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## 3 **INSTALLATION INSTRUCTIONS**

### 3.1 **GENERAL**

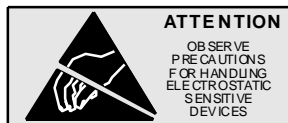
This chapter provides a detailed description of the installation procedure for the DRB-25 Dual Channel Radio System and should be read **before** starting the installation. Use the Installation Instructions in conjunction with the configuration checklist for the specific system being installed.

### 3.2 **SAFETY PRECAUTIONS**

Observe standard safety procedures for the handling of electronic equipment:

#### **WARNING**

**FOLLOW CORRECT LIFTING PROCEDURES FOR  
HEAVY ELECTRONIC EQUIPMENT.**



**When removing or handling cards, use an anti-static wrist strap connected to ground and always place the card on an anti-static mat**

**Handle modules by their edges and do not touch components or connectors.**

#### **CAUTION**

**Avoid placing the DRB-25 near any source of excessive heat**

**Avoid placing the DRB-25 near a naked flame**

**Avoid placing the DRB-25 in a wet or damp location**

**Do not subject the DRB-25 to severe mechanical shock**

### 3.3 ***SITE REQUIREMENTS***

#### 3.3.1 ***Antenna Installation and Safe Operating Distances***

Before installing the DRB-25 at the operating site, the following details regarding desk or floor space, rack clearance and lightning protection should be considered.

Use only manufacturer or dealer supplied antenna.

**Antenna Minimum Safe Distance:** 70 cm, 50% Duty Cycle.

**Antenna Gain:** zero dBd referenced to a dipole.

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy which is below the OSHA Occupational Safety and Health Act) limits.

**Antenna Mounting:** The antenna supplied by the manufacturer or radio dealer must not be mounted at a location such that during radio transmission, any person or persons can come closer than the above indicated minimum safe distance to the antenna i.e. 70 cm.

To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance shown above, and in accordance with the requirements of the antenna manufacturer or supplier.

**Base Station Installation:** The antenna should be fixed-mounted on an outdoor permanent structure. RF Exposure compliance must be addressed at the time of installation.

**Antenna Substitution:** Do not substitute any antenna for the one supplied or recommended by the manufacturer or radio dealer. You may be exposing person or persons to excess radio frequency radiation. You may contact your radio dealer or the manufacturer for further instructions.

**Warning:** Maintain a separation distance from the antenna to a person(s) of at least 70 cm. You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational /Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

#### 3.3.2 ***Desk/Floor Space or Rack Mounting Considerations***

The DRB-25 is 19 inches (483 mm) wide (standard 19 inch rack mountable), 14 inches (355 mm) high, 17.4 inches (440 mm) deep, and weighs 61 lb (28 kg) for a single radio configuration, or 85 lb (39 kg) for a dual radio configuration.

When mounting the DRB-25 Cabinet:

- Ensure that the DRB-25 is securely mounted.
- Ensure that the DRB-25 air vents are clear of obstructions.
- Provide sufficient space on all sides to of the DRB-25 to allow adequate access to the equipment and cables.
- Ensure that there is adequate space for entry of external cables (antenna and AC power cables) at the rear of the unit without the need for small radius bends.

### 3.3.3 *Lightning Protection*

To minimize damage to equipment, or injury to maintainers, a complete system of lightning protection and grounding connections should be installed. The following points should be considered:

- All down conductors, bonding interconnections, ground rings and radial tapes should be un-insulated solid copper tape at least 25 x 3 mm in cross section. All connection clamps and supports should be protected by non-reactive paste or tape.
- The use of gas lightning arresters or metal oxide varistors is recommended on line interfaces, including antenna cables.
- Protected test points should be included where appropriate and sacrificial grounding lugs should be clearly marked and accessible for periodic inspection and replacement if necessary.
- Use a large copper strap to take outer cable casings to a central ground bonding point.
- Antenna support structures, whether on the ground or on a building, should be connected to an o ring arrangement (or equivalent) via sacrificial ground lugs.
- A ground ring consists of copper tape with driver ground electrodes or radial tapes around the base of the structure (as close to it as possible), buried approximately 24 inches (0.6 m), where soil conditions allow.
- The main building and any other metalwork structures within 3m should be connected to a ground ring.

## 3.4 *DELIVERY AND UNPACKING*

The DRB-25 cabinet and supporting modules are packed and transported in customized packages that conform to best commercial practices for transportation and protection of electronic assemblies.

The DRB-25 cabinet is delivered complete, requiring only the fitting of the plug in modules.

In addition to the DRB-25 cabinet, the following Modules will be supplied in separate packages. The type and number of modules will depend on the configuration of the DRB-25

- One or two Power Supply Modules.

- One or two Power Amplifier Modules.
- One or two Transceiver Modules.
- Controller Module.
- Interface Module.

If ordered, a programming will be provided, including a programming disk and interface cable.

Before unpacking, examine the packages for evidence of external damage, water ingress or vermin activity, which may have occurred during transportation.

Examine the delivery docket or check list to confirm that the correct items for the intended DRB-25 configuration has been delivered.

Notify the supplier or its agent immediately if any discrepancy is noted.

Unpack the DRB-25 as follows:

- Carefully remove the DRB-25 cabinet from its packaging and relocate to a convenient level work surface.
- Remove all protective wrapping and inspect the cabinet for signs of damage or loose parts. Notify the supplier or its agent immediately if any is noted.
- Remove each of the modules in turn from their packages, unwrap and inspect as for the cabinet. Notify the supplier or its agent immediately if any damage or loose parts are noted.

## **3.5      *INSTALLATION***



**Take care to align each module correctly into its guide rails. Ensure that the module is correctly mated into the backplane of the DRB-25 and the connectors are firmly seated. Failure to do so may result in damage to the module or DRB-25 system.**

### **3.5.1      *Tools Required***

The following tools should be on hand during installation:

- Flat-bladed screwdrivers (small, medium and large).
- Cross-recessed (Phillips) screwdriver (large and medium).
- Cable ties and cutters.

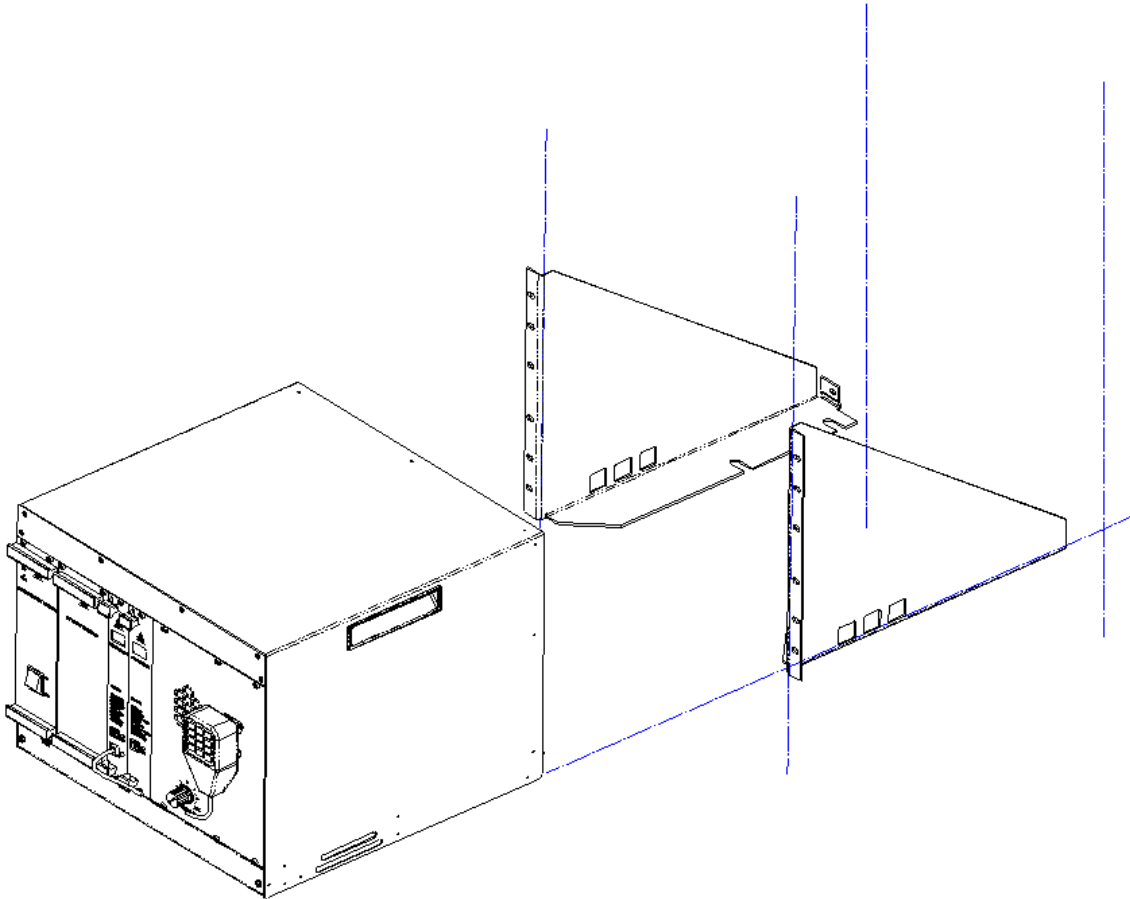
- 9/32 inch (7 mm) hexagonal nut driver.
- Multimeter with pointed probes for continuity and DC voltage measurements.

