



December 1, 2010

Roberta Wagner
State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Charleston, WV 25305

Re: BPH11084, Radios for State Wide Medical Command

Dear Ms. Wagner:

Motorola, Inc. by and through its Government and Enterprise Mobility Solutions business ("Motorola"), is pleased to have the opportunity to provide the State of West Virginia with quality communications equipment and services. The Motorola project team has taken great care to propose a solution that will meet your needs and provide unsurpassed value.

To best meet the functional and operational requirements of the State of West Virginia, Motorola's proposal includes a combination of hardware, and software devices as specified in RFQ BPH11084.

Motorola's proposal is subject to Motorola's Clarifications to the terms and conditions set forth in the West Virginia Department of Health and Human Resources Request for Quotation (BPH11084) and to the attached and incorporated Master Purchase Agreement and Software Licensing Agreement, or, in the alternative, a negotiated version thereof.

Any questions can be directed to Peter Marotta, Motorola Account Manager for the State of West Virginia at 304-860-5051.

Sincerely,

A handwritten signature in black ink, appearing to read 'Tim Askeland'.

Timothy D. Askeland
Division Controller
U.S. Federal Government Markets Division



Nov 30th, 2010

Clarifications to Motorola's response for BPH11084, RFQ

1. Provisions 1.8 Payment terms

Motorola takes exception. Motorola will submit invoices to the Customer for Products when they are shipped. Customer will make payment to Motorola within thirty (30) days after the date of each invoice

2. Provision 2 on Page "2", "Cancellation"

Motorola complies with clarification and suggests the following language: "The Director of Purchasing reserves the right to cancel this contract immediately upon written notice to the vendor if the commodities and/or services supplied do not conform to the specifications of bid and contract herein."

3. Provision 4 under "General Terms and Conditions" (Funds contingent upon appropriation by the Legislature):

Motorola complies with clarification. Customer shall use its best efforts to secure sufficient appropriations to fund the Contract. Customer agrees that, to the extent permitted by law, it will not, during the term of the Contract, give priority in the appropriation of funds to any other functionally similar equipment or services, and Customer may not terminate in order to acquire any other equipment or services or to allocate funds directly or indirectly for equipment or services that perform essentially the same function as equipment or services provided to the Customer pursuant to the Contract. If, however, the funds appropriated in any fiscal period are insufficient for any payment by Customer due hereunder, the Contract will terminate on the last day of the period for which appropriations were received. Such termination will be without penalty or expense to Customer. Customer shall give written notice to Motorola of insufficient funding as soon as practicable after Customer becomes aware of such insufficiency.

4. Provision 5 on Page "2"

Motorola complies with clarification. Motorola's proposal is subject to Motorola's clarifications to the terms and conditions set forth in the West Virginia DHHR RFQ No.BPH11084 and to the attached and incorporated Master Purchase Agreement and Software Licensing Agreement, or, in the alternative, a negotiated version thereof.

5. Provisions 5.5, 5.6, 5.7, and 5.8 of Attachments A, B, and C

Comply.

Motorola's software warranty terms are set forth in the West Virginia Department of Health and Human Resources Request for Quotation (BPH11084) and to the attached and incorporated Master Purchase Agreement and Software Licensing Agreement.



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER:
BPH11084

PAGE:
1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
**ROBERTA WAGNER
 304-558-0067**

RFQ COPY
 TYPE NAME/ADDRESS HERE
**Motorola, Inc.
 7031 Columbia Gateway Drive, 3rd Floor
 Columbia, MD 21046**

**HEALTH AND HUMAN RESOURCES
 BPH - STATE TRAUMA &
 EMERGENCY MEDICAL SYSTEM
 190 HART FIELD ROAD
 MORGANTOWN, WV
 26505 304-581-2900**

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
10/29/2010				

BID OPENING DATE: **12/01/2010** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	EA		906-29		
<p>RADIOS FOR THE STATEWIDE MEDICAL COMMAND MICROWAVE</p> <p>REQUEST FOR QUOTATION</p> <p>TO PROVIDE THE WVDHHR STATE TRAUMA & EMERGENCY MEDICAL SYSTEM WITH AN OPEN END CONTRACT FOR THE PURCHASE OF DUAL-BAND MOBILE RADIOS, DUAL-BAND PORTABLE RADIOS, REMOTE CONTROL CONSOLETTES, BASE STATION RADIOS, BASE STATION ANTENNAS, AND SERVICE MONITORS FOR THE STATEWIDE MEDICAL COMMAND MICROWAVE COMMUNICATIONS AND INTEROPERABLE RADIO SYSTEM THAT INCLUDES RF COMMUNICATIONS CARRIED ON ITS CURRENT MICROWAVE INFRASTRUCTURE PER THE ATTACHED SPECIFICATIONS.</p> <p>LIFE OF CONTRACT: THIS CONTRACT BECOMES EFFECTIVE ON AWARD..... AND EXTENDS FOR A PERIOD OF ONE (1) YEAR OR UNTIL SUCH "REASONABLE TIME" THEREAFTER AS IS NECESSARY TO OBTAIN A NEW CONTRACT OR RENEW THE ORIGINAL CONTRACT. THE "REASONABLE TIME" PERIOD SHALL NOT EXCEED TWELVE (12) MONTHS. DURING THIS "REASONABLE TIME" THE VENDOR MAY TERMINATE THIS CONTRACT FOR ANY REASON UPON GIVING THE DIRECTOR OF PURCHASING 30 DAYS WRITTEN NOTICE.</p> <p>UNLESS SPECIFIC PROVISIONS ARE STIPULATED ELSEWHERE IN THIS CONTRACT DOCUMENT, THE TERMS, CONDITIONS AND PRICING SET HEREIN ARE FIRM FOR THE LIFE OF THE CONTRACT.</p>						

RECEIVED
 200 DEC -1 A 11: 52
 PURCHASING DIVISION
 STATE OF WV

SEE REVERSE SIDE FOR TERMS AND CONDITIONS			
SIGNATURE <i>T. D. Askeland</i>	TITLE Timothy D. Askeland	TELEPHONE 410-712-6200	DATE 11/30/2010
TITLE Division Controller, USFGMD	FEIN 36-1115800	ADDRESS CHANGES TO BE NOTED ABOVE	

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

*see note on page 75

GENERAL TERMS & CONDITIONS REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid.
3. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
4. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.
5. Payment may only be made after the delivery and acceptance of goods or services.
6. Interest may be paid for late payment in accordance with the *West Virginia Code*.
7. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
8. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
9. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
10. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern the purchasing process.
11. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
12. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.
13. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at www.state.wv.us/admin/purchase/vrc/hipaa.htm and is hereby made part of the agreement. Provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
14. **CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.
15. **LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.
16. **ANTITRUST:** In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.
2. Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
4. All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130
5. Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

