amplifier. The pilot tone is used (1) to set the gain of the LNA channel and (2) to provide a method of detecting a faulty LNA module. The LNA channel gain is user adjustable. The maximum LNA gain is +27 dB for the 4 port DLA per output port and +30 dB for the 2 port DLA. See Table 1-2 Distribution Line Amplifier Specifications for the range over which the gain is adjustable. Under normal operation, the input signal is expected to be lower (nominally 10 dB) than the pilot tone.

The PA channel input alarm is used to detect a loss of input signal due to cable breakage, etc. The PA channel output alarm and the LNA channel output alarm are combined to indicate an amplifier failure.

Refer to Figure 1-2 DLA Block Diagram, for bi-directional amplifier major component identification.

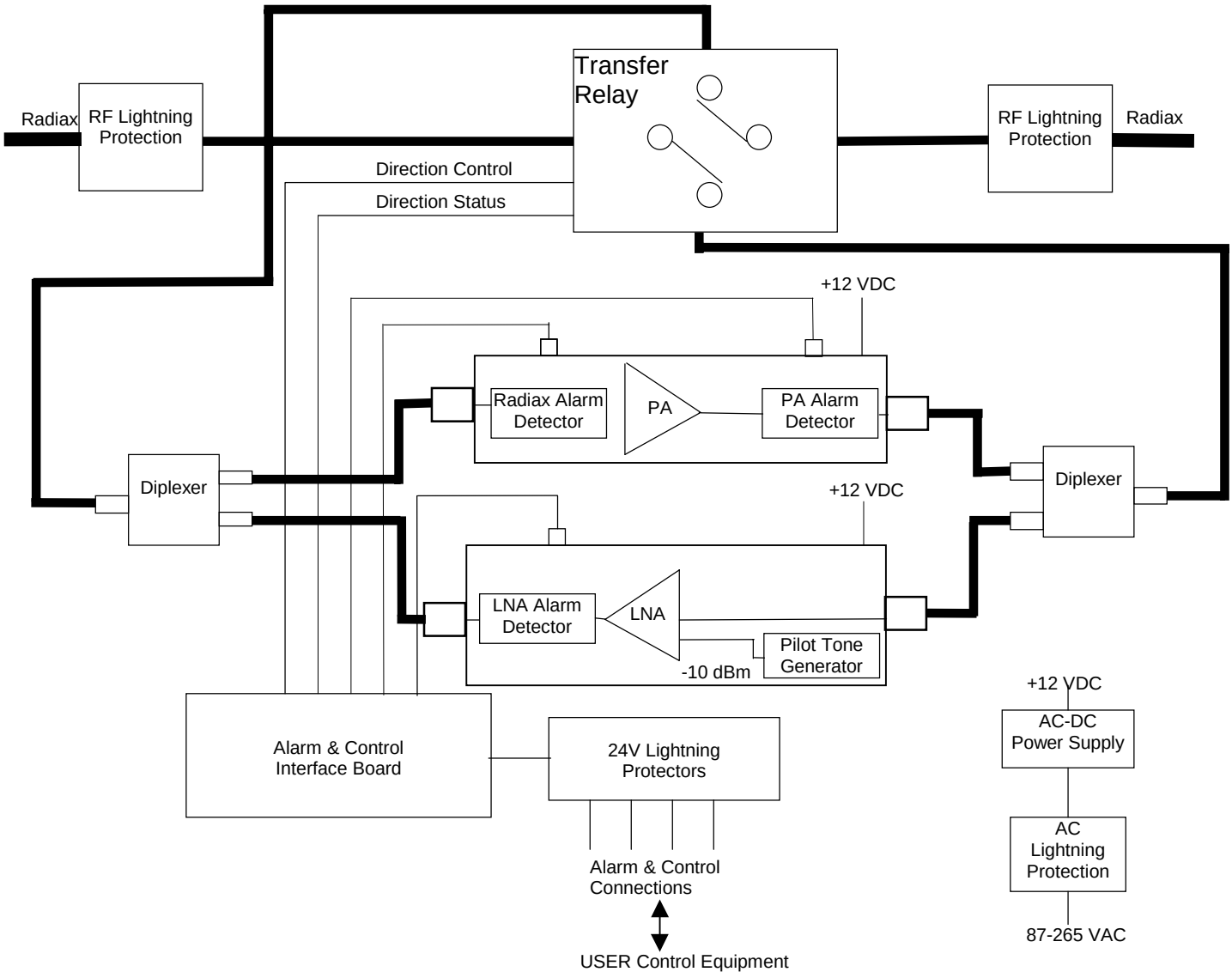


Figure 1-2 DLA Block Diagram

1.4.2 Distribution Line Amplifier Major Components

Refer to Figure 1-3 DLA Internal View for locations of major DLA components. The test point locations, Pilot Tone Output J3 on the Pilot Tone Board and Alarm and Control Interface Board Test Points J4, shown in
Figure 1-3 are used for initial DLA adjustments and referenced later in this manual in section 2.5.

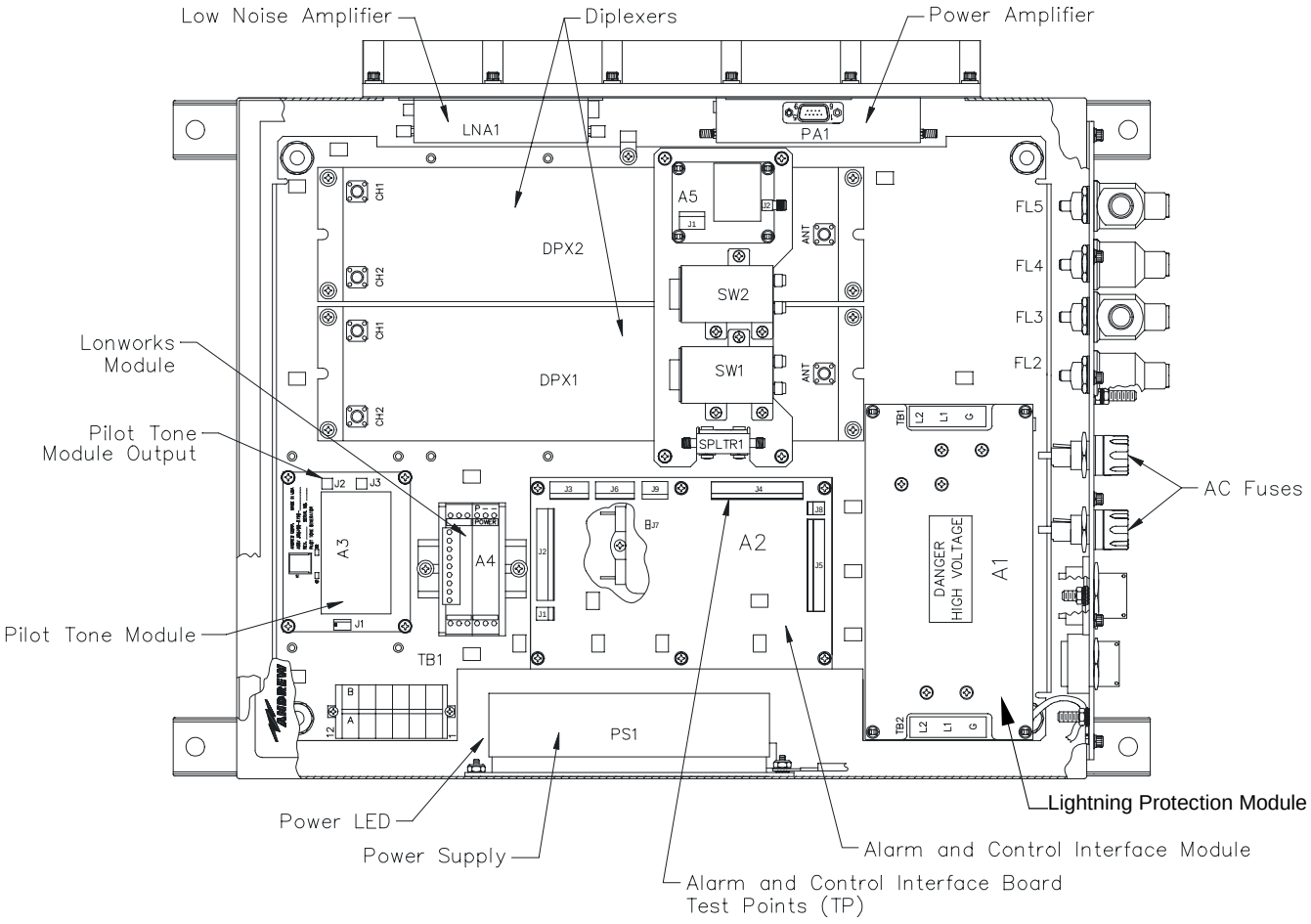


Figure 1-3 DLA Internal View

Refer to section 2.5.1, Distribution Line Amplifier Setup, for PA and LNA outline views and controls.

1.5 EQUIPMENT CHARACTERISTICS

Refer to Table 1-2 Distribution Line Amplifier Specifications. The table contains the specifications for the DLA. The table includes characteristics and specifications in three categories: technical, environmental, and physical.

1.5.1 Power and Utility Requirements

The DLA operates across an AC input range of 87 to 265 VAC. No user adjustment is required.

1.5.2 Environmental Information

The DLA assembly is designed for above and below ground environments. Refer to Table 1-2 Distribution Line Amplifier Specifications, for more detailed information.

The DLA is housed in a NEMA4X enclosure. It is intended for indoor or outdoor use to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-direct water; undamaged by the formation of ice on the enclosure. The NEMA4X enclosure is manufactured from 16 gauge Type 304 stainless steel.

Electrical Specifications	
Channels	2
Channel 1, MHz	2416.64 ± 13.5 MHz
Channel 2, MHz	2467.86 ± 13.5 MHz
Input and Output Impedance, ohms	50
Channel 1 (PA channel)	
input power	-15 dBm to +5 dBm
output power, adjustable	+15 to +30 dBm (2 port amplifier)
	+12 to +27 dBm (4 port amplifier)
input signal alarm, adjustable	-10 dBm nominal
output signal alarm, adjustable	+20 dBm nominal
Channel 2 (LNA channel)	
input power	-25 dBm maximum
output power	+0 dBm maximum (2 port amplifier)
	-3 dBm maximum (4 port amplifier)
output gain, adjustable	15 to 30 dB
output signal alarm	10 dB below the pilot tone level
Gain, dB	≥ 30 (at maximum gain)
Noise Figure, dB	
Channel 1	≤ 8
Channel 2	≤ 6
Environment Specifications	
Operating Temperature, °C	-40 to +70
Storage Temperature, °C	-55 to +85
Physical Specifications	
Power Requirements	87-265 VAC 47-63 Hz
Power Consumption, watts	50
Dimensions, in (mm)	20 (508) x 16 (406) x 7 (178) excluding mounting feet
Weight, lbs. (kg)	43 (19.5)

Table 1-2 Distribution Line Amplifier Specifications

CHAPTER 2

INSTALLATION

2.1 INSTALLING THE DISTRIBUTION LINE AMPLIFIER EQUIPMENT

This chapter provides information to install the Distribution Line Amplifier (DLA) and to prepare the equipment for use.

2.1.1 Unpacking and Inspection

Unpacking the Distribution Line Amplifier does not require special procedures. Use normal shop procedures to unpack the equipment.