### 3.5.2 *Installing the DRB-25 Cabinet*

If the DRB-25 is to be desk mounted then screw the supplied feet to the four threaded inserts on the underside of the case and position the case as required.

If the cabinet is to be rack-mounted then assemble the rack mounting brackets and case as shown in Figure 3-1: DRB-25 Rack Mounting Arrangement :

1. Fit the brackets to the rack using the caged nuts and bolt supplied.
2. Slide the DRB-25 case into the brackets.
3. Fix the DRB-25 in place by locating the two studs at the rear of the case through the hole in each bracket, and secure using the nuts supplied.
4. Set the DRB-25's Identity (Box ID) and fit the modules as described in the following sections.



**Figure 3-1 DRB-25 Rack Mounting Arrangement**

### 3.5.3 **Configuring DRB-25 Identity (Box ID)**

An 8-way DIP switch on the backplane adjacent to the right transceiver connections enables a Box ID to be set for each DRB-25. The switch is accessed from the front of the unit with the modules removed. A total of 256 identities are available.

The Box ID is used by each Transceiver to determine its default settings on power-up. Transceiver modules can be programmed with up to 512 operating channels, and the default operating channel for each Transceiver is determined by the DRB-25 Box ID as detailed in Appendix A Table A-1.

DRB-25 Box ID settings may be defined in a plan that covers all DRB-25 units in the network. The Box ID is also used by the Controller Module for network management purposes to enable it to identify itself within a network.

The default factory setting is a box identity of zero.

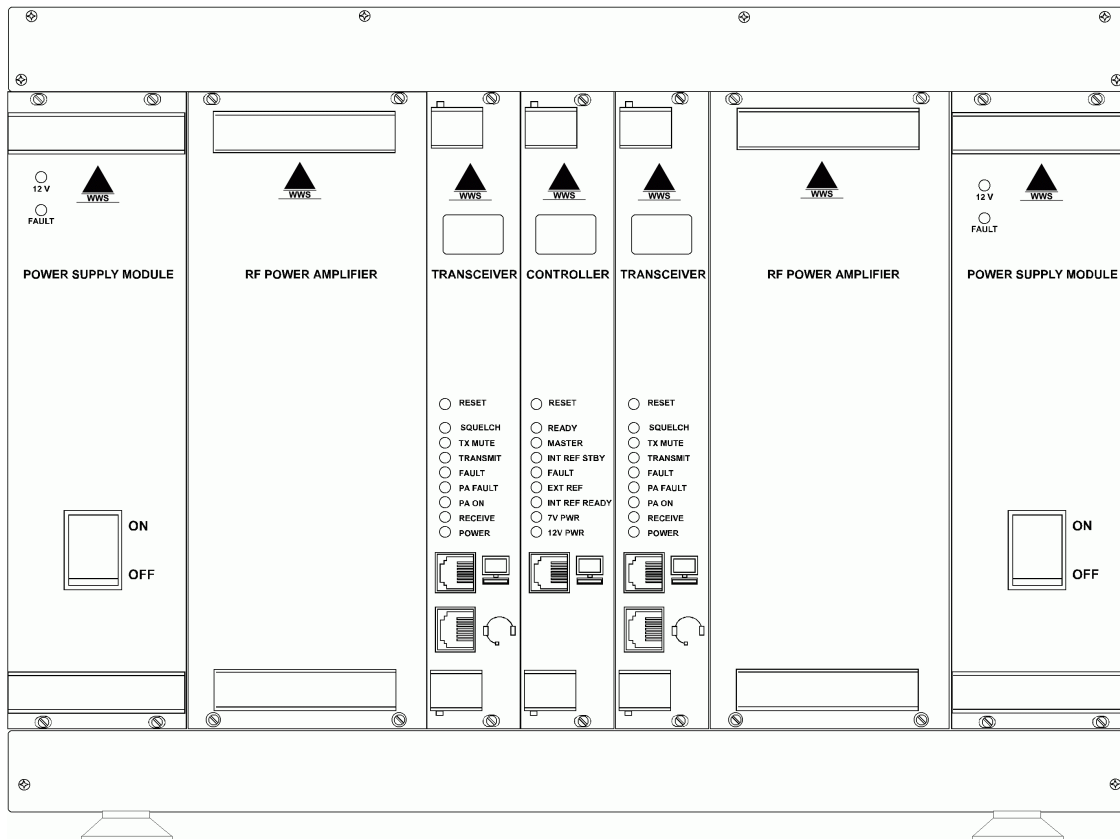
To set the DIP switches:

1. LOCATE the DIP switch on the upper right of the backplane, through the front of the DRB-25 case without the plug in modules fitted.
2. Using a screwdriver or pen, set the eight sections of the DIP switch to the desired Box ID, according to and the intended DRB-25 Box numbering plan.
3. The Switch 1 (LSB) is the top switch; Switch 8 (MSB) is the lower switch. OFF is to the left, ON is to the right.



### 3.5.4 Installing the Modules

Refer to the following figures (Figure 3-2, Figure 3-3 and Figure 3-4) to identify the correct position for each module within the DRB-25 cabinet. Install the supplied modules as detailed in the following paragraphs.



