A Comparison of Some Existing Radios with Implications for Public Safety Interoperability

S.W. Ellingson

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Introduction

Presently, public safety communications infrastructure in the U.S. consists of a disparate collection of radio technologies operating over a wide range of frequencies and using a variety of incompatible protocols [1]. This situation impairs interoperability between public safety agencies, which is particularly apparent during periods of crisis. One possible approach to mitigating this difficulty is to employ mobile radios that are capable of operating over multiple frequency bands and protocols (modes), as opposed to being limited to one frequency range and one protocol [2].

However, this problem is not unique to the public safety community. A similar problem has arisen in military radio communications, which has led to the development of military radios with multiband/multimode capabilities [3]. Also, for somewhat different reasons, multiband/multimode mobile radios are prevalent in the amateur radio community. Therefore, there may be something to be learned by comparing the characteristics of these existing multiband/multimode radios to existing public safety mobile radios. This report is a first attempt.

Methodology

The summary of this brief, informal study is reported in the form of a table in Appendix A. Ten radios were selected, including 6 from the public safety market, 3 from the military market, and 1 from the amateur radio market. The military radios are relatively modern vintage, with two (the AN/PRC-148 and AN/PRC-152) being SCA-compliant JTRS models which should be representative of the state of the art in military multiband/multimode radio. Additionally, the AN/USC-61 “DMR” radio is included – even though it is far from being a handheld – as an example of an extreme, “no holds barred” approach to multiband/multimode radio. The public safety and amateur radio vendors and models were selected by no particular criterion, but rather based on ease of locating suitable technical information. Sources of information included brochures downloaded from the vendor’s web sites (in all cases) and information published in a trade journal’s annual report of product specifications.
[4] (for the public safety radios). For these reasons, the information provided in this report is informal only, provided solely for the purpose of identifying trends, and is not suitable for making purchasing decisions. In particular, price information is based on information reported in [4] (for public safety radios) or private communications, and thus could be significantly higher or lower than reported here.

From the available information, only a subset of characteristics, specifications, and features are reported in Appendix A. “Multiplicity” (under “Modes”) refers to the number of simultaneous communications links that can be maintained with the stated characteristics. Most of the other specifications should be self-explanatory or (in the case of FM receive/transmit specifications) based on definitions established in TIA-603 [5]. It should be emphasized that many aspects of these radios that may be of critical importance to practitioners – e.g., user interfaces, encryption, etc. – are not considered here. Instead, the intent is to compare those specifications that have the most bearing on the fundamental ability of the radio to perform multiband/multimode communications.

## 3 Findings

Despite the constraints imposed by the caveats described above, it is nevertheless possible to identify some trends. One is to note that the three military radios are in fact the three worst performers in terms of sensitivity in FM mode (for the uninitiated, it should be noted that just a few dB difference in sensitivity amounts to a potentially dramatic difference in range). In fact, the most capable radio in terms of frequency coverage, the AN/USC-61, is dramatically worse than the other two military radios.

This is most likely a reflection of the fundamental difficulty of designing radios with simultaneously wide bandwidth and wide tuning range; in fact, existing technology requires that this ability is achieved only by trading off performance. A similar observation can be made for output spurious levels, and probably for the same reason.

It is interesting to compare other radios to the VX-7R (amateur market) radio in this context – in this case we see that the VX-7R provides excellent FM sensitivity over a very large tuning range at relatively low cost, but has performance similar to the
military handhelds with respect to other specifications. This suggests that there is not a simple tradeoff between cost and performance in this context.

4 Concluding Remarks

This brief, informal study suggests that there is some possibility to design radios which are considerably more capable than existing public safety radios, without necessarily sacrificing performance (e.g., sensitivity/range) and with relatively small impact on cost. Of course, this does not take into account other non-technical factors (e.g., market forces, training costs, non-recurring engineering, etc.).

This document is intended only to be an initial foray into this topic, and is not intended to be authoritative. The author is happy to receive corrections, additional information, and comments to be taken into account in a future version of this report.
References


A Summary of Radio Specifications

Provided as a table on the following page.
<table>
<thead>
<tr>
<th>Vendor</th>
<th>Model</th>
<th>Market</th>
<th>Nomenclature</th>
<th>Cost</th>
<th>Tuning Range</th>
<th>Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Dynamics</td>
<td>DMR</td>
<td>Military</td>
<td>AN/USC-61</td>
<td>$1,800</td>
<td>2 - 30 MHz</td>
<td>Tuning Resolution: 10 Hz, 12.5 kHz</td>
</tr>
<tr>
<td>Harris</td>
<td>Falcon III</td>
<td>Military</td>
<td>AN/PRC-152</td>
<td>$2,000</td>
<td>30-50 MHz</td>
<td>Frequency Stability: 2.5 ppm, 1.5 ppm</td>
</tr>
<tr>
<td>M/A-COM</td>
<td>P7100 (VHF/UHF) Public Safety</td>
<td>---</td>
<td>$875</td>
<td>50-54 MHz</td>
<td><strong>FM Sensitivity</strong>: -108 dBm</td>
<td></td>
</tr>
<tr>
<td>Motorola</td>
<td>PR860 (800 MHz Public Safety)</td>
<td>---</td>
<td>$1,250</td>
<td>54-136 MHz</td>
<td><strong>AM Sensitivity</strong>: -106 dBm</td>
<td></td>
</tr>
<tr>
<td>Motorola</td>
<td>PR1500 (Public Safety)</td>
<td>---</td>
<td>$3,500</td>
<td>136-144 MHz</td>
<td><strong>Selectivity</strong>: 55 dB</td>
<td></td>
</tr>
<tr>
<td>Thales</td>
<td>XTS-5000 (VHF) Public Safety</td>
<td>---</td>
<td>$2,500</td>
<td>144-146 MHz</td>
<td><strong>Spurious</strong>: 60 dB</td>
<td></td>
</tr>
<tr>
<td>Thales</td>
<td>25 MBITR (Public Safety)</td>
<td>---</td>
<td>$7,500</td>
<td>146-174 MHz</td>
<td><strong>FM Hum &amp; Noise</strong>: 34 dB</td>
<td></td>
</tr>
<tr>
<td>Yaesu</td>
<td>VX-7R (Amateur)</td>
<td>---</td>
<td>$466</td>
<td>174-222 MHz</td>
<td><strong>Max Audio Distortion</strong>: 3%</td>
<td></td>
</tr>
<tr>
<td>Motorola</td>
<td>P7100 (VHF/UHF) Public Safety</td>
<td>---</td>
<td>$1,250</td>
<td>222-225 MHz</td>
<td><strong>AM</strong>: Yes, 2nd Rx</td>
<td></td>
</tr>
<tr>
<td>Motorola</td>
<td>X</td>
<td>Public Safety</td>
<td>---</td>
<td>$7,500</td>
<td>225-378 MHz</td>
<td><strong>FM</strong>: Yes, 2nd Rx</td>
</tr>
<tr>
<td>Motorola</td>
<td>P7100 (800 MHz Public Safety)</td>
<td>---</td>
<td>$875</td>
<td>378-430 MHz</td>
<td><strong>Selectivity</strong>: 55 dB</td>
<td></td>
</tr>
<tr>
<td>Thales</td>
<td>25 MBITR (Public Safety)</td>
<td>---</td>
<td>$7,500</td>
<td>430-450 MHz</td>
<td><strong>FM</strong>: Yes, 2nd Rx</td>
<td></td>
</tr>
<tr>
<td>Thales</td>
<td>25 MBITR (Public Safety)</td>
<td>---</td>
<td>$7,500</td>
<td>450-512 MHz</td>
<td><strong>Selectivity</strong>: 55 dB</td>
<td></td>
</tr>
<tr>
<td>Yaesu</td>
<td>VX-7R (Amateur)</td>
<td>---</td>
<td>$466</td>
<td>512-806 MHz</td>
<td><strong>FM</strong>: Yes, 2nd Rx</td>
<td></td>
</tr>
<tr>
<td>Motorola</td>
<td>X</td>
<td>Public Safety</td>
<td>---</td>
<td>$1,250</td>
<td>806-870 MHz</td>
<td><strong>Selectivity</strong>: 55 dB</td>
</tr>
<tr>
<td>Motorola</td>
<td>P7100 (VHF/UHF) Public Safety</td>
<td>---</td>
<td>$1,250</td>
<td>870-2000 MHz</td>
<td><strong>Selectivity</strong>: 55 dB</td>
<td></td>
</tr>
<tr>
<td>Thales</td>
<td>25 MBITR (Public Safety)</td>
<td>---</td>
<td>$7,500</td>
<td>2000-3000 MHz</td>
<td><strong>Selectivity</strong>: 55 dB</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. **Receive-only in this band**
2. Possibly supported (or could be supported) via SCA
3. **FM sensitivity criterion is 12 dB SINAD with 20 dB quieting**
4. **AM sensitivity criterion is 10 dB SINAD**
Brochures for each of the radios considered follow.
Our expertise in Software Defined Radio (SDR) technology draws on our experience in Speakeasy and the SDR Forum and has culminated in our Wireless Information Transfer System (WITS) technology. These WITS-enabled solutions with embedded reprogrammable INFOSEC have led to the development of the U.S. Navy’s Digital Modular Radio (DMR) set, which is being delivered to the U.S. Navy today for surface, subsurface and fixed sites. Approximately 750 software-defined channels capable of 2 MHz to 2 GHz operation have been delivered.

The system is controlled, either locally or across the network, by a user-friendly, Windows®-based Human Machine Interface (HMI). Our DMR system integrates 2 MHz-2 GHz communications, security, peripheral control, ancillaries, computing and networking into one compact system. This open architecture technology aids the Navy in the transition to its IT21 FORCEnet vision of Network Centric Warfare.

For complete details, visit our Website: www.gdds.com/radiosystems or call us toll-free today: 1-800-424-0052. Give us your email address and we’ll send you future product and news releases.

From DMR...to the future. Right now.
**Benefits/Features**
Software Redefinable for Flexibility and Growth
- On-site or remote programming via dedicated LAN or WAN
- Controlled from a Windows NT laptop
- Programmable RF channels require no hardware slices or hardware changes
- No special modules required for certain functions
- Software selectable features

Migration/Interoperability
- Diverse legacy and emerging networks interoperate via an RF connection

**Secure**
- 4-Channel, full duplex gateway system allows independent security configuration

**Versatile**
- Flexible infrastructure
- Implements national and international standards
- Allows operational characteristics of each channel to be redefined as required by changing communications needs
- Stores all DMR-developed waveforms
- Multiple units can be networked and controlled by one SNMP Manager
- Software upgradeable over the network
- Utilizes open standards to promote third-party application software and portability
- Common HMI controls associated 100/200W PAs via Ethernet

**Reduced Cost of Ownership**
- Lowers training, maintenance, inventory, installation, development and field upgrade costs
- Extensive COTS utilization

**Communicating**
4 Channel Simultaneous Wireless Operation
(Call for Availability of Software-defined Waveforms.)
- SATCOM – 181B, 182A and 183A
- SINCGARS SIP/ESIP
- Havequick I/II*
- UHF Link-11, Link-4a
- HF SSB, ISB, AM and Link-11 (serial tone modem 110A and ALE 141A)
- VHF/UHF LOS
- AM Civil and Military Aviation
- FM Voice and Data
- FSK/BPSK/DBPSK/QPSK
- Reconfigurable Wireline Interface

**Supporting**
- EIA/TIA 530A
- JMINI
- Ethernet
- Analog

**Reprogrammable Voice and Data Security Options**
(Available as released and with specific U.S. Government approval. Call for details.)
- KY-57/58
- KGV-10/11
- KG-84A/C
- KG-194
- KWR-46
- Others as Required

**Networking**
- Configurable IP Addressing
- Configuring, controlling, and operating
- Selectable Operational Modes and Parameters
- Download of Network Configuration and SW Updates**
- Download of Security Keys and Updates**

**Evolving**
- Open Architecture and Custom Control Options
- Future Waveforms and Third Party Software Applications

**Certifications**
- JtTc
- NSA
- Navy, Technical and Operational evaluations

**System Characteristics**
(Call for complete system characteristics.)

**Frequency Range**
- 2 MHz – 2 Ghz, contiguous

**AM Sensitivity**
- -106 dBm
  Typical (10 dB S/N, 3.5 kHz BW)

**FM Sensitivity**
- -108 dBm
  Typical (10 dB SINAD, 10 kHz BW)

**Spurious and Image Rejection**
- >60 dB

**Transmit Power**
- 100 mW Nominal per Channel
  (50 mW AM)

**Size**
- 17.5”W x 19.25”H x 22”D
  (EIA-310-D Clearance)
- 44.45 x 48.90 x 55.9 cm

**Weight**
- 210 lbs (95.3 kilograms)

**Input Power**
- 100 - 140 VAC
  (47 - 63 Hz)

**Operating Temperature**
- 0° to 55° C

**Vibration**
- MIL-STD-167

**Shock**
- MIL-STD-901

*For U.S. Government use only. For other uses, call for details.
**Upgradeable. Call for availability.
The AN/PRC-152 single-channel, multiband handheld radio provides the multimission capabilities needed by today's warfighter. It covers the frequency range of 30 to 512 MHz and provides an adjustable transmit output power up to 5 watts. With a JTRS architecture and SCA operating environment, the AN/PRC-152 provides the optimal transition to JTRS technology.