Carefully inspect the shipping containers and equipment. If the containers show damage, inspect the equipment in those containers with extra care. Do not open containers with extreme damage.

Check equipment for bent frames, protrusions, and dents. Pay close attention to external brackets, controls and connectors, because they are especially susceptible to damage during shipment.

If you find damage to the equipment, notify Andrew Corporation's Customer Service Center at:

- 1-800-255-1479 (Inside the USA)
- 708-873-2307 (Outside the USA)

2.1.2 Proper Installation of Units

The amplifier has a weatherproof NEMA4X enclosure. The layout is optimized for vertical mounting of the amplifier with the cables connected at the bottom of the amplifier. The enclosure is accompanied with hanger brackets that are used to mount the amplifier. The type of fasteners will depend on the construction of the mounting surface. Typical construction in a concrete tunnel would be to use concrete anchors embedded in concrete.

Once DLA is mounted, the power connections and RF connections can be made next.

2.2 INTERCONNECTIONS

Refer to Figure 2-1 DLA Forward Direction Interconnect Diagram, for a block diagram of wiring runs and connector designations. The following paragraphs describe the interconnections directly related to the Distribution Line Amplifier.

WARNING

Before applying power, verify that the input/output cables are securely connected to the DLA Input/Output J3 and J4 ports. Failure to observe these warnings will damage the equipment.

2.2.1 Forward Direction Configuration Interconnection

In normal usage, the RF connections to the Distribution Line Amplifier are made with non-radiating coaxial cable that is attached to the main radiating coaxial cable RADIAX®. The non-radiating RF cable is type HELIAX® LDF4-50A (or equivalent) with N male type connectors. In the forward configuration, connect the HELIAX® coaxial cable coming from the direction of BDR or the preceding DLA in a cascaded configuration to the Distribution Line Amplifier at **NORM PA IN/LNA OUT** (J4) port on the connector panel of the unit. Connect the HELIAX coaxial cable coming from the direction of the succeeding DLA in a cascaded configuration at the DLA **NORM PA OUT1/LNA IN** (J3) port. See Figure 2-1 DLA Forward Direction Interconnect Diagram for a typical 4 port configuration. For 2 port configurations, J5 and J6 are not connected. Refer to Andrew Catalog, -- HELIAX® Coaxial Cable – for cable and connector information.

Connect a nominal 120 VAC power source to the DLA connector panel **POWER IN** (J1) port. Refer to Figure 2-3 DLA Input VAC Pin-outs.

The **ALARM/CONTROL** (J2) connector is connected via cable to the USER control equipment network data interface. The data interface may be represented by either LONWORKS® type connection or by twisted pair cable connection. For the dry contacts refer to Figure 2-4 DLA ALARM/CONTROL Port Pin-outs. The **ALARM/CONTROL** interface includes a signal that controls the direction of the line amplifier. In normal usage the direction control is set to **FORWARD**.

2.2.2 Reverse Direction Configuration Interconnection

In normal usage, the direction of the amplifier is reversed by controlling the amplifier from the **ALARM/CONTROL** interface. The signals are connected to the line amplifier as described in the previous section. Selecting the reverse direction reverses the direction of the signals within the line amplifier as well as the signals that appear on J3 and J4 of the line amplifier.

2.3 CABLE AND GROUND REQUIREMENTS

The following paragraphs contain the requirements for constructing the interconnect cabling between the DLA vendor supplied equipment.
The chassis of the DLA must be bonded to earth with 6-guage solid conductor. See Figure 1-1. Connection to the DLA is made at ground lug provided at the connector panel of the DLA.

The RF coaxial cables that are connected to the main radiating cable under normal conditions must support potential bends in the path from the main radiating cable to the DLA plate. Loss through this cable must be less than 2 dB.

For the ALARM/CONTROL interface (direction and amplifier status signals), construct signal cabling using 16 gauge shielded cabling.

All signal cables shall be shielded for EMI reduction.

FORWARD CONFIGURATION : DIRECTION CONTROL = NORMAL

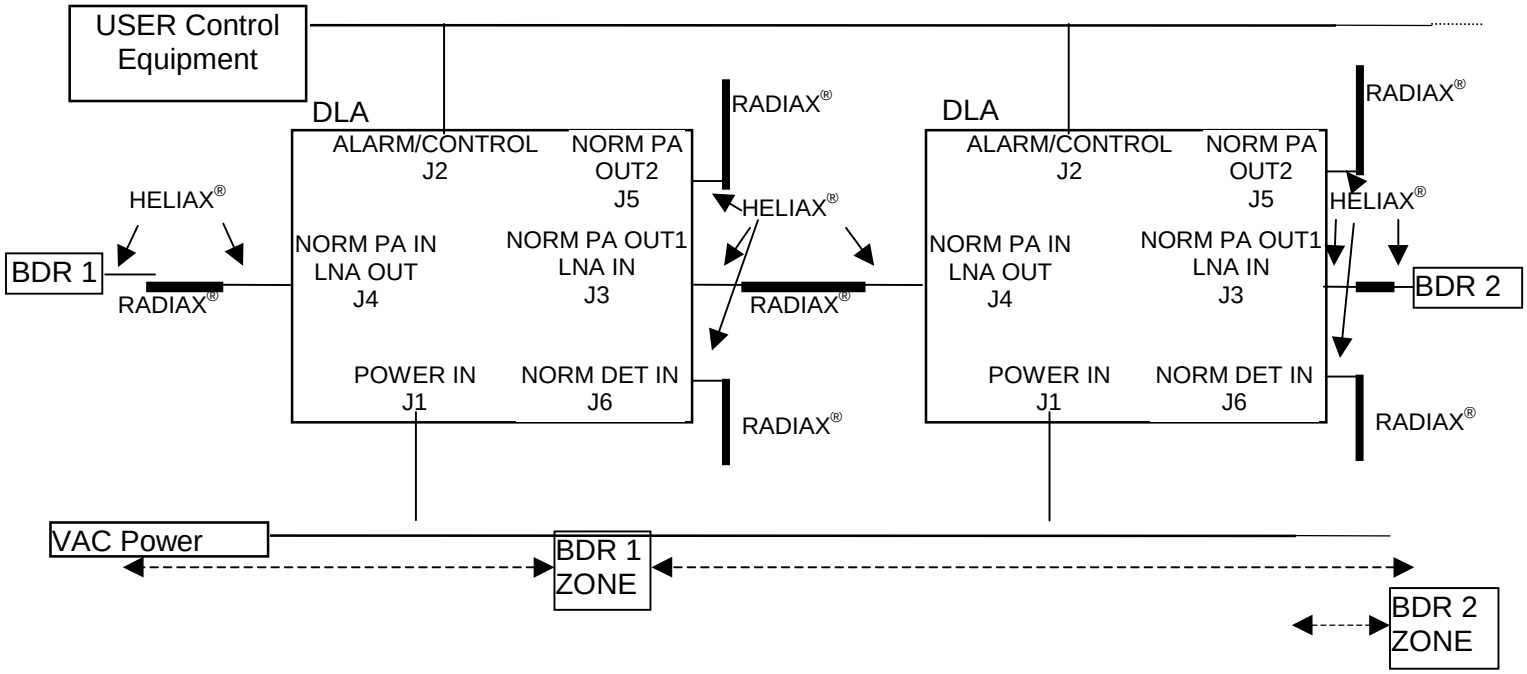


Figure 2-1 DLA Forward Direction Interconnect Diagram

RF Port	Frequency	Input/Output	4 Port/2 Port
J3 – LNA In	2467.84 MHz ± 13.5 MHz	I	Y
J3 – Norm PA Out1	2416.64 MHz ± 13.5 MHz	O	Y
J4 – Norm PA In	2416.64 MHz ± 13.5 MHz	I	Y
J4 – LNA Out	2467.84 MHz ± 13.5 MHz	O	Y
J5 – Norm PA Out2	2416.64 MHz ± 13.5 MHz	0	4 Port only
J6 – Norm Det In	2416.64 MHz ± 13.5 MHz	I	4 Port only

Table 2-1 – Forward Direction RF Port Functions

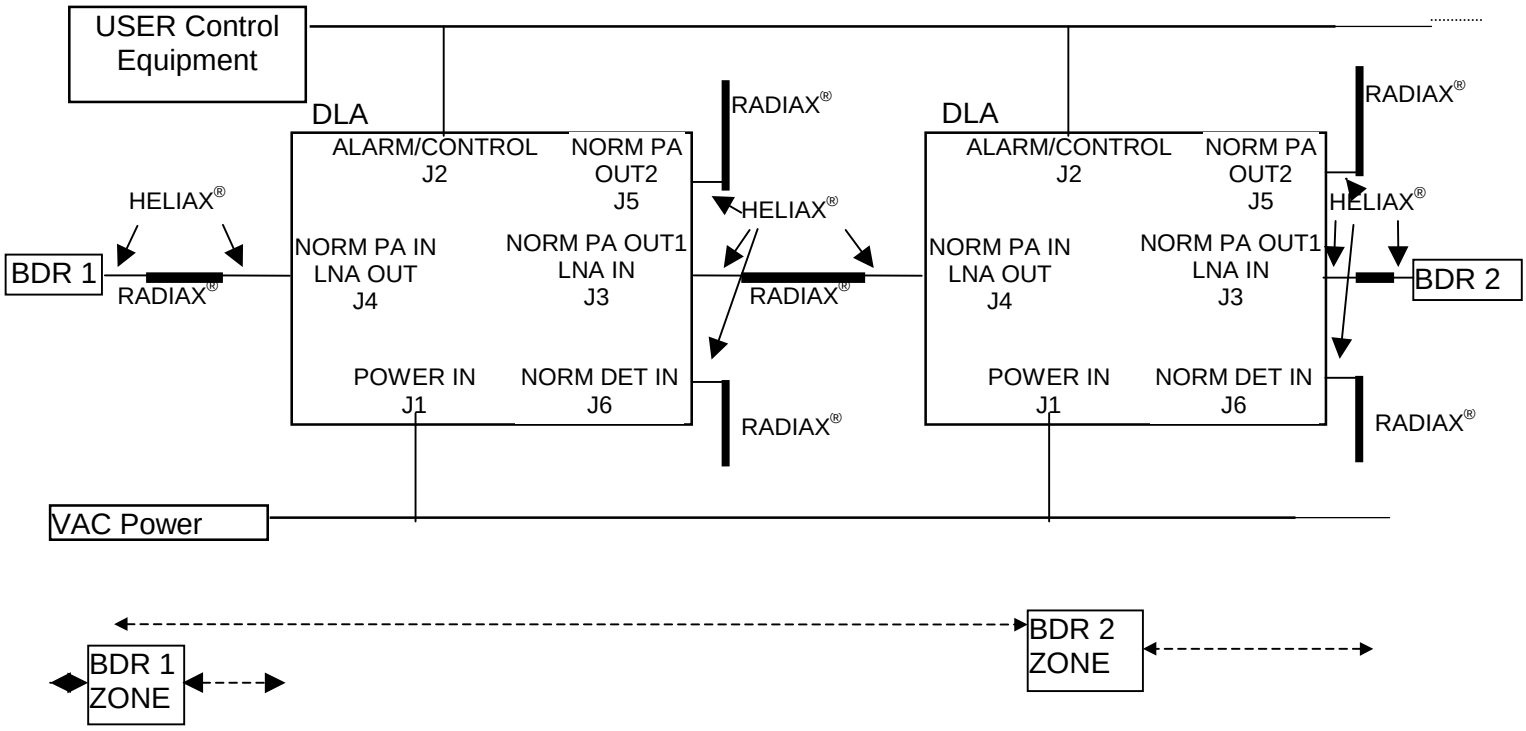


Figure 2-2 DLA Forward Direction Interconnect Diagram

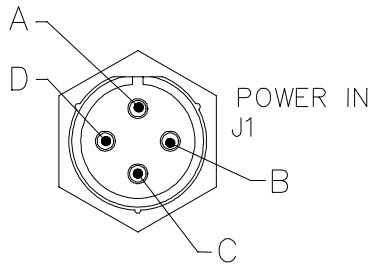
RF Port	Frequency	Input/Output	4 Port/2 Port
J3 – LNA In	2467.84 MHz ± 13.5 MHz	O	Y
J3 – Norm PA Out1	2416.64 MHz ± 13.5 MHz	I	Y
J4 – Norm PA In	2416.64 MHz ± 13.5 MHz	O	Y
J4 – LNA Out	2467.84 MHz ± 13.5 MHz	I	Y
J5 – Norm PA Out2	2416.64 MHz ± 13.5 MHz	I	4 Port only
J6 – Norm Det In	2416.64 MHz ± 13.5 MHz	O	4 Port only

Table 2-2 Reverse Direction RF Port Functions

2.3.1 Connector Pin-outs

Refer to Figures Figure 2-3 and Figure 2-4 for the connector pin-out information for the Distribution Line Amplifier ports.