**Figure 3-2 DRB-25 Front Module Positions**

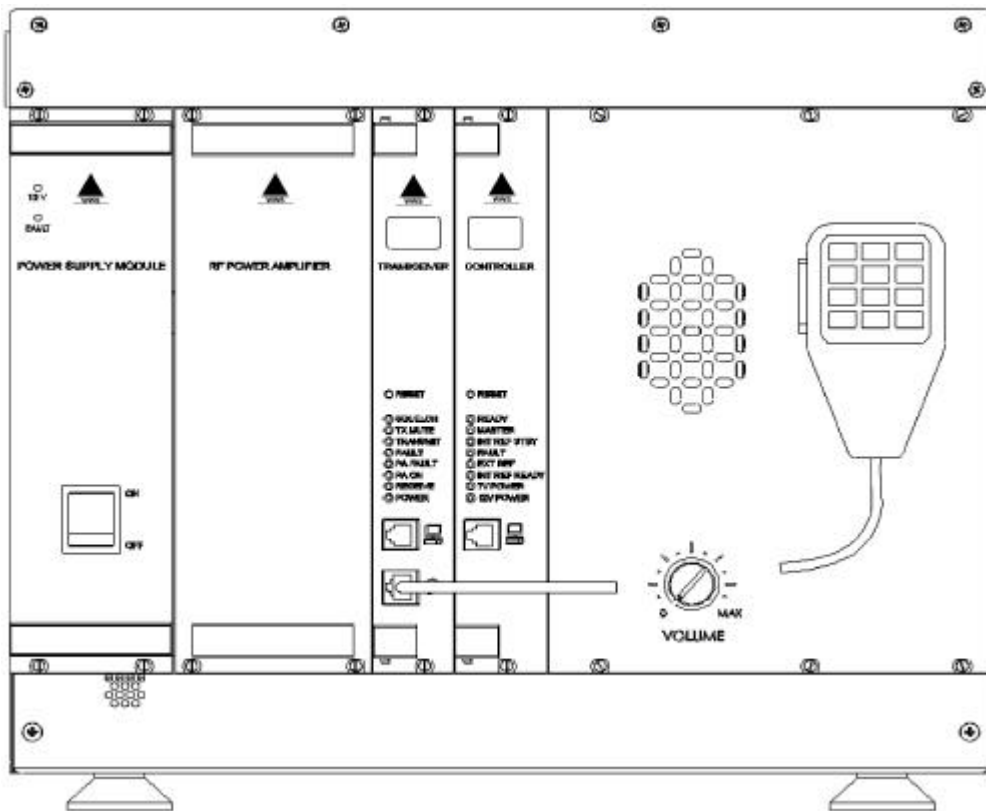
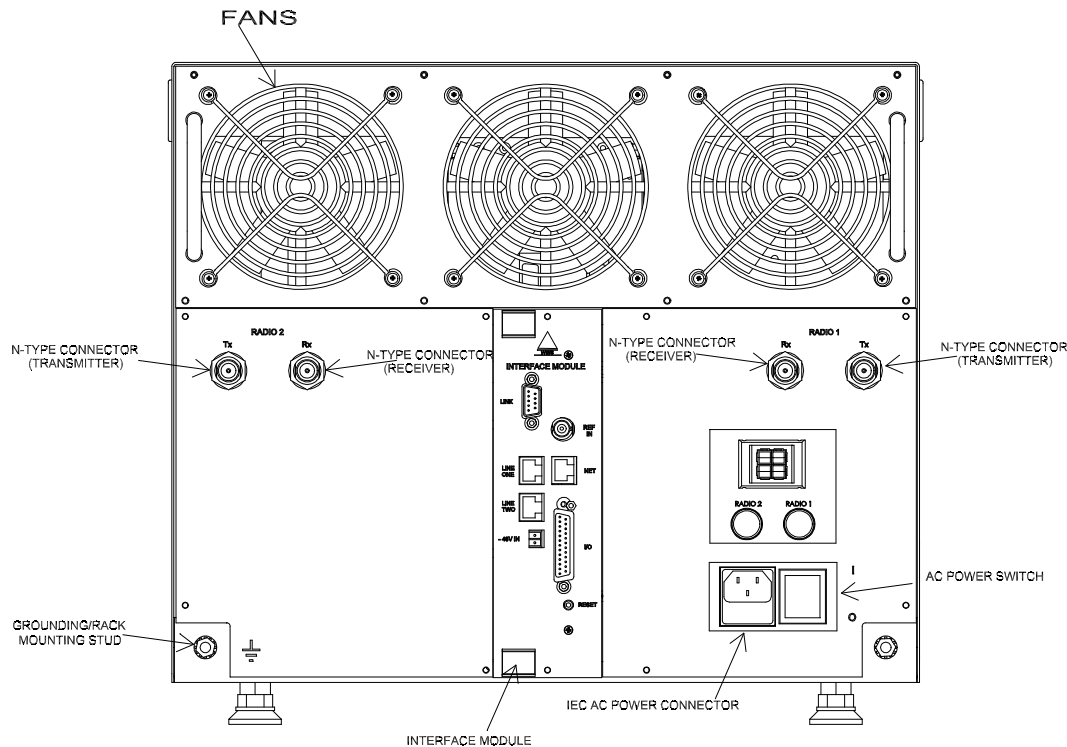


Figure 3-3 DRB-25 with Loudspeaker and Microphone fitted



**Figure 3-4 DRB-25 Rear Module Positions (4W Interface Module)**

#### 3.5.4.1 Power Supply Module

To install the Power Supply Module:

1. Carefully insert the Power Supply Module into its position from the front of the cabinet by aligning the guide rails and pushing home until the backplane connector is correctly mated and the panel is flush with the adjacent panels.
2. Using a medium sized flat-bladed screwdriver, secure the Module with the four captive collar screws. Do not over-tighten.
3. If two Power Supply Modules are supplied, repeat for the other module.

#### 3.4.4.2 Power Amplifier Module

To install the Power Amplifier Module:

1. Locate the coax lead with a right-angled N-type connector. Stretch the lead out of the box and partially insert the Power Amplifier into its card slot. Attach the N-type connector to the mating connector on the Power Amplifier, then carefully insert the Power Amplifier Module fully into position from the front of the cabinet. Push the module home so that the backplane connector is correctly mated and the panel is flush with the adjacent panels.
2. Using a medium sized flat-bladed screwdriver, secure the Module using the four captive collar screws. Do not over-tighten.

3. If two Power Amplifier Modules are supplied, repeat for the other module.

#### **3.5.4.3 Transceiver Module**

To install the Transceiver Module:

1. Carefully insert the Transceiver Module into its position from the front of the cabinet by aligning the guide rails and pushing home until the backplane connector is correctly mated and the panel is flush with the adjacent panels.
2. Using a medium sized flat-bladed screwdriver, secure the Module using the two captive collar screws. Do not over-tighten.
3. If two Transceiver Modules are supplied repeat for the other module.

#### **3.5.4.4 Controller Module**

To install the Controller Module:

1. Carefully insert the Controller Module into its position from the front of the cabinet by aligning the guide rails and pushing home until the backplane connector is correctly mated and the panel is flush with the adjacent panels.
2. Using a medium sized flat-bladed screwdriver, secure the Module using the two captive collar screws. Do not over-tighten.

#### **3.5.4.5 Interface Module**

To install the Interface Module:

1. Carefully insert the Interface Module into its position from the rear of the cabinet by aligning the guide rails and pushing home until the backplane connector is correctly mated and the panel is flush with the adjacent panels.
2. Using a medium sized Phillips screwdriver, secure the Module using the two captive screws. Do not over-tighten.

#### **3.5.4.6 Loudspeaker Panel and Microphone**

A DRB-25 configured with only one transceiver may have a Loudspeaker Panel, (or a Loudspeaker Panel and microphone) installed in place of Transceiver 2 and its associated PA and power supply.

To install the Loudspeaker Panel and microphone:

1. The panel is installed on the right hand side of a single channel DRB-25 in place of Transceiver 2. An internal cable is connected from the rear of the loudspeaker panel to the connector marked "TR1 Audio" on the DRB-25 backplane adjacent to Transceiver 2.
2. Carefully align the panel and using a medium sized flat-bladed screwdriver secure the panel using the six captive collar screws.
3. If the panel is supplied with a microphone, the cable is connected to the Transceiver 1 front panel audio connector (RJ45).

### 3.5.5 *Configuring the IP-Enabled Controller*

This section is only applicable to IP-Enabled (Ethernet) Controller Modules.

#### 3.5.5.1 *Network Parameters*

When the IP-enabled Controller boots, the IP interface is configured with an IP address and other settings so that it can communicate with other hosts on the network. These values can be set in different ways, depending on your requirements. For example, they may be obtained from a Dynamic Host Control Protocol (DHCP) server or they may be read from persistent storage on the Controller Module. These options are designed to give you maximum flexibility in integrating the DRB-25 into your existing network but your network does not have a DHCP server or you do not want the DRB-25 to use it, the network parameters must be set via the Controller front-panel serial port.

This table lists all the network settings for the DRB-25 and their default settings in persistent storage.

Network Parameter	Factory Setting
Hostname	DRB25
IP Address	192.168.0.1
Netmask	255.255.255.0
Gateway	192.168.0.2
Primary DNS Server	192.168.0.3
Secondary DNS Server	192.168.0.4
NTP Server	Empty
Use DHCP	yes

##### 3.5.5.1.1 *IP Address Configuration via DHCP*

By default, the Controller will try to configure the network interface during the boot procedure using DHCP. If your network already has a DHCP server, this is probably the easiest method of configuration. The Controller will receive appropriate values for its IP Address, Netmask, etc., from the DHCP server.

If the DHCP method is used you need to determine the IP address which has been allocated to the Controller. Your network administrator can assist you in this or, alternatively, this information is available from the front panel serial port.

To do this, it is necessary to connect the Controller front-panel serial port to the serial (COM) port on a PC. A terminal emulation program such as TeraTerm is also required with the serial port parameters set to 9600, N, 1.