The AN/PRC-152 supports SINCGARS, HAVEQUICK II, VHF/UHF AM & FM, MIL-STD-188-181B, which provides Advanced Narrowband Digital Voice Terminal (ANDVT) voice and up to 56 kbits/sec data. Both HAVEQUICK II and VHF/UHF AM & FM waveforms are ported versions of the preliminary JTRS library waveforms, validating the AN/PRC-152's JTRS architecture. Future software upgrades will include the High Performance Waveform (HPW), and the APCO 25 Land Mobile Radio waveform to support interoperability with civil authorities (optional).

The AN/PRC-152 uses the Harris Sierra™ II software-programmable encryption module. This programmable encryption device has been designed to maximize battery life in battery-powered radios. Sierra II supports all JTRS COMSEC and TRANSEC requirements. The AN/PRC-152 supports numerous device compatibility modes: KY-57/VINSON, ANDVT/KYV-5, KG-84C, DS-101, and DS-102.

A first for tactical radios, the AN/PRC-152 is able to store multiple fill files, extending the time between reconfigurations. The handheld optionally includes an embedded GPS receiver to display local position and to provide automatic position reporting for situational awareness on the battlefield.

With over 20 times the processing power of currently fielded Type 1 handhelds, the AN/PRC-152 represents state-of-the-art radio technology to ensure software upgradeability well into the future. The AN/PRC-152 is the multiband, multimission tactical radio enabling today's warfighter to take on tomorrow's missions.
**Specifications for the AN/PRC-152**

**General**
- **Frequency Range**: 30 to 512 MHz
- **Presets**: 100
- **Transmission Modes**: FM, AM, PSK, CPM
- **Tuning Resolution**: 10 Hz

**Transmitter**
- **Output Power**: 250 mW to 5 W
- **Harmonic Suppression**: –47 dBc
- **Frequency Stability**: +/- 2.5 ppm

**Receiver**
- **FM Sensitivity**: -116 dBm (12 dB SINAD)
- **Adjacent Channel Rejection**: Greater than 55 dB

**Interoperability**
- **Fill Devices**: AN/CYZ-10 DTD (Supports DS-101, DS-102 and Mode 2/3)
- **Crypto Modes**: KY-57, ANDVVT/KYV-5, KG-84C

**Interfaces**
- **External Data**: RS-232, RS-422, MIL-STD-188-114A
- **Remote Control**: USB, RS-232
- **Antenna**: 50 Ohm TNC
- **Audio**: 6-pin Standard

**Physical**
- **Dimensions**: 2.5 W x 9.2 H x 1.7 D (inches) (with battery)
- **Weight**: 2.4 lbs (with battery)

**Environmental**
- **Temperature**: -31˚C to 60˚C
- **Immersion**: 1 Meter
- **Test Method**: MIL-STD-810F
- **Finish**: CARC Green

**Key Features**
- SCA v2.2
- Sierra II Programmable Crypto
- Built-in Speaker/Mic
- Full Numeric Keypad
- NVG Compatible Display
- Embedded GPS (optional)

**Waveforms:**
- SINCGARS
- VHF/UHF AM/FM
- MIL-STD-188-181B
- HAVEQUICK II

**Accessories**
- 30 to 512 MHz Small Whip Antenna (included)
- Rechargeable Lithium-Ion Battery (included)
- 30 to 108 MHz 1 Meter Blade Antenna (included)
- Operator's Manual (included)
- Holster
- Single-bay Battery Charger
- 2-bay Battery Charger
- 6-bay Battery Charger
- H-250 Handset
- Audio Headsets

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Falcon and Citadel are registered trademarks of Harris Corporation
Specifications are subject to change without notice.
One of M/A-COM’s latest generation software-defined digital radios, the P7100IP is designed to excel in the challenging public safety environment. The P7100IP portable is a digital two-way radio that operates in multiple applications – Enhanced Digital Access Communications System (EDACS) or ProVoice trunked modes, Project 25 digital trunked mode, and conventional analog mode. A rugged and lightweight mechanical package ensures that the P7100IP will stand up to rough handling and be ready when needed in critical situations.

**Product Overview**

The P7100IP portable provides digital voice and IP data for the critical communication demands of public safety users.

**One Radio – Multiple Applications**

The P7100IP uses a high-speed digital signal processor and the latest RF components to support multiple applications in one package:
- Project 25 Digital Conventional
- P25 Trunking
- ProVoice Digital Trunking
- EDACS Trunking (Aegis™ is optional)
- DES Encryption
- Advanced Encryption Standard (AES) for P25
- Complete Analog Conventional features

**Maximum RF Performance**

The radio operates over the entire VHF band from 136 to 174 MHz, including 7.5 kHz offset channels, and combines digital and analog operation in one radio. Such versatility maximizes interoperability.
- TIA-603 compliance – the highest analog RF performance
- TIA-102 Class-A compliance – the highest level of P25 RF performance available on the market

**Lightweight with Heavy-Duty Performance**

The P7100IP is more than just new electronics and software, it is the most robust mechanical package ever offered in a M/A-COM portable radio.
- MIL-STD-810F rugged – including 1-meter drop per TIA (even the knobs)
- Optional Immersion – 1 meter for 4 hours per MIL-STD-810F
- Non-Slip grips on the side
- Knobs with large blades for excellent tactile feel, yet rounded and with set-screws to prevent accidental changes
- Tx/Rx LED and improved clarity display for more visible signaling (including new features such as a battery-level gauge)
- Large speaker and amplified microphone for loud and clear audio
- At 21 ounces with battery, the same weight as an LPE-200™ or M-RK™
- Intrinsically safe certification (optional)
- Jaguar™ accessory compatibility – including batteries, chargers, vehicular chargers, carrying accessories, and audio accessories.

**Flexible and Efficient Design**

With the software-based design, the P7100IP portable is readily configurable and easily expandable with software upgrades.
- Stores up to 800 trunked system/group combinations and up to 400 conventional channels
- Stores 99 individual call numbers and 99 telephone numbers in memory
- ProFile™ offers easy over-the-air programming for efficient updates
- ProScan™ provides smooth, automatic roaming between sites
- Full conventional feature set, including dual priority scan and various tone signaling formats
- EDACS Security Key (ESK) prevents unauthorized users from programming radios or accessing the system.

**Advanced Digital Voice**

The P7100IP portable is available with M/A-COM’s third-generation digital voice technology, ProVoice. ProVoice utilizes the acclaimed IMBETM vocoder to allow the P7100IP portable to deliver exceptional voice quality in areas where the repeater signal strength is weak.

**Radio TextLink Text Messages**

With this option, users may receive, display, and respond to text messages sent from authorized users on the EDACS network. This feature improves real-time situation intelligence and communications among first responders while also providing the capability to leave messages with users that are actively engaged in other critical activities.

**Project 25 Interoperability**

The P7100IP portable is Project 25 compliant and provides P25 trunking and P25 digital conventional operation. The portable facilitates digital interoperability with other Project 25 users during critical communications situations. The P7100IP portable is capable of supporting ProVoice or EDACS and P25 simultaneously.

**For More Information**

For more information about this or any other M/A-COM Wireless Systems product, call toll free in the U.S. 1-800-368-3277. From outside the U.S. call 1-434-455-9223 (Asia Pacific), 1-434-455-9229 (Latin America and Middle East), and 1-434-455-9219 (Europe).
**General Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Key Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>P7100IP</td>
<td>Portables are available in 3 models:</td>
</tr>
<tr>
<td>P7170IP</td>
<td>System Model with LCD and DTMF keypad</td>
</tr>
<tr>
<td>P7150IP</td>
<td>Scan Model with LCD and limited keypad</td>
</tr>
<tr>
<td>P7130IP</td>
<td>Select Model with LCD and no front keypad</td>
</tr>
</tbody>
</table>

### Dimensions (H x W x D): (Without Knobs and Antenna)

- With battery: 6.75 x 2.58 x 1.79 in. (171.4 x 65.5 x 44.7 mm)

### Weight (with Battery): (Without Knobs and Antenna)

- NiCd: 21.3 oz (604g)
- NiMH: 22.3 oz (633g)

### Input Voltage:

- 7.5 VDC (nominal)

### Shock:

- 1 meter drop (per TIA/EIA-603-A)

### Immersion*:

- 1 meter for 4 hours with 49°F (27°C) differential (MIL-STD-810F)

*P7100IP immersion model only.

### Battery Life (at 5% Tx, 5% Rx, and 90% standby):

- NiCd: 8 hours (1600 mAH)
- NiMH: 11 hours (2400 mAH)

### Operating Temperature Range:

- NiCd: -22 to +140°F (-30 to +60°C)
- NiMH: -14 to +122°F (-10 to +50°C)

### Relative Humidity:

- 90% @ 122°F (+50°C)

### Color (case):

- Black

### Options and Accessories

- Headset, carpeare, speaker microphones, PC programming software and cables, subminiature surveillance accessories, antennas, cases, straps, belt loops and swivel mounts, desk chargers, wall chargers, and vehicular chargers.

### Intrinsicly Safe Options

- Factory Mutual Intrinsicly Safe for Class I, II, and III, Division 1, Groups C, D, E, F, and G, Temp T3C, TA=-60°C; Nonincendive for Class I, Division 2, Groups A, B, C, and D, Temp T4, TA=-60°C.
- CSA Intrinsicly Safe for Class I, Groups C and D, Class II, Group G (Coal Dust), Class III; Nonincendive for Class I, Division 2, Groups A, B, C, and D.

### Encryption Standards

- FIPS 140-2 Level 2 for P7170IP
- FIPS 140-2 Level 1 for P7150IP

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**Transmitter**

<table>
<thead>
<tr>
<th>Frequency Range (MHz):</th>
<th>VHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>136-174</td>
<td></td>
</tr>
<tr>
<td>Rated RF Power (W):</td>
<td>1.5</td>
</tr>
<tr>
<td>Frequency Stability (-30 to +60°C, ±25°C Ref): (ppm):</td>
<td>±1.5</td>
</tr>
<tr>
<td>Frequency Separation (MHz):</td>
<td>38 (full bandwidth)</td>
</tr>
<tr>
<td>Modulation Deviation (kHz):</td>
<td>5.0 (wideband), 2.5 (narrowband)</td>
</tr>
<tr>
<td>FM Illus and Noise (Companion Receiver) (dB):</td>
<td>&lt;40 (wideband), &lt;34 (narrowband)</td>
</tr>
<tr>
<td>Spurious and Harmonics (dBm/dBc):</td>
<td>≤-36/73</td>
</tr>
<tr>
<td>Audio Response (dB):</td>
<td>≤1.3</td>
</tr>
<tr>
<td>Audio Distortion:</td>
<td>&lt;3% (1 kHz tone @ 3 kHz deviation (wideband))</td>
</tr>
<tr>
<td></td>
<td>&lt;3% (1 kHz tone @ 1.5 kHz deviation (narrowband))</td>
</tr>
<tr>
<td>Project 25 Modulation Fidelity (%):</td>
<td>≤5</td>
</tr>
<tr>
<td>Project 25 ACP (dBc):</td>
<td>&gt;67</td>
</tr>
</tbody>
</table>

**Receiver**

<table>
<thead>
<tr>
<th>Frequency Range (MHz):</th>
<th>VHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>136-174*</td>
<td></td>
</tr>
<tr>
<td>Channel Separation (MHz):</td>
<td>38 (full bandwidth)</td>
</tr>
<tr>
<td>Sensitivity (12 dB SINAD): (μV/dBm):</td>
<td>0.28/-118</td>
</tr>
<tr>
<td>Squelch Sensitivity (dB SINAD):</td>
<td>8 ± 2</td>
</tr>
<tr>
<td>Adjacent Channel Selectivity (dB):</td>
<td>@ ±25 kHz (wideband): &gt;75</td>
</tr>
<tr>
<td></td>
<td>@ ±15 kHz (narrowband): &gt;65</td>
</tr>
<tr>
<td></td>
<td>@ ±12.5 kHz (narrowband): &gt;60</td>
</tr>
<tr>
<td>Intermodulation (dB):</td>
<td>&gt;75</td>
</tr>
<tr>
<td>Spurious and Image Rejection (dB):</td>
<td>&gt;75</td>
</tr>
<tr>
<td>Rated Audio Output (mW):</td>
<td>400</td>
</tr>
<tr>
<td>Audio Distortion:</td>
<td>≤3% @ rated power</td>
</tr>
<tr>
<td>Project 25 Reference Sensitivity (μV/dBm):</td>
<td>0.28/-118</td>
</tr>
<tr>
<td>Project 25 Adjacent Channel Rejection (dB):</td>
<td>&gt;40</td>
</tr>
</tbody>
</table>

*The following self-quieting frequencies cannot be programmed as receive frequencies: 144.000, 153.600, 163.200, and 172.800 MHz.