Figure 2-3 DLA Input VAC Pin-outs shows the pin assignments for the Distribution Line Amplifier **POWER IN** connector.

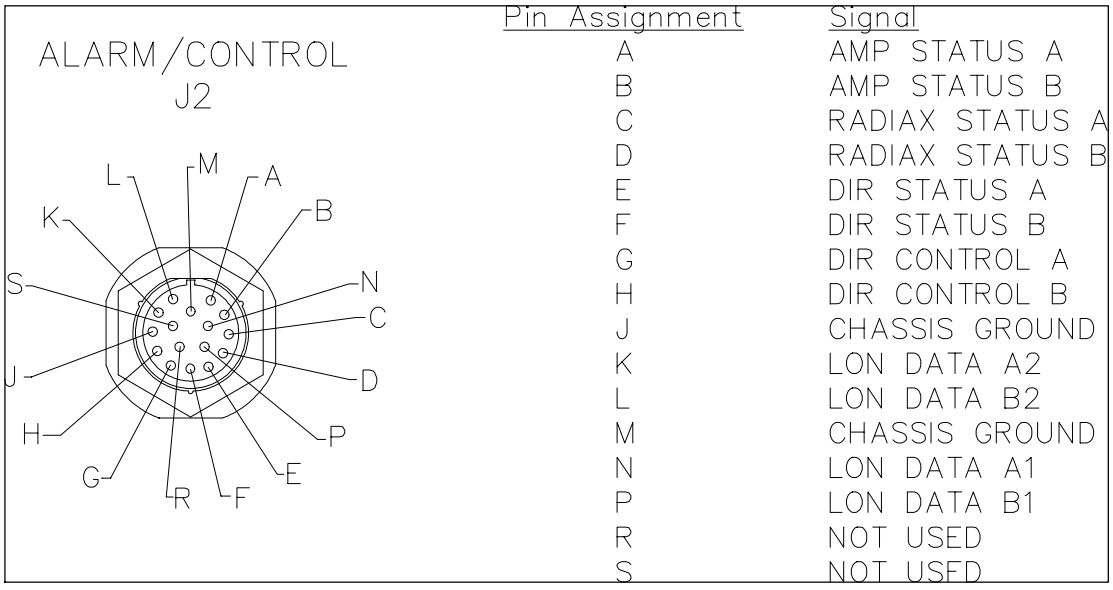


Pin Assignment	Signal
PIN A (Black)	Line
PIN B (White)	Neutral
PIN C (Green)	Ground
PIN D	Not Used

The DLA Power Connector is a MIL-C-26482, Series 2 connector. The connector is MS3474W14-4P or equivalent. Mating connectors are MS3475W14-4S, PV75W14-4S, or equivalent.

Figure 2-3 DLA Input VAC Pin-outs

Figure 2-4 DLA ALARM/CONTROL Port Pin-outs, shows the pin assignments for the Distribution Line Amplifier **ALARM/CONTROL** connector.



Pin Assignment	Signal
A	AMP STATUS A
B	AMP STATUS B
C	RADIAX STATUS A
D	RADIAX STATUS B
E	DIR STATUS A
F	DIR STATUS B
G	DIR CONTROL A
H	DIR CONTROL B
J	CHASSIS GROUND
K	LON DATA A2
L	LON DATA B2
M	CHASSIS GROUND
N	LON DATA A1
P	LON DATA B1
R	NOT USED
S	NOT USED

Figure 2-4 DLA ALARM/CONTROL Port Pin-outs

The Alarm/Control connector is a MIL-C-26482, Series 1 connector. The part is MS3124E20-16P, KPSE07E20-16P, or equivalent. The mating connectors are MS3126F20-16S, KPSE06F20-16S, or equivalent. These are crimp connectors with a grommet seal and strain relief. Other options are available including a right angle plug assembly(KPSE08F20-16S) and solder connections.

2.4 DISTRIBUTION LINE AMPLIFIER COMPONENT JACK LOCATIONS

The following paragraphs describe the purpose and location of the jacks for the Distribution Line Amplifier. Refer to Figure 2-5 DLA Assembly Jack Locations. The amplifier connector panel contains one data jack, **ALARM/CONTROL** (J2). The DLA exchanges status and control signals with USER control equipment over **ALARM/CONTROL** (J2) port.

The **NORM PA OUT1/LNA IN** (J3) port and **NORM PA IN/LNA OUT** (J4) are connected to RADIAX® cable via HELIAX® coaxial cable. The signal (downlink) coming from the BDR is routed through the section of RADIAX cable to the **NORM PA IN/LNA OUT** (J4) port of the DLA. The signal (uplink) coming from the succeeding DLA **NORM PA OUT1/LNA IN RF FWD OUT/RVS IN** (J3) port is routed through the section of RADIAX cable to the next DLA in cascade.

Port **POWER IN** (J1) connects the DLA to the AC power source.

In the normal direction, **NORM PA OUT2** ((J5), if installed, is used with a non cascaded section of RADIAX® cable.

In the normal direction, NORM DET IN (J6), if installed, is used to terminate a section of RADIAX® cable.

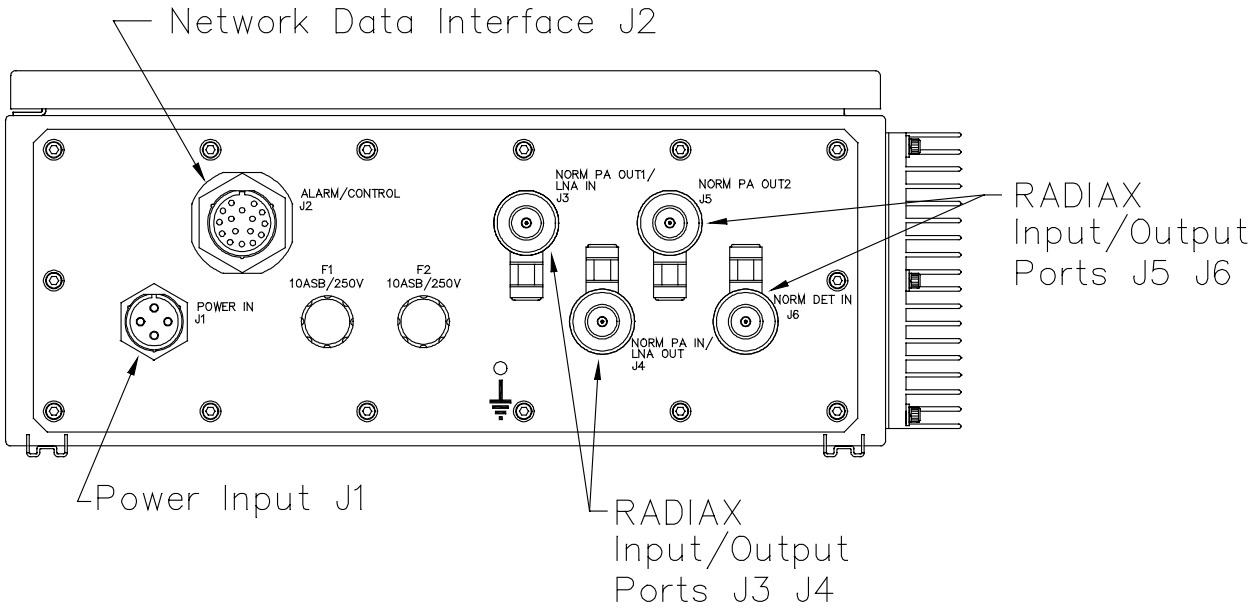


Figure 2-5 DLA Assembly Jack Locations

2.5 PREPARATION FOR USE

CAUTION

Before applying power to the Distribution Line Amplifier, securely connect the RF ports to 50-ohm terminations. Failure to observe these cautions can damage the equipment.

2.5.1 Distribution Line Amplifier Setup

A Distribution Line Amplifier is part of a wayside antenna system; a RADIAX® based signal distribution system. The amplifier provides signal gain to offset the signal loss of the system. The signal loss is based on the length and type of cable used. The Distribution Line Amplifier includes gain adjustments for both channels as well as adjustable thresholds for the status signals.

Channel 1, whose center frequency is 2416.64 MHz, is referred to as the Power Amplifier (PA) or downlink channel. Refer Figure 1-3 DLA Internal View for the location of the PA module (part number 385700-2012). The output of this channel is a nominal +30 dBm for a two port DLA. The output of a 4 port DLA is a nominal +27 dBm per PA output port. For the downlink channel, the signal input level as well as the output level are monitored. R_1, R_2, and R_3 are adjustment points on the PA module. See Figure 2-7 PA Module Outline for more details.
Channel 2, whose center frequency is 2467.84 MHz, is referred to as the Low Noise Amplifier (LNA) or uplink channel. Refer to Figure 1-3 DLA Internal View, for for the location of the LNA module (part number 385700-2011). A pilot tone module within the Distribution Line Amplifier serves as a constant input signal for the LNA channel. The output level of the pilot tone is monitored within the LNA module. No user adjustment of this signal is required. Because of the diplexers within the DLA the pilot tone may not be observable at the external DLA coaxial connectors. The input signal range of the LNA channel is approximately -30 dBm to < -100 dBm. R_1 and R_2 are adjustment points on the LNA module. See Figure 2-8 LNA Module Outline for more details.

A configuration sheet is included with the DLA that specifies the adjustable settings at the time of shipping the equipment.

The direction of the DLA must be set by the user for proper operation. The amplifier direction status is indeterminate after powering up the unit. This manual assumes that either the user's system control interface is available or a test box similar to an example given at the end of this manual is used.