1. Press the <Enter> key a few times and the login prompt will appear.
2. Log in as user "root". By default, the root user has an empty password (just press Enter).

3. Type the following at the shell prompt (#):

```
# ifconfig
```

This will produce output similar to:

```
eth0  Link encap:Ethernet HWaddr 00:02:B3:07:BE:73
       inet addr:192.168.100.84 Bcast:192.168.100.255 Mask:255.255.255.0
       UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
       RX packets:82773 errors:0 dropped:0 overruns:0 frame:0
       TX packets:15227 errors:0 dropped:0 overruns:0 carrier:0
       collisions:15 txqueuelen:100
       RX bytes:9319817 (8.8 MiB) TX bytes:1186091 (1.1 MiB)
       Base address:0x3c00
```

The IP address, Broadcast address and Netmask allocated by the DHCP server are shown.

#### 3.5.5.1.2 IP Address Configuration via Serial Port

This method involves using a shell (command-line) to enter commands. To do this, it is necessary to connect the Controller front-panel serial port to the serial (COM) port on a PC. A terminal emulation program such as TeraTerm is also required with the serial port parameters set to 9600, N, 1.

As a minimum it is necessary to disable DHCP, set the IP address, Netmask and Gateway addresses although the serial port can be used to set all network parameters.

The first step is to disable DHCP, so that the network settings stored on the Controller Module are used instead.

1. Log in as user "root". By default, the root user has an empty password (just press Enter).

2. Type the following at the shell prompt:

```
# config -f dhcp -w no
```

Next, the network parameter values must be entered using dotted-decimal notation e.g.: 192.168.100.84 and stored:

1. Type the following at the shell prompt to set the IP address:

```
# config -f ipaddr -w <IP Address>
```

2. Type the following at the shell prompt to set the Netmask:

```
# config -f netmask -w <Netmask>
```

3. Type the following at the shell prompt to set the Gateway:

```
# config -f gateway -w <Gateway>
```

4. Reboot the Controller by typing the following at the shell prompt:

```
# reboot
```

The Controller boot process is displayed on the screen. At the conclusion the following should be displayed (or similar):

```
#
Starting Bipod Services .....
```

```

Loading Xilinx Driver ..... OK
Initialising Glue Xilinx ..... OK
Initialising GPIO Xilinx ..... OK
Loading SPI driver ..... OK
Loading HDLC Driver ..... OK
Loading Cross-Connect Driver .... OK
Loading STBUS Driver ..... OK
Activating Cross-Connect ..... OK
Loading Codec Driver ..... OK
Loading DSP driver ..... OK
Loading DSP program code .... OK
Starting DSP ..... OK
Starting HDLC daemon ..... OK
Initialising Transceivers ..... OK
Configuring network ..... OK
Starting boa webserver ..... OK
Starting PC Console daemon .... OK
Started Bipod Services: Done.

```

login:

Once the Controller has rebooted, you can check that the new network parameters have been applied correctly by using the command:

```
# ifconfig
```

This will produce output similar to:

```

eth0  Link encap:Ethernet HWaddr 00:02:B3:07:BE:73
       inet addr:192.168.100.84 Bcast:192.168.100.255 Mask:255.255.255.0
       UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
       RX packets:82773 errors:0 dropped:0 overruns:0 frame:0
       TX packets:15227 errors:0 dropped:0 overruns:0 carrier:0
       collisions:15 txqueuelen:100
       RX bytes:9319817 (8.8 MiB) TX bytes:1186091 (1.1 MiB)
       Base address:0x3c00

```

### 3.5.6 Other Configuration Settings

Once the DRB-25 can be accessed via the network, the other configuration settings can be set either via the web page or via the serial port. This page shows the settings in persistent storage on the Controller. Note that these may be different to the actual network settings if DHCP is being used.

## Configuration Settings

Hostname:	<input type="text" value="dewey"/>
IP Address:	<input type="text" value="192.168.100.84"/>
Gateway:	<input type="text" value="192.168.100.101"/>
Netmask:	<input type="text" value="255.255.255.0"/>
Primary DNS Server:	<input type="text" value="192.168.100.86"/>
Secondary DNS Server:	<input type="text" value="192.168.100.86"/>
Network Time Protocol (NTP) Server:	<input type="text"/>
Use DHCP:	<input type="button" value="No"/>
Timezone:	<div><div>Custom Timezone (enter below) <input type="button" value="v"/></div><div>Custom Timezone: <input type="text" value="EST-10"/></div><div>Note that DST = Daylight Saving Time</div></div>
I/O daemon:	<input type="button" value="PC Console daemon"/>
Start Telnet daemon:	<input type="button" value="No"/>
Require Web Login:	<input type="button" value="No"/>
Require IP Console Login:	<input type="button" value="Yes"/>

The “Store New Configuration” button writes the displayed values to persistent storage on the Controller card.

The “Apply New Configuration” button changes the Controller’s configuration to reflect those stored in persistent storage. This requires restarting the web server and other processes, and can take up to 10 seconds.

The “Reboot” button reboots the Controller (and both Transceivers, if present). The boot process takes around thirty seconds.



### 3.5.6.1 *DNS Servers*

Provision to nominate DNS servers is made although these are not required for normal IP Controller operation. If DNS servers are used it is recommended that entries are made for both Primary DNS (DNS1) and Secondary DNS (DNS2).

The DNS servers may also be entered using the front panel serial port. The command to do this is:

```
# config -f DNS1 -w <IP address> or
```

```
# config -f DNS2 -w <IP address>
```

### 3.5.6.2 *NTP Server*

NTP is the Network Time Protocol, a technique for synchronizing the time between two hosts on a network. This option can be set to the IP address or host name of a computer running an NTP server. When the option is set, the Controller will attempt to set the system time from the NTP server when the Controller boots or when the "Apply New Configuration" button is pressed.

Note that there is no real time clock on the Controller, therefore unless the system time is set when booting using this method, the system time will always be incorrect.

The NTP server may also be entered using the front panel serial port. The command to do this is:

```
# config -f ntp -w <IP address>
```

### 3.5.6.3 *Timezone*

The system time, when set using NTP, will be set in Coordinated Universal Time (UTC). To have the time displayed correctly in other time zones, this option must be set. There are two ways to do this:

- If the required time zone is within the United States, select the time zone from the drop-down list.
- Otherwise, select the entry "Custom Timezone" from the drop down box and enter a string representing the time zone. This string must be in the format specified by The Open Group Base Specifications Issue 6, IEEE Std 1003.1, 2004 Edition.

In its simplest form this format consists of a three-letter descriptive code followed by a numeric offset from UTC. For example, the time zone for Sydney, Australia, which is 10 hours ahead of UTC is *UTC+10*. In general, the letter code is arbitrary and the time zone is completely specified by the numeric offset.

The Timezone may also be entered using the front panel serial port. The command to do this is:

```
# config -f timezone -w <UTC+10>
```

#### 3.5.6.4 *Input/Output Daemon*

This field can be set to “PC Console Daemon” or “Tone Remote/PSTN daemon”. The “PC Console Daemon” allows the PC Console application to connect to the DRB-25 and stream audio data between the DRB-25 and a Windows PC. The “Tone Remote/PSTN daemon” must be run when controlling a Transceiver with a tone remote unit or connecting it to the PSTN.

The Input/Output Daemon may also be set via the front panel serial port. The command options to do this are:

PC Console :       # config -f iod -w <bsa>

Tone Remote/PSTN:       # config -f iod -w <iac>

None :               # config -f iod -w <no>

#### 3.5.6.5 *Telnet Daemon*

A Telnet daemon can be run giving shell access to the Controller card. Setting this option to “Yes” will start the daemon when the Controller boots or when the “Apply New Configuration” button is pressed.

The Telnet Daemon may also be activated via the front panel serial port. The command to do this is:

# config -f telnetd -w <yes> or # config -f telnetd -w <no>

#### 3.5.6.6 *Web Login*

This option determines whether a valid username and password are required to use the web interface. If set to yes, all the web pages will redirect to a login page until a valid user/password combination has been entered. The default setting is *no*. See Section 3.5.8 for information on creating users and setting passwords.