### Environmental Specifications

<table>
<thead>
<tr>
<th>Standard</th>
<th>Parameter</th>
<th>Methods &amp; Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIL-STD-810F</td>
<td>Low Pressure</td>
<td>500/1.2</td>
</tr>
<tr>
<td></td>
<td>High Temperature</td>
<td>501.4/1.2</td>
</tr>
<tr>
<td></td>
<td>Low Temperature</td>
<td>502.4/1.2</td>
</tr>
<tr>
<td></td>
<td>Temperature Shock</td>
<td>503.4/1</td>
</tr>
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<td>Solar Radiation</td>
<td>505.4/2</td>
</tr>
<tr>
<td></td>
<td>Blowing Rain</td>
<td>506.4/1</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
<td>507.4</td>
</tr>
<tr>
<td></td>
<td>Salt Fog</td>
<td>509.4</td>
</tr>
<tr>
<td></td>
<td>Blowing Dust</td>
<td>510.4/1</td>
</tr>
<tr>
<td></td>
<td>Immersion**</td>
<td>512.4/1</td>
</tr>
<tr>
<td></td>
<td>Vibration (Minimum Integrity)</td>
<td>514.5/1, Category 24</td>
</tr>
<tr>
<td></td>
<td>Vibration (Basic Transportation)</td>
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<tr>
<td></td>
<td>Shock (Functional/Basic)</td>
<td>516.5/1</td>
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<tr>
<td></td>
<td>Shock (Transit Drop)</td>
<td>516.5/4</td>
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<tr>
<td></td>
<td>IP67</td>
<td>Dust-tight and Water Immersion IEC 60529</td>
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<tr>
<td></td>
<td>U.S. Forest Service</td>
<td>Vibration (10-60 Hz) USDA LMR Standard, Section 2.15</td>
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<tr>
<td></td>
<td>TIA/EIA-603-A</td>
<td>JF-1208072</td>
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<tr>
<td></td>
<td>*Also meets equivalent superseded MIL-STD-810C, -D, and -E.</td>
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</tr>
<tr>
<td></td>
<td>**P7100IP immersion model only.</td>
<td></td>
</tr>
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</table>

### Digital Operation

- Vocodering Method: Improved MultiBand Excitation (IMBE)
- Data Rate: 9600 bps
- Modulation: GFSK for ProVoice, C4FM for P25

### Regulatory Data

<table>
<thead>
<tr>
<th>Frequency Range MHz</th>
<th>RF Output (W)</th>
<th>Frequency Stability (ppm)</th>
<th>FCC Type Acceptance Number</th>
<th>Industry Canada Certification Number</th>
<th>Applicable Industry Canada Rules</th>
<th>NTIA Certification Number</th>
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</thead>
<tbody>
<tr>
<td>136-174</td>
<td>1.5</td>
<td>1.5</td>
<td>DWDR-0013-E</td>
<td>36348-0013</td>
<td>RSS-119</td>
<td>JF-1208072</td>
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</table>

M/A-COM Wireless Systems
P. O. Box 2000
Lynchburg, Virginia 24501
Phone: 1-800-368-3277
www.macom-wireless.com

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04/06 Printed in U.S.A.
One of M/A-COM’s latest generation software-defined digital radios, the P7100IP is designed to excel in the challenging public safety environment. The P7100IP portable is a digital two-way radio that operates in multiple applications – Enhanced Digital Access Communications System (EDACS) or ProVoice trunked modes, Project 25 digital trunked mode, and conventional analog mode. A rugged and lightweight mechanical package ensures that the P7100IP will stand up to rough handling and be ready when needed in critical situations.

Product Overview

The P7100IP portable provides digital voice and IP data for the critical communication demands of public safety users.

One Radio – Multiple Applications
The P7100IP uses a high-speed digital signal processor and the latest RF components to support multiple applications in one package:
- Project 25 Digital Conventional
- P25 Trunking
- ProVoice Digital Trunking
- EDACS Trunking (Aegis™ is optional)
- DES Encryption
- Advanced Encryption Standard (AES) for P25
- Complete Analog Conventional features

Maximum RF Performance
The radio operates over the UHF band from either 378 to 430 or 450 to 512 MHz, and combines digital and analog operation in one radio. Such versatility maximizes interoperability.
- TIA-603 compliance – the highest analog RF performance
- TIA-102 Class-A compliance – the highest level of P25 RF performance available on the market

Lightweight with Heavy-Duty Performance
The P7100IP is more than just new electronics and software, it is the most robust mechanical package ever offered in a M/A-COM portable radio.
- MIL-STD-810F rugged – including 1-meter drop per TIA (even the knobs)
- Optional Immersion – 1 meter for 4 hours per MIL-STD-810F

Flexible and Efficient Design
With the software-based design, the P7100IP portable is readily configurable and easily expandable with software upgrades.
- Stores up to 800 trunked system/group combinations and up to 400 conventional channels
- Stores 99 individual call numbers and 99 telephone numbers in memory
- ProFile™ offers easy over-the-air programming for efficient updates
- ProScan™ provides smooth, automatic roaming between sites
- Full conventional feature set, including dual priority scan and various tone signaling formats
- EDACS Security Key (ESK) prevents unauthorized users from programming radios or accessing the system.

Advanced Digital Voice
The P7100IP portable is available with M/A-COM’s third-generation digital voice technology, ProVoice. ProVoice utilizes the acclaimed IMBE™ vocoder to allow the P7100IP portable to deliver exceptional voice quality in areas where the repeater signal strength is weak.

Radio TextLink Text Messages
With this option, users may receive, display, and respond to text messages sent from authorized users on the EDACS network. This feature improves real-time situation intelligence and communications among first responders while also providing the capability to leave messages with users that are actively engaged in other critical activities.

Project 25 Interoperability
The P7100IP portable is Project 25 compliant and provides P25 trunking and P25 digital conventional operation. The portable facilitates digital interoperability with other Project 25 users during critical communications situations. The P7100IP portable is capable of supporting ProVoice or EDACS and P25 simultaneously.

For More Information
For more information about this or any other M/A-COM Wireless Systems product, call toll free in the U.S. 1-800-368-3277. From outside the U.S. call 1-434-455-9223 (Asia Pacific), 1-434-455-9229 (Latin America and Middle East), and 1-434-455-9219 (Europe).
### Technical Specifications

**General Specifications**

**P7100**: Portables are available in 3 models: 
- **P7170**: System Model with LCD and DTMF keypad  
- **P7150**: Scan Model with LCD and limited keypad  
- **P7130**: Select Model with LCD and no front keypad

**Dimensions (H x W x D):**

(Without Knobs and Antenna)  
With battery:  
6.75 x 2.58 x 1.79 in.  
(171.4 x 65.5 x 44.7 mm)

**Weight (with Battery):**

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Weight (oz)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NiCd</td>
<td>21.3</td>
<td>604</td>
</tr>
<tr>
<td>NiMH</td>
<td>22.3</td>
<td>633</td>
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</tbody>
</table>

**Input Voltage:**

7.5 VDC (nominal)

**Vibration:**

5 G (per U.S. Forest Service)

**Shock:**

1 meter drop (per TIA/EIA-603-A)

**Battery Life (at 5% Tx, 5% Rx, and 90% standsby):**

- NiCd: 8 hours (1600 mAh)  
- NiMH: 11 hours (2400 mAh)

**Operating Temperature Range:**

- NiCd: -22 to +140°F (-30 to +60°C)  
- NiMH: -10 to +50°C

**Relative Humidity:**

- NiCd: 90% @ 122°F (+50°C)  
- NiMH: 90% @ 122°F (+50°C)

**Altitude:**

- Operational: 15,000 ft (4,572 m)  
- In Transit: 50,000 ft (15,240 m)

**Color (case):**

- Black

### Options and Accessories

- Headset, carpiece, speaker microphones, PC programming software and cables, subminiature surveillance accessories, antennas, cases, straps, belt loops and swivel mounts, desk chargers, wall chargers, and vehicular chargers.

### Intrinsically Safe Options

**Factory Mutual Intrinsically Safe for Class I, II, and III, Division 1, Groups C, D, E, F, and G, Temp T3C, TA=-60°C; Nonincendive for Class I, Division 2, Groups A, B, C, and D, Temp T4, TA=-60°C.**

**CSA Intrinsically Safe for Class I, Groups C and D, Class II, Group G (Coal Dust); Class III, Nonincendive for Class I, Division 2, Groups A, B, C, and D.**

### Encryption Standards

- FIPS 140-2 Level 2 for P7170  
- FIPS 140-2 Level 1 for P7150  
- FIPS 140-2 Level 1 for P7130

### Transmitter

<table>
<thead>
<tr>
<th>Frequency Range (MHz)</th>
<th>UHF</th>
<th>Rated RF Power (W)</th>
<th>Frequency Stability (-30 to +60°C, +25°C Ref) (ppm)</th>
<th>Intermodulation (dB):</th>
</tr>
</thead>
<tbody>
<tr>
<td>378-430</td>
<td></td>
<td>1.4</td>
<td>±1.5</td>
<td>&gt;63</td>
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<tr>
<td>430-512</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

### Receiver

<table>
<thead>
<tr>
<th>Frequency Range (MHz)</th>
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<th>Frequency Stability (-30 to +60°C, +25°C Ref) (ppm)</th>
<th>Intermodulation (dB):</th>
<th>Spurious and Image Rejection (dB):</th>
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</thead>
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<tr>
<td>378-430</td>
<td></td>
<td>±1.5</td>
<td></td>
<td>&gt;73</td>
</tr>
<tr>
<td>430-512</td>
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<td></td>
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<td></td>
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<td></td>
<td>NTIA</td>
<td>Vibration (10-60 Hz)</td>
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<tr>
<td></td>
<td>TIA/EIA-603-A</td>
<td>Shock</td>
</tr>
</tbody>
</table>

**Also meets equivalent superseded MIL-STD-810C, -D, and -E.**

**P7100** immersion model only.

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- **Vocodering Method:** Improved MultiBand Excitation (MBE)
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<td>378-430</td>
<td>1-4</td>
<td>1.5</td>
<td>OWDTR-0016-E</td>
<td>3636B-0016</td>
<td>RSS-119</td>
<td>NA</td>
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<tr>
<td>450-512</td>
<td>1-4</td>
<td>1.5</td>
<td>OWDTR-0015-E</td>
<td>15, 22, 74, 90</td>
<td>3636B-0015</td>
<td>RSS-119</td>
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</tbody>
</table>

Approved to Australian Communications Authority (ACA) AS-4295 for 403-430 MHz.

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Technical specifications are subject to change without notice. This product is subject to U.S. export control for national security reasons.
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- Complete Analog Conventional features

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The P7100™ is more than just new electronics and software, it is the most robust mechanical package ever offered in a M/A-COM portable radio.

- MIL-STD-810F rugged – including 1-meter drop per TIA (even the knobs)
- Optional Immersion – 1 meter for 4 hours per MIL-STD-810F
- Non-Slip grips on the side
- Knobs with large blades for excellent tactile feel, yet rounded and with set-screws to prevent accidental changes
- Tx/Rx LED and improved clarity display for more visible signaling (including new features such as a battery-level gauge)
- Large speaker and amplified microphone for loud and clear audio
- At 21 ounces with battery, the same weight as an LPE-200™ or M-RK™
- Intrinsically safe certification (optional)
- Jaguar™ accessory compatibility – including batteries, chargers, vehicular chargers, carrying accessories, and audio accessories.

**Flexible and Efficient Design**
With the software-based design, the P7100™ portable is readily configurable and easily expandable with software upgrades.