2.5.2 Distribution Line Amplifier Initial Operational Adjustments

2.5.2.1 Input AC Power

The Distribution Line Amplifier AC power supply automatically senses the input AC voltage. The DLA input voltage range is 87-265 VAC. Refer to Table 1-2 Distribution Line Amplifier Specifications.

2.5.2.2 Power Amplifier (PA) Channel (Channel 1)

The nominal output level of the PA channel, as set at the time of manufacturing, is set to +27 dBm (4 port) or +30 dBm (2 port). The output alarm level is set for a threshold of 10 dB below the expected output level. The expected input is 0 dBm. The input signal level threshold is set for 10 dB below the input level. If other levels are desired, the customer should contact Andrew with additional information when ordering the equipment. Refer to Figure 2-7 PA Module Outline, for PA adjustment points locations.

2.5.2.2.1 PA Equipment Setup

The equipment required to adjust the PA output level is:

- Signal Generator
- Power Meter or Spectrum Analyzer
- Digital Volt Meter
- small Blade Screwdriver
- ≥ 10 dB power attenuator
- direction control signal

Refer to Table 4-2 Test Equipment for a listing of suggested equipment. Refer to Figure 2-6 PA Output Level Test Setup, for test equipment setup.

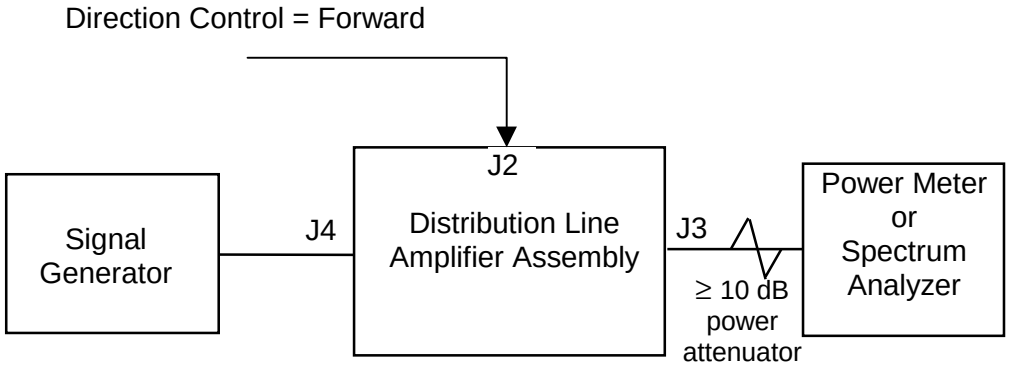


Figure 2-6 PA Output Level Test Setup

The signal generator should be set for an output frequency of 2416.64 MHz with an output level of 0 dBm.

The power meter, if used, should be configured to measure signals from 0 dBm to +40 dBm. This can be done by either using the appropriate power sensor head(s) or by using power attenuators.

The spectrum analyzer, if used, should be configured as follows:

Center Frequency	2416.64 MHz
Span	2 MHz
RBW	30 KHz
VBW	3 Hz
Ref. Level	as required

Attach a ≥ 10 dB, 2 watt or greater, power attenuator to the spectrum analyzer RF input.

The direction control signal characteristics required will depend on the interface option installed. The direction must be set to the **NORMAL** state.

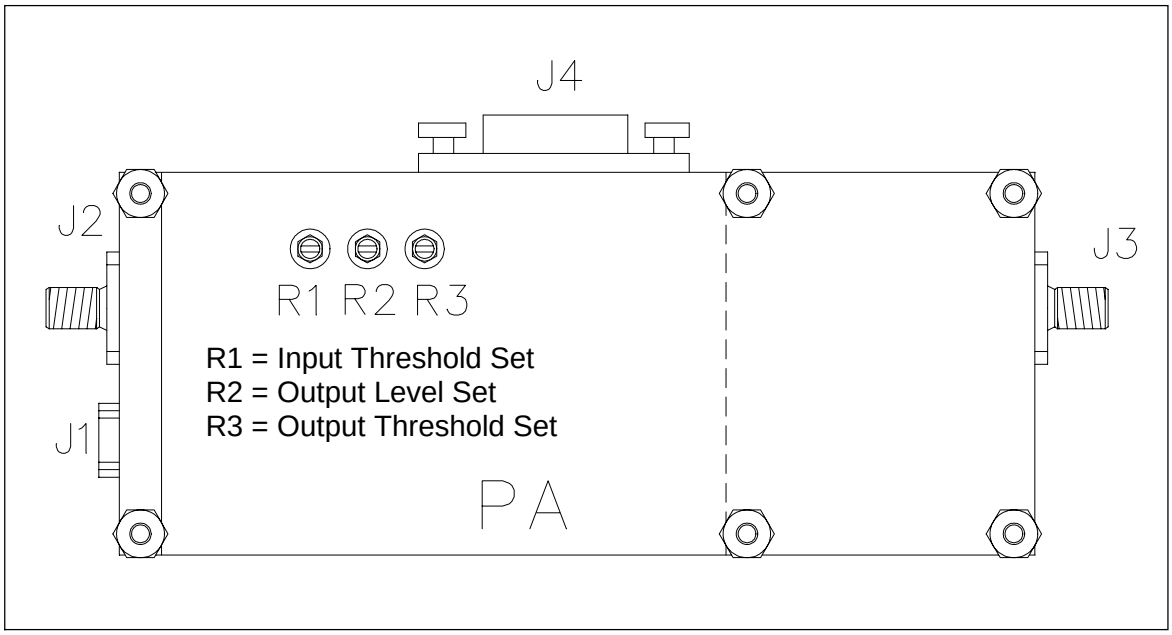


Figure 2-7 PA Module Outline

2.5.2.2.2 PA Input Alarm Adjustment

Set the signal generator output to **RF ON**. Adjust the output level of the generator to 10 dB less than the expected input level. If this level exceeds the range of the input detector, the detector should be set to its minimum detectable level.

Attach a voltmeter to J4-3 on the Alarm I/O board. (PA input alarm test point). TP1 or TP2 can be used as the ground connection. Refer to Figure 1-3 DLA Internal View for the location of the Alarm and Control Interface Board test points. Standard 0.080 test probes should be used for test points.

Adjust R1 (Input Alarm Set) on the PA module for TP3 to go to the high condition (≥ 3 VDC), low (≤1 VDC), and then high again. Reduce the signal generator level by 2 dB and verify that the alarm is asserted. Increase the signal generator level by 4 dB and verify that the alarm is negated. If needed, readjust R1 and repeat this process as necessary.

2.5.2.2.3 PA Output Adjustment

Set the signal generator output to RF ON at the nominal input level (i.e. 0 dBm). The maximum input level is +5 dBm. Adjust **R2** (Output Power Set) on the PA module to obtain the desired amplifier output level. Note that the actual level measured will depend on the attenuation used on the spectrum analyzer or power meter.

2.5.2.2.4 PA Output Alarm Adjustment

Attach a voltmeter to J4-1 on the Alarm I/O relay board. (P.A. output Alarm test point). TP1 or TP2 can be used as the ground connection.

Adjust the signal generator level as necessary to obtain 10 dB below the desired output power as observed at J3 (**FWD OUT/RVS IN**) port. If this level exceeds the range of the output detector, the detector should be set to its minimum detectable level.

Adjust R3 (output Alarm Set) on PA for high condition (> 3 VDC), low (< 1.0 VDC), and then high again. Reduce the signal generator level until the alarm is asserted. Verify that the output level is ± 2 dB of the desired level. If needed, readjust R3 and repeat this process as necessary.

2.5.2.3 Low Noise Amplifier (LNA) Channel (Channel 2)

The nominal gain of the LNA channel, as set at the time of manufacturing, is set to 30 dB. The output alarm level is set for a threshold nominally 10 dB below the expected output pilot level. The expected signal input range is -40 to -90 dBm. If other settings are desired, the customer should contact Andrew with additional information when ordering the equipment. Refer to Figure 2-8 LNA Module Outline, for LNA adjustment points locations.

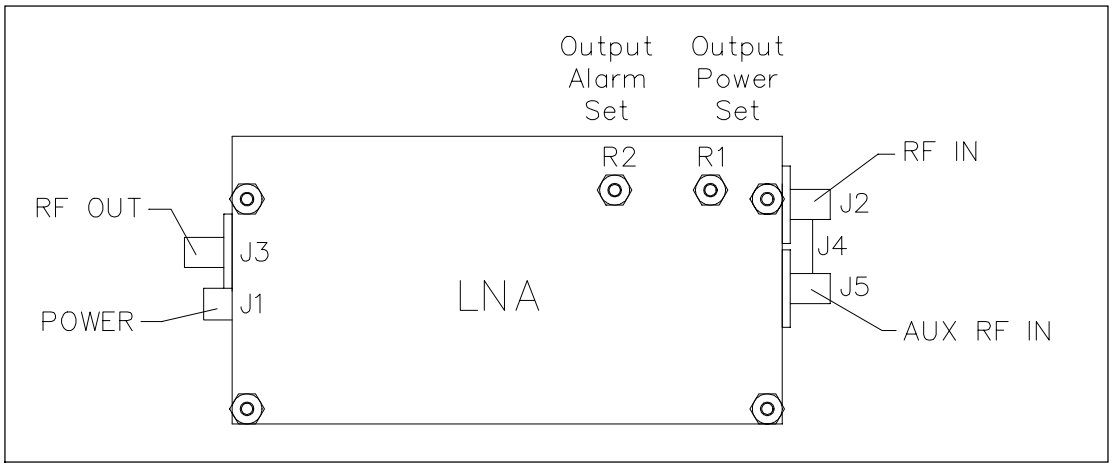


Figure 2-8 LNA Module Outline

2.5.2.3.1 LNA Adjustment Equipment Setup

The equipment required to adjust the LNA output level is:

- signal generator
- power meter or spectrum analyzer
- digital volt meter
- small Blade screwdriver
- ≥ 10 dB power attenuator
- 50 ohm SMA termination
- direction control interface

See Table 4-2 Test Equipment, for a listing of suggested equipment. Refer to Figure 2-9 LNA Output Level Test Set Up, for test equipment setup.

The signal generator should be set for an output frequency of 2467.86 MHz with an output level of -40 dBm.

The power meter, if used, should be configured to measure signals from -70 dBm to 0 dBm. This can be done by either using the appropriate power sensor head(s) or by using attenuators.

The spectrum analyzer, if used, should be configured as follows:

Center Frequency	2467 MHz
Span	2 MHz
RBW	30 KHz
VBW	3 Hz
Ref. Level	as required

Attach a 10 dB, 2 watt or greater, power attenuator to the spectrum analyzer RF input.

The direction control signal characteristics required will depend on the interface option installed. The direction must be set to the **NORMAL** state.