The Web Login may also be activated via the front panel serial port. The command to do this is:

# config -f web-login -w <yes> or # config -f web-login -w <no>

#### 3.5.6.7 *IP Console Login*

This option determines whether a valid username and password are required to use the IP interface provided by the PC Console Daemon (See 3.5.6.1). If set to yes, client applications such as Westel’s PC Console will have to send a username and password when connecting to the DRB-25. The default setting is *no*.

The PC Console Login may also be activated via the front panel serial port. The command to do this is:

# config -f pcc-login -w <yes> or # config -f pcc-login -w <no>

### 3.5.7 Web Interface

#### 3.5.7.1 Home page

The DRB-25 home page gives an overview of the Transceivers currently in the unit. If a Transceiver is present, the current channel name, current channel number, current Radio Mode and software versions are displayed.

The version number of the Controller Module software is also shown.

Controller Module	
Software Version: 1.0	

Transceiver Module 1		
Module Serial Number: L1D15000359		
Software Versions	MPC:	-4.22
	DSP:	2.09
Current Channel	Number:	0
	Name:	NAC 293
	Operating Mode:	P25 Basestation

Transceiver Module 2	
There is no transceiver in slot 2 or it is not responding to messages from the Controller.	

## 3.5.7.2 Transceiver Status Page

Diagnostics and Monitoring															
<b>Transceiver Slot:</b> 2	Slot 1: <input type="radio"/> Slot 2: <input checked="" type="radio"/> <input type="button" value="Go"/>														
<b>Channel Number:</b> 1															
<b>Channel Name:</b> "Chan000 "															
<b>Operating Mode:</b> P25 Repeater															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">TX Parameters</th> </tr> </thead> <tbody> <tr><td style="padding: 2px;">TX Frequency (MHz): 164.000000</td></tr> <tr><td style="padding: 2px;">CxCSS: 0</td></tr> <tr><td style="padding: 2px;">NAC: 400</td></tr> <tr><td style="padding: 2px;">Talkgroup ID: 1</td></tr> <tr><td style="padding: 2px;">Station ID: 0</td></tr> </tbody> </table>	TX Parameters	TX Frequency (MHz): 164.000000	CxCSS: 0	NAC: 400	Talkgroup ID: 1	Station ID: 0	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">RX Parameters</th> </tr> </thead> <tbody> <tr><td style="padding: 2px;">RX Frequency (MHz): 157.625000</td></tr> <tr><td style="padding: 2px;">Last CxCSS: 0</td></tr> <tr><td style="padding: 2px;">Last NAC: 0</td></tr> <tr><td style="padding: 2px;">Last Talkgroup ID: 0</td></tr> <tr><td style="padding: 2px;">Last Subscriber Group ID: 0</td></tr> <tr><td style="padding: 2px;">Signal Strength: 78</td></tr> <tr><td style="padding: 2px;">BER: 0</td></tr> </tbody> </table>	RX Parameters	RX Frequency (MHz): 157.625000	Last CxCSS: 0	Last NAC: 0	Last Talkgroup ID: 0	Last Subscriber Group ID: 0	Signal Strength: 78	BER: 0
TX Parameters															
TX Frequency (MHz): 164.000000															
CxCSS: 0															
NAC: 400															
Talkgroup ID: 1															
Station ID: 0															
RX Parameters															
RX Frequency (MHz): 157.625000															
Last CxCSS: 0															
Last NAC: 0															
Last Talkgroup ID: 0															
Last Subscriber Group ID: 0															
Signal Strength: 78															
BER: 0															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td style="padding: 2px;">VSWR:</td></tr> <tr><td style="padding: 2px;">Radio Status:</td></tr> <tr><td style="padding: 2px;">Temperature:</td></tr> <tr><td style="padding: 2px;">PA Status:</td></tr> </tbody> </table>	VSWR:	Radio Status:	Temperature:	PA Status:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td style="text-align: center; padding: 2px;">NORMAL</td></tr> <tr><td style="text-align: center; padding: 2px;">OK</td></tr> <tr><td style="text-align: center; padding: 2px;">NORMAL</td></tr> <tr><td style="text-align: center; padding: 2px;">OK</td></tr> </tbody> </table>	NORMAL	OK	NORMAL	OK						
VSWR:															
Radio Status:															
Temperature:															
PA Status:															
NORMAL															
OK															
NORMAL															
OK															

The Transceiver Status page displays information about the configuration and operation of a single Transceiver. To view the Transceiver in the other slot, select the desired slot using the radio buttons and press the "GO" button.

RX parameters such as "Last CxCSS", "Last NAC", etc. are based on the last signal that the Transceiver received when the page was requested. To view the latest values, reload the page by pressing the "Refresh" button in your web browser or by pressing the "Go" button.

TX parameters are properties of the current channel, and are set using the DMR-25 Programmer Application (see Chapter 5).

**3.5.7.3 Test Signal Generation Page**

<h2 style="margin: 0;">Test Signal Generation</h2>	
Slot 1: <input type="radio"/> Slot 2: <input checked="" type="radio"/> <input type="button" value="Go"/>	
<b>Channel Number:</b>	<input style="width: 100px;" type="text" value="1"/>
<b>Channel Name:</b>	"Chan000 "
<input type="button" value="Change Channel"/>	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Standard 1101 Hz Test Tone ▼</div>	<input type="button" value="TX On"/> <input type="button" value="TX Off"/>

The Test Signal Generation page allows the Transceiver channel to be changed and for test signals to be transmitted. The page controls one Transceiver at a time, as indicated by the radio buttons. The current channel number and channel name are shown for that Transceiver.

To change the radio channel, enter the new channel number in the input field and press the "Change Channel" button.

To transmit a test signal, select a signal from the drop-down menu, then press the "TX On" button. The Transceiver will transmit the selected signal until the "TX Off" button is pressed. The four possible test signals are:

Standard 1101 Hz Test Tone
Hi Deviation Pattern
Low Deviation Pattern
PRBS Sequence

**3.5.7.4 Feature Licensing Page**

<h2 style="margin: 0;">Feature Licensing</h2>	
<b>License:</b> 773FBBB5890CD07EE500D3BC4	Remove <input type="checkbox"/>
<b>Duration:</b> Permanent	
<b>Features enabled by this license:</b>	
♦ VoIP connection to DRB-25 with PCM audio	
<b>Add license:</b> <input style="width: 150px;" type="text"/>	
<input type="button" value="Add License"/>	
Controller Module Serial# : L1D33000313	
<b>Remove selected licenses:</b> <input type="button" value="Remove Licenses"/>	

Some features on the Controller Module require a license to operate. The feature licensing page allows license strings to be added, viewed and removed.

All installed licenses are displayed. The license string, the license duration, and the specific features enabled by a license are all shown.

To add a license, copy and paste the string into the “Add license” text box and press the “Add License” button. The license information should be displayed immediately.

To remove a license, check the “Remove” checkbox corresponding to that license, then press the “Remove Licenses” button.

The Controller Module serial number is also shown, as this will be required if you wish to purchase more licenses from Westel.

**3.5.7.5 Login Page**

<b>Username:</b>	<input style="width: 100%;" type="text"/>
<b>Password:</b>	<input style="width: 100%;" type="password"/>

If the “Require Web Login” configuration option is set to yes, users must log in before they can use the web interface. Navigating to any page while not logged in will redirect to the login page, when a valid username and password must be entered. Once logged in, the user’s web browser will be automatically redirected to the DRB-25 home page.

### 3.5.8 ***Configuring Users and Passwords on the Controller***

Users and passwords must be configured at the shell (command-line) at the front-panel serial port on the Controller Module. Note that to add users, you must be logged in as the user “root”. This is the only user initially present. The root user’s password is initially empty (Enter), but should be changed to a secure password during installation.

Users can be added with the adduser command. To add a user with username “fred”:

```
# adduser fred
```

And removed with the deluser command. To delete user “fred”:

```
# deluser fred
```

Passwords can be changed with the passwd command:

```
# passwd fred
```

## 3.6 ***CONNECTIONS***

### 3.6.1 ***Grounding Strap***

Before connecting the DRB-25, it is recommended that a secure ground strap be connected from the grounding stud at the rear left hand side of the DRB-25 case to a substantial ground system:

1. Locate the primary grounding stud at the rear of the chassis on the lower left hand side.
2. Connect a grounding strap from an external grounding point or ground ring to the chassis primary grounding stud.
3. Ensure good electrical contact and security of all connections.

