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4 OPERATING INSTRUCTIONS

4.1 INTRODUCTION

After installation (as described in Chapter 3), normal operation of the DRB-25 is achieved by applying power to the DRB-25 and switching on the rear panel power switch and the Power Supply Modules.

The DRB-25 Modules will perform self-test diagnostics after power is applied. Visual indicators on the module front panels will convey the status of the DRB-25 to the Operator. If any of these visual indicators show an error or fault code, simple faultfinding procedures may identify the problem and suggest an immediate solution.

If operational checks reveal a fault in DRB-25 equipment, it may be necessary to replace it. Removal of equipment is the reverse of the installation procedure described in Chapter 3. Any faulty items should be carefully packaged and sent to an authorized repair center.

If faults are not corrected by substituting equipment at an operational level, contact the supplier or its representative.

Additional connectors on the front and back panels of selected equipment allow maintenance personnel to access functions for system configuration, operational statistics and faultfinding.

4.2 SWITCHES

There are two types of switches on the front panels of the DRB-25: power and reset switches.

If an AC supply is used with the DRB-25, there is a master power supply switch on the rear of the unit which should be turned on first. The power switches on the front panel of the Power Supply Modules are switched on next.

Recessed reset switches on the Transceiver, Controller and Interface Modules (optional) allow the equipment to be reset. Additionally the DRB-25 may be reset using an external reset line available on the 2-4W Interface Module. Table 4-1 describes each reset switch and its function.

Table 4-1 Reset Switches

Equipment	Reset function
Interface Module	Resets all modules (accessed from rear)
Interface Module	External Reset on 2-4W Interface Module Resets all modules
Controller Module	Resets all modules (accessed from front)
Transceiver Module	Resets the Transceiver Module (accessed from front)

4.3 **APPLYING POWER**

Perform the following final checks before applying power:

1. Check that the ground wires are connected to the DRB-25 primary ground from an external ground point.
2. Check that all equipment and connections are secure.
3. Ensure the power cable to the DRB-25 is plugged in securely and switch power on.
4. Switch on each Power Supply Module

Note that DC direct configurations have no power supplies or switches.

4.3.1 **Initial Power-On Checklist**

Refer to Table 4-2 to verify that power indications are correct. Should displays or indicators suggest a fault condition, refer to 4.3.2 before proceeding.

The DRB-25 performs a self test and warm-up routine at power-on. During this, the Controller display flashes while the Transceiver display remains blank. When the warm-up is complete, the Controller READY indicator illuminates and the display changes to an oscillating pattern. The Transceiver then tunes to its default channel and displays the channel number, and the unit is ready to operate.

At normal temperatures the Controller takes approximately one minute to warm up, however at -30°C warm-up will take up to 10 minutes.

Table 4-2 Power-on Indicators

Equipment	Indicator	Normal Power On Indication
Power Supply Module	ON	Red lamp (in switch) lit
Controller Module	12 V PWR	Green LED lit
Controller Module	7 V PWR	Green LED lit
Transceiver Module	PWR	Green LED lit

4.3.2 Power-On Faultfinding

If the power-on indicators do not display normally, refer to Table 4-3 for simple faultfinding procedures. Check each indication in sequence, proceeding to the next fault only when the previous one has been eliminated.

Table 4-3 Faultfinding Chart for Power on Problems

Fault	Probable Cause	Recommended Action
Red Lamp in Power switch of Power Supply Module not lit	Poor supply connection	Check all connections to the relevant equipment.
	Supply faulty	Check supply for correct output of 115 V, 240 VAC or 12 / 24 VDC as appropriate.
	Power fuse blown	Replace fuse as detailed below.
OUTPUT lamp on Power Supply Module not lit	Power Supply Module failure	Substitute known good Power Supply Module and re-test.
7 V PWR and/or 12 V PWR lamps on Controller or Transceiver Module fail to light	System Power Supply Failure	Check outputs of System Power Supply on Backplane as detailed below. If either voltage is absent, replace System Power Supply as detailed below.
	Controller Module Failure	If Voltages are present, switch power off, substitute known good Controller Module and re-test.
	Transceiver Module Failure	If Voltages are present, switch power off, substitute known good Transceiver Module and re-test.
Controller or Transceiver module display error code in the range E01 to E99	User serviceable failure or module failure.	See table B-1 in Appendix B for likely cause and recommended action