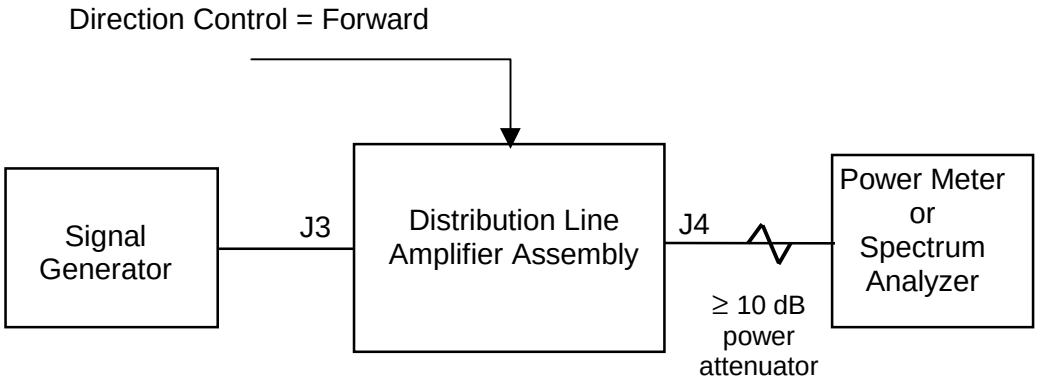


Figure 2-9 LNA Output Level Test Set Up

2.5.2.3.2 LNA Output Adjustment

Disconnect the pilot tone signal from the LNA module J5 Aux RF IN port. Terminate the pilot tone input port with a 50 ohm termination.

Connect the signal generator to J3 of the DLA as shown in Figure 2-9 LNA Output Level Test Set Up.

Adjust R1 so that the signal at J3 at 2467 MHz is the desired level ±0.5 dB. The maximum output value for the LNA channel is +5 dBm.

With the LNA output set, go to the next step to set the LNA output alarm adjustment.

2.5.2.3.3 LNA Output Alarm Adjustment

NOTE

The previous step must be completed before adjusting the output alarm.

Attach a voltmeter to J4-2 (LNA output Alarm test point) on the Alarm I/O board. TP1 or TP2 can be used as the ground connection.
Adjust R2 on the LNA until the voltage on J4-2 goes high (≥ 3 VDC), low (≤ 1.0 VDC), and then high again.

Decrease the signal generator output as required to obtain a 10 dB drop in output level, from the level set in the previous section, of the LNA channel.

Adjust R2 on the LNA until the voltage on TP2 goes low (≤ 1.0 VDC), high (≥ 3 VDC), and then low (≤ 1.0 VDC) again. Increase the signal generator input by 10 dB and verify that the output alarm signal at TP2 is high (≥ 3 VDC). Decrease the signal generator level by 10 dB and verify that the output alarm signal at TP2 is low (≤ 1.0 VDC). Readjust R2 and repeat as necessary.

Remove the SMA termination from the LNA module J5 Aux RF IN port and reattach the pilot tone signal cable to the LNA module J5 Aux RF IN port.

2.5.3 Operational Check-Out

Attach a 2 watt or greater 10 dB power attenuator to the J3 and J4 ports of the DLA. From the configuration documentation sent with the amplifier or using on site documentation that reflects any changes from the factory settings, determine the output level settings of the PA and LNA channels, the PA input alarm level, and the PA and LNA output alarm levels.

2.5.3.1 Forward PA Channel Verification

Set the DLA direction to the **forward** direction.

2.5.3.1.1 PA Output Level Verification

Attach either a signal generator (frequency = 2417 MHz) or a BDR to J4 (FWD IN/RVS OUT) port of the Distribution Line Amplifier Assembly. Adjust the signal generator or BDR signal level at J4 to 0 dBm ± 0.1 dB. Using a power meter verify that the signal level at the J3 (FWD OUT/RVS IN) port of the Distribution Line Amplifier Assembly equals G_{pa} dBm ± 1 dB where G_{pa} is equal to the expected gain of the PA channel. If the gain is not equal to G_{pa} dBm ± 1 dB, perform the steps outlined in section 2.5 for the PA output adjustment. If after completing the amplifier setup procedure the output level of the PA channel is not G_{pa} dBm ± 1 dB and all

external test measurement cable losses are accounted for, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.1.2 PA Input Signal Alarm

Attach a voltmeter to J4-3 on the Alarm I/O relay board (PA output alarm test point). TP1 or TP2 can be used as the ground connection. After removing the signal from the J4 (FWD IN/RVS OUT) port of the Distribution Line Amplifier Assembly verify that J4-3 is < 0.7 VDC. If J4-3 is > 1.0 VDC, perform the steps outlined in section 2.5 for the PA input alarm adjustment. If after completing the amplifier setup procedure the input alarm is not < 0.7 VDC with no input to J4, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.1.3 PA Output Signal Alarm

Attach a voltmeter to J4-1 on the Alarm I/O relay board (PA output alarm test point). TP1 or TP2 can be used as the ground connection. After removing the signal from the J4 (FWD IN/RVS OUT) port of the Distribution Line Amplifier Assembly verify that J4-1 is < 0.7 VDC. If J4-1 is > 1.0 VDC perform the steps outlined in section 2.5 for the PA output alarm adjustment. If after completing the amplifier setup procedure the input alarm is not < 0.7 VDC with the expected input to J4, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.2 Forward LNA Channel Verification

Set the DLA direction to the **forward** direction.

2.5.3.2.1 LNA Output Level Verification

Attach either a signal generator (frequency = 2467 MHz) or a MDR to J3 (FWD OUT/RVS IN) port of the Distribution Line Amplifier Assembly. Adjust the signal generator or BDR signal level at J3 to -50 dBm ± 1 dB. Using a power meter verify that the signal level at the J4 (FWD IN/RVS OUT) port of the Distribution Line Amplifier Assembly equals G_{lna} dBm ± 1 dB where G_{lna} is equal to the expected gain of the LNA channel. If the gain is not equal to G_{lna} dBm ± 1 dB perform the steps outlined in section 2.5 for the LNA output adjustment. If after completing the amplifier setup procedure the output level of the LNA channel is not G_{lna} dBm ± 1 dB and all external test measurement cable losses are accounted for, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.2.2 LNA Output Signal Alarm

This step assumes that the LNA output level has been set as explained in section 2.5.3.2.1 Attach a voltmeter to J4-2 on the Alarm I/O relay board (LNA output alarm test point). TP1 or TP2 can be used as the ground connection. Remove the pilot tone cable from the LNA module J5 Aux RF IN port port. Verify that J4-2 on the Alarm I/O relay board is < 0.7 VDC. If J4-2 is > 0.7 VDC, perform the steps outlined in section 2.5 for the LNA output alarm adjustment. If after completing the amplifier setup procedure the output alarm is not < 0.7 VDC with the previously set input level to J3, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.3 Reverse PA Channel Verification

Set the DLA direction to the **reverse** direction.

2.5.3.3.1 PA Output Level Verification

Attach either a signal generator (frequency = 2417 MHz) or a BDR to J3 (FWD OUT/RVS IN) port of the Distribution Line Amplifier Assembly. Adjust the signal generator or BDR signal level at J3 to 0 dBm ± 1 dB. Using a power meter verify that the signal level at the J4 (FWD IN/RVS OUT) port of the Distribution Line Amplifier Assembly equals G_{pa} dBm ± 1 dB where G_{pa} is equal to the expected gain of the PA channel. If the gain is not equal to G_{pa} dBm ± 1 dB and the Distribution Line Amplifier has not been tested for the forward direction, perform the steps outlined in section 2.5 for the PA output adjustment. If after completing the amplifier setup procedure the output level of the PA channel is not G_{pa} dBm ± 1 dB and all external test measurement cable losses are accounted for, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.3.2 PA Input Signal Alarm

Attach a voltmeter to J4-3 on the Alarm I/O relay board (PA output alarm test point). TP1 or TP2 can be used as the ground connection. After removing the signal from the J3 (FWD OUT/RVS IN) port of the Distribution Line Amplifier Assembly verify that J4-3 is < 0.7 VDC. If J4-3 is > 0.7 VDC and the Distribution Line Amplifier has not been tested for the forward direction, perform the steps outlined in section 2.5 for the PA input alarm adjustment. If after completing the amplifier setup procedure the input alarm is not < 0.7 VDC with no input to J4, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.3.3 PA Output Signal Alarm

Attach a voltmeter to TP1 on the Alarm I/O relay board (PA output alarm test point). TP1 or TP2 can be used as the ground connection. After removing the signal from J3 (FWD OUT/RVS IN) port of the Distribution Line Amplifier Assembly, verify that J4-1 is < 0.7 VDC. If J4-1 is > 0.7 VDC and the Distribution Line Amplifier has not been tested for the forward direction, perform the steps outlined in section 2.5 for the PA output alarm adjustment. If after completing the amplifier setup procedure the input alarm is not < 0.7 VDC with the expected input to J4, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.4 Reverse LNA Channel Verification

Set the DLA direction to the **reverse** direction.

2.5.3.4.1 LNA Output Level Verification

Attach either a signal generator (frequency = 2467 MHz) or a MDR to J4 (FWD IN/RVS OUT) port of the Distribution Line Amplifier Assembly. Adjust the signal generator or BDR signal level at J4 to -50 dBm $\pm$ 1 dB. Using a power meter verify that the signal level at the J3 (FWD OUT/RVS IN) port of the Distribution Line Amplifier Assembly equals G_{lna} dBm $\pm$ 1 dB where G_{lna} is equal to the expected gain of the LNA channel. If the gain is not equal to G_{lna} dBm $\pm$ 1 dB and the Distribution Line Amplifier has not been tested for the forward direction, perform the steps outlined in section 2.5 for the LNA output adjustment. If after completing the amplifier setup procedure the output level of the LNA channel is not G_{lna} dBm $\pm$ 1 dB and all external test measurement cable losses are accounted for, the amplifier should be replaced. Contact Andrew for additional information.

2.5.3.4.2 LNA Output Signal Alarm

This step assumes that the LNA output level has been set as explained in section 2.5.3.2.1 Attach a voltmeter to J4-2 on the Alarm I/O relay board (PA output alarm test point). TP1 or TP2 can be used as the ground connection. Remove the pilot tone cable from the LNA module J5 Aux RF IN port. Verify that J4- on the Alarm I/O relay board is < 0.7 VDC. If J4-2 is > 0.7 VDC, perform the steps outlined in section 2.5 for the LNA output alarm adjustment. If after completing the amplifier setup procedure the output alarm is not < 0.7 VDC with the previously set input level to J3, the amplifier should be replaced. Contact Andrew for additional information.

CHAPTER 3
OPERATIONS

3.1 WIRING PROTECTION AND GROUNDING

The Distribution Line Amplifier does not have controls and indicators accessible from the outside of the unit. The DLA has two 10 Ampere fuses F1 and F2 for wiring protection on the connector panel. Refer to Figure 3-1 DLA Connector Panel Layout.

There is a ground stud on the DLA connector panel for a ground wire connection. Refer to Figure 3-1 DLA Connector Panel Layout.