### 3.6.2 ***AC Power***

An IEC standard AC power cable is provided with the AC and DC revert configurations. Connect the AC power cable as follows:

1. Set the power switch on the rear of the DRB-25 to OFF.
2. Plug-in the IEC connector of the cable to the recessed IEC plug on the rear of the DRB-25.
3. Connect the other end of the AC power cable to a properly protected and grounded AC power outlet.

### 3.6.3 ***DC Power***

External DC power connection for DC and DC revert configurations is via a 2-way terminal block mounted on the rear of the DRB-25 above the mains input receptacle. Connect DC power cable as follows:

1. Ensure that DC power is not applied to the cables being connected to the DRB-25.

2. Strip back 3/8" of cable insulation on both positive and negative cables.
3. Insert positive supply into the topmost terminal (Red) and negative supply into the lower terminal (Black).
4. Secure both terminal screws and apply DC power to cable.

DC configurations include an internal fuse within the DRB-25, however to allow isolation of the unit it is recommended that a circuit breaker or DC switch is placed in the DC circuit to the DRB-25.

### **3.6.4     *Antenna Cabling***

The length and type of antenna cabling required depends on the system configuration and will be supplied separately. Connect the Transmit (N-type) and Receive (BNC type) cables to the Transmit and Receive connectors on the rear of the cabinet to the Antenna system.

### **3.6.5     *External Interfaces***

The DRB-25 supports the following external interfaces:

Transceiver Module:

- Transceiver Module audio connector
- Transceiver Module programming connector.

Controller Module

- Controller Module serial data connector

Interface Module

- Radio serial data.
- Analog line connections for PSTN, PBX, Microwave or tone remote control unit.
- RS-485 serial data (for future use as APCO Project 25 Fixed Station Interface (Ef) and digital console interface.
- Ethernet connection for future use as a network management interface.
- General purpose input/output lines.
- External 10 MHz reference source input.
- Standby power to maintain temperature of reference oscillator oven during power outages.
- -48 V DC input for operation of E & M signalling interface.

#### **3.6.5.1     *Transceiver Module***

##### **3.6.5.1.1     Transceiver Module Audio Connector**



**Function:** Connects external microphone or speaker or both to Transceiver Module

**Located:** Transceiver Module front panel (lower connector)

**Connector:** RJ45

**Pin allocation:** (Pin 1 is the top pin looking from the front of the module)

Pin	Function
1	Microphone audio
2	Ground
3	Line/speaker output (link selectable on the Tx module)
4	Microphone supply (+12 V)
5	PTT (Active Low)
6	Monitor (Active Low)
7	Channel Up (Active Low)
8	Channel Down (Active Low)

#### 3.6.5.1.2 Transceiver Module Programming Connector

**Function:** Connects programming PC to Transceiver Module

**Located:** Transceiver Module front panel (upper connector)

**Electrical:** RS-232

**Connector:** RJ11

**Pin allocation:** (Pin 1 is the top pin looking from the front of the module)

Pin	Function
1	N/C
2	Reserved
3	Transmit data (output)
4	Receive data (input)
5	Ground
6	N/C

#### 3.6.5.3 Controller Module

##### 3.6.5.3.1 Controller Module Serial Data Connector

**Function:** Connects PC running Transceiver Diagnostic Monitor application to DRB-25

**Located:** Controller Module front panel

**Electrical:** RS-232

**Connector:** RJ11

**Pin allocation:** (Pin 1 is the top pin looking from the front of the module)

Pin	Function
1	RTS (output)
2	CD (input)

Pin	Function
3	Transmit data (output)
4	Receive data (input)
5	Ground
6	CTS (input)

#### 3.6.5.4 2W Interface Module

This section provides the interface descriptions for the 2/4W Interface Module. Interface descriptions for the 4W Interface Module which is superseded by the 2/4W version are provided in section 3.6.5.5.

##### 3.6.5.4.1 Radio Serial Data

**Function:** Radio Serial Diagnostic Data  
**Located:** Interface Module  
**Label:** I/O  
**Electrical:** RS-232 (one per transceiver module)  
**Connector:** DB25 (female)  
**Pin Allocation:** See 3.6.5.8.1

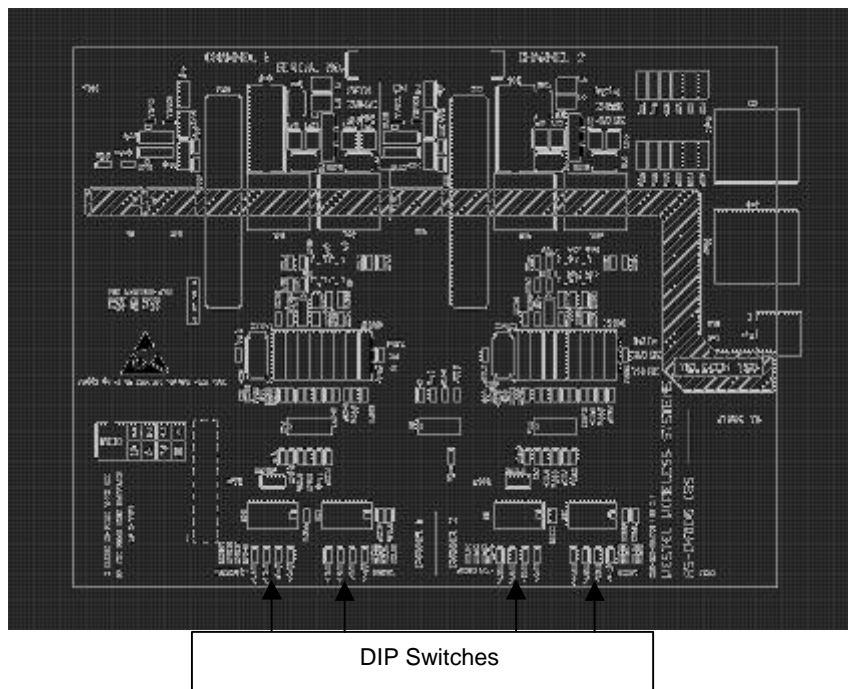
##### 3.6.5.4.2 Analog Line Connection

**Function:** Provides line connections for PSTN, PBX, Microwave or tone remote control unit.  
**Located:** Interface Module  
**Label:** Line One and Line Two (one per transceiver module)  
**Electrical:** See table below  
**Connector:** RJ45  
**Pin allocation:** (Pin 1 is the lower pin on the connector)

Pin	2 wire
1	SB Lead (used only when configured)
2	M lead (used only when configured)
3	Reserved
4	Ring: DRB-25 Transmit/Receive Audio (+), balanced signal, 600R, Transmit 0 dBm (nominal), Receive -10 dBm (nominal)
5	Tip: DRB-25 Transmit/Receive Audio (+), balanced signal, 600R, Transmit 0 dBm (nominal), Receive -10 dBm (nominal)
6	Reserved
7	SG Lead (Gnd for external E/M supply)
8	E Lead (used only when configured)

Pin	4 wire
1	SB Lead
2	M lead
3	DRB-25 Receive Audio (+), balanced signal, 600R, -10 dBm (nominal)
4	DRB-25 Transmit Audio (+), balanced signal, 600R, 0 dBm (nominal)
5	DRB-25 Transmit Audio (-), balanced signal, 600R, 0 dBm (nominal)
6	DRB-25 Receive Audio (-), balanced signal, 600R, -10 dBm (nominal)
7	SG Lead (Gnd for external E/M supply)
8	E Lead

The level of signals sent to line and received from line is adjustable using the 4 DIP switches on the Telecom Board. The following fixed steps are available: +4 dB, +8dB, +12dB and +16 dB.