- Stores up to 800 trunked system/group combinations and up to 400 conventional channels
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- **P7150IP**: Scan Model with LCD and limited keypad
- **P7130IP**: Select Model with LCD and no front keypad

**Dimensions (H x W x D):**
(Without Knobs and Antenna)

- With battery:
  - 6.75 x 2.58 x 1.79 in. (171.4 x 65.5 x 44.7 mm)
- **Weight:**
  - NiCd: 21.3 oz (604g)
  - NiMH: 22.3 oz (633g)

**Input Voltage:**
- NiMH: 22.3 oz (633g)
- NiCd: 21.3 oz (604g)

**Weight:**
- NiCd: 21.3 oz (604g)
- NiMH: 22.3 oz (633g)

**Input Voltage:**
- NiMH: 7.5 VDC (nominal)
- NiCd: 7.5 VDC (nominal)

**Vibration:**
- 5 G (per U.S. Forest Service)

**Shock:**
- 1 meter drop (per TIA/EIA-603-A)

**Immersion:**
- 1 meter for 4 hours with 49°F (27°C) differential (MIL-STD-810F)

- *P7100IP* immersion model only.

**Battery Life (at 5% Tx, 5% Rx, and 90% stand-by):**
- NiCd: 8 hours (1600 mAh)
- NiMH: 11 hours (2400 mAh)

**Operating Temperature Range:**
- NiCd: -22 to +140°F (-30 to +60°C)
- NiMH: +14 to +122°F (-10 to +50°C)

**Relative Humidity:**
- 90% @ 122°F (+50°C)

**Altitude:**
- Operational: 15,000 ft (4,572 m)
- In Transit: 50,000 ft (15,240 m)

**Color (case):**
- Black

**Options and Accessories**
- Headset, carpiece, speaker microphones, PC programming software and cables, subminiature surveillance accessories, antennas, cases, straps, belt loops and swivel mounts, desk chargers, wall chargers, and vehicular chargers.

**Intrinsically Safe Options**
- Factory Mutual Intrinsically Safe for Class I, II, and III, Division 1, Groups C, D, E, F, and G, Temp T3C, TA=-60°C; Nonincendive for Class I, Division 2, Groups A, B, C, and D, Temp T4, TA=-60°C.
- CSA Intrinsically Safe for Class I, Groups C and D; Class II, Group G (Coal Dust); Class III; Nonincendive for Class I, Division 2, Groups A, B, C, and D.

**Encryption Standards**
- FIPS 140-2 Level 2 for P7170IP
- FIPS 140-2 Level 1 for P7150IP

---

### Transmitter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range (MHz):</td>
<td>806-825, 831-870</td>
</tr>
<tr>
<td>Rated RF Power Transmitted (W):</td>
<td>1,3</td>
</tr>
<tr>
<td>Frequency Stability (ppm):</td>
<td>±1.5</td>
</tr>
<tr>
<td>Frequency Separation (MHz):</td>
<td>Full bandwidth</td>
</tr>
<tr>
<td>Modulation Deviation (kHz):</td>
<td>±20 (±24.0 NPSPAC)</td>
</tr>
<tr>
<td>FM Imitation (dBm):</td>
<td>&lt;40 (non-NPSPAC), &lt;38 (NPSPAC)</td>
</tr>
<tr>
<td>Spurious and Harmonics (dBm/dBc):</td>
<td>&lt;16/-51</td>
</tr>
<tr>
<td>Audio Response (dB):</td>
<td>+1/-3</td>
</tr>
<tr>
<td>Audio Distortion (at 1 kHz:):</td>
<td>&lt;3% (1 kHz tone @ 3 kHz deviation (non-NPSPAC))</td>
</tr>
<tr>
<td>Spurious and Image Rejection (dB):</td>
<td>&lt;5</td>
</tr>
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</table>

**Receiver**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>800</th>
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</thead>
<tbody>
<tr>
<td>Frequency Range (MHz):</td>
<td>851-870*</td>
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<tr>
<td>Frequency Separation (MHz):</td>
<td>Full bandwidth</td>
</tr>
<tr>
<td>Channel Spacing (kHz):</td>
<td>25/NPSPAC</td>
</tr>
<tr>
<td>Frequency Stability (ppm):</td>
<td>±1.5</td>
</tr>
<tr>
<td>Sensitivity (12 dB SINAD) (μV/dBm):</td>
<td>0.28/-118</td>
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<td>Adjacent Channel Rejection (±25 kHz):</td>
<td>&gt;72</td>
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<tr>
<td>Intermodulation (dB):</td>
<td>&gt;72</td>
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<tr>
<td>Spurious and Image Rejection (dB):</td>
<td>&gt;70</td>
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<tr>
<td>Rated Audio Output (mW):</td>
<td>500</td>
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<tr>
<td>Audio Distortion (at 1 kHz:):</td>
<td>&lt;3% @ rated power</td>
</tr>
<tr>
<td>Offset Channel Selectivity (dB):</td>
<td>&gt;20</td>
</tr>
</tbody>
</table>

*The following self-quieting frequency cannot be programmed as a receive frequency: 864.000 MHz.*

**Environmental Specifications**

<table>
<thead>
<tr>
<th>Standard</th>
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<th>Methods &amp; Procedures</th>
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<td>IEC 60529</td>
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**U.S. Forest Service**

- **Vibration (10-60 Hz)**
  - USDA LMR Standard, Section 2.15
- **TIA/EIA-603-A**
  - Shock: Paragraph 3.3.5.3

*Also meets equivalent superseded MIL-STD-810C, -D, and -E.

**P7100IP** immersion model only.

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<th>RF Output (W)</th>
<th>Frequency Stability (ppm)</th>
<th>FCC Type Acceptance Number</th>
<th>Applicable FCC Rules</th>
<th>Industry Canada Certification Number</th>
<th>Applicable Industry Canada Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>806-869</td>
<td>1-3</td>
<td>1.5</td>
<td>OWDTR-0018-E</td>
<td>15, 90</td>
<td>RSS-119</td>
<td>RSS-119</td>
</tr>
<tr>
<td>806-869</td>
<td>1-3</td>
<td>1.5</td>
<td>OWDTR-0023-E</td>
<td>15, 90</td>
<td>RSS-119</td>
<td>RSS-119</td>
</tr>
</tbody>
</table>

**Regulatory Data**

- **FCC**
  - Modulation: GFSK for ProVoice, C4FM for P25

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**ProVoice, ProFile, Aegis, LPE-200, M-RK, Jaguar, and ProScan are trademarks of M/A-COM, Inc.**

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04/06 Printed in U.S.A.
The heavyweight features you desire in a two-way radio, now available in a durable, lighter-than-expected model. The PR860 Professional Series two-way radio from Motorola is the perfect option for safety professionals as well as businesses specializing in construction, manufacturing and public utilities.

Easy to handle and operate, the PR860 offers superb audio quality and programming options normally found in higher-end radios. The rugged construction also makes it tough enough to operate in the most challenging environments.

In addition, when used with an IMPRES™ charger, your PR860 IMPRES batteries will maintain their capacity longer, thus maximizing your talktime.

PR860 Additional Features

**Quik-Call II™ and MDC1200 Signaling**

Send and receive information in a variety of ways including:

- **Selective Call (Decode)** Receive a call from a specific group or individual
- **Call Alert (Decode)** Receive alerts of incoming calls when you’re a short distance from your radio

**MDC1200 Signaling Only:**

- **Push-to-Talk ID (Encode)** Identify your outgoing calls
- **Radio Check (Decode)** Lets others check your radio status
- **Emergency (Encode)** Alerts dispatcher in urgent situations
- **Selective Radio Inhibit (Decode)** Allows system owner to disable stolen or missing radios

**PR860 Standard Package**

- IMPRES™ Li-ion 2000 mAh Battery
- IMPRES Single Unit Rapid Charger
- Low Band, VHF or UHF Antenna
- 2.5” Belt Clip
- User Guide CD
- 2-Year Standard Warranty

For more information, please contact:
**PR860 Features**

16 Channels
Large Raised Channel and On/Off Volume Knobs
Easy to operate when wearing gloves

Programmable Emergency Button
Alerts dispatcher in an emergency situation

X-Pand™ Voice Compression
Crisp, clear audio quality

Adjustable Power Levels
Helps preserve battery life

Priority Channel Scan
Frequently scan higher priority channels

Sealed Accessory Connector
Customize audio solutions to meet your needs

Internal VOX
Hands-free operation with headset

3 Programmable Side Buttons and Large Textured Push-To-Talk Button
Easy access to favorite features. Easy to operate when wearing gloves and provides good tactile response

IMPRES™ Energy System
Battery, charging and reconditioning system that automates battery maintenance, optimizes cycle life and maximizes talktime

---

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Lowband</th>
<th>VHF</th>
<th>UHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Numbers</td>
<td>AAH489CE9A3A_N</td>
<td>AAH48SDK9A3A3N</td>
<td>AAH48SD9A3A3_N</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>28-74 MHz</td>
<td>136-174 MHz</td>
<td>403-470 MHz</td>
</tr>
<tr>
<td>Frequency Stability (30°C to 40°C, 25°C Ref.)</td>
<td>±10 ppm</td>
<td>±5 ppm at 25 kHz</td>
<td>±5 ppm at 25 kHz</td>
</tr>
<tr>
<td>Channel Capacity</td>
<td>16 Ch</td>
<td>16 Ch</td>
<td>16 Ch</td>
</tr>
<tr>
<td>Channel Spacing</td>
<td>12.5/25 kHz</td>
<td>50.0/25 kHz</td>
<td>50.0/25 kHz</td>
</tr>
<tr>
<td>Power Supply</td>
<td>7.5 volts rechargeable battery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions H x W x D</td>
<td>9.3 x 4.4 x 2.4 in. (237 x 112 x 61 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With IMPRES NiMH Battery</td>
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<td></td>
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<tr>
<td>With IMPRES Li-ion Battery</td>
<td>9.3 x 4.4 x 2.4 in. (237 x 112 x 61 mm)</td>
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<td></td>
</tr>
<tr>
<td>Weight</td>
<td>18.5 ounces (528 grams)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Mic</td>
<td>5.40 in. x 2.26 in. x 1.60 in. (137mm x 57.5mm x 40mm)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Battery Life @ 55°F Duty Cycle*</td>
<td>Low Power</td>
<td>High Power</td>
<td>Low Power</td>
</tr>
<tr>
<td>With IMPRES NiMH Battery</td>
<td>17 hours</td>
<td>13 hours</td>
<td>13 hours</td>
</tr>
<tr>
<td>With IMPRES NiMH FM Battery</td>
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<td>13 hours</td>
<td>13 hours</td>
</tr>
<tr>
<td>With IMPRES Li-ion Battery</td>
<td>17 hours</td>
<td>13 hours</td>
<td>13 hours</td>
</tr>
<tr>
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<td>14 hours</td>
<td>14 hours</td>
</tr>
<tr>
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<td>14 hours</td>
<td>14 hours</td>
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### TRANSMITTER

<table>
<thead>
<tr>
<th>Specification</th>
<th>Lowband</th>
<th>VHF</th>
<th>UHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output NMV @ 7.5W</td>
<td>1.6 W</td>
<td>1.5 W</td>
<td>1.4 W</td>
</tr>
<tr>
<td>Source Harmonics</td>
<td>1 x 107, 2 x 106, 3 x 105, 5 x 105</td>
<td>1 x 107, 2 x 106, 3 x 105, 5 x 105</td>
<td>1 x 107, 2 x 106, 3 x 105, 5 x 105</td>
</tr>
<tr>
<td>Audio Response @ 100 kHz</td>
<td>0.1 to 0.3 dB</td>
<td>0.05 to 0.15 dB</td>
<td>0.05 to 0.15 dB</td>
</tr>
<tr>
<td>Audio Distortion @ 1 kHz, 60%</td>
<td>6% Typical</td>
<td>6% Typical</td>
<td>6% Typical</td>
</tr>
<tr>
<td>Rated Max. Dev.</td>
<td>±5.0 kHz at 12.5 kHz</td>
<td>±4.0 kHz at 20 kHz</td>
<td>±5.0 kHz at 25 kHz</td>
</tr>
<tr>
<td>Conduction/Interference Emissions</td>
<td>66 dBv</td>
<td>66 dBv</td>
<td>66 dBv</td>
</tr>
<tr>
<td>FM Hum and Noise</td>
<td>40 dB</td>
<td>40 dB</td>
<td>40 dB</td>
</tr>
<tr>
<td>FM Modulation</td>
<td>11K0P3E</td>
<td>16K0P3E</td>
<td>16K0P3E</td>
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</tbody>
</table>