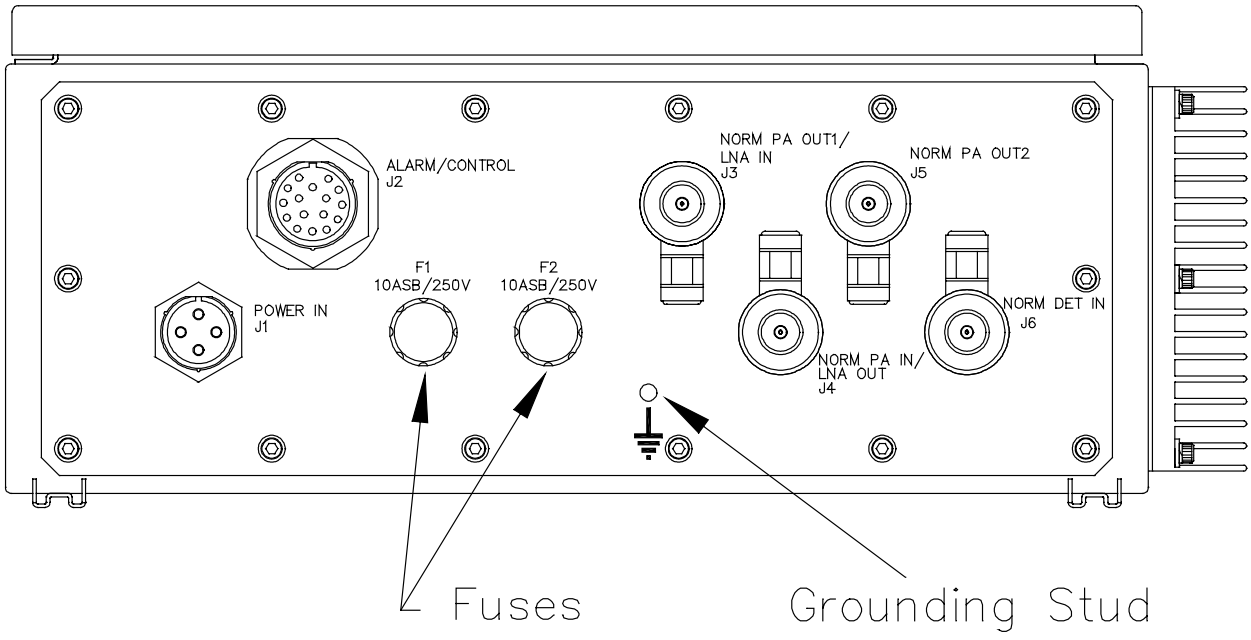


Figure 3-1 DLA Connector Panel Layout

3.2 STARTUP AND SHUTDOWN PRODECURES

The following procedures ensure that installation does not damage the equipment.

3.2.1 DLA Startup

Refer to section 4.2.1, for procedures to properly install the DLA. Mount the DLA in the equipment room or in the tunnel with no connections made. To start the DLA perform the following:

1. Securely connect HELIAX® cables to DLA J3 and J4 ports.
2. Connect the USER control equipment to the DLA connector panel J2 port.
3. Connect the VAC power supply to the DLA J1 port.

3.2.2 Normal Operation

Refer to section 1.4.1, Distribution Line Amplifier Principles of Operation.

3.2.3 Shutdown

Disconnect the DLA from the VAC power source.

WARNING

IN CASE OF EMERGENCY; Immediately turn off power to the unit.

CHAPTER 4
MAINTENANCE AND TROUBLESHOOTING

4.1 TROUBLESHOOTING

Before beginning any in-depth troubleshooting, ensure that power is available to the unit. Ensure that all cable connections are secure.

Table 4-1 DLA Fault Isolation, describes the troubleshooting procedures for the DLA. Locate the unit's symptom in the Fault Indication column. The Fault Description column lists components or functions that can cause faults. The last column, Corrective Action, specifies the action necessary to correct the fault. After taking corrective action, perform the appropriate diagnostic procedure to verify that the correction was successful.

For malfunctions that the fault isolation table does not list, contact Andrew's technical support personnel.

NOTE

The following table only isolates faults to the LRU level. The test procedures in Section III of this chapter provide assistance for further fault isolation. If an LRU fails, return it to the equipment manufacturer for maintenance or repair.

Step	Fault Indication	Fault Description	Corrective Action
1	No output signal	No input power	Verify power input cable
2	No output signal	No power in amplifier	Replace fuses
3	No output signals	Poor connections	Verify connections
4	RADIAX® Alarm	No BDR input signal	Verify cables connections to J4 (forward direction) or J3 (reverse direction)
5	RADIAX® Alarm	No BDR input signal	Verify preceding cascaded amplifier is operational
6	RADIAX® Alarm	No BDR input signal	If valid inputs, replace amplifier
7	Amplifier Alarm	No BDR and/or MDR output RF signals	If valid inputs, replace amplifier
8	Direction Control invalid status	Direction control status is opposite of direction control input control	If valid inputs, replace amplifier

Table 4-1 DLA Fault Isolation

4.2 CORRECTIVE MAINTENANCE

This section describes the removal and replacement of the DLA. See Table 4-1 DLA Fault Isolation, to determine when to remove and replace a line replaceable unit (LRU).

4.2.1 Remove and Replace DLA

Referring to Figure 4-1 Remove and Replace DLA, perform the following actions to remove the DLA (shown as Item 2)

1. Disconnect VAC power cable from DLA (2) **POWER IN** (3) port.
2. Disconnect the USER control equipment data cable that attaches to the DLA's ALARM/CONTROL port (6).
3. Disconnect the HELIAX® cables from the RADIAX® input/out ports (4) and (5).
4. Disconnect grounding wire from the grounding stud (7) on the connector panel of the DLA.
5. Remove four bolts (1) from the DLA (2) mounting brackets.
6. Remove DLA (2).

Referring to Figure 4-1 Remove and Replace DLA, perform the following actions to replace the DLA:

1. Place DLA (2) in position.
2. Secure DLA (2) with four bolts (1).
3. Reconnect the HELIAX cables to RADIAX input/output ports (4) and (5).
4. Reconnect the USER control equipment data cable that attaches to the DLA's ALARM/CONTROL port (6).
5. Reconnect the grounding wire to grounding stud (7).
6. Reconnect the VAC power cable to the POWER IN (3) port.
7. Configure Channel 1 and Channel 2 output level and status alarm adjustments per section 2.5.2 if not already performed.

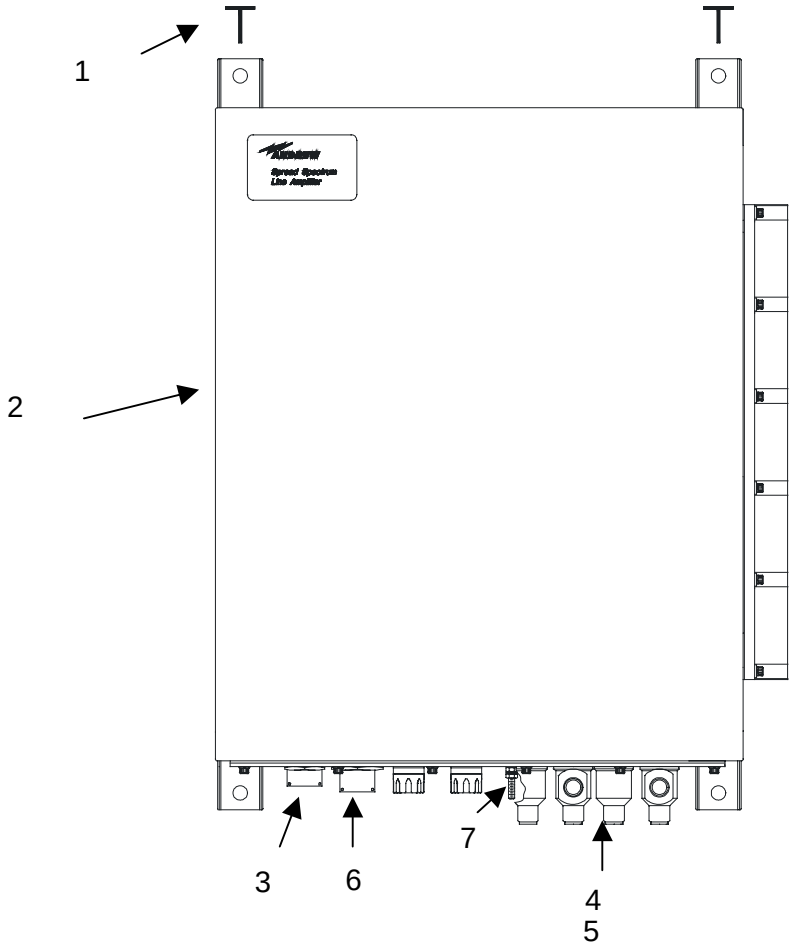


Figure 4-1 Remove and Replace DLA

4.3 TEST PROCEDURES

Refer to Table 4-2 Test Equipment, for a list of test equipment to perform the following test procedures. If necessary, substitute an equivalent to the equipment listed.

The following test procedures help the user verify that a DLA is faulty. Return faulty amplifiers to Andrew Corporation for maintenance and repair. Refer to paragraph 2.1.1 for equipment return information.

Equipment	Qty	Part Number
Spectrum Analyzer	1	HP8561B
Power Meter	1	HP437B
Power Sensor	1	HP8481A
Power Sensor	1	HP8481D
Digital Volt Meter	1	Fluke Model 77
RF Signal Generator	1	HP 8664A
10 dB Power Attenuator	As required	Inmet 6N10W-10
Variable Attenuator	As required	HP 8495B
Coaxial Cables	As required	

Table 4-2 Test Equipment

4.3.1 Inoperative Distribution Line Amplifier

WARNING

DANGER! High voltage shock hazard.

4.3.1.1 Input Power Verification

Disconnect the power connector to the DLA. Using a DVM verify the levels of the AC input voltage. See Figure 2-3 DLA Input VAC Pin-outs for additional information. If the input power level is present, reconnect the power connector to the DLA.

If the input power is available to the DLA, open the amplifier and verify that the LED on the power supply is illuminated. See Figure 1-3 DLA Internal View. If the LED is illuminated, then verify the coaxial and Alarm/control signal connections.

If the power supply LED is not illuminated, unscrew the two fuses at the DLA connector plate.

Remove the fuses from the holder. Measure the resistance across the fuses. If the resistance is > 1.0 ohms, replace the fuse. Reinstall the fuses in the DLA. If the fuses are operational and the power supply remains off, replace the Distribution Line Amplifier.

4.3.1.2 RADIAX® Alarm Asserted

Assertion of the RADIAX input alarm indicates a loss of signal (Signal Center Frequency is 2416.64 MHz) from the preceding Distribution Line Amplifier and or base station radio. The following trouble shooting procedure assumes that the amplifiers are cascaded in the forward configuration normal direction mode and that the amplifier has been correctly configured as indicated in 2.5.

Visually inspect the cable assemblies from the preceding amplifier or radio for loose connections and or cable breakage. Tighten all cable connections. Replace broken or damaged cables as necessary.

If all cable assemblies are secure and intact, disconnect the cable at J4 of the DLA. Using a power meter or spectrum analyzer attached to the cable, verify the presence and expected level of the RF signal (F_c = 2416.64 MHz, 0 dBm nominal). If the signal is present and the alarm is configured correctly (refer to section 2.5.2.2.2) the amplifier should be replaced. If the RF signal is not present continue to determine the origin of the signal loss.

4.3.1.3 Amplifier Alarm Asserted

Assertion of the Amplifier Alarm can be caused by:

- Loss of an input signal on the PA Channel (RADIAX Alarm Asserted)
- Failure of the PA module
- Loss of the Pilot Tone Signal to the LNA module
- Failure of the LNA module.

4.3.1.3.1 Loss of PA Input Signal

When the RADIAX Alarm is asserted, the loss of input signal can also cause the PA module to also assert its output alarm. With a loss of input signal, the PA module gain is insufficient to generate a signal level above the level represented by the output threshold detector in the PA module. If both the RADIAX alarm signal and the Amplifier Alarm signals are asserted, the user should determine the cause for the loss of input signal.