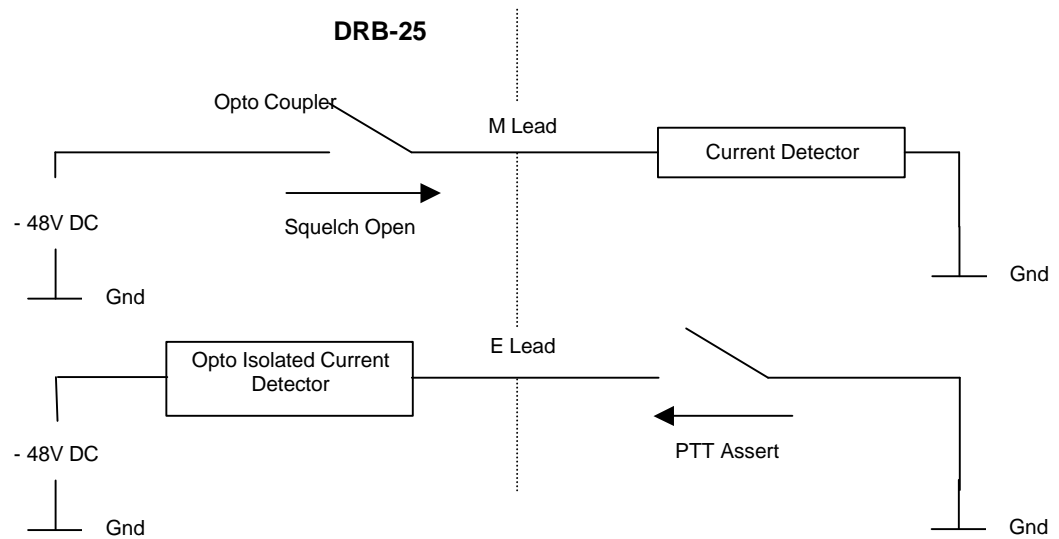
### 3.6.5.4.3 Analog Line Jumper Settings

To select the mode of the analog line interfaces set jumpers XMA and XMB as follows:

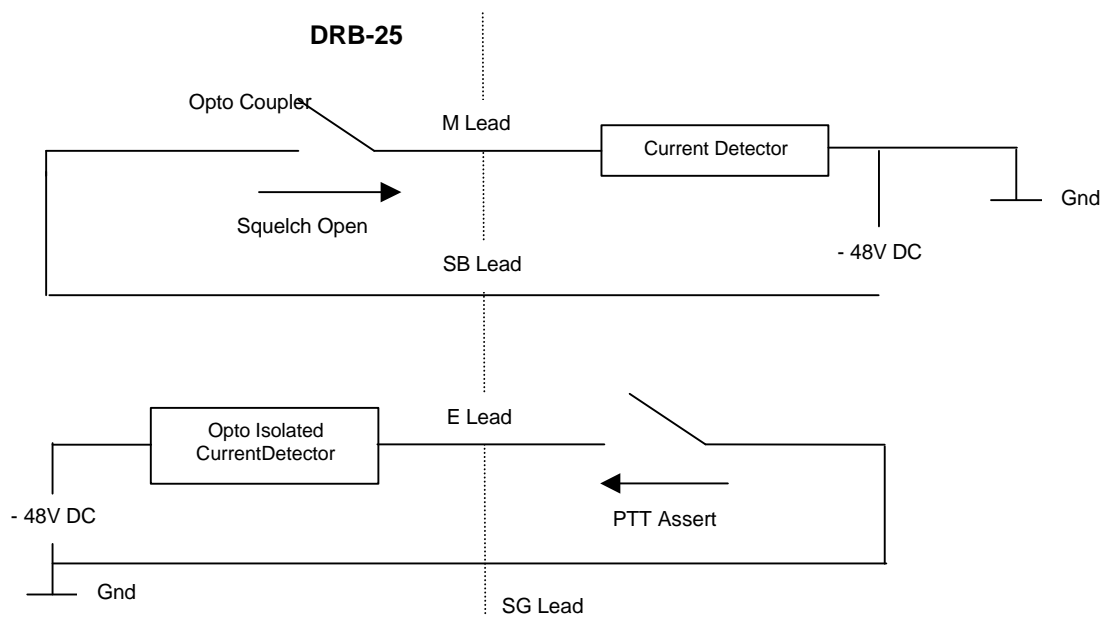
	Line 1	Line 2
2W PSTN	XMA1 and XMA2-9 set to 'PSTN'	XMB1 and XMB2-9 set to 'PSTN'
2W leased line or 2W+E/M	XMA1 and XMA2-9 set to '2W'	XMB1 and XMB2-9 set to '2W'
4W leased line or 4W+E/M	XMA1 and XMA2-9 set to '4W'	XMB1 and XMB2-9 set to '4W'

The mode of operation of the E/M signaling is that when the radio squelch opens the M signaling line is connected to –48V DC active and when the E signaling line is asserted (by connection to Gnd by an external equipment) the radio PTT function is asserted.

The Interface Module can support both Type I and Type II E/M signaling. Type I signaling uses an earth return, Type II signaling uses the SB line as the return for the M signaling line and the SG line as the return for the E signaling line.



**E/M Signaling – Type I Configuration**



**E/M Signaling – Type II Configuration**

The configuration of the E/M signaling interface to Type I or Type II is set using the solder links XLA and XLB as follows:

	Line 1	Line 2
Type I	XLA1 : no links fitted XLA2 : pin 1- pin 2	XLB1 : no links fitted XLB2 : pin 1- pin 2
Type II	XLA1 : pin 2 – pin 3 XLA2 : no links fitted	XLB1 : pin 2 – pin 3 XLB2 : no links fitted

#### 3.6.5.4.4 RS-485 serial data

**Function:** Provides vocoded voice for APCO Project 25 Fixed Station Interface (Ef) or for a digital console interface. Future enhancement, software upgrade.

**Located:** Interface Module front panel

**Label:** LINK

**Electrical:** RS-485

**Connector:** DB9 (male)

**Pin allocation:**

Pin	Function
1	Reserved
2	Transmit data + (out of IAC)
3	Transmit data - (out of IAC)
4	Reserved
5	Ground
6	Reserved
7	Receive data + (into IAC)
8	Receive data - (into IAC)
9	Reserved

#### 3.6.5.4.5 Ethernet

**Function:** Provides Ethernet connection for VOIP, Network management interface and APCO Project 25 Data Host Interface (Ed) for packet data.

**Status:** Future enhancement, software upgrade.

**Located:** Interface Module

**Label:** NET

**Electrical:** 10Base-T

**Connector:** RJ45

**Pin allocation:** (Pin 1 is the lower pin of the connector)

Pin	Function
1	Transmit data + (out of IAC)
2	Transmit data - (out of IAC)
3	Receive data + (into IAC)
4 - 5	Reserved
6	Receive data - (into IAC)
7 - 8	Reserved

#### 3.6.5.4.6 General Purpose Input/Output Lines

**Function:** See descriptions below.

**Located:** Interface Module

**Label:** I/O

**Connector:** DB25 (female)

**Function:** Provides outputs for control of transmit/receive antenna change-over relays, transmit disable inputs, Radio audio outputs, external DRB-25 reset input, Reference Backup supply input, Radio Serial Data,

**Pin allocation:**

Pin	Function
1	Radio 1 Serial Data output
14	Radio 2 Serial Data output
2	Radio 1 Serial Data input
15	Radio 2 Serial Data input
3	Gnd
16	Gnd
4	Transmit disable input radio 1: - (active low)
17	Transmit disable input radio 2: - (active low)
5	General purpose input 3: - (active low)
18	General purpose input 4: - (active low)
6	Radio 1 Audio Output: 600R, 0dBm
19	Radio 2 Audio Output: 600R, 0dBm
7	Reset DRB-25 - (active low)
20	Ref Backup +12V DC input
8	Gnd
21	Gnd
9	General purpose output 3: +
22	General purpose output 3: -
10	General purpose output 4: +

Pin	Function
23	General purpose output 4: -
11	Radio 1 TxRx Antenna Change-over Relay +
24	Radio 2 TxRx Antenna Change-over Relay +
12	Radio 1 TxRx Antenna Change-over Relay -
25	Radio 2 TxRx Antenna Change-over Relay -
13	Ground

**Transmit disable inputs:**

When the - input is connected to ground the relevant transmitter is disabled. This input is opto isolated.

**Antenna relay outputs:**

The configuration of the Antenna Change-over Relay outputs is set using links XM1 and XM2. The outputs can be configured to provide a 'contact closure' or supply 12V DC to an antenna change-over relay.