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### RECEIVER

<table>
<thead>
<tr>
<th>Specification</th>
<th>Lowband</th>
<th>VHF</th>
<th>UHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity (12 dB SINAD EIA)</td>
<td>0.30 µV typical</td>
<td>0.25 µV typical</td>
<td>0.15 µV typical</td>
</tr>
<tr>
<td>Sensitivity (20 dB SINAD ETS)</td>
<td>0.5 µV typical</td>
<td>0.5 µV typical</td>
<td>0.5 µV typical</td>
</tr>
<tr>
<td>Intermodulation per EIA</td>
<td>0.1 dB</td>
<td>0.1 dB</td>
<td>0.1 dB</td>
</tr>
<tr>
<td>Adjacent Channel Selectivity ETS</td>
<td>60 dB at 12.5 kHz</td>
<td>70 dB at 25 kHz</td>
<td>70 dB at 25 kHz</td>
</tr>
<tr>
<td>Spurious Rejection</td>
<td>70 dB</td>
<td>70 dB</td>
<td>70 dB</td>
</tr>
<tr>
<td>Audio Noise</td>
<td>0.3 µV typical</td>
<td>0.3 µV typical</td>
<td>0.3 µV typical</td>
</tr>
<tr>
<td>Audio Distortion @ Rated Audio</td>
<td>3% Typical</td>
<td>3% Typical</td>
<td>3% Typical</td>
</tr>
<tr>
<td>Hum and Noise (with LLE enabled)</td>
<td>60 µV at 250kHz</td>
<td>60 µV at 250kHz</td>
<td>60 µV at 250kHz</td>
</tr>
<tr>
<td>Audio Response (3.3 – 3 kHz)</td>
<td>3% Typical</td>
<td>3% Typical</td>
<td>3% Typical</td>
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<tr>
<td>Conducted Spurious Emission per FCC Part 15</td>
<td>57 dBm &lt; 1 kHz</td>
<td>47 dBm &lt; 1 kHz</td>
<td>47 dBm &lt; 1 kHz</td>
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### PORTABLE MILITARY STANDARDS 810 C, D, & E

<table>
<thead>
<tr>
<th>Specification</th>
<th>810C</th>
<th>810D</th>
<th>810E</th>
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<tbody>
<tr>
<td>Operating Temperature</td>
<td>110°C</td>
<td>110°C</td>
<td>110°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>55°C</td>
<td>55°C</td>
<td>55°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>95% RH</td>
<td>95% RH</td>
<td>95% RH</td>
</tr>
<tr>
<td>ESD</td>
<td>100 µA</td>
<td>100 µA</td>
<td>100 µA</td>
</tr>
<tr>
<td>Water Intrusion</td>
<td>1000 V</td>
<td>1000 V</td>
<td>1000 V</td>
</tr>
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</table>

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### ENVIRONMENTAL SPECIFICATIONS

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<tr>
<th>Specification</th>
<th>Lowband</th>
<th>VHF</th>
<th>UHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>7.5 volts rechargeable battery</td>
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<td></td>
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<tr>
<td>Dimensions H x W x D</td>
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<tr>
<td>Battery Life @ 55°F Duty Cycle*</td>
<td>Low Power</td>
<td>High Power</td>
<td>Low Power</td>
</tr>
<tr>
<td>With IMPRES NiMH Battery</td>
<td>17 hours</td>
<td>13 hours</td>
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<td>With IMPRES NiMH FM Battery</td>
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</tr>
<tr>
<td>With IMPRES Li-ion Battery</td>
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<td>13 hours</td>
<td>13 hours</td>
</tr>
<tr>
<td>Average Battery Life</td>
<td>16 hours</td>
<td>14 hours</td>
<td>14 hours</td>
</tr>
<tr>
<td>With IMPRES NiMH Battery</td>
<td>16 hours</td>
<td>14 hours</td>
<td>14 hours</td>
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<tr>
<td>With IMPRES NiMH FM Battery</td>
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<td>14 hours</td>
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<tr>
<td>With IMPRES Li-ion Battery</td>
<td>16 hours</td>
<td>14 hours</td>
<td>14 hours</td>
</tr>
</tbody>
</table>

---

### FACTORY MUTUAL APPROVALS

The PR860 is Factory Mutual approved and Canadian Standard Association approved as intrinsically safe for use in Classes I, II, and III, Division 1, Groups C, D, E, F and G, as well as non-intrinsically safe in Class I, Division 2, Groups A, B, C, and D on models ordered with the Factory Mutual option, and battery.

### Accelerated Life Test

Motorola’s Accelerated Life Test (ALT) is a developmental process of rigorous laboratory testing that simulates years of field use. Motorola has a firm commitment to quality and reliability. These radios have been designed, manufactured and tested to achieve high levels of component and workmanship quality. Motorola radios are designed to minimize costly repairs and downtime.

---

**Did you know?**

The PR860 weighs less than a can of soda. (12.8 oz. with IMPRES Li-ion battery)
When it comes to public safety, a community shouldn’t settle for “good enough.” And neither should those who work tirelessly to keep our community safe and secure. That’s why so much innovation went into designing the PR1500 Professional Series two-way radio from Motorola.

The housing and control knobs of the PR1500 are rugged and tough. But what really sets this radio apart is how it performs. You’ll notice a rich, full audio that can be customized for your ear as well as environment. The PR1500 also offers enhanced performance that delivers wide range and improved battery life.

The PR1500 puts innovative Motorola technology to work for the safety professional and first responders that make our communities secure.

Linking Communities with Project 25 (P25)
With a single software upgrade, the PR1500 becomes P25 interoperable. This essential feature gives you the ability to interact with other networks in times of crisis. Check with your Motorola Authorized Dealer or Representative for availability.

PR1500 Additional Features
Quik-Call II™ and MDC1200 Signaling
Send and receive information in a variety of ways including:
- Selective Call (Decode) Receive a call from a specific group or individual
- Call Alert (Decode) Receive alerts of incoming calls when you’re a short distance from your radio

MDC1200 Signaling Only:
- Push-to-Talk ID (Encode) Identify your outgoing calls
- Radio Check (Decode) Lets others check your radio status
- Emergency (Encode) Alerts dispatcher in urgent situations
- Selective Radio Inhibit (Decode) Allows system owner to disable stolen or missing radios

PR1500 Standard Package
- IMPRES™ NiMH 1850 mAh Battery
- IMPRES Single Unit Rapid Charger
- VHF or UHF Antenna
- 2.25” Belt Clip
- Remote Speaker Microphone Adapter
- Accessory Connector Dust Cover
- User Guide CD
- 2-Year Standard Warranty

For more information, please contact:

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MD-PR1500TRIFOLDB
Rev. 2
05/06
**PR1500**

**PR1500 Features**

**32 Channels**
- Large Raised Channel and On/Off Volume Knobs
  - Easy to operate when wearing gloves
- 3 Position Concentric Switch
  - Allows customization of radio features for easy use
- Programmable Emergency Button
  - Alerts dispatcher in an emergency situation
- Sealed Accessory Connector
  - Customizes audio solutions to meet your needs
- Enhanced Audio Features
  - Noise reduction software and Audio Gain Control (CPS programmable) allow audio customization to meet your needs
- Adjustable Power Levels
  - Helps preserve battery life
- Priority/Dynamic Priority Channel Scan
  - Frequently scan higher priority channels
- Monitor/Permanent Monitor
  - Allows continuous channel monitoring
- 3 Programmable Side Buttons and Large Textured Push-To-Talk Button
  - Easy access to favorite features. Easy to operate when wearing gloves and provides good tactile response
- IMPRES™ Energy System
  - Battery, charging and reconditioning system that automates battery maintenance, optimizes cycle life, and maximizes talktime
- P25 Conventional Upgradeable

---

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>CHANNEL</th>
<th>VHF</th>
<th>UHF R1</th>
<th>UHF R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Capacity</td>
<td>136-174 MHz</td>
<td>380-470 MHz</td>
<td>480-520 MHz</td>
</tr>
<tr>
<td>Model Numbers</td>
<td>AAVT5900C9P001, N</td>
<td>AAVT5900C9P001, N</td>
<td>AAVT5900C9P001, N</td>
</tr>
<tr>
<td>FCC Designation</td>
<td>A248A914867</td>
<td>A248A914867</td>
<td>A248A914867</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>136-174 MHz</td>
<td>380-470 MHz</td>
<td>480-520 MHz</td>
</tr>
<tr>
<td>Channel Spacing</td>
<td>12.5 kHz</td>
<td>12.5 kHz</td>
<td>12.5 kHz</td>
</tr>
<tr>
<td>Maximum Frequency Separation</td>
<td>Full Bandsplit</td>
<td>Full Bandsplit</td>
<td>Full Bandsplit</td>
</tr>
<tr>
<td>Rated RF Output Power Adj*</td>
<td>1 W to 5 W</td>
<td>1 W to 5 W</td>
<td>1 W to 5 W</td>
</tr>
<tr>
<td>Frequency Stability*</td>
<td>±0.00025%</td>
<td>±0.0002%</td>
<td>±0.0002%</td>
</tr>
<tr>
<td>Emissions (Conducted &amp; Radiated)</td>
<td>-65 dBc</td>
<td>-70 dBc</td>
<td>-70 dBc</td>
</tr>
<tr>
<td>Audio Response*</td>
<td>12.5 kHz channel</td>
<td>12.5 kHz channel</td>
<td>12.5 kHz channel</td>
</tr>
<tr>
<td>Audio Distortion*</td>
<td>&lt;2.5%</td>
<td>&lt;2.5%</td>
<td>&lt;2.5%</td>
</tr>
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</table>

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### TRANSMITTER

**Typical Performance Specifications**

<table>
<thead>
<tr>
<th>CHANNEL</th>
<th>VHF</th>
<th>UHF R1</th>
<th>UHF R2</th>
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<tbody>
<tr>
<td>Frequency Range</td>
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<td>Channel Spacing</td>
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<td>12.5 kHz</td>
<td>12.5 kHz</td>
</tr>
<tr>
<td>Maximum Frequency Separation</td>
<td>Full Bandsplit</td>
<td>Full Bandsplit</td>
<td>Full Bandsplit</td>
</tr>
<tr>
<td>Audio Output Power at Rated*</td>
<td>500 mW</td>
<td>500 mW</td>
<td>500 mW</td>
</tr>
<tr>
<td>Frequency Stability*</td>
<td>±0.00025%</td>
<td>±0.0002%</td>
<td>±0.0002%</td>
</tr>
<tr>
<td>Selectivity*</td>
<td>25 kHz channel</td>
<td>25 kHz channel</td>
<td>25 kHz channel</td>
</tr>
<tr>
<td>Audio Distortion*</td>
<td>&lt;2.5%</td>
<td>&lt;2.5%</td>
<td>&lt;2.5%</td>
</tr>
</tbody>
</table>

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### RECEIVER

**Typical Performance Specifications**

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<tr>
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<th>VHF</th>
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<td>&lt;2.5%</td>
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### ENVIRONMENTAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>VHF</th>
<th>UHF R1</th>
<th>UHF R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-30°C to +60°C</td>
<td>-30°C to +60°C</td>
<td>-30°C to +60°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +85°C</td>
<td>-40°C to +85°C</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>Per MIL-STD</td>
<td>Per MIL-STD</td>
<td>Per MIL-STD</td>
</tr>
<tr>
<td>ESD</td>
<td>IEC 801-2</td>
<td>IEC 801-2</td>
<td>IEC 801-2</td>
</tr>
<tr>
<td>Water Intrusion</td>
<td>IP54, MIL-STD</td>
<td>IP54, MIL-STD</td>
<td>IP54, MIL-STD</td>
</tr>
</tbody>
</table>

---

### FACTORY MUTUAL APPROVALS

The PR1500 is Factory Mutual approved and Canadian Standard Association approved as intrinsically safe for use in Classes I, II, and III; Division 1, Groups C, D, E, F and G, as well as non-incendive use in Class I, Division 2, Groups A, B, C and D on models ordered with the Factory Mutual option, and battery.

### Accelerated Life Test

Motorola’s Accelerated Life Test (ALT) is a developmental process of rigorous laboratory testing that simulates years of field use. Motorola has a firm commitment to quality and reliability. These radios have been designed, manufactured and tested to achieve high levels of component and workmanship quality. Motorola radios are designed to minimize costly repairs and downtime.

---

**PORTABLE MILITARY STANDARDS 810 C, D, E & F**

<table>
<thead>
<tr>
<th>Method</th>
<th>MIL-STD 810C</th>
<th>MIL-STD 810D</th>
<th>MIL-STD 810E</th>
<th>MIL-STD 810F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Pressure</td>
<td>500</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>High Temperature</td>
<td>501.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Low Temperature</td>
<td>502.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Temperature Shock</td>
<td>503.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Solar Radiation</td>
<td>505.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Rain</td>
<td>506.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Salt Fog</td>
<td>509.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Blowing Dust</td>
<td>510.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Vibrations</td>
<td>512.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Drop Test</td>
<td>516.1</td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
</tbody>
</table>

* MIL-STD 810F test method is mandatory; other methods are specific to the vehicle in which the radio is installed.

---

**Military Standards** specify a single procedure for each test.

---

* Statistical variations are stated as a percentage of rated value and are subject to change without notice.

