

# **DRB-25**

# Digital Mobile Radio Repeater and Radio Base Station

# Installation and Operator Handbook

AMX-MA-00400

Issue 0.13 (USA)

Date of Issue: 16 March 2004

As part of its ongoing commitment to product improvement, The Westel Group reserves the right to alter at any time the equipment and specifications described in this publication.

All performance figures quoted are typical and are subject to normal manufacturing and service tolerances.

The purchaser is warned that the statements made in this publication may be inaccurate due to typographical or other errors or subsequent modification of the products described herein. Whilst every care has been taken in the preparation of this publication, no warranty of accuracy or reliability is given in relation to any advice or information contained in this publication and no responsibility for any loss or damage whatsoever arising in any way for any representation, act or omission whether express or implied (including responsibility to any person by reasons of negligence) is accepted by The Westel Group or any officer, agent, or employee of it.

C The Westel Group, 2000.

This work is copyright. Other than as permitted by law, no part of it may be reproduced, stored in a retrieval system or transmitted in any form or by any process without prior written permission.

This device made under license under one or more of the following US patents: 5,164,986; 5,146,497; 5,185,795, 4,636,791; 4,590,473; 5,185,796; 5,148,482; 5,271,017; 5,377,229; 4,833,701; 4,972,460; 5,651,030.

Other worldwide patents pending.

The IMBE<sup>TM</sup> voice coding technology embodied in this product is protected by intellectual property rights including patent rights, copyrights and trade secrets of Digital Voice Systems, Inc. The voice coding technology can be used only as part of the North American land mobile communications system for APCO Project 25. The user of this technology is explicitly prohibited from attempting to decompile, reverse engineer, or disassemble the Object Code, or in any other way convert the Object Code into a human readable form.

## PREFACE

This manual provides the information personnel will need to install and operate the DRB-25 Dual Channel Radio Base Station.

The manual consists of nine documents, as described below:

|            | Title   | Document Ref | Issue | Date          |
|------------|---|--------------|-------|---------------|
|            | Preliminary Pages                               | AMX-MA-00400 | 0.13  | 16 March 2004 |
| 1          | Introduction                                    | AMX-MA-00651 | 0.04  | 24 July 2003  |
| 2          | Equipment Description                           | AMX-MA-00652 | 0.04  | 24 July 2003  |
| 3          | Installation Instructions                       | AMX-MA-00653 | 0.06  | 16 March 2004 |
| 4          | Operating Instructions                          | AMX-MA-00654 | 0.03  | 24 July 2003  |
| 5          | Programming and Configuration                   | AMX-MA-00657 | 1.04  | 24 July 2003  |
| 6          | Diagnostics Monitor                             | AMX-MA-00656 | 0.02  | 30 March 00   |
| Appendix A | Box ID and Transceiver Default Channel Settings | AMX-MA-00658 | 0.02  | 30 March 00   |
| Appendix B | Module Error Codes and Recommended Actions      | AMX-MA-00659 | 0.02  | 30 March 00   |

Definitions of warnings, cautions and notes are shown on the next page. Safety of personnel and equipment depends upon adherence to these precautions.

#### **FCC Interference Warning**

This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference.

For specific instructions regarding antenna safety and safe operating distances see Chapter 3.

## **PRECAUTIONARY NOTATIONS**

Where it is necessary to highlight a potentially hazardous situation, a critical procedure or requirement, or an important fact, the appropriate precautionary notation is used:

#### WARNING

A WARNING PRECEDES A PRACTICE OR PROCEDURE WHICH, IF NOT CORRECTLY FOLLOWED, COULD RESULT IN PERSONAL INJURY OR LOSS OF LIFE.



A caution precedes a practice or procedure which, if not strictly observed, could result in damage to or destruction of the equipment, or corruption of data.



A caution for static devices precedes a practice or procedure which, if not strictly observed, could result in damage to or destruction of the equipment, or corruption of data.

#### NOTE

A note either precedes or follows a practice, procedure or condition which requires highlighting.