4.3.3 Fuse Replacement

AC DRB-25 units are protected by a single fuse located on the IEC connector/switch module. To check and if required, replace the DRB-25 AC power fuse, proceed as follows:

1. Switch off all power to the DRB-25 and disconnect the Mains lead.
2. Unclip and withdraw the fuse slide immediately below the AC power connector on the IEC connector/switch module on the rear of the cabinet.
3. Remove the fuse from the slide and check the continuity using a multimeter. If the fuse is ruptured, replace with a new 205 size (20 x 5) 10 Amp cartridge fuse.
4. Fit the fuse to the slide and push the fuse slide firmly home.

DRB-25 units fitted with DC input are protected by fuses located adjacent to the DC power input connector. Each Power Amplifier Module is protected by a separate fuse. To check and, if required, replace the DRB-25 DC power fuse, proceed as follows:

1. Switch off DC power to the DRB-25.
2. Unclip and withdraw the relevant fuse slide immediately below the DC power input connector on the rear of the cabinet.

3. Remove the fuse from the slide and check the continuity using a multimeter. If the fuse is ruptured, replace with a new ¼" x 1 ¼" 20 Amp cartridge fuse.
4. Fit the fuse to the slide and push the fuse slide firmly home.

4.3.4 *Checking System Power Supply Outputs*

To check the presence of 7 V and 12 VDC outputs from the System Power Supply, proceed as follows:

1. Disconnect and remove the Controller and Transceiver Modules from the front of the DRB-25 cabinet.
2. Observe the position of the backplane and identify the 12 VDC and 7 VDC test points between the connectors for Transceiver 1 and the Controller
3. Connect the negative probe of a Multimeter to the 0 V test point or the DRB-25 system cabinet grounding stud.
4. Using the positive lead, probe the +12 V and +7 V test points on the backplane card for the presence of the indicated voltages $\pm 5\%$.

4.3.5 *Replacing System Power Supply*

If the above test indicates the lack of one or both voltage rails, replace the System Power Supply as follows:

WARNING

**ENSURE ALL POWER IS SWITCHED OFF BEFORE
ATTEMPTING TO WORK ON THE DRB-25..**

1. Switch off all power to the DRB-25 and disconnect the Mains lead.
2. Disconnect and remove the Interface Module from the rear of the DRB-25 cabinet.
3. Disconnect and remove the antenna system RF cables from the rear of the DRB-25.
4. Remove the four Philips head screws securing the left-hand rear panel of the DRB-25.
5. Ease the panel out from the Cabinet, disconnect the two RF cables from the inside of the bulkhead connectors on the panel, and carefully lay the panel aside.
6. Remove the four Philips head screws from the right-hand rear panel of the DRB-25.
7. Ease the panel out from the DRB-25 Cabinet, disconnect the two RF cables from the inside of the bulkhead connectors on the panel, and carefully lay the panel aside.
8. Locate the 4-pin DC power connector on the backplane and disconnect.
9. Locate System Power Supply DC input power leads, trace these leads to the DC power distribution terminal block located in the area behind the right hand rear panel of the cabinet and disconnect. Note the connection points for reference during refitting.

10. Using a 9/32 inch (7 mm) hexagonal nut driver, remove the four Nyloc nuts securing the Power Supply Module to the studs on the rear of the left-hand panel and remove the Power Supply Module.
11. Refitting is a reversal of the removal procedure.

4.4 OPERATIONAL FAULTFINDING

If, during operation, the DRB-25 should fail to operate as expected, observe the status indicators and displays of the modules as described in Chapter 2. Press the RESET button of the Controller Module and the Transceiver Module and re-evaluate the condition. If this fails to clear the problem, proceed with the faultfinding detailed in Table 4-4.