---

* Specifications subject to change without notice.
ASTRO XTS 5000™ Digital Portable Radio

Specification Sheet

Available in the 700/800 MHz, VHF, UHF R1 and R2 bands

Trunking standards supported: clear or digital encrypted APCO P16 and APCO P25

Capable of SmartZone, SmartZone Omnilink, SMARTNET, and Conventional System Configurations and ASTRO®25 Trunked Operation

Narrow and wide bandwidth digital receiver (12.5 kHz / 25 kHz)

High speed and embedded digital signalling (ASTRO & ASTRO 25)

Enhanced audio features
- High quality, error corrected digital voice
- Noise Reduction Software
- Audio Gain Control

Convenience Features
- Time / Date
- Digital Caller ID

Ruggedized housing option available in traditional black or public safety yellow

Enhanced encryption capability (optional)

Utilizes Windows®-based Customer Programming Software (CPS)
- Supports USB and RS-232 communications
- Built in FLASHport™ support

Meets Applicable Mil Specs 810C, D, E and F

Compatible with most MTS and XTS accessories

Interchangeable display labels

MODEL I:
- Large PTT button
- Angled On/Off volume knob
- Orange emergency button
- Illuminated 16 position top mounted rotary knob
- 2 position concentric switch
- 3 position toggle switch
- 3 programmable side buttons
- Transmit LED indicator
- No keypad / No display
- Up to 48 channels

MODEL II:
- Same as XTS Model I features plus the following:
  - 512 channels
  - Dial from pre-stored lists
  - Programmable soft keys for easy access to radio menu
  - Backlit Keypad
  - 3 soft keys
  - 3 navigation keys
  - Full Bitmap Display
  - 2 lines icons
  - 4 lines w/12 characters per line
  - Status icons including battery and power indicator

MODEL III:
- Same as XTS Model I features plus the following:
  - 512 channels
  - Dial from pre-stored lists
  - Programmable soft keys for easy access to radio menu
  - Backlit Keypad
  - 3 soft keys
  - 3 navigation keys
  - 4 x 3 keypad
  - Full Bitmap Display
  - 2 lines icons
  - 4 lines w/12 characters per line
  - Status icons including battery and power indicator

- 512 channels
- Dial from pre-stored lists
- Programmable soft keys for easy access to radio menu
- Backlit Keypad
- 3 soft keys
- 3 navigation keys
- 4 x 3 keypad
- Full Bitmap Display
- 2 lines icons
- 4 lines w/12 characters per line
- Status icons including battery and power indicator

- 512 channels
- Dial from pre-stored lists
- Programmable soft keys for easy access to radio menu
- Backlit Keypad
- 3 soft keys
- 3 navigation keys
- 4 x 3 keypad
- Full Bitmap Display
- 2 lines icons
- 4 lines w/12 characters per line
- Status icons including battery and power indicator
## TRANSMITTER

<table>
<thead>
<tr>
<th>Frequency Range/Bandsplits</th>
<th>700 MHz</th>
<th>800 MHz</th>
<th>Channel Spacing</th>
<th>Maximum Frequency Separation</th>
</tr>
</thead>
<tbody>
<tr>
<td>700 MHz: 700-776, 773-797, 803-806</td>
<td>700-776, 773-797, 803-806</td>
<td>136-174 MHz</td>
<td>12.5 / 25 kHz</td>
<td>Full Bandsplit</td>
</tr>
<tr>
<td>800 MHz: 806-824, 851-870</td>
<td>806-824, 851-870</td>
<td>380-470 MHz</td>
<td>12.5 / 25 kHz</td>
<td>Full Bandsplit</td>
</tr>
</tbody>
</table>

### Typical Performance Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>700/800</th>
<th>VHF</th>
<th>UHF R1</th>
<th>UHF R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>700 MHz: 764-806 MHz</td>
<td>1 to 2.5 W</td>
<td>1 to 6 W</td>
<td>1 to 5 W</td>
<td>1 to 5 W</td>
</tr>
<tr>
<td>806-870 MHz: 1 to 3 W</td>
<td>1 to 5 W</td>
<td>1 to 5 W</td>
<td>1 to 5 W</td>
<td>1 to 5 W</td>
</tr>
<tr>
<td>Frequency Stability*</td>
<td>±0.00015%</td>
<td>±0.00020%</td>
<td>±0.00020%</td>
<td>±0.00020%</td>
</tr>
<tr>
<td>Modulation Limiting*</td>
<td>25 kHz chnl</td>
<td>±5.0 kHz</td>
<td>±5.0 kHz</td>
<td>±5.0 kHz</td>
</tr>
<tr>
<td></td>
<td>NPSAPAC chnl</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>12.5 kHz chnl</td>
<td>±2.5 kHz</td>
<td>±2.5 kHz</td>
<td>±2.5 kHz</td>
</tr>
<tr>
<td>Emissions*</td>
<td>–75 dBc</td>
<td>–75 dBc</td>
<td>–70 dBc</td>
<td>–75 dBc</td>
</tr>
<tr>
<td>Audio Response*</td>
<td>(6 dB/Octave Pre-emphasis from 300 to 3000 Hz)</td>
<td>+1, –3 dB</td>
<td>+1, –3 dB</td>
<td>+1, –3 dB</td>
</tr>
<tr>
<td>FM Hum &amp; Noise</td>
<td>25 kHz</td>
<td>–45 dB</td>
<td>–48 dB</td>
<td>–45 dB</td>
</tr>
<tr>
<td></td>
<td>12.5 kHz</td>
<td>–40 dB</td>
<td>–42 dB</td>
<td>–40 dB</td>
</tr>
<tr>
<td>Audio Distortion*</td>
<td>1.50%</td>
<td>1%</td>
<td>1.50%</td>
<td>1.50%</td>
</tr>
</tbody>
</table>

* Measured in the analog mode per TIA / EIA 603 under nominal conditions
** Measured in digital mode per TIA / EIA IS 102.CAAA under nominal conditions

## RECEIVER

<table>
<thead>
<tr>
<th>Frequency Range/Bandsplits</th>
<th>700 MHz</th>
<th>800 MHz</th>
<th>Channel Spacing</th>
<th>Maximum Frequency Separation</th>
</tr>
</thead>
<tbody>
<tr>
<td>700 MHz: 764-776, 773-797</td>
<td>764-767, 773-797</td>
<td>136-174 MHz</td>
<td>12.5 / 25 kHz</td>
<td>Full Bandsplit</td>
</tr>
<tr>
<td>800 MHz: 806-824, 851-870</td>
<td>806-824, 851-870</td>
<td>380-470 MHz</td>
<td>12.5 / 25 kHz</td>
<td>Full Bandsplit</td>
</tr>
</tbody>
</table>

### Typical Performance Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>700/800</th>
<th>VHF</th>
<th>UHF R1</th>
<th>UHF R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>700 MHz: 764-806 MHz</td>
<td>500 mW</td>
<td>500 mW</td>
<td>500 mW</td>
<td>500 mW</td>
</tr>
<tr>
<td>806-870 MHz: 1 to 3 W</td>
<td>500 mW</td>
<td>500 mW</td>
<td>500 mW</td>
<td>500 mW</td>
</tr>
<tr>
<td>Frequency Stability*</td>
<td>±0.00015%</td>
<td>±0.00020%</td>
<td>±0.00020%</td>
<td>±0.00020%</td>
</tr>
<tr>
<td>Analog Sensitivity*</td>
<td>12 dB SINAD</td>
<td>.25</td>
<td>.20</td>
<td>.25</td>
</tr>
<tr>
<td>Digital Sensitivity</td>
<td>1% BER</td>
<td>.40</td>
<td>.25</td>
<td>.40</td>
</tr>
<tr>
<td></td>
<td>5% BER</td>
<td>.25</td>
<td>.20</td>
<td>.25</td>
</tr>
<tr>
<td>Selectivity*</td>
<td>25 kHz chnl</td>
<td>–72 dB</td>
<td>–80 dB</td>
<td>–78 dB</td>
</tr>
<tr>
<td></td>
<td>12.5 kHz chnl</td>
<td>–63 dB</td>
<td>–63 dB</td>
<td>–60 dB</td>
</tr>
<tr>
<td>Intermodulation</td>
<td>–75 dB</td>
<td>–78 dB</td>
<td>–75 dB</td>
<td>–77 dB</td>
</tr>
<tr>
<td>Spurious Rejection</td>
<td>–75 dB</td>
<td>–80 dB</td>
<td>–80 dB</td>
<td>–85 dB</td>
</tr>
<tr>
<td>FM Hum and Noise</td>
<td>25 kHz</td>
<td>–46 dB</td>
<td>–56 dB</td>
<td>–64 dB</td>
</tr>
<tr>
<td></td>
<td>12.5 kHz</td>
<td>–40 dB</td>
<td>–50 dB</td>
<td>–45 dB</td>
</tr>
<tr>
<td>Audio Distortion*</td>
<td>1.5%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

* Measured in the analog mode per TIA / EIA 603 under nominal conditions
** Measured in digital mode per TIA / EIA IS 102.CAAA under nominal conditions
### Batteries for Astro Digital XTS 5000

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Dimensions (HxWxD)</th>
<th>Weight</th>
<th>Battery Part Numbers</th>
<th>Smart Battery</th>
<th>Battery Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Capacity NiCD</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>11.10 oz</td>
<td>HNN9031</td>
<td>Y</td>
<td>1525 mAH</td>
</tr>
<tr>
<td>High Capacity NiCD FM</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>11.10 oz</td>
<td>HNN9032</td>
<td>Y</td>
<td>1525 mAH</td>
</tr>
<tr>
<td>High Capacity NiCD Rugged FM</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>9.53 oz</td>
<td>NTN8297</td>
<td>N</td>
<td>1525 mAH</td>
</tr>
<tr>
<td>High Capacity NiMH</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>9.53 oz</td>
<td>NNTN4435</td>
<td>Y</td>
<td>1800 mAH</td>
</tr>
<tr>
<td>High Capacity NiMH FM</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>9.53 oz</td>
<td>NNTN4436</td>
<td>Y</td>
<td>1750 mAH</td>
</tr>
<tr>
<td>High Capacity NiMH Rugged FM</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>9.53 oz</td>
<td>NNTN4437</td>
<td>Y</td>
<td>1750 mAH</td>
</tr>
<tr>
<td>Ultra High Capacity NiMH</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>12.18 oz</td>
<td>RNN4006</td>
<td>N</td>
<td>3000 mAH</td>
</tr>
<tr>
<td>Ultra High Capacity NiMH FM</td>
<td>6.15&quot;x2.3&quot;x.92&quot;</td>
<td>12.18 oz</td>
<td>RNN4007</td>
<td>N</td>
<td>3000 mAH</td>
</tr>
<tr>
<td>High Capacity Lithium Ion</td>
<td>6.15&quot;x2.3&quot;x.60&quot;</td>
<td>6.98 oz</td>
<td>NTN8810</td>
<td>N</td>
<td>1850 mAH</td>
</tr>
<tr>
<td>High Capacity Lithium Ion FM</td>
<td>6.15&quot;x2.3&quot;x.60&quot;</td>
<td>6.98 oz</td>
<td>NTN8862</td>
<td>Y</td>
<td>2000 mAH</td>
</tr>
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</table>