## LIST OF ABBREVIATIONS

| APCOAssociation of Public-Safety Communications Officials - International, Inc.BERBit Error RateCAICommon Air InterfaceCMController ModuleCDCSSContinuous Digital Carrier Squelch SystemCOmmsCommunicationsCTCSSContinuous Tone Carrier Squelch SystemDCDirect CurrentDMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMCElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModuleKHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPrivate Branch ExchangePKAPrivate GroupturePCAPrivate GroupturePCAPrivate GroupturePCARadio FrequencyRtRadio FrequencyRtRack UnitRtRack UnitRtRack UnitRtTransceiver ModulePTMTransceiver ModulePTMTransceiver ModuleRtPNack UnitRtTransceiver ModuleTMPTransceiver ModuleTMPTransceiver ModuleTMPTransceiver ModuleTMPTransceiver ModuleTMPTransceiver ModuleTMPTransceiver ModuleTMPTransceiver ModuleTMPUltra High Frequency </th <th>AC</th> <th>Alternating Current</th> | AC     | Alternating Current                       |  |
|---|--------|---|--|
| CAICommon Air InterfaceCMController ModuleCDCSSContinuous Digital Carrier Squelch SystemCommsCommunicationsCTCSSContinuous Tone Carrier Squelch SystemDCDirect CurrentDMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModuleKHzKilohetzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASXPrivate Automatic Branch ExchangePKPersonal ComputerPCAPersonal ComputerPCARadio FrequencyFTTPress-to-talkRFRack UnitRxReceiveTMATransceiver ModulePTFTransceiver ModulePTFTransceiver ModulePTFTransceiver ModuleTMPUltra High FrequencyVVoltVHFVortVVort   | APCO   |   |  |
| CMController ModuleCDCSSContinuous Digital Carrier Squelch SystemCommsCommunicationsCTCSSContinuous Tone Carrier Squelch SystemDCDirect CurrentDMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASXPrivate Automatic Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURack UnitRxReceiveTMTransceiver ModulePMPTransceiver ModuleVVoltVHFVoltVHFVery High Frequency   | BER    | Bit Error Rate                            |  |
| CDCSSContinuous Digital Carrier Squelch SystemCommsCommunicationsCTCSSContinuous Tone Carrier Squelch SystemDCDirect CurrentDMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePASMPrivate Automatic Branch ExchangePCPersonal ComputerPCAPrivate Automatic Branch ExchangePCPersonal ComputerPTTPerss-to-talkRFRadio FrequencyRURack UnitRxReceiveTMMTransceiver ModuleTMPTransceiver ModulePMFUltra High FrequencyVVoltVHFVery High Frequency   | CAI    | Common Air Interface                      |  |
| CommsCommunicationsCTCSSContinuous Tone Carrier Squelch SystemDCDirect CurrentDMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModuleKHzKilohertzLCDLiquid Crystal DisplayLEDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPried Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRMTransceiver ModuleTMPTransceiver ModuleVVoltVHFVery High Frequency  | СМ     | Controller Module                         |  |
| CTCSSContinuous Tone Carrier Squelch SystemDCDirect CurrentDMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModuleKHzKilohertzLCDLiquid Crystal DisplayLEDLiqti Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCAPrivate Branch ExchangePCAPriset Origuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRKReceiveTMPTranseciver ModuleTMPTranseciver ModulePMAQueritPUITranseciver ModulePTMPress-to-talkRFRadio FrequencyIMPTranseciver ModuleTMPTranseciver ModuleTMPTranseciver ModuleTMPTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency   | CDCSS  | Continuous Digital Carrier Squelch System |  |
| DCDirect CurrentDMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURack UnitRxReceiveTMTransceiver ModuleProgrammerTrasceiver ModuleVVoltVHFVery High Frequency   | Comms  | Communications                            |  |
| DMRDigital Mobile RadioDTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPrivate Automatic Branch ExchangePBXPrivate Ranch ExchangePCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURaceiveTMATransceiver ModulePASReceivePTTPress-to-talkRFRadio FrequencyVVoltVHFVoltVHFVery High Frequency  | CTCSS  | Continuous Tone Carrier Squelch System    |  |
| DTMFDual Tone Multiple FrequencyEMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModuleKHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePASMPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPTTPess-to-talkRFRadio FrequencyRMRack UnitRxReceiveTMPTransceiver ModulePMPUransitiPMPMultip FrequencyVVoltVHFVolt  | DC     | Direct Current                            |  |
| EMCElectromagnetic CompatibilityEMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePASXPrivate Automatic Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURack UnitTARTransceiver ModuleTMPTransceiver ModuleVMFVoltVHFVoltVHFVoltVHFVery High Frequency   | DMR    | Digital Mobile Radio                      |  |
| EMIElectromagnetic InterferenceIACInterface Adapter CardIMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePGPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRMReceiveTMPTransceiver ModulePMPUltra High FrequencyVVoltVHFVery High Frequency   | DTMF   | Dual Tone Multiple Frequency              |  |