Table 4-4 Faultfinding Chart for Operational Problems

Indication	Probable Cause	Recommended Action
FAULT lamp on Controller Module lit and error code displayed	Controller Module failure	Note displayed error code on Controller Module: see Appendix B for recommended action.
FAULT lamp on Transceiver Module lit and error code displayed	Transceiver Module failure	Note displayed error code on Transceiver Module: see Appendix B for recommended action.
PA FAULT lamp on Transceiver Module lit and error code displayed	PA Module failure	Note displayed error code on Transceiver Module: see Appendix B for recommended action.
DRB-25 fails to transmit SWR Error E08	Antenna System failure	Check antenna system for damage and ensure correct connections.
	Power Amplifier Module failure	Switch power off, substitute known good Power Amplifier Module and re-test.
DRB-25 fails to receive	Antenna system failure	Check antenna system for damage and ensure correct connections.
	Transceiver Module failure	Switch power off, substitute known good Transceiver Module and re-test.
Failure of external interfaces	Interface Module failure	Switch power off, substitute known good Interface Module and re-test.

4.5 CONFIGURATION

If all the external indications are that the DRB-25 is operational, proceed with the configuration process using the Transceiver Module Programmer application as described in Chapter 5. Once configuration has been completed, the DRB-25 can be tested in its intended system environment.

Channels may be configured as fixed channels or scan channels as described in Chapter 5.

4.5.1 *Fixed Channel Operation*

Fixed channels will operate according to all the parameters entered in the channel settings dialog box (see Chapter 5).

4.5.2 *Scan Channel Operation*

Scan channels may be set up to scan between up to eight channels. The first channel selected in the scan sequence will define the operating mode (local or remote basestation or repeater), station ID, timers, encryption, power output and source priority during all scanning. The DRB-25 will scan between the channel mode, spacing, talk group ID, receive configuration and transmit configuration of each selected channel.

The DRB-25 will scan sequentially through the selected channels, with a maximum scan rate of 2 channels per second (500ms on each channel), unless a valid signal is detected on a channel. If a valid signal is detected then the DRB-25 will remain on that channel until the call is completed, then continue scanning. The scan channel can also be programmed with additional dwell times, such that the DRB-25 will remain on the channel for the specified dwell time after the completion of a call, to allow for a return call.

4.6 *LOCAL OPERATION*

The DRB-25 may be operated locally by using a DTMF microphone and speaker connected to the front panel handset socket of the transceiver module. Each transceiver must have a separate speaker and microphone.

4.6.1 *Monitoring Audio*

In single channel configurations a loudspeaker panel may be fitted to the unit to provide a speaker and volume control (refer to 3.5.4.6). Audio may be also monitored from the Transceiver Module via an external speaker connected to the front panel RJ45 audio connector.

The speaker will monitor audio on the selected channel of the transceiver, with receive parameters as defined by the channel table entry in the Transceiver Module Programmer. In normal operation all traffic with a valid NAC (digital mode) or CTCSS/CDCSS (analog mode) will be routed to the speaker. When operating as a basestation the unit may be put into 'monitor' mode by keying the sequence *5* on a DTMF microphone connected to the transceiver module audio connector. In monitor mode all traffic on the receive frequency will be routed to the speaker irrespective of NAC or CTCSS/CDCSS. The DTMF key sequence *5* will revert the basestation to normal squelch mode.

Note : the DTMF key # will erase any preceding (incomplete) DTMF key sequence.

4.6.2 *Making Calls*

Calls may be sent from the DRB-25 using a microphone connected to the transceiver module front panel RJ45 audio connector. Calls will be broadcast with the transmit NAC and Talkgroup ID (digital mode) or transmit CTCSS/CDCSS (analog mode) of the transceiver's current channel, as defined by the channel table entry in the Transceiver Module Programmer.