4.3.1.3.2 PA Module Failure

If the input signal to the PA channel is at the expected level and the PA channel output alarm is asserted, either the PA module has failed or it is incorrectly configured. The PA module output alarm can be monitored with a DVM at J4-1 of the Relay/IO board. A voltage level < 1 VDC indicates a fault condition for the PA channel.

The output signal can be measured with a power meter or spectrum analyzer. If no signal is detected at the Distribution Line Amplifier output port (J3 for the forward direction) the unit should be returned to Andrew Corporation. If a signal is present, the user should confirm that the amplifier output is below the levels indicated on the configuration sheet attached to the Distribution Line Amplifier. If the input and output signal levels are at the levels specified on the

configuration sheet, the PA module alarm may be indicating a faulty setting on the output level monitor. Refer to section 2.5.2.2.4 for details on setting the output alarm. If the output level monitor is correctly configured, the Distribution Line Amplifier should be returned to Andrew Corporation.

4.3.1.3.3 Loss of Pilot Tone Signal

In a correctly configured DLA, the pilot tone is monitored by the LNA output detector circuit. Without the pilot tone there may not be sufficient signal at the LNA module output. As a result, the LNA module will signal an amplifier failure. The pilot tone signal can be monitored with either a power meter or a spectrum analyzer.
Figure 1-3 DLA Internal View shows the location of the pilot tone module and its output port J3. The expected output at the pilot tone module J3 port is a nominal - 10 dBm signal at 2401 $\pm$ 2 MHz. If this signal is not present, the Distribution Line Amplifier should be returned to Andrew Corporation. If the signal is present, reattach the cable from J3 of the pilot tone module to the LNA module AUX RF input port. Tighten the connections as necessary.

4.3.1.3.4 LNA Module Failure

If the pilot tone signal to the LNA channel is at the expected level and the LNA channel output alarm is asserted, either the LNA module has failed or it is incorrectly configured. The LNA module output alarm can be monitored with a DVM at J4-2 on the Relay/IO board. A voltage level < 1 VDC indicates a fault condition for the LNA channel.

In order to measure the output of the LNA channel, it is necessary to inject an external signal into the LNA channel. The external signal can be either a CW signal at a frequency in the passband of the LNA channel (see Table 1-2 Distribution Line Amplifier Specifications in section 1.5.2) or it can be the output signal of an MDR. In either case, the signal input level to J3 of the DLA (normal forward configuration) should be -50 dBm.

Based on the gain setting specified on the configuration sheet attached to the DLA, the external signal can be verified with a power meter or spectrum analyzer. If no signal is detected at the Distribution Line Amplifier output port (J4 for the forward direction) the DLA should be returned to Andrew Corporation. If a signal is present, the user should confirm that the amplifier output is below the levels indicated on the configuration sheet attached to the Distribution Line Amplifier. If the measured level is below the expected value the Distribution Line Amplifier should be returned to Andrew Corporation. If the input and output signal levels are at the levels specified on the configuration sheet, the PA module alarm may be indicating a faulty setting on the output level monitor. Refer to section 2.5 for details on setting the output alarm. If the output level monitor is correctly configured, the Distribution Line Amplifier should be returned to Andrew Corporation

CHAPTER 5
ORDERING INFORMATION

5.1 PARTS LIST

This chapter provides a list of replacement parts and mating connectors for the Distribution Line Amplifier assembly. It also provides vendor names and addresses. Table 1-1 – DLA Part Numbers lists the various versions of the DLA and their respective part numbers. Figure 1-1 Distribution Line Amplifier (4 port) shows all of the items on the list. To procure any of the parts, contact Andrew Corporation or the appropriate vendor for the part.

The parts list includes three columns: Description, Part Number, and Quantity (Qty). The Description column identifies the specific part, beginning with the assembly or line-replaceable unit (LRU) that contains it. The information in the Description column includes an (AP) symbol to denote attaching hardware for the LRUs. The Part Number column provides the vendor's number for that drawing or part. The Quantity column defines how many of the particular part the next higher assembly (NHA) contains.

Table 5-1 provides a list of applicable vendors and their addresses.

Vendor	Address (Phone Number)
Andrew Corporation	2601 Telecom Parkway Richardson, Texas 75082-3521 (972) 235-7300
ITT Corporation ITT Canon Division	666 East Dyer Road Santa Ana, CA 92702
Bussman	P.O. Box 14460 St Louis, MO 63178 314-394-2877

Table 5-1 Vendors

Table 5-2 provides a list of replaceable parts and mating connectors for the amplifier assemblies.

Description	Part Number	Qty
Distribution Line Amplifier	385700-4000	1
Mating Power Connector Assembly (J1)	MS3475W14-4S	1
Mating Alarm/Control Connector (J2)	MS3126F20-16S or KPSE08F20-16S	1
AC Fuses (F1, F2)	Bussman MDA-10	2

Table 5-2 Parts List

CHAPTER 6
MECHANICAL INFORMATION

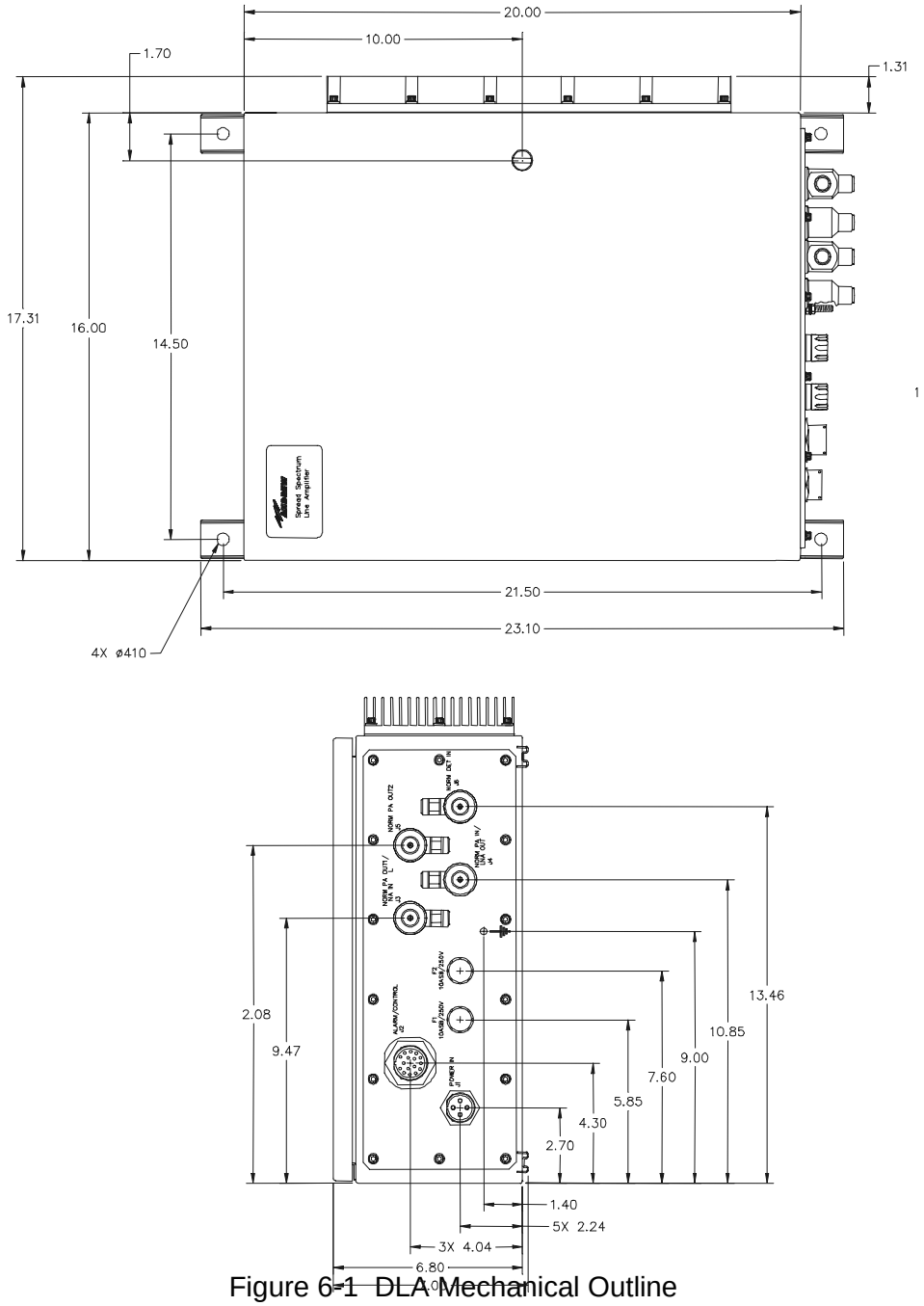


Figure 6-1 DLA Mechanical Outline

CHAPTER 7

ALARM/CONTROL TEST CIRCUIT

The following schematic can be used to construct a test fixture to control the direction of the DLA and to monitor the status of the various