| IACInterface Adapter CardIMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePGPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRMReceiveTMPTransceiver Module ProgrammerTxTransmitUHFVoltVHFVery High FrequencyVHFVery High Frequency  | EMC    | Electromagnetic Compatibility             |  |
| IMInterface ModulekHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePASXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPolic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURack UnitTMPTransceiver ModuleTMPTransmitUHFUltra High FrequencyVHFVoitVery High Frequency  | EMI    | Electromagnetic Interference              |  |
| kHzKilohertzLCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPTTPress-to-talkRFRadio FrequencyRVReceiveTMPTransceiver ModuleTMPTransceiver ModuleVHFVoltVHFVoltVHFVolt  | IAC    | Interface Adapter Card                    |  |
| LCDLiquid Crystal DisplayLEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePASMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRXReceiveTMPTransceiver ModuleTMPTransceiver ModuleTMPUltra High FrequencyVHFVoltVHFVery High Frequency  | IM     | Interface Module                          |  |
| LEDLight Emitting DiodeMHzMegahertzPAMPower Amplifier ModulePAMPower Amplifier Power Supply ModulePASMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRack UnitRXReceiveTMPTransceiver ModuleTMPTransceiver Module ProgrammerTxTansmitUHFVoltVutVoltVutVolt   | kHz    | Kilohertz                                 |  |
| MHzMegahertzPAMPower Amplifier ModulePAMPower Amplifier Power Supply ModulePASMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRVReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVery High Frequency   | LCD    | Liquid Crystal Display                    |  |
| PAMPower Amplifier ModulePA PSMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRVRack UnitRXReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency   | LED    | Light Emitting Diode                      |  |
| PA PSMPower Amplifier Power Supply ModulePABXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePBXPersonal ComputerPCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRVReceiveTMTransceiver ModulePMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency   | MHz    | Megahertz                                 |  |
| PABXPrivate Automatic Branch ExchangePBXPrivate Branch ExchangePBXPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURack UnitRxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency   | PAM    | Power Amplifier Module                    |  |
| PBXPrivate Branch ExchangePCPersonal ComputerPCAPrinted Circuit AssemblyPCAPublic Switched Telephone NetworkPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURack UnitRxReceiveTMPTransceiver ModuleTXTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency   | PA PSM | Power Amplifier Power Supply Module       |  |
| PCPersonal ComputerPCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRVRack UnitRxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency  | PABX   | Private Automatic Branch Exchange         |  |
| PCAPrinted Circuit AssemblyPSTNPublic Switched Telephone NetworkPTTPress-to-talkPTTRadio FrequencyRURack UnitRxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency  | PBX    | Private Branch Exchange                   |  |
| PSTNPublic Switched Telephone NetworkPTTPress-to-talkRFRadio FrequencyRURack UnitRxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency  | PC     | Personal Computer                         |  |
| PTTPress-to-talkRFRadio FrequencyRURack UnitRxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency   | PCA    | Printed Circuit Assembly                  |  |
| RFRadio FrequencyRURack UnitRxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVSoltVHFVery High Frequency   | PSTN   | Public Switched Telephone Network         |  |
| RURack UnitRxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency  | PTT    | Press-to-talk                             |  |
| RxReceiveTMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency   | RF     | Radio Frequency                           |  |
| TMTransceiver ModuleTMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency  | RU     | Rack Unit                                 |  |
| TMPTransceiver Module ProgrammerTxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency  | Rx     | Receive                                   |  |
| TxTransmitUHFUltra High FrequencyVVoltVHFVery High Frequency  | ТМ     | Transceiver Module                        |  |
| UHFUltra High FrequencyVVoltVHFVery High Frequency  | TMP    | Transceiver Module Programmer             |  |
| VVoltVHFVery High Frequency   | Tx     | Transmit                                  |  |
| VHF Very High Frequency   | UHF    | Ultra High Frequency                      |  |
|   | V      | Volt                                      |  |
| W Watt  | VHF    | Very High Frequency                       |  |
|   | W      | Watt                                      |  |