### Portable Military Standards 810 C, D, E & F

<table>
<thead>
<tr>
<th>Condition</th>
<th>Method</th>
<th>Proc./Cat.</th>
<th>Method</th>
<th>Proc./Cat.</th>
<th>Method</th>
<th>Proc./Cat.</th>
<th>Method</th>
<th>Proc./Cat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Pressure</td>
<td>500.1</td>
<td>I</td>
<td>500.2</td>
<td>II</td>
<td>500.3</td>
<td>II</td>
<td>500.4</td>
<td>II</td>
</tr>
<tr>
<td>High Temperature</td>
<td>501.1</td>
<td>I, II</td>
<td>501.2</td>
<td>I/A1, II/A1</td>
<td>501.3</td>
<td>I/A1, II/A1</td>
<td>501.4</td>
<td>I/Hot, II/Hot</td>
</tr>
<tr>
<td>Low Temperature</td>
<td>502.1</td>
<td>I</td>
<td>502.2</td>
<td>I/C3, II/C1</td>
<td>502.3</td>
<td>I/C3, II/C1</td>
<td>502.4</td>
<td>I/C3, II/C1</td>
</tr>
<tr>
<td>Temperature Shock</td>
<td>503.1</td>
<td>–</td>
<td>503.2</td>
<td>I/A1C3</td>
<td>503.3</td>
<td>I/A1C3</td>
<td>503.4</td>
<td>I</td>
</tr>
<tr>
<td>Solar Radiation</td>
<td>505.1</td>
<td>II</td>
<td>505.2</td>
<td>I</td>
<td>505.3</td>
<td>I</td>
<td>505.4</td>
<td>I</td>
</tr>
<tr>
<td>Rain</td>
<td>506.1</td>
<td>I, II</td>
<td>506.2</td>
<td>I, II</td>
<td>506.3</td>
<td>I, II</td>
<td>506.4</td>
<td>I, III</td>
</tr>
<tr>
<td>Humidity</td>
<td>507.1</td>
<td>II</td>
<td>507.2</td>
<td>II</td>
<td>507.3</td>
<td>II</td>
<td>507.4</td>
<td>–</td>
</tr>
<tr>
<td>Salt Fog</td>
<td>509.1</td>
<td>–</td>
<td>509.2</td>
<td>–</td>
<td>509.3</td>
<td>–</td>
<td>509.4</td>
<td>–</td>
</tr>
<tr>
<td>Blowing Dust</td>
<td>510.1</td>
<td>I</td>
<td>510.2</td>
<td>I</td>
<td>510.3</td>
<td>I</td>
<td>510.4</td>
<td>I</td>
</tr>
<tr>
<td>Immersion*</td>
<td>512.1</td>
<td>I</td>
<td>512.2</td>
<td>I</td>
<td>512.3</td>
<td>I</td>
<td>512.4</td>
<td>I</td>
</tr>
<tr>
<td>Vibration</td>
<td>514.2</td>
<td>VIII/F, Curve-W</td>
<td>514.3</td>
<td>I/10, II/3</td>
<td>514.4</td>
<td>I/10, II/3</td>
<td>514.5</td>
<td>I/24</td>
</tr>
<tr>
<td>Shock</td>
<td>516.2</td>
<td>I, II</td>
<td>516.3</td>
<td>I, IV</td>
<td>516.4</td>
<td>I/IV</td>
<td>516.5</td>
<td>I, IV</td>
</tr>
</tbody>
</table>

### Power Supply
700/800 MHz: One rechargeable nickel-cadmium, or one optional nickel-metal hydride or lithium ion battery
VHF/UHF R1&2: One rechargeable nickel-metal hydride, or one optional nickel cadmium or lithium ion battery

### Dimensions
- 6.58" x 2.44" x 1.83"

### Weight
- 12.5 oz
## ENCRYPTION

<table>
<thead>
<tr>
<th>Supported Encryption Algorithms</th>
<th>AES, DES-XL and DES-OFB, DVP-XL, DVI-XL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encryption Algorithm Capacity</td>
<td>8</td>
</tr>
<tr>
<td>Encryption Keys per Radio</td>
<td>48 common Key Reference (CKR) Encryption Keys</td>
</tr>
<tr>
<td></td>
<td>16 Physical Identifier (PID) Encryption Keys</td>
</tr>
<tr>
<td>Encryption Frame Re-sync Interval</td>
<td>P25 CAI 360 msec</td>
</tr>
<tr>
<td>Encryption Keying</td>
<td>Key Loader</td>
</tr>
<tr>
<td>Synchronization</td>
<td>CFB – Cipher Feedback</td>
</tr>
<tr>
<td></td>
<td>XL - Counter Addressing</td>
</tr>
<tr>
<td></td>
<td>OFB - Output Feedback</td>
</tr>
<tr>
<td>Vector Generator</td>
<td>National Institute of Standards and Technology (NIST) approved random number generator</td>
</tr>
<tr>
<td>Encryption Type</td>
<td>Digital</td>
</tr>
<tr>
<td>Key Storage</td>
<td>Tamper protected volatile or non volatile memory</td>
</tr>
<tr>
<td>Key Erasure</td>
<td>Keyboard command and tamper detection</td>
</tr>
<tr>
<td>Standards</td>
<td>FIPS 46-2</td>
</tr>
<tr>
<td></td>
<td>FIPS 81</td>
</tr>
<tr>
<td></td>
<td>FIPS 140-1 Level 1</td>
</tr>
</tbody>
</table>

## ENVIRONMENTAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Operating Temperature</th>
<th>-30°C / +60°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-40°C / +85°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>Per MIL-STD</td>
</tr>
<tr>
<td>ESD</td>
<td>IEC 801-2KV</td>
</tr>
<tr>
<td>Water &amp; Dust Intrusion</td>
<td>IP54, IPX7*, MIL-STD</td>
</tr>
</tbody>
</table>

## RUGGED OPTION SPECIFICATIONS

| Leakage (immersion)            | MIL-STD-810 C, D, E, F Method 512.X Procedure I: IPX7* |

* For rugged models only.
The Thales 25 is the smallest, lightest and most rugged Project 25-compliant digital radio available. This compact portable supports full, multi-mode operation and features high-quality, error-corrected, digital voice and DES Encryption without range or audio quality loss. Programming can be performed via the radio front-panel keyboard (password protected), by direct unit-to-unit cloning, or with a PC using the Microsoft® Windows based PC Programmer. Software upgrades can be distributed via the Internet or disk without the requirement for special interface boxes or software. With exceptional scanning and encryption capabilities, and an advanced lithium-ion battery with fuel gauge display, the Thales 25 is available now to fill your present and future communication requirements.
Physical Parameters (with Battery)
Height 7.80 inches (19.8 cm)
Width 2.60 inches (6.60 cm)
Thickness 1.05 inches (2.67 cm)
Volume 21.3 cubic inches (348.9 cubic cm)
Weight 16.7 ounces (473.4 gm)

Keypad
16 Back-Lit Buttons
(16-Button DTMF including 4 Menu Navigation Keys)

Display
32 x 80 Pixel Graphics
- Liquid Crystal Display (LCD)
- Adjustable Back-Lighting
- 3-Color LED Status Indicator

Controls
16-Position Channel Select Knob
Programmable-Function
- 3-Position Toggle Switch
3 Programmable-Function Side Keys
Emergency Push Button
Push-To-Talk Switch
On/Off/Volume Knob

Channels
16 Zones of up to 16 Channels Each
16/48 Quick Select
(Channel Select Knob and Toggle)
256 Selectable from the Keypad
+48 in Optional Event Bank

Batteries
Twist-Lock Rechargeable Lithium-Ion
Hybrid Battery (Li-Ion/Alkaline)
AA Clamshell Cassette

Features of all Batteries
Internal Cell Management
“Smart-Battery” Monitoring Features
1800 mAH Capacity
11+ Hours Operation at 5 watts
(5/5/90 Duty Cycle)

Channel Spacing
12.5/20/25/30 kHz Channels
2.5/3.125 kHz Frequency Increments

Operating Bandwidth
VHF 136-174 MHz

Environmental
Case Sealed Metal Case
Immersion 6 Feet of Water (2 meters)
Temperature
- Operating -30°C to +60°C
- Storage -40°C to +85°C
Shock MIL-STD-810E
Vibration MIL-STD-810E
Salt Fog MIL-STD-810E
Humidity MIL-STD-810E
Altitude MIL-STD-810E
Sand & Dust MIL-STD-810E
Blowing Rain MIL-STD-810E

Operating Modes
12.5/25 kHz Conventional Analog FM
12 kbps CVSD DES (25 kHz Channels)
Project 25 Common Air Interface (CAI)
Digital
Project 25 CAI with OFB DES Encryption
- Digital (optional)
Project 25 OTAR (optional)

Transmitter
RF Output Power
- 0.1, 0.5, 1, 2 and 5 watts Channel
by Channel Programmable
Frequency Stability ±1.0 ppm
FM Hum and Noise
- 46 dB @ 25 kHz
- 40 dB @ 12.5 kHz
Audio Distortion <2%
Non-Harmonic Emissions
- Conducted/Radiated -75 dBc

FCC Emission Designators
11KOF3E
16KOF3E
20KOF1E

Receiver
Sensitivity
- 0.22 µV (-120 dBm) 25/30 kHz Analog
- 0.22 µV (-120 dBm) 12.5 kHz Analog
- 0.22 µV (-120 dBm) 12.5 kHz Digital

Adjacent Channel Rejection (Selectivity)
- 60 dB 12.5 kHz Channels
- 65 dB 25/30 kHz Channels

Audio Output Power 500 mW
Intermodulation 75 dB
Spurious Response 80 dBc

Accessories
Carrying Cases
- Leather Fire Fighter’s Duty Case
- Leather Duty Case
- Nylon Tactical Carrying Case
Hand Held Speaker/Microphone
AC Powered Single Battery Charger
AC Powered 6-Way Battery Charger
AC/DC Powered 6-Way Battery Charger
136-174 MHz Antenna
Cloning Cable
PC Programmer
Surveillance Harness, 2-Wire and 3-Wire

Encryption Capabilities
Include up to 16 Keys
2 Algorithms
Keyfill from PC or Existing KVL® Keyfill Device
Analog DES Encryption (25 kHz Channels)
Digital OFB DES Encryption
OTAR

Advanced Scanning
Channel Scan
Multiple Zone Scan
Two Priority Scan Channels (pre-emptive)
Talkback Scan Revert

Specifications are typical performance
and subject to change without notice.
Thales Communications, Inc.

MBITR AN/PRC-148(V)(C)
Multiband Inter/Intra Team Radio PRC 6991
The Most Capable Hand Held Radio in the World

- 30-512 MHz Contiguous Frequency Coverage
- AM/FM; Voice/Data
- Selectable RF Output Power (100 mWatts to 5 watts)
- US Type 1 COMSEC
- Immersibility: 20 Meter Maritime Version, 2 Meter Urban Version
- 30.6 Ounces (867.5 gm)

The MBITR is more capable than any hand held radio available today. In a ruggedized package weighing less than two pounds, the MBITR provides unprecedented interoperability with existing military legacy systems and commercial radios, while ensuring future operation with the next generation of communication equipment. Seven programmable devices, supported by flash memory, are incorporated into the MBITR architecture, creating a truly software-based hand held radio. With MBITR’s combination of software upgradeability, Type 1 encryption and 30-512 MHz AM/FM RF capability, you benefit from a radio that satisfies both current and future communications requirements. MBITR, the hand held radio of the 21st century, is here today.
Frequency Range
30-512 MHz Contiguous
5 and 6.25 kHz Step Size

Modulation Types
AM and FM (Single Channel)
HAVEQUICK I/II, SINCGARS Single Channel and Frequency Hopping (ESIP), ANDVT (PSK)

Frequency Stability: 5 PPM

Receive Sensitivity
FM: -116 dBm 12 dB SINAD
AM: <1.5 uV 10 dB SINAD

Adjacent Channel Rejection
Greater than 45 dB at ±25 kHz

Spurious & Image Rejection
Greater than 58 dB

Third Order Intercept Point
Greater than +5 dBm

Receive Audio Distortion
Less than 10% at Rated Audio Power

Acoustic Output Power
Greater than 85 dBSPL

Transmit Output Power
0.1, 0.5, 1.0, 3.0 & 5.0 watts (FM)
1.0 and 5.0 watts (AM)
User Selectable

Transmit Characteristics
Radiated Spurious Output: <-13 dBm
Audio Distortion: Less than 10%
Adjacent Channel Power Ratio: >62 dBc

Reliability
MTBF: >11,400 hours
MTTR: <8 minutes

Emergency Beacons and GPS
AM Swept Tone Beacon
GPS Interface to PLGR

TEMPEST Compliance
NSTISSM TEMPEST/1-92, Level III
NACSEM 5112

Interoperability
AN/PRC-77, AN/VRC-12
AN/PRC-68, AN/PRC-117
AN/PRC-119
AN/PRC-113, AN/PRC-139
Motorola MX300 Series
Motorola Saber

Programmable Channels
100 Memory Preset Channels
Menu Selectable Groups
Clear/Encrypted Mode Selection on a Channel by Channel Basis
User Programmable from:
• Front Panel Menu
• PC Programmer
• Radio-to-Radio Cloning

Controls
On/Off/Volume/Whisper/Zeroize Knob
16-Position Channel Select Knob
Large Tactile Push-To-Talk Switch
Squelch Override Push-button
Backlit 7-Button Keypad (NVG Compatible)
Software Configurable Option Keys

Indicators
32 x 80 Pixel Backlit LCD
(NVG Compatible)
Intuitive Menu Driven User Interface
• Channel Name/Frequency
• Group Name
• Clear/Secure Mode
• Key Location
• Battery Capacity
• Transmit Power

Connectors
50 Ohm TNC Antenna
10-Pin Multi-Function Immersion
Sealed Top Connector (20 Meter)
6-Pin Multi-Function Top Connector (2 Meter)
18-Pin Side Connector for Extended Capabilities and Upgrades

COMSEC
US Type 1
VINSON and FED-STD-1023
Selective Key Zeriozation with Mechanical Interlock Protection
Receive OTAR Compatible
6 Key Locations

Physical Parameters (with battery)
Length: 8.44 inches (21.44 cm)
Width: 2.63 inches (6.68 cm)
Depth: 1.52 inches (3.86 cm)
Volume: 33.74 cubic inches (552.8 cubic cm)
Weight: 30.6 ounces (867.5 gm)