REQ NUMBER
 BPH11084

PAGE
 2

ADDRESS: CORRESPONDENCE TO ATTENTION OF
 ROBERTA WAGNER
 304-558-0067

RFQ COPY
 TYPE NAME/ADDRESS HERE
 Motorola, Inc.
 7031 Columbia Gateway Drive, 3rd Floor
 Columbia, MD 21046

HEALTH AND HUMAN RESOURCES
 BPH - STATE TRAUMA &
 EMERGENCY MEDICAL SYSTEM
 190 HART FIELD ROAD
 MORGANTOWN, WV
 26505 304-581-2900

DATE PRINTED	TERMS OF SALE	BMP VIA	FCB	FREIGHT TERMS
10/29/2010				
BID OPENING DATE: 12/01/2010		BID OPENING TIME: 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>RENEWAL: THIS CONTRACT MAY BE RENEWED UPON THE MUTUAL WRITTEN CONSENT OF THE SPENDING UNIT AND VENDOR, SUBMITTED TO THE DIRECTOR OF PURCHASING THIRTY (30) DAYS PRIOR TO THE EXPIRATION DATE. SUCH RENEWAL SHALL BE IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE ORIGINAL CONTRACT AND SHALL BE LIMITED TO TWO (2) ONE (1) YEAR PERIODS.</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICES SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM TO THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.</p> <p>ORDERING PROCEDURE: SPENDING UNIT(S) SHALL ISSUE A WRITTEN STATE CONTRACT ORDER (FORM NUMBER WV-39) TO THE VENDOR FOR COMMODITIES COVERED BY THIS CONTRACT. THE ORIGINAL COPY OF THE WV-39 SHALL BE MAILED TO THE VENDOR AS AUTHORIZATION FOR SHIPMENT, A SECOND COPY MAILED TO THE PURCHASING DIVISION, AND A THIRD COPY RETAINED BY THE SPENDING UNIT.</p> <p>BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.</p> <p>THE TERMS AND CONDITIONS CONTAINED IN THIS CONTRACT SHALL SUPERSEDE ANY AND ALL SUBSEQUENT TERMS AND CONDITIONS WHICH MAY APPEAR ON ANY ATTACHED PRINTED DOCUMENTS SUCH AS PRICE LISTS, ORDER FORMS, SALES AGREEMENTS OR MAINTENANCE AGREEMENTS, INCLUDING ANY ELECTRONIC MEDIUM SUCH AS CD-ROM. EXHIBIT 4</p> <p>LOCAL GOVERNMENT BODIES: UNLESS THE VENDOR INDICATES</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

*** see page 1 for signature*

** see note on Page 75*



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10/29/2010				

BID OPENING DATE: 12/01/2010 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>IN THE BID HIS REFUSAL TO EXTEND THE PRICES, TERMS, AND CONDITIONS OF THE BID TO COUNTY, SCHOOL, MUNICIPAL AND OTHER LOCAL GOVERNMENT BODIES, THE BID SHALL EXTEND TO POLITICAL SUBDIVISIONS OF THE STATE OF WEST VIRGINIA. IF THE VENDOR DOES NOT WISH TO EXTEND THE PRICES, TERMS, AND CONDITIONS OF THE BID TO ALL POLITICAL SUBDIVISIONS OF THE STATE, THE VENDOR MUST CLEARLY INDICATE SUCH REFUSAL IN HIS BID. SUCH REFUSAL SHALL NOT PREJUDICE THE AWARD OF THIS CONTRACT IN ANY MANNER.</p> <p>REV. 3/88</p> <p>INQUIRIES: WRITTEN QUESTIONS SHALL BE ACCEPTED THROUGH CLOSE OF BUSINESS ON 11/15/2010. QUESTIONS MAY BE SENT VIA USPS, FAX, COURIER OR E-MAIL. IN ORDER TO ASSURE NO VENDOR RECEIVES AN UNFAIR ADVANTAGE, NO SUBSTANTIVE QUESTIONS WILL BE ANSWERED ORALLY. IF POSSIBLE, E-MAIL QUESTIONS ARE PREFERRED. ADDRESS INQUIRIES TO:</p> <p>ROBERTA WAGNER DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25311</p> <p>FAX: 304-558-4115 E-MAIL: ROBERTA.A.WAGNER@WV.GOV</p>						

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* * see page 1 for signature

* see note on page 75



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RFQ COPY

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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
10/29/2010				

BID OPENING DATE: 12/01/2010 BID OPENING TIME 01:30PM

LINE	QUANTITY	UICP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
BUYER:-----RW/FILE 22----- RFQ. NO.:-----BPH11084----- BID OPENING DATE:-----12/1/2010----- BID OPENING TIME:-----1:30 PM----- PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID: -----410-712-4996----- CONTACT PERSON (PLEASE PRINT CLEARLY): -----Peter Marotta----- ***** THIS IS THE END OF RFQ BPH11084 ***** TOTAL:						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

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** see page 1 for SIGNATURE * see note on page 75*



State of West Virginia
 Department of Administration
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 2019 Washington Street East
 Post Office Box 50130
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Request for Quotation

RFQ NUMBER
 BPH11084

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 304-558-0067

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HEALTH AND HUMAN RESOURCES
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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
11/04/2010				

BID OPENING DATE: 12/01/2010 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	GAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM NO. 1						
1. TO ADD PAGE 4 WHICH WAS INADVERTENTLY MISSED WHEN THE RFQ WAS ISSUED ORIGINALLY. 2. ADDENDUM ACKNOWLEDGEMENT IS ATTACHED. THIS DOCUMENT SHOULD BE SIGNED AND RETURNED WITH YOUR BID. FAILURE TO SIGN AND RETURN MAY RESULT IN DISQUALIFICATION OF YOUR BID.						
EXHIBIT 10						
REQUISITION NO.: BPH11084						
ADDENDUM ACKNOWLEDGEMENT						
I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.						
ADDENDUM NO.'S:						
NO. 1 ... X ...						
NO. 2						
NO. 3						
NO. 4						
NO. 5						
I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS.						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
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State of West Virginia
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Request for Quotation

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RFQ COPY
 VENDOR TYPE NAME/ADDRESS HERE
 Motorola, Inc.
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VENDOR HEALTH AND HUMAN RESOURCES
 EPH - STATE TRAUMA &
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11/04/2010				

BID OPENING DATE: 12/01/2010 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.</p> <p style="text-align: center;"> SIGNATURE Motorola, Inc. COMPANY November 30, 2010 DATE </p> <p>NOTE: THIS ADDENDUM ACKNOWLEDGEMENT SHOULD BE SUBMITTED WITH THE BID.</p> <p>REV. 09/21/2009</p> <p style="text-align: center;">END OF ADDENDUM NO. 1</p> <p style="text-align: center;">* see note on page 75</p>						