4.6.3 *Changing Audio Volume*

If a loudspeaker panel is fitted, audio volume is controlled by the volume knob on the panel. If an external speaker is connected, audio volume may be controlled using a DTMF microphone connected to the transceiver module front panel RJ45 audio connector. The DTMF key sequence **2*nn** will set audio volume to level 'n' between 00 (off) and 09 (full volume).

Note : the DTMF key # will erase any preceding (incomplete) DTMF key sequence.

4.6.4 *Changing Selected Channel:*

The transceiver's current channel may be changed using a DTMF microphone connected to the transceiver module front panel RJ45 audio connector. The DTMF key sequence **1*nnn** will change the transceiver to channel 'nnn'. The selected channel will be displayed on the front panel of the transceiver module.

Note : the DTMF key # will erase any preceding (incomplete) DTMF key sequence.

4.6.5 *Squelch Adjustment*

The receiver squelch level may be set in analog mode using a DTMF microphone connected to the transceiver module front panel RJ45 audio connector. The DTMF key sequence **3*nn** will change the squelch level as follows:

- **3*00** sets carrier squelch.
- **3*nn** sets squelch level to 'nn' dB SINAD where 'nn' is between 06 and 20.
- Squelch hysteresis is 2dB.

4.7 *REMOTE OPERATION*

The DRB-25 may be controlled remotely using any industry standard tone remote control console over two or four wire telephone lines using leased lines or dial up, provided the DRB-25 is fitted with the corresponding two or four wire line interface option. One line is used for each transceiver. To configure the DRB-25 for remote operation:

1. Connect the two or four wire line(s) to the RJ45 line socket on the interface module at the rear of the DRB-25.
2. Configure the allocation of function tones (F1 up to F12) if required (this functionality is part of the Transceiver Module Programmer software described in chapter 5).

Connect the tone remote console to the line and operate according to the console manufacturer's instructions.

4.8 *PSTN OPERATION*

Remote users may use the DRB-25 to make PSTN calls from a compatible handset. The DRB-25 PSTN capability can be accessed using one of the following radios:

1. A wideband or narrow band analog radio with DTMF signaling
2. A Project 25 compatible radio supporting Project 25 PSTN Explicit Dialling messaging as described in the P25 Specification "Link Control Formats for Conventional Operation"

The DRB-25 must have a Controller Module and an Interface Module with 2-wire support fitted to enable PSTN operation. The DRB-25 operates in full-duplex mode; subscriber units operate in half-duplex mode.

4.8.1 *Analog Operation*

To make a PSTN call from an analog radio, a user will follow the following procedure:

1. When on channel, a user can take the PSTN line "off hook" by keying PTT and dialing the sequence ***13*** into the handset.
2. Once the user releases PTT a dial tone should be heard back from the DRB-25.
3. The user can then dial the desired number and conduct a conversation.
4. At the end of the call the user will place the PSTN line "on hook" by keying PTT and dialing the sequence ***14*** into the handset.

4.8.2 *Project 25 Digital Operation*

To make a PSTN call from a P25 compatible digital radio, a user will follow the following procedure:

1. The P25 radio is programmed with a PSTN access (off-hook) code of ***13***, a PSTN de-access code of ***14*** and the phone number (or numbers) that are required to be called. The method of doing this varies by manufacturer and the appropriate programming manual should be consulted.
2. When on channel, a user can take the PSTN line "off hook" by pressing the key programmed with the PSTN access code on the P25 radio. A dial tone should be heard back from the P25 handset.
3. Select from the programmed list the PSTN number to be dialed. Call progress tones from the PSTN should be audible in the P25 radio.
4. When the called party answers the conversation can be conducted.
5. At the end of the call the user will place the PSTN line "on hook" by pressing the appropriate de-access (on-hook) key.

4.8.3 *PSTN Timeout*

The DRB-25 is fitted with a PSTN timeout of 30s so that if the user loses access to the channel the DRB-25 will time out and place the PSTN line on hook.