Links XM1 and XM2 are located on the Interface card (lower card) of the Interface Module adjacent to the DB25 I/O connector

	Radio 1	Radio 2
Contact Closure Outputs	XM1: pin 2 – pin 3	XM2: pin 2 – pin 3
12V DC Relay Supply Output	XM1: pin 1 – pin 2 & pin 3 – pin 4	XM1: pin 1 – pin 2 & pin 3 – pin 4

**Reset DRB-25 input:**

When this input is grounded the DRB-25 will be reset. This input is opto isolated.

**3.6.5.4.7 External 10 MHz reference source**

**Function:** Provides 10 MHz input. When present automatically used in preference to internal 10 MHz reference

**Located:** Interface Module (2-4W and 4W versions)

**Label:** REF IN

**Electrical:** Level between 450 mV peak-peak and 4v peak-peak, impedance 50 Ohm

**Connector:** BNC

**Pin allocation:**

Pin	Function
Inner	External reference input
Outer	Ground



**3.6.5.4.8 Standby power**

**Function:** Maintain internal reference oscillator during power outages.  
**Located:** Interface Module  
**Label:** I/O  
**Electrical:** 12 V DC (+/- 5%) input, max. current 1A  
**Connector:** See details in 3.6.5.4.6

**3.6.5.4.9 -48 V DC input**

**Function:** Provides -48 V DC input for E/M signaling  
**Located:** Interface Module  
**Label:** -48 V DC  
**Connector:** 2 pin (male) Mating plug: Phoenix Contact MSTB 1,5/2-ST-3,81  
**Pin allocation:**

Pin	Function
Upper	-48 V DC ground (0 V)
Lower	-48 V DC input

**3.6.5.5 4W Interface Module (Discontinued)****3.6.5.5.1 Radio Serial Data**

**Function:** Radio Serial Diagnostic Data  
**Located:** Interface Module  
**Label:** Serial One, Serial Two (one per transceiver module)  
**Electrical:** RS-232  
**Connector:** DB9 (female)  
**Pin allocation:**

Pin	Function
1	Reserved
2	Receive data (input)
3	Transmit data (output)
4	Reserved
5	Ground
6	Reserved
7	Reserved
8	Reserved
9	Reserved

**3.6.5.5.2 Analog Line Connection**

- Function:** Provides line connections for PSTN, PBX, Microwave or tone remote control unit. (4 wire functional, 2 wire future enhancement).
- Located:** Interface Module
- Label:** Line One and Line Two (one per transceiver module)
- Electrical:** See table below
- Connector:** RJ45
- Pin allocation:** (Pin 1 is the lower pin on the connector)

Pin	Function (4 wire)
1	SB Lead
2	M lead
3	DRB-25 Receive Audio (+) - balanced signal, 600R, 0 dBm (nominal)
4	DRB-25 Transmit Audio (+) - balanced signal, 600R, 0 dBm (nominal)
5	DRB-25 Transmit Audio (-) - balanced signal, 600R, 0 dBm (nominal)
6	DRB-25 Receive Audio (-) - balanced signal, 600R, 0 dBm (nominal)
7	SG Lead (Gnd for external E/M supply)
8	E Lead

**3.6.5.5.3 Analog Line Jumper Settings**

The mode of operation of the E/M signaling is that when the radio squelch opens the M signaling line is connected to -48V DC active and when the E signaling line is asserted (by connection to -48V by an external equipment) the radio PTT function is asserted.

The Interface Module can support both Type I and Type II E/M signaling. Type I signaling uses an earth return, Type II signaling uses the SB line as the return for the M signaling line and the SG line as the return for the E signaling line.

The configuration of the E/M signaling interface to Type I or Type II is set using the links XL1 and XL2 as follows:

	Line 1	Line 2
Type I (earth return)	XL1 : pin 2 - pin 3	XL2 : pin 2 - pin 3
Type II (SB and SG return)	XL1 : pin 1 – pin 2	XL2 : pin 1 – pin 2

4W phantom circuits are also supported by inserting solder links XLA1/2 and XLB1/2.

	Line 1	Line 2
E Line Signaling	Insert XLA1	Insert XLB1
M Line Signaling	Insert XLA2	Insert XLB2

The default configuration of the 4 wire interface is as a console interface with pin allocation as shown in 3.6.5.5.2 above, suitable for connection to a tone remote console.

The interface may be reconfigured by jumper placement to an exchange interface suitable for connection to a PSTN or PABX network. The exchange configuration has pin 3 connected to DRB-25 Transmit Audio (-), pin 4 connected to DRB-25 Receive Audio (+), and is otherwise the same as the console configuration pin allocation.

To configure the pin allocation as either a console or exchange interface place the jumpers on connectors XL5, XL6 (line 1) and XL3, XL4 (line 2) as follows:

	Line 1	Line 2
Connectors	XL5 & XL6	XL3 & XL4
Console configuration jumper position (default)	pin 1- pin 2	pin 1- pin 2
Exchange configuration jumper position	pin 2- pin 3	pin 2- pin 3

#### 3.6.5.5.4 RS-485 serial data

**Function:** Provides vocoded voice for APCO Project 25 Fixed Station Interface (Ef) or for a digital console interface. Future enhancement, software upgrade.

**Located:** Interface Module front panel

**Label:** LINK

**Electrical:** RS-485

**Connector:** DB9 (male)

**Pin allocation:**

Pin	Function
1	Reserved
2	Transmit data + (out of IAC)
3	Transmit data - (out of IAC)
4	Reserved
5	Ground
6	Reserved
7	Receive data + (into IAC)
8	Receive data - (into IAC)
9	Reserved

**3.6.5.5.5 General Purpose Input/Output Lines****Function:** See descriptions below.**Located:** Interface Module**Label:** I/O**Connector:** DB25 (female)**Function:** Provides 6 general purpose inputs and outputs for control of transmit/receive antenna change-over relays, external site alarms and functions.**Pin allocation:**

Pin	Function
1	Antenna relay output radio 1: +
14	Antenna relay output radio 1: -
2	Antenna relay output radio 2: +
15	Antenna relay output radio 2: -
3	General purpose output 3: +
16	General purpose output 3: -
4	General purpose output 4: +
17	General purpose output 4: -
5	General purpose output 5: +
18	General purpose output 5: -
6	General purpose output 6: +
19	General purpose output 6: -
7	Transmit disable input radio 1: +
20	Transmit disable input radio 1: -
8	Transmit disable input radio 2: +
21	Transmit disable input radio 2: -
9	General purpose input 3: +
22	General purpose input 3: -
10	General purpose input 4: +
23	General purpose input 4: -
11	General purpose input 5: +
24	General purpose input 5: -
12	General purpose input 6: +
25	General purpose input 6: -
13	Ground

**Transmit disable inputs:**

When the + input is connected to +12 V and the - input to ground the relevant transmitter is disabled.

**Antenna relay outputs:**

Ensure that 4 links are present on Interface Module XM3. When the radio PTT is active, the + output is connected to +12V, the - output is connected to ground

**3.6.5.5.6 External 10 MHz reference source**

**Function:** Provides 10 MHz input. When present automatically used in preference to internal 10 MHz reference

**Located:** Interface Module

**Label:** REF IN

**Electrical:** Level between 450 mV peak-peak and 4v peak-peak, impedance 50 Ohm

**Connector:** BNC

**Pin allocation:**

Pin	Function
Inner	External reference input
Outer	Ground

**3.6.5.5.7 Standby power**

**Function:** Maintain internal reference oscillator during power outages.

**Located:** Interface Module

**Label:** STDBY IN

**Electrical:** 12 V DC (+/- 5%) input, max. current 1A

**Connector:** 2 pin (male). Mating plug: Phoenix Contact MSTB 2.5/2-ST-5.08

**Pin allocation:**

Pin	Function
Upper	+12 V DC ground (0 V)
Lower	+12 V DC input

**3.6.5.5.8 -48 V DC input**

**Function:** Provides -48 V DC input for E/M signaling

**Located:** Interface Module

**Label:** -48 V DC

**Connector:** 2 pin (male) Mating plug: Phoenix Contact MSTB 2.5/2-ST-5.08

**Pin allocation:**

Pin	Function
Upper	-48 V DC ground (0 V)
Lower	-48 V DC input