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0001	1	EA		906-29		
RADIO FOR THE STATEWIDE MEDICAL COMMAND MICROWAVE						
***** THIS IS THE END OF RFQ BPH11084 ***** TOTAL:						

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Request for Quotation

RFQ NUMBER
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PAGE
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Motorola, Inc.
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SHIP TO

HEALTH AND HUMAN RESOURCES
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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
10/31/2010				

BID OPENING DATE: **12/01/2010** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	QTY NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>THE MODEL/BRAND/SPECIFICATIONS NAMED HEREIN ESTABLISH THE ACCEPTABLE LEVEL OF QUALITY ONLY AND ARE NOT INTENDED TO REFLECT A PREFERENCE OR FAVOR ANY PARTICULAR BRAND OR VENDOR. VENDORS WHO ARE BIDDING ALTERNATES SHOULD SO STATE AND INCLUDE PERTINENT LITERATURE AND SPECIFICATIONS. FAILURE TO PROVIDE INFORMATION FOR ANY ALTERNATES MAY BE GROUNDS FOR REJECTION OF THE BID. THE STATE RESERVES THE RIGHT TO WAIVE MINOR IRREGULARITIES IN BIDS OR SPECIFICATIONS IN ACCORDANCE WITH SECTION 148-1-4(F) OF THE WEST VIRGINIA LEGISLATIVE RULES AND REGULATIONS.</p> <p>PURCHASING CARD ACCEPTANCE: THE STATE OF WEST VIRGINIA CURRENTLY UTILIZES A VISA PURCHASING CARD PROGRAM WHICH IS ISSUED THROUGH A BANK. THE SUCCESSFUL VENDOR MUST ACCEPT THE STATE OF WEST VIRGINIA VISA PURCHASING CARD FOR PAYMENT OF ALL ORDERS PLACED BY ANY STATE AGENCY AS A CONDITION OF AWARD.</p> <p style="text-align: center;">NOTICE</p> <p>A SIGNED BID MUST BE SUBMITTED TO:</p> <p style="text-align: center;">DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130</p> <p>PLEASE NOTE: A CONVENIENCE COPY WOULD BE APPRECIATED.</p> <p>THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:</p> <p>SEALED BID</p>						

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Columbia, MD 21046

HEALTH AND HUMAN RESOURCES
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DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
11/18/2010				

BID OPENING DATE: 12/01/2010	BID OPENING TIME: 01:30PM
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LINE	QUANTITY	UQP	QAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM NO. 2						
1. QUESTIONS AND ANSWERS ARE ATTACHED.						
2. ADDENDUM ACKNOWLEDGEMENT IS ATTACHED. THIS DOCUMENT SHOULD BE SIGNED AND RETURNED WITH YOUR BID. FAILURE TO SIGN AND RETURN MAY RESULT IN A DISQUALIFICATION OF YOUR BID.						
EXHIBIT 10						
REQUISITION NO.: BPH11084						
ADDENDUM ACKNOWLEDGEMENT						
I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.						
ADDENDUM NO.'S:						
NO. 1						
NO. 2 .. X						
NO. 3						
NO. 4						
NO. 5						
I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS.						

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ADDRESS CORRESPONDENCE TO ATTENTION OF
ROBERTA WAGNER
304-558-0067

RFQ COPY

TYPE NAME/ADDRESS HERE
Motorola, Inc.
7031 Columbia Gateway Drive, 3rd Floor
Columbia, MD 21046

RFQ COPY

HEALTH AND HUMAN RESOURCES
BPH - STATE TRAUMA &
EMERGENCY MEDICAL SYSTEM
190 HART FIELD ROAD
MORGANTOWN, WV
26505 **304-581-2900**

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
11/18/2010				

BID OPENING DATE	BID OPENING TIME
12/01/2010	01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.</p> <p>..... <i>J. Kelly</i> SIGNATURE</p> <p>..... Motorola, Inc. COMPANY</p> <p>..... November 30, 2010 DATE</p> <p>NOTE: THIS ADDENDUM ACKNOWLEDGEMENT SHOULD BE SUBMITTED WITH THE BID.</p> <p>REV. 09/21/2009</p> <p>END OF ADDENDUM NO. 2</p> <p><i>* see note on Page 75</i></p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
BPH11084

PAGE
3

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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
11/18/2010				

BID OPENING DATE: **12/01/2010** BID OPENING TIME: **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	EA		906-29		
RADIOS FOR THE STATEWIDE MEDICAL COMMAND MICROWAVE						
***** THIS IS THE END OF RFQ BPH11084 ***** TOTAL:						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

BPH11084 ADDENDUM:

1. **Question:** The ADP encryption in the RFP is it a proprietary technology or is it an open standard? It is our understanding that this a proprietary technology and only available through one manufacturer? Please confirm if this is correct?
Answer: *Yes it is proprietary and should read "ADP or other optional encryption capability".*

2. **Question:** Also, I noticed on the RFP that it has piggy back language. Most county, state and local municipalities do not have self maintained shops, should our RFP response also include our labor cost? The labor cost could be very expensive on some of these installs for the local municipalities or government agencies so I thought I should ask.
Answer: *No.*

3. **Question:** 2.9 devise must contain software to allow for field configuration of TDMA
Please clarify protocol required for TDMA?
Answer: *Remove references to TDMA : this also negates sections 2.10 and 2.11*

4. **Question:** 2.12 devise shall support field configuration to operate in a digital trunking system. Please clarify what digital trunking protocol is required?
Answer: *Remove references to digital trunking*

5. **Question:** Will awards be made on individual RFQ's/Attachments?
Answer: *No.*

6. **Question:** Sinclair is an Antenna and RF Conditioning product manufacturer and we are interested in bidding on your RFQ# BPH11084. Are we allowed to just bid on the antenna section or do you have to bid on the entire RFQ?
Answer: *You must bid on the entire contract. We want a single vendor for each item requested.*

REQUEST FOR QUOTATION
WV DHHR BPH STEMS RFQ#BPH11084

The West Virginia Department of Health and Human Resources (DHHR), Bureau of Public Health (BPH), State Trauma and Emergency Medical System, (STEMS), hereinafter referred to as the "Agency," desires to establish an open-end contract for the purchase of Dual-Band Mobile Radios, Dual-Band Portable Radios, Remote Control Console's, Base Station Radios, Base Station Antennas, and Service Monitors. The Agency is responsible for operating the Statewide Medical Command System that includes RF communications carried on its current microwave infrastructure. Other entities of West Virginia state government as well as counties, municipalities and Public Safety Agencies shall be able to piggy back on this contract with prior approval from the Agency.