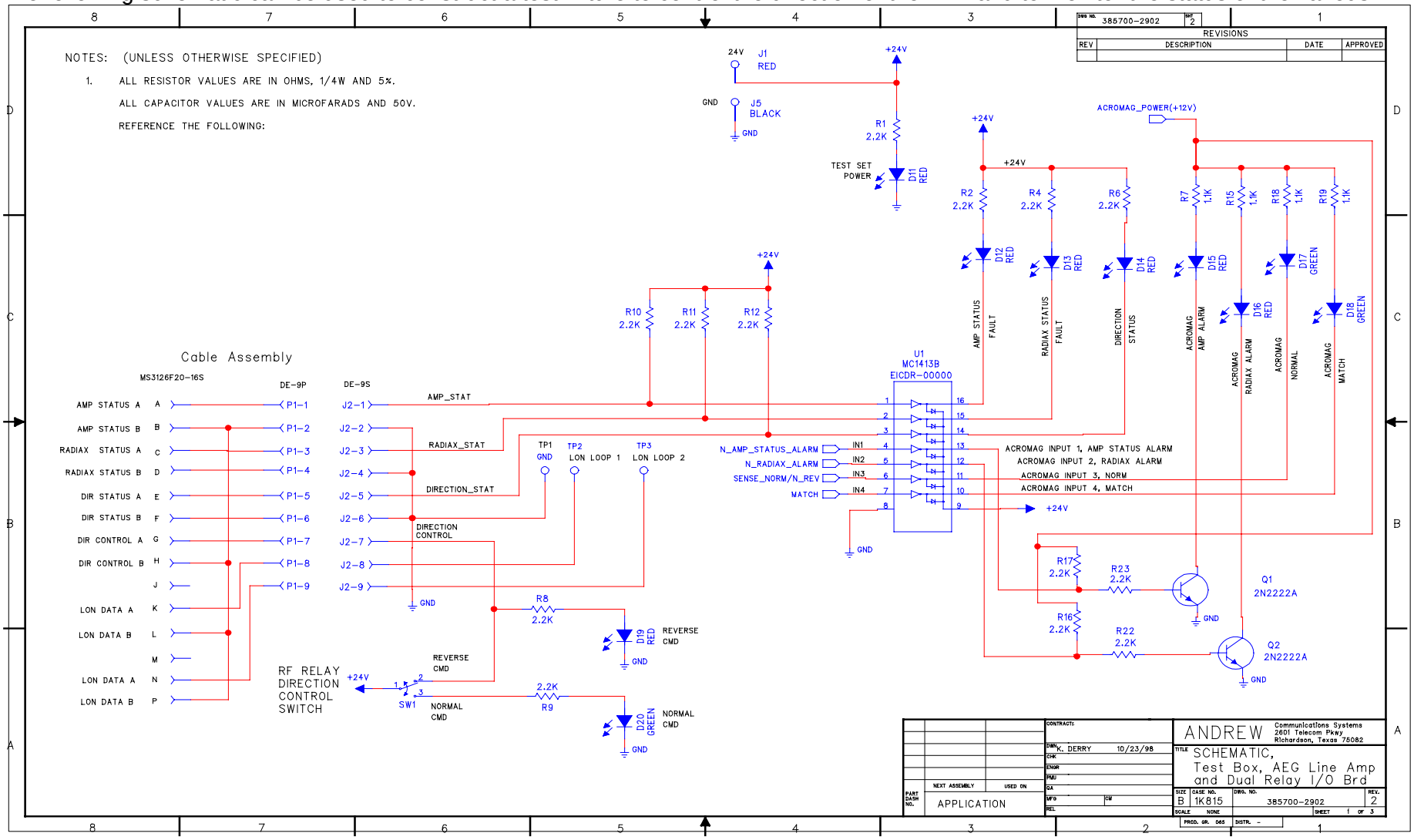
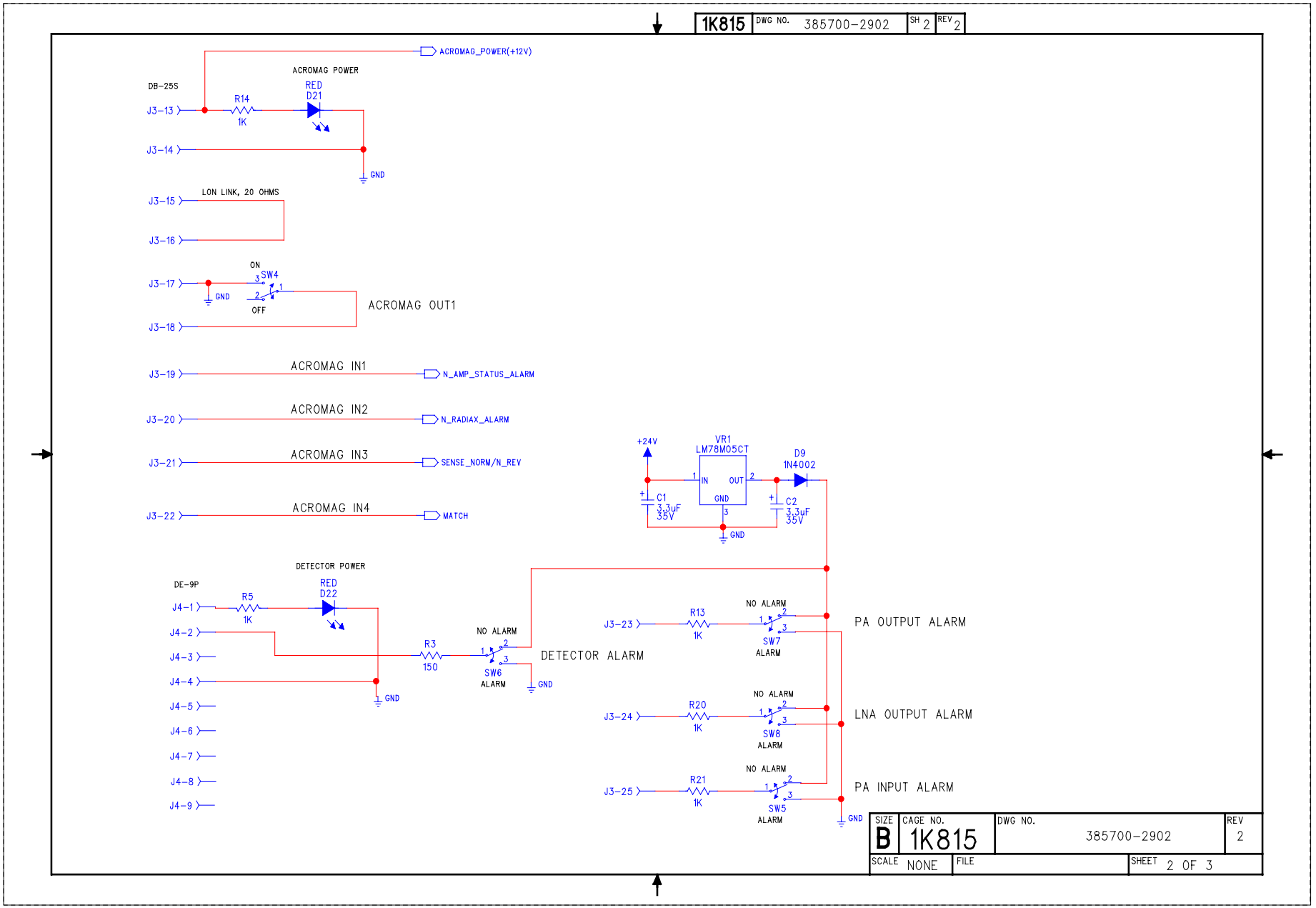


Figure 7-1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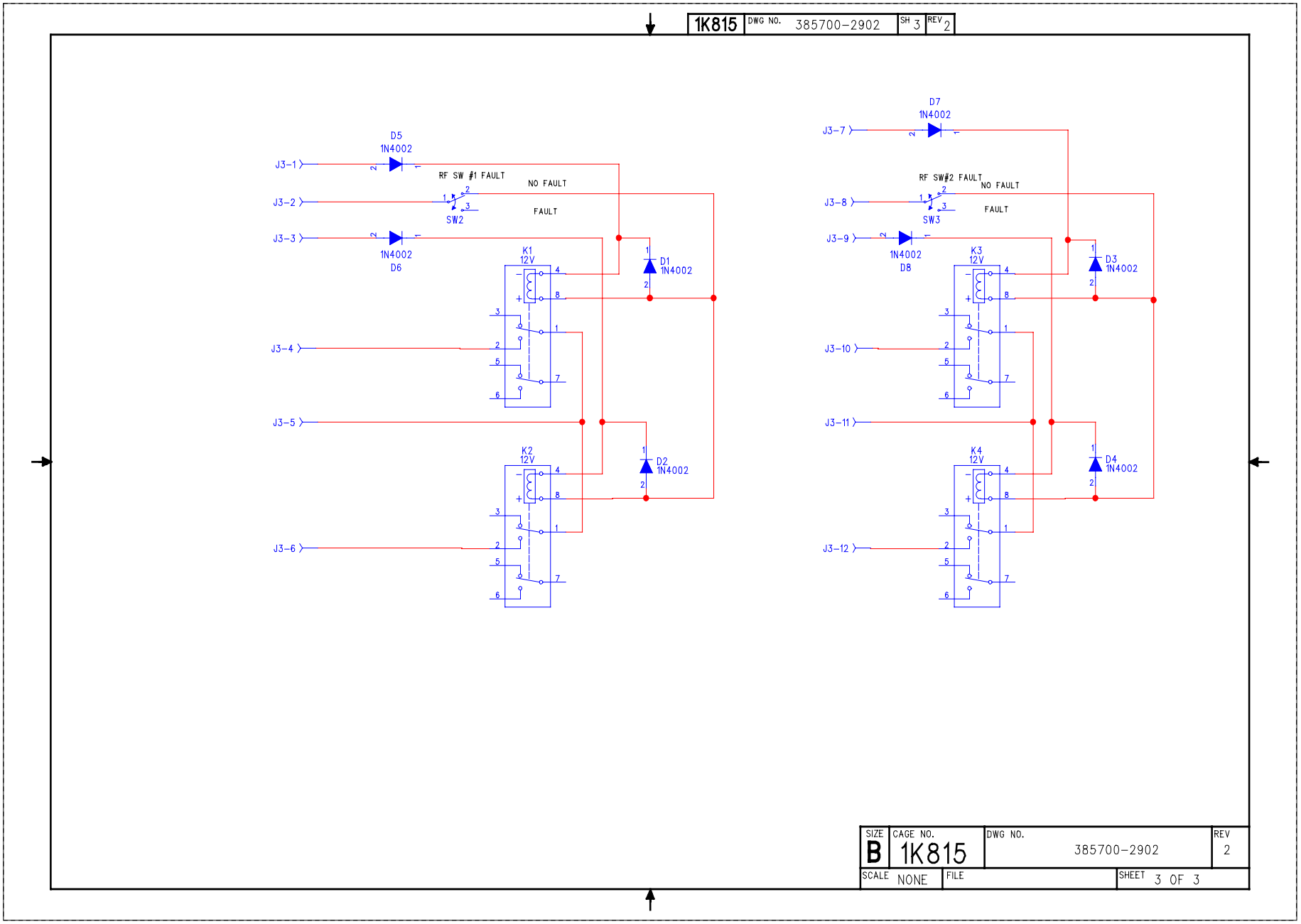
ACROMAG_POWER(+12V)
ACROMAG POWER
DB-25S
J3-13
R14
1K
RED
D21
J3-14
GND
LON LINK, 20 OHMS
J3-15
J3-16
ON
SW4
J3-17
GND
OFF
ACROMAG OUT1
J3-18
ACROMAG IN1
J3-19
N_AMP_STATUS_ALARM
ACROMAG IN2
J3-20
N_RADIAX_ALARM
ACROMAG IN3
J3-21
SENSE_NORM/N_REV
ACROMAG IN4
J3-22
MATCH
+24V
VR1
LM78M05CT
IN
OUT
GND
C1
3.3uF
35V
C2
3.3uF
35V
D9
1N4002
DETECTOR POWER
DE-9P
J4-1
J4-2
J4-3
J4-4
J4-5
J4-6
J4-7
J4-8
J4-9
R5
1K
RED
D22
GND
R3
150
NO ALARM
SW6
ALARM
DETECTOR ALARM
J3-23
R13
1K
NO ALARM
SW7
ALARM
PA OUTPUT ALARM
J3-24
R20
1K
NO ALARM
SW8
ALARM
LNA OUTPUT ALARM
J3-25
R21
1K
NO ALARM
SW5
ALARM
PA INPUT ALARM
SIZE B
CAGE NO. 1K815
DWG NO. 385700-2902
REV 2
SCALE NONE
FILE
SHEET 2 OF 3


1K815 DWG NO. 385700-2902 SH 3 REV 2
D5
1N4002
J3-1
RF SW #1 FAULT
NO FAULT
J3-2
SW2
FAULT
J3-3
1N4002
D6
K1
12V
D1
1N4002
J3-4
J3-5
K2
12V
D2
1N4002
J3-6
D7
1N4002
J3-7
RF SW#2 FAULT
NO FAULT
J3-8
SW3
FAULT
J3-9
1N4002
D8
K3
12V
D3
1N4002
J3-10
J3-11
K4
12V
D4
1N4002
J3-12
SIZE B
CAGE NO. 1K815
DWG NO. 385700-2902
REV 2
SCALE NONE
FILE
SHEET 3 OF 3

alarms. The test fixture connects to J2 Alarm/Control of the DLA. This test fixture requires an external 24 VDC supply. The circuit should be mounted within a metal enclosure so that the required cable shielding integrity is maintained.