Finish
NBC Compatible
Matte Black, Non-Reflective

Environmental Specifications
Temperature:
• Operating: -31° to +60°C
• Storage: -33° to +71°C
Humidity: 95% Non-condensing
Shock: EIA-603-1992
Vibration: EIA-603-1992
Altitude: 30,000 Feet
Immersion:
PRC-6891-ABR 20 Meter Version
PRC-6891-BBR 2 Meter Version

Batteries
Rechargeable Lithion-Ion
• 4400 mAH
• >10 Hours Life at 5 watts+
Non-Rechargeable Battery Holder
• Commercial Lithium Cells
• 10 Hour Life at 5 watts+
• Standard Duty Cycle (8:1:1)

Antenna Set
30-90 MHz
90-512 MHz

Accessories
Vehicle Adapter
Radio Holster
Radio System Carrying Bag
AC Powered Single Battery Charger
AC/DC Powered 6-Way Battery Charger
Specialized Audio Accessories
GPS, Cloning, Data, and Retransmission Cables
PC Programmer
Special Power Adapter Interface

Specifications are subject to change without notice.
50/144/430 MHz 5W FM TRANSCEIVER

VX-7R

ULTRA-RUGGED, SUBMERSIBLE TRI-BAND MAGNESIUM HANDIE

INTERNET KEY FOR ACCESS TO WIRES™

50/144/430 MHz 5 Watt FM Transceiver

(50 MHz AM: 1W; 222 MHz FM: 300 mW (USA version Only))

VX-7R/VX-7Rb

Magnesium Silver
New Black Version Available

INTERNET KEY FOR ACCESS TO WIRES™

INTERNET KEY FOR ACCESS TO WIRES™
**YAESU'S VX-7R: THE WORLD'S FIRST SUBMERSIBLE AMATEUR HAND-HELD**

Protected against water ingress by a wide array of rubber gaskets and other weatherproofing techniques, the VX-7R is rated for 30 minutes of submersion at a depth of 3 feet (JIS-7), a tough magnesium body with rubber bumper pads, making it ideal for outdoor use. Plus you get Dual Receive, 50/144/430 MHz operation, wide-band receive coverage, a full color status indicator Strobe, and an “Internet” key for quick access to the exciting new WIRES™ —ll repeater-internet linking system!

---

**THE BEST OUTDOOR HANDIE EVER**

The VX-7R case, keypad, speaker, and connectors are carefully sealed to protect the internal circuitry against water damage. And the optional CMP460A Speaker/Mic, like the transceiver itself, is rated for 30 minutes of submersion at a depth of up to three feet!

---

**THE BEST VERSATILITY EVER**

The VX-7R is capable of four modes of Dual Receive, including simultaneous reception on (1) two VHF frequencies; (2) two UHF frequencies; (3) one VHF and one UHF frequency; or (4) one “General Coverage” frequency and one “Ham” frequency. And when a call is received on the “Main” band, you can set up the VX-7R to reduce the audio level on the “Sub” band, if you like!

---

**LONG BATTERY LIFE AND MULTIPLE POWER SOURCES**

The VX-7R is capable of four modes of Dual Receive, including simultaneous reception on (1) two VHF frequencies; (2) two UHF frequencies; (3) one VHF and one UHF frequency; or (4) one “General Coverage” frequency and one “Ham” frequency. And when a call is received on the “Main” band, you can set up the VX-7R to reduce the audio level on the “Sub” band, if you like!

---

**THE BEST TONE SIGNALING EVER**

Ideal for operation on modern repeater systems, the VX-7R includes built-in Encoder/Decoder circuits providing 50 CTSS (Subaudible) tones and 104 DCS (Digital Coded Squelch) codes. Adding to the versatility is provision for using “mixed” tone/code configurations (CTCSS for TX, DCS for RX, or vice-versa).

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**ARTS™ (Auto-Range Transponding System)**

Utilizing the DCS capability of the transceiver, the ARTS™ feature provides audio and/or visual confirmation that another ARTS-equipped station is within communication range. If you are in search-and-rescue operation, and get out of range of the base station, ARTS will warn the base operator to advise you to move to a better location.

---

**Wide Frequency Coverage**

With continuous AM/FM reception coverage of 500 kHz to 999 MHz (cellular frequencies are blocked and non-restorable), the VX-7R is ideal for monitoring HF shortwave broadcasts, the AM and FM Broadcast bands, plus a wide variety of Marine, Public Safety, and Government bands. And special memory banks for the Weather, Marine, and Shortwave bands make station selection effortless!

---

**50/144/430 MHz: 5 W Power**

Utilizing a reliable FET power amplifier circuit, the VX-7R provides a full 5 Watts of power output on the 50, 144, and 430 MHz Amateur bands, with bonus coverage of the 222 MHz band at 300 mW (USA version Only) of power output. And for 6-meter AM enthusiasts, you also get 1 Watt of carrier power on the 50 MHz band! Four power levels may be selected, for optimum battery life.

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<table>
<thead>
<tr>
<th>Power Source</th>
<th>High Power</th>
<th>L3</th>
<th>L2</th>
<th>L1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Pack</td>
<td>5 W</td>
<td>2.5 W</td>
<td>1 W</td>
<td>0.05 W</td>
</tr>
<tr>
<td>External DC (13.8 V)</td>
<td>0.3 W</td>
<td>0.05 W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Dual Receive: V-V/U-U/V-U/GEN-HAM**

V+V

V+U

V-U

GEN+HAM

---

**Battery Life (Approx.)**

<table>
<thead>
<tr>
<th>Operating Band</th>
<th>Battery Life (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MHz *1</td>
<td>6.5 hours</td>
</tr>
<tr>
<td>144 MHz *1</td>
<td>6.0 hours</td>
</tr>
<tr>
<td>430 MHz *1</td>
<td>5.5 hours</td>
</tr>
<tr>
<td>Other Band *2</td>
<td>15 hours</td>
</tr>
</tbody>
</table>

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*1 TX 6 sec., RX 6 sec. and Squelched 48 sec.  
*2 Continuous signal reception
A unique feature of the VX-7R is the new “Internet” key, prominently located in the bottom right-hand corner of the keypad, providing easy access to the new WIRES™-II Repeater-Internet-linking system. Pressing the Internet key activates a single-tone DTMF burst at the beginning of each transmission, as required for Internet linking access to a "sister city" or repeater. WIRES™-II can link up to 10 repeaters (by prior arrangement), with a single DTMF tone (at the start of each transmission) providing access to the WIRES™-II network.

While WIRES™-II networks may be accessed using any manufacturer’s transceiver that is equipped with a DTMF keypad, the VX-7R’s Internet key provides automatic transmission of the required DTMF burst, for easy access when seconds count.

### Full Color Strobe LED

Among the more innovative features introduced in the VX-7R is the full-color Strobe LED, which provides indication of a number of transceiver status items using different colors. The Menu allows you to custom-design a color that you will recognize for indication of “Busy Channel” for the Main, Sub and “Both” receive channels, as well as “TX” indicators for the Main and Sub bands. Different colors may be selected for each of the above conditions, and a total of 256 color shades are available, for customizing the colors just the way you like them.

### THE MOST DAZZLING DISPLAY EVER

No Amateur handheld transceiver has a display that even compares to the VX-7R’s 132 x 64 dot matrix display. Providing clear, easy-to-read indication of both the Main and Sub band frequencies, operating mode, and S-meters for both bands, the VX-7R’s display includes an unparalleled array of graphical and pictorial tools that make operation a breeze.

#### 450 “Main” Memories

Storing frequency, mode, and CTCSS/DCS data, the 450 Memory Channels may be assigned into any of 9 Memory Groups, for easy recall (up to 48 channels per group may be stored).

#### 10 One-Touch (OTM) memories

Store your most-used frequencies in the quick-access OTM bank!

#### 24 Hour Clock

The VX-7R includes a built-in 24-hour clock, with calendar, powered by a separate (rechargeable) Lithium-Ion battery that will maintain clock data for up to two months without the use of main transceiver battery power.

#### Change Icons and Fonts

During monoband operation, the huge size of the dot matrix display allows the use of pictorial icons to depict a number of band and operational status notations. You can substitute icons, if you like, from a selection of alternative icons, or you can use the icon editor feature to create your own icon or font.

**ICON List**

- **S1**
- **S2**
- **S3**
- **S4**
- **S5**
- **S6**
- **S7**
- **S8**
- **S9**
- **CH1**
- **12345678**

#### 40 Programmable Memory Scan (PMS) Band-Limit Memories

Use the PMS memories for setting upper and lower scanning/operaing limits in the Amateur bands.

#### 12 Home Channel Memories

The “Home” channels may be set to a “favorite” operating frequency, or a central operating frequency, that may be used as a starting point for operation. The 430 MHz Home Channel is also used for the “Emergency” beacon.

#### 10 Weather Band Memories (U.S. Version)

Ideal for quick access to the Weather Band broadcasts, these memories may be scanned in search of the loudest Weather station in your area.

### THE BEST TRAVELING COMPANION EVER

Whether you’re walking around town, or walking down a mountain, the VX-7R is equipped with the features and durability that you need.

#### Emergency Strobe/Beep Feature

If you press and hold in the EMG (HM/RV) key for two seconds, the VX-7R will be placed in the “Emergency” mode, wherein (A) it will automatically be set to the 430 MHz “Home Channel” for a loud “Alarm” beep will be put out from the speaker, and (C) the front panel Strobe will brightly flash in sequential colors. If you press the PTT switch during Emergency operation, the Alarm will be temporarily silenced, and you may now call a friend, family member, or a rescuer on the UHF Home Channel.

#### Optional SU-1 Barometric Pressure Unit with Weather Forecast Feature

The optional SU-1 Barometric Pressure Sensor Unit provides indication of the current pressure, calibrated in either units of inches or mm of mercury, hpa, or millibars. On a hike, altitude (in feet or meters) can be deduced from a starting pressure calculation, and a basic weather trend forecast will also appear on the display! While the transceiver is turned off, it can be set up to monitor and display the temperature (in °F or °C), pressure, altitude, or any combination of these.

#### Audio Wave Meter

During monoband operation, you can also choose to have the VX-7R display a depiction of the incoming audio waveform, just below the frequency display field.

#### Spectrum Scope Display

When you engage the Spectrum Scope, the display will indicate relative signal strengths on adjacent channels (you may select either ±5 or ±8 channels from the current frequency), allowing you to truly keep an eye on the band.

#### Battery-Saving Illumination Control

The Omni-Glow™ display/key illumination may be configured in a number of battery-saving ways. Both Brightness and Contrast are adjustable. You can set the illumination to appear continuously, or only for a few seconds after a key is pressed. You can even turn the “Busy” Strobe off, for additional battery conservation.

#### 89 Shortwave Broadcast Station Memories

The most popular HF Shortwave Broadcast stations are pre-stored at the factory, for instant selection of your favorite program and station.

#### 280 Marine Channels

The huge 280-channel Marine Bank allows full access to the excitement of monitoring the world of Marine operation.

#### 10 “Hyper” Memories

The Hyper memories may be used to store and recall a complete set of transceiver configuration data, such as Dual Receive status, Spectrum Scope configuration, scanning features, etc.
Innovative Multi-section Antenna
When operating on 144 and 430 MHz, use the bottom section of the supplied antenna. For operation on 220 MHz, simply screw on the antenna extension element and you’re ready for DX action!

Specifications
- Antenna Impedance: 50 Ohms
- Emission Type: A3/F2/F3
- Supply Voltage: Nominal: 7.4 V DC, Negative Ground
- Current Consumption: 200 mA (Mono Band Receive), 100 mA (Dual Band Receive, Standby, Saver Off)
- Transmit Power: 1.0W (@7.4 V & 13.8 V EXT DC IN, 50 MHz AM)
- Modulation Type: F2, F3: Variable Reactance (MAIN & SUB)
- Receiver Sensitivity: 1.0 µV for 12 dB SINAD (800-999, N-FM)
- Receiver AF Output: 200 mW @ 8 Ohms for 10 % THD (@ 7.4 V DC)
- Receiver Selectivity: 12 kHz/25 kHz (-6dB/-60dB: N-FM, AM)
- Transmit Power Output: 5.0 W (97.7-99.8 MHz, 3 W UHF, 25 W VHF)
- Transmit Bandwidth: 5 kHz F2/F3

About this brochure: we have made this brochure as comprehensive and factual as possible. We reserve the right, however, to make changes at any time in equipment, optional accessories, specifications, model numbers, and availability. Some accessories shown herein may not be available in some countries. Some information may have been updated since the time of printing; please check with your Authorized Yaesu Dealer for complete details.