1.0 GENERAL INFORMATION

- 1.1 It is the intent of this RFQ to establish a "Menu Bid" for Dual-Band Mobile Radios, Dual-Band Portable Radios, Remote Control Console's, Base Station Radios, Base Station Antennas, and Service Monitors.
- 1.2 The response shall be specific and complete in every detail and prepared in a simple and straight forward manner.
- 1.3 Successful bidder shall pre-pay freight costs for delivery to various locations in WV. The vendor will then be paid the actual freight costs upon submission of a copy of the original freight invoice to STEMS.
- 1.4 Quote shall include samples of pertinent warranties. Bidder must warranty product for a minimum of one (1) year.
- 1.5 Quote shall be valid for a period of One (1) year from date of opening with the option to renew for two (2) additional one (1) year periods.
- 1.6 Award of this contract will go to a single vendor who meets all of the specifications as outlined in the RFQ at the lowest price.
- 1.7 The Agency will issue a State contract order form to the vendor for items covered by this contract with item quantities and location for delivery.
- 1.8 Payment to vendor will be made following delivery of equipment ordered and once a final complete invoice is received. Invoice must include copies of the original freight invoice. Payment will be made within sixty (60) days of invoice.

2.0 DETAILED SPECIFICATIONS FOR DUAL-BAND MOBILE RADIOS, DUAL-BAND PORTABLE RADIOS, REMOTE CONTROL CONSOLETTES, BASE STATION RADIOS, BASE STATION ANTENNAS, and SERVICE MONITORS.

- 2.1 **See Attachment A – Dual Band Mobile Radio**
 - 2.1.1 Attachment A1 Dual Band Mobile Cost Sheet
- 2.2 **See Attachment B – Dual Band Portable Radio**
 - 2.2.1 Attachment B1 Dual Band Portable Cost Sheet
- 2.3 **See Attachment C – Remote Control Consolette**
 - 2.3.1 Attachment C1 Remote Control Consolette Cost Sheet
- 2.4 **See Attachment D – Base Station Radios**
 - 2.4.1 Attachment D1 Base Station Radios Cost Sheet
- 2.5 **See Attachment E – Base Station Antennas**
 - 2.5.1 Attachment E1 Base Station Antennas Cost Sheet
- 2.6 **See Attachment F – Service Monitor**
 - 2.6.1 Attachment F1 Service Monitor Cost Sheet

STATE OF WEST VIRGINIA
Purchasing Division**PURCHASING AFFIDAVIT**

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

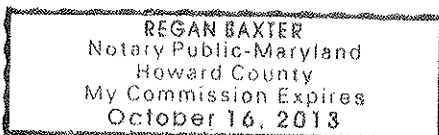
"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code* §61-5-3), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATUREVendor's Name: Motorola, Inc., Timothy D. Askeland, Division Controller, USFGMDAuthorized Signature: _____ Date: November 30, 2010State of MarylandCounty of Howard, to-wit:Taken, subscribed, and sworn to before me this 30th day of November, 2010.My Commission expires October 16, 2013.**AFFIX SEAL HERE**

NOTARY PUBLIC



ATTACHMENT
P.O.# BPH11084

This agreement constitutes the entire agreement between the parties, and there are no other terms and conditions applicable to the licenses granted hereunder.*

Agreed

J. J. Wolf 11/30/10
Signature Date

Division Controller, USFGMD
Title

Motorola, Inc.
Company Name

Signature Date

Title

Agency/Division

* Motorola's proposal is subject to Motorola's Clarifications to the terms and conditions set forth in the West Virginia Department of Health and Human Resources Request for Quotation (BPH11084) and to the attached and incorporated Master Purchase Agreement and Software Licensing Agreement, or, in the alternative, a negotiated version thereof.

AGREEMENT ADDENDUM

In the event of conflict between this addendum and the agreement, this addendum shall control:

1. **DISPUTES** - Any references in the agreement to arbitration or to the jurisdiction of any court are hereby deleted. Disputes arising out of the agreement shall be presented to the West Virginia Court of Claims.
2. **HOLD HARMLESS** - Any clause requiring the Agency to indemnify or hold harmless any party is hereby deleted in its entirety.
3. **GOVERNING LAW** - The agreement shall be governed by the laws of the State of West Virginia. This provision replaces any references to any other State's governing law.
4. **TAXES** - Provisions in the agreement requiring the Agency to pay taxes are deleted. As a State entity, the Agency is exempt from Federal, State, and local taxes and will not pay taxes for any Vendor including individuals, nor will the Agency file any tax returns or reports on behalf of Vendor or any other party.
5. **PAYMENT** - Any references to prepayment are deleted. Payment will be in arrears.
6. **INTEREST** - Should the agreement include a provision for interest on late payments, the Agency agrees to pay the maximum legal rate under West Virginia law. All other references to interest or late charges are deleted.
7. **RECOUPMENT** - Any language in the agreement waiving the Agency's right to set-off, counterclaim, recoupment, or other defense is hereby deleted.
8. **FISCAL YEAR FUNDING** - Service performed under the agreement may be continued in succeeding fiscal years for the term of the agreement, contingent upon funds being appropriated by the Legislature or otherwise being available for this service. In the event funds are not appropriated or otherwise available for this service, the agreement shall terminate without penalty on June 30. After that date, the agreement becomes of no effect and is null and void. However, the Agency agrees to use its best efforts to have the amounts contemplated under the agreement included in its budget. Non-appropriation or non-funding shall not be considered an event of default.
9. **STATUTE OF LIMITATION** - Any clauses limiting the time in which the Agency may bring suit against the Vendor, lessor, individual, or any other party are deleted.
10. **SIMILAR SERVICES** - Any provisions limiting the Agency's right to obtain similar services or equipment in the event of default or non-funding during the term of the agreement are hereby deleted.
11. **ATTORNEY FEES** - The Agency recognizes an obligation to pay attorney's fees or costs only when assessed by a court of competent jurisdiction. Any other provision is invalid and considered null and void.
12. **ASSIGNMENT** - Notwithstanding any clause to the contrary, the Agency reserves the right to assign the agreement to another State of West Virginia agency, board or commission upon thirty (30) days written notice to the Vendor and Vendor shall obtain the written consent of Agency prior to assigning the agreement.
13. **LIMITATION OF LIABILITY** - ~~The Agency, as a State entity, cannot agree to assume the potential liability of a Vendor. Accordingly, any provision limiting the Vendor's liability for direct damages to a certain dollar amount or to the amount of the agreement is hereby deleted. Limitations on special, incidental or consequential damages are acceptable. In addition, any limitation is null and void to the extent that it precludes any action for injury to persons or for damages to personal property.~~ NA
14. **RIGHT TO TERMINATE** - Agency shall have the right to terminate the agreement upon thirty (30) days written notice to Vendor. Agency agrees to pay Vendor for services rendered or goods received prior to the effective date of termination.
15. **TERMINATION CHARGES** - Any provision requiring the Agency to pay a fixed amount or liquidated damages upon termination of the agreement is hereby deleted. The Agency may only agree to reimburse a Vendor for actual costs incurred or losses sustained during the current fiscal year due to wrongful termination by the Agency prior to the end of any current agreement term.
16. **RENEWAL** - Any reference to automatic renewal is hereby deleted. The agreement may be renewed only upon mutual written agreement of the parties.
17. **INSURANCE** - Any provision requiring the Agency to insure equipment or property of any kind and name the Vendor as beneficiary or as an additional insured is hereby deleted.
18. **RIGHT TO NOTICE** - Any provision for repossession of equipment without notice is hereby deleted. However, the Agency does recognize a right of repossession with notice.
19. **ACCELERATION** - Any reference to acceleration of payments in the event of default or non-funding is hereby deleted.
20. **CONFIDENTIALITY** - Any provision regarding confidentiality of the terms and conditions of the agreement is hereby deleted. State contracts are public records under the West Virginia Freedom of Information Act.
21. **AMENDMENTS** - All amendments, modifications, alterations or changes to the agreement shall be in writing and signed by both parties. No amendment, modification, alteration or change may be made to this addendum without the express written approval of the Purchasing Division and the Attorney General.

ACCEPTED BY:
STATE OF WEST VIRGINIA

VENDOR

Spending Unit: _____

Company Name: Motorola, Inc.

Signed: _____

Signed: 

Title: _____

Title: Timothy D. Askeland, Division Controller, USFGMD

Date: _____

Date: November 30, 2010

Agreement Addendum to WV-96

The vendor and the agency agree to delete Paragraph 13 of the WV-96 Agreement Addendum and insert in lieu thereof the following:

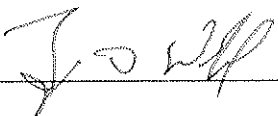
“Vendor agrees to indemnify Agency for the negligent or intentional acts of its officers, employees, servants and agent in connection with the performance of this Agreement. Except for claims related to personal injury, death, or damages to personal property, Vendor’s total liability shall be limited to its warranty and the contract value. In no event shall Vendor be liable for special, consequential, or incidental damages.”

ACCEPTED BY:

WEST VIRGINIA OFFICE
OF HOMELAND SECURITY AND
EMERGENCY MANAGEMENT

MOTOROLA, Inc.

Signed: _____


Signed: 

Title: _____

Title: Division Controller, USFGMD

Date: _____

Date: November 30, 2010

APPROVED AS TO FORM PRIOR TO
ACKNOWLEDGEMENT THEREOF, THIS
2nd day of February, 2009
DARRELL V. McGRAW, JR.
ATTORNEY GENERAL
By: 
DEPUTY ATTORNEY GENERAL

State of West Virginia

VENDOR PREFERENCE CERTIFICATE

Certification and application* is hereby made for Preference in accordance with West Virginia Code, §5A-3-37. (Does not apply to construction contracts). West Virginia Code, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the West Virginia Code. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Resident Vendor Preference, if applicable.

1. Application is made for 2.5% resident vendor preference for the reason checked:

- Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; or, Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or 80% of the ownership interest of Bidder is held by another individual, partnership, association or corporation resident vendor who has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or, Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; or,

2. Application is made for 2.5% resident vendor preference for the reason checked:

Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,

3. Application is made for 2.5% resident vendor preference for the reason checked:

Bidder is a nonresident vendor employing a minimum of one hundred state residents or is a nonresident vendor with an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia employing a minimum of one hundred state residents who certifies that, during the life of the contract, on average at least 75% of the employees or Bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,

4. Application is made for 5% resident vendor preference for the reason checked:

Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; or,

5. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:

Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; or,

6. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:

Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) reject the bid; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: Motorola, Inc.

Signed: [Signature]

Date: November 30, 2010

Title: Timothy D. Askeland, Division Controller, USFGMD

*Check any combination of preference consideration(s) indicated above, which you are entitled to receive.

Attachment A

**Request for Quotation
For
Dual Band Mobile Radio**

West Virginia

**Department of Health and Human Resources (DHHR),
Bureau for Public Health (BPH), State Trauma and
Emergency Medical System (STEMS)**

1 General Description

The Department of Health and Human Resources, State Trauma and Emergency Medical System, desires to establish a contract for the purchase of a Federal Communications Commission, FCC, mandated Narrow Band Digital Project 25, P25, Compliant Dual Band Mobile Radio equipment and related accessories. Other entities of West Virginia state government as well as counties, municipalities and Public Safety Agencies shall be able to piggy back on this contract with prior approval from the Agency.

A Dual Band Mobile radio is a device that in professional two-way radio systems, allows a user to establish contact with personnel on similar devices in one of two distinct frequency bands on a channel assigned within that band, by the pressing of a single button. It is one end of the communications link.

2 Requirements

Item	Requirement	Compliance	
		Yes	No
	General Operation-Dual Band Mobile Radio		
2.1	The device shall operate as a Dual Band Digital Mobile radio, organized into a primary band Ultra High Frequency, UHF, and secondary band Very High Frequency, VHF, operation.	X	
2.2	The Primary Band shall support UHF frequency range of 403 to 470 mega hertz, mhz.	X	
2.3	In primary Band mode, the device shall be P-25 Digital Common Air Interface, CAI, compliant and be able to operate on the West Virginia Interoperable Radio Project, WVIRP, system.	X	
2.4	The Secondary Band shall support VHF frequency range of 136 to 174 mhz.	X	
2.5	The device shall support Conventional Push to talk, PTT, transmissions.	X	
2.6	The device shall support P-25 Trunk PTT transmissions.	X	
2.7	The device shall have a minimum output power of 40 watts.	X	
2.8	The device shall support FCC Narrow Band.	X	
2.8.1	The device shall provide 25 Khz +/- 5 Khz channel spacing.	X	
2.8.2	The device shall provide 12.5 Khz +/- 2.5 Khz channel spacing.	X	
2.8.3	The device shall have the capability to provide 6.25 Khz +/- 2.5 Khz channel spacing.	X	
2.9	The device shall include any other software necessary to enable seamless roaming operation on the WVIRP radio system presently being installed in West Virginia, Dept of Health and Human Resources / STEMS Medical Command Network, and shall be capable of supporting multiple zone operation, and West Virginia Department of Natural Resources, WV DNR, Law Enforcement Agency.	X	

Requirements continued			
2.10	The device shall be capable of receiving and transmitting on a minimum of 512 channels.	X	
2.11	All currently licensable frequencies shall be considered acceptable to the unit.	X	
2.12	Radio shall be capable via programming of wide band and narrow band operation (12.5 khz/25khz) respectively and capable of storing more than 512 channels.	X	
2.13	Each channel shall be individually programmable with regard to wideband/narrowband operation, digital/analog operation, and /or trunked/non-trunked operation.	X	
2.14	There shall be no limitations in the radio with regard to what channels may be programmed into the radio in a given bank and in a particular mix of channels/talk groups	X	
2.15	The device shall support Zone selection to allow access to more groups of channels.	X	
2.16	The device shall support UHF and VHF analog Trunk.	X	
2.17	The device shall support UHF and VHF analog conventional.	X	
2.18	Radio shall have programmable encode and decode capability for continuous tone coded squelch system, CTCSS, tones and digital coded squelch with a minimum of one pair of tones, not necessarily the same, for each programmed channel.	X	
2.19	Radio shall be capable of using and storing user defined scan lists.	X	
2.20	Predefined Scan lists may be edited by the user utilizing buttons on the radio.	X	
2.21	Scan lists shall be able to be established at the user/keypad level.	X	
2.22	Scanning will be enabled and disabled by depressing no more than one button, one time.	X	
2.23	The device shall operate from standard vehicle 13.8v Direct Current ,DC, power source.	X	
2.24	Radio shall include necessary hardware and software to support Advanced Encryption Standard, AES, encryption.	X	

Requirements continued			
2.25	The radio shall include the necessary hardware and software to support Advanced Digital Privacy, ADP, encryption.	X	
2.26	Radio shall be capable of holding multiple encryption keys.	X	
2.26.1	All encryption key loading shall be facilitated by a Motorola KVL3000 Plus.	X	
2.27	A keyloading cable compatible with the Motorola KVL3000 Plus shall be included as an option.	X	
2.28	The device shall have the capability to support P-25 phase II Time Division Multiple Access, TDMA, operation.	X	
2.29	The device shall have the ability to support Over the Air Re-keying.	X	
2.30	The device shall have the ability to support Programming over P25, POP25.	X	
2.31	The device shall have the capability to support autonomous Global Positioning System, GPS, operation.	X	
2.32	The device shall be capable of a minimum of 7.5watts of audio output.	X	
2.33	The device shall support an external speaker.	X	
2.34	The device shall support a standard public safety microphone.	X	
2.35	The device shall support remote mount configurations.	X	
2.36	The device shall support dual control head configurations.	X	
2.37	The device shall support remote control head operation.	X	
2.38	The device shall be in dash mountable.	X	
2.39	The device shall be under dash mountable.	X	

3 Common Requirements

Item	Requirement	Compliance	
		Yes	No
3.1	Environmental & Physical		
3.1.1	The device shall meet Ingress Protection Rating, IP54 standard.	X	
3.1.2	The device shall meet performance specifications over the temperature range of -30° C to 60° C.	X	
3.1.3	The device shall meet performance criteria of Military 810 C, D, E and F. Designed and tested to meet the U.S. military standards approval for Shock, Vibration, Rain & Dust, ensuring its ability to perform in rigorous work environments for mobile radios.	X	
3.1.4	The device shall have FCC type acceptance for full operation.	X	
3.1.5	The device shall meet RoHS. (Restriction of Hazardous Substances)	X	
3.1.6	The device shall have a comprehensive 3 year warranty.	X	
3.1.7	The device shall have maximum dimensions of 7.5"w x 3.5"h x 11"d	X	
3.1.8	The device shall not weigh more than 7 pounds.	X	
3.1.9	The front panel of the display shall not have a slope greater than 20 degrees from vertical.	X	
3.2	USER Interface-Display		
3.2.1	Radio shall have an alphanumeric display with a minimum of 2 rows of 14 characters each.	X	
3.2.2	Radio shall have Identification, ID, display capability.	X	

Common Requirements continued			
3.2.3	Channel indication shall be by way of an alphanumeric display containing a minimum of 14 digits.	X	
3.2.4	Radio shall have a backlit display	X	
3.3	USER Interface-Function Access		
3.3.1	Radio shall have a minimum of 5 programmable function buttons.	X	
3.3.2	Radio shall have a menu navigational button capability.	X	
3.3.3	The device shall have an emergency button with a clearly distinctive color.	X	

4 Electrical Parameters

Item	Requirement	Compliance	
		Yes	No
4.1	Transmitter Specifications		
4.1.1	The transmitter shall maintain ± 0.0002 % frequency stability	X	
4.1.2	The transmitter shall maintain ± 5 kHz / ± 2.5 kHz modulation limiting.	X	
4.1.3	The transmitter shall have an audio response of +1, -3 dB.	X	
4.1.4	The transmitter shall have a FM Hum and noise rejection of 40 dB.	X	
4.1.5	The transmitter shall have an audio distortion of less than 2%.	X	
4.2	Receiver Specifications		
4.2.1	The receiver shall have ± 0.0002 % frequency stability.	X	
4.2.2	The receiver in Band shall have an analog sensitivity at 12 db Sinad of 0.3 microV.	X	
4.2.3	The receiver in Band shall have a digital sensitivity at 1% BER of 0.4 microV, and at 5% BER of 0.3 microV.	X	
4.2.4	The receiver in the UHF Band shall have Selectivity at 25khz of 90 dB, at 12.5khz of 70 dB.	X	
4.2.5	The receiver in Band shall have audio distortion of no more than 3 %.	X	
4.2.6	The receiver in UHF and VHF bands shall have 85dB of intermodulation rejection.	X	

5 General Capability

Item	Requirement	Compliance	
		Yes	No
5.1	The vendor shall provide installation manual, user manual and basic repair shop service manual.	X	
5.2	All programming operation software support shall operate on a Microsoft Windows pc with operating systems 2000/XP/Vista/Windows 7.	X	
5.3	The device shall be field software upgradeable.	X	
5.4	All features that are placed into the device by way of programming shall remain for the life of the radio	X	
5.5	Any lost feature (i.e., No. of Channels, type of radio, etc.) will be replaced at no charge during the warranty period.	X	
5.6	All firmware needed to correct radio product defects as identified by the user agency must be provided for free during the warranty period. This does not include enhancements or addition of features.	X	
5.7	All programming software for code-plug type of data shall be free of charge throughout the warranty period of the device.	X	
5.8	The device shall include any other software necessary to enable seamless roaming operation on the WVIRP radio system presently being installed in West Virginia, Dept of Health and Human Resources / STEMS Medical Command Network, and shall be capable of supporting multiple zone operation, and WV DNR Law Enforcement Agency.	X	
5.9	The vendor shall make available for purchase all programming software and cabling necessary to program the device.	X	
5.10	The vendor shall make available for purchase a version with AES encryption configuration.	X	

General Capability continued			
5.11	The vendor shall make available for purchase a version with ADP encryption configuration.	X	
5.12	The vendor shall make available for purchase a version with no encryption configuration.	X	
5.13	The vendor shall have a 100 watt RF power version for purchase.	X	

6 Accessories

Item	Requirement	Compliance	
		Yes	No
6.1	A remote microphone with coiled cord shall be provided.	X	
6.1.1	The microphone cable shall be capable of extending to a minimum of 24 inches.	X	
6.1.2	The microphone shall be available as a separate purchasable item.	X	
6.1.3	The microphone shall include a clip for mounting purposes.	X	
6.2	The vendor shall make available for purchase antennae for UHF R1 and VHF frequencies.	X	
6.3	The vendor shall make available for purchase an externally mounted speaker.	X	

**RFQ# BPH11084
P25 Dual Band VHF and UHF Digital Mobile Radio
Attachment A: Cost Sheet**

The vendor must provide pricing inclusive of all associated costs for the following items including the cost of delivery. The estimated quantities contained on the cost sheet are intended for bid evaluation purposes only. Actual quantities may vary based upon the needs of the agency. Vendors should complete this pricing sheet in lieu of submission of manufacturer's quotes.

TIER	Description	Unit Cost	Estimated Qty.	Extended Cost
1	Digital Dual Band Mobile with: AES encryption Dash Mount	\$ 5,480.00	20	\$109,600.00
2	Digital Dual Band Mobile with: AES encryption Remote Mount	\$ 5,617.60	5	\$28,088.00
3	Digital Dual Band Mobile Basic: AES Encryption Remote Mount with Dual Control Head	\$ 5,965.60	5	\$29,828.00
4	Digital Dual Band Mobile Basic: No encryption Dash Mount	\$ 4,836.00	10	\$48,360.00
<i>Options for Items 1-4</i>				
A)	Remote Microphone	\$ 60.00	40	\$2,400.00
B)	External Speaker	\$ 48.40	40	\$1,936.00
C)	UHF Antenna	\$ 46.40	40	\$1,856.00
D)	VHF Antenna	\$ 10.80	40	\$432.00
E)	Hand Held Full function Control Head	\$ 756.80	5	\$3,784.00
F)	Encryption Key Loader cable (for KVL3000+)	\$ 100.40	5	\$502.00
G)	Programming Software	\$ 212.00	5	\$1,060.00
H)	Programming Cable	\$ 36.40	5	\$182.00
I)	High Power (100 watt) transmitter cost adder onto Tier 2 or 3 costing	\$ 162.40	20	\$3,248.00
J)	Hand Held Full function Control Head cost adder onto tier 2 package costing	\$ 353.60	0	\$0.00
Total Bid:				\$227,846.00

**RFQ# BPH11084
P25 Dual Band VHF and UHF Digital Mobile Radio
Attachment A: Equipment List**

The vendor must provide manufacturer, model number, and part number for all the equipment bid. Vendors should include, with their bid, a copy of the manufacturer's product sheet and any other supporting documentation which demonstrates the vendor's adherence to the mandatory specifications as outlined in the specifications.

TIER	Description	Manufacturer	Model Number	Part Number /Configuration Codes
1	Digital Dual Band Mobile with: AES encryption Dash Mount	Motorola	APX 7500	M30TSS9PW1 N, GA00341, GA00306, GA00579, G806, G51, QAO1749, G361, G442, G444, G66, G300, G431, W22, B18, W969, G843, G78
2	Digital Dual Band Mobile with: AES encryption Remote Mount	Motorola	APX 7500	M30TSS9PW1 N, GA00341, GA00306, GA00579, G806, G51, QAO1749, G361, G442, G444, G67, G300, G431, W22, B18, W969, G843, G78
3	Digital Dual Band Mobile Basic: AES Encryption Remote Mount with Dual Control Head	Motorola	APX 7500	M30TSS9PW1 N, GA00341, GA00306, GA00579, G806, G51, QAO1749, G361, G442, G444, GA00092, G628, G628, G300, G431, W22, W22, B18, B18, W969, G843, G78
4	Digital Dual Band Mobile Basic: No encryption Dash Mount	Motorola	APX 7500	M30TSS9PW1 N, GA00341, GA00306, GA00579, G806, G51, QAO1749, G361, G442, G444, G66, G300, G431, W22, B18, G78
<i>Options for items 1-4</i>				
A)	Remote Microphone			HMN1090B
B)	External Speaker			HSN4038
C)	UHF Antenna			G431
D)	VHF Antenna			G300
E)	Hand Held Full function Control Head			G72
F)	Encryption Key Loader cable (for KVL3000+)			HKN6182/TKN8531C
G)	Programming Software			RVN5224
H)	Programming Cable			HKN6184
I)	High Power (100 watt) transmitter onto Tier 2 or 3 device			M30TSS9PW1 N, GA00341, GA00306, GA00579, G806, G51, QAO1749, G361, G442, G444, G300, G431, W22, B18, W969, G843, G78
J)	Hand Held Full function Control Head package onto tier 2			M30TSS9PW1 N, GA00341, GA00306, GA00579, G806, G51, QAO1749, G361, G444, G300, G431, W22, B18, W969, G843, G78, G72, G90

APX™ 7500

Project 25 Multi-Band Mobile Radio



STANDARD FEATURES

Available in 700/800 MHz and VHF bands

Up to 1250 Channels

Optional multi-band operation

Trunking Standards supported:

- Clear or digital encrypted ASTRO® 25 Trunked Operation
- Capable of SmartZone®, SmartZone Omnilink, SmartNet®

Analog MDC-1200 and Digital APCO P25 Conventional System Configurations

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

Embedded digital signaling (ASTRO and ASTRO 25)

Integrated GPS capable

Integrated Encryption Hardware

Seamless wideband scan

Intelligent lighting

Radio profiles

Unified Call List

Expansion Slot Standard

Meets applicable MIL-specs 810C, D, E, F and G

Ships standard IP54

Utilizes Windows XP and Vista Customer Programming Software (CPS)

- Supports USB Communications
- Built in FLASHport™ support

Re-use of most XTL™ accessories

OPTIONAL FEATURES

Enhanced Encryption Software Options

Programming over Project 25 (POP25)

Text Messaging

Over the Air Re-Key (OTAR)

12 character RF ID asset tracking

The APX 7500 mobile exemplifies Motorola's commitment to meet the voice and data demands of today's first responders in mission critical environments—to enable, anywhere, anyplace, anytime connectivity. With integrated voice and data capabilities, these radios offer improved communications between multiple agencies, as well as neighboring communities, from everyday operations to disaster response.

Motorola's newest P25 mobile is multi-band (700/800 MHz and VHF), communicates with current and future networks (FDMA and TDMA)



SPECIFICATION SHEET

APX 7500
Project 25 Multi-Band Mobile Radio

TRANSMITTER – TYPICAL PERFORMANCE SPECIFICATIONS

	700MHz	800MHz	VHF
Frequency Range/Bandsplits	764-776 794-806	806-824 851-870	136-174
Channel Spacing	25/12.5 kHz	25/20/12.5 kHz	30/25/12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj*	10-30 Watts	10-35 Watts	25-100 Watts
Frequency Stability* (-30°C to +60°C; +25°C Ref.)	±0.00015 %	±0.00015 %	±0.0002 %
Modulation Limiting*	±5 kHz/±2.5 kHz	±5 kHz/±4 kHz (NPSPEC) /±2.5 kHz	±5 kHz/±2.5 kHz
Modulation Fidelity (C4FM) 12.5kHz Digital Channel	±2.8 kHz	±2.8 kHz	±2.8 kHz
Emissions*	Conducted* -70/-85 dBc	Radiated* -20/-40 dBm	Conducted -85 dBc
Audio Response*	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)
FM Hum & Noise (25 & 20 KHz/12.5 KHz)	40/34 dB	40/34 dB	50/40 dB
Audio Distortion*	2%	2%	2%

RECEIVER – TYPICAL PERFORMANCE SPECIFICATIONS

	700MHz	800MHz	VHF
Frequency Range/Bandsplits	764-776	851-870	136-174 MHz
Channel Spacing	25/12.5 kHz	25/20/12.5 kHz	30/25/12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at 3% distortion*	7.5 W or 13 W **	7.5 W or 13 W **	7.5 W or 13 W **
Frequency Stability* (-30°C to +60°C; +25°C Ref.)	±0.00015 %	±0.00015 %	±0.0002 %
Analog Sensitivity* 12 dB SINAD	0.25 µV	0.25 µV	Pre-Amp 0.2 µV
Digital Sensitivity 1% BER	0.3 µV	0.3 µV	Standard 0.3 µV
5% BER	0.25 µV	0.25 µV	0.2 µV 0.3 µV
Intermodulation	80 dB	80 dB	80 dB 85 dB
Spurious Rejection	90 dB	90 dB	90 dB
Audio Distortion at rated*	3.00%	3.00%	3.00%
Selectivity* 25 kHz/30 kHz	80 dB	80 dB	90 dB
12.5 kHz	65 dB	65 dB	70 dB

GPS SPECIFICATIONS

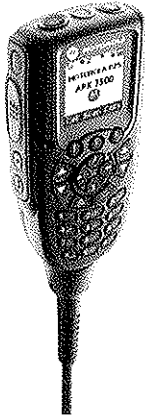
Channels	12
Tracking Sensitivity	-153 dBm
Accuracy**	<10 meters (95%)
Cold Start	<60 seconds (95%)
Hot Start	<10 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted) GPS

POWER AND BATTERY DRAIN

Model Type	136-174 MHz 764-870 MHz
Minimum RF Power Output	10-35 Watt (764-870 MHz) 25-100 Watt (136-174 MHz)
Operation	13.8V DC ±20% Negative Ground
Standby at 13.8V	764-870 MHz (10-35 Watt) 0.85A 136-174 MHz (25-100 Watt) 0.85A
Receive at Rate Audio at 13.8V	764-870 MHz (10-35 Watt) 3.2A 136-174 MHz (25-100 Watt) 3.2A
Transmit Current (A) at Rated Power (W)	764-870 MHz (10-35 Watt) 12A (35W), 8A (15W) 136-174 MHz (25-100 Watt) 20A (100W)

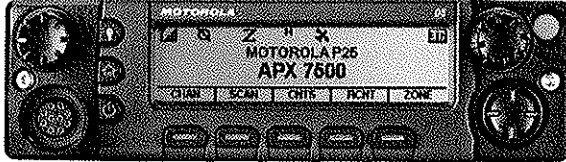
SPECIFICATION SHEET

APX 7500
Project 25 Multi-Band Mobile Radio



O3 HANDHELD CONTROL HEAD FEATURES

- 4 lines: 2 lines text (14 characters), 1 line icons, 1 line soft menu keys
- 3 x 6 keypad with up to 24 programmable soft keys
- Cellular style user interface and color display



O5 CONTROL HEAD FEATURES

- Tri-color LCD display
- 4 lines: 2 lines text (14 characters), 1 line icons, 1 line soft menu keys
- 3 x 6 keypad microphone accessory with 3 programmable soft keys
- 5 programmable soft key buttons and 5 scroll-through menus with up to 24 programmable soft keys
- Multiple control head configuration to fully control a single radio with up to 4 different wired locations
- Motorcycle configuration available

O9 INTEGRATED CONTROL HEAD AVAILABLE AS A FUTURE RELEASE.

SIGNALLING (ASTRO MODE)

Signalling Rate	9.6 kbps
Digital ID Capacity	10,000,000 Conventional / 48,000 Trunking
Digital Network Access Codes	4,096 network site addresses
ASTRO Digital User Group Addresses	4,096 network site addresses
Project 25 – CAI Digital User Group Addresses	65,000 Conventional / 4,094 Trunking
Error Correction Techniques	Golay, BCH, Reed-Solomon codes
Data Access Control	Slotted CSMA: Utilizes infrastructure-sourced data status bits embedded in both voice and data transmissions.

MOBILE APX7500

Dimensions	Mid Power Radio Transceiver
	2" x 7" x 8.6" (50.8 x 177.8 x 218.4 mm)
	O5 Control Head
	2" x 7" x 2.5" (50.8 x 180.3 x 63.5 mm)
	Mid Power Radio Transceiver and O5 Control Head–Dash Mount
	2" x 7" x 9.6" (50.8 x 180.3 x 243.8 mm)
Weight	Mid Power Radio Transceiver and Remote Mount
	2.0" x 7" x 9.6" (50.8 x 180.3 x 243.8 mm)
	High Power Radio Transceiver
	2.9" x 11.5" x 8.8" (74 x 293 x 223 mm)
	High Power Radio Transceiver with Handle
	3.4" x 11.5" x 8.8" (87 x 293 x 223 mm)

SPECIFICATION SHEET

APX 7500
Project 25 Multi-Band Mobile Radio

MOBILE MILITARY STANDARDS 810 C, D, E, F, & G

	MIL-STD-810C	MIL-STD-810D	MIL-STD-810E	MIL-STD-810F	MIL-STD-810G
	Method Proc./Cat.	Method Proc./Cat.	Method Proc./Cat.	Method Proc./Cat.	Method Proc./Cat.
Low Pressure	500.1 I	500.2 II	500.3 II	500.4 II	500.5 II
High Temperature	501.1 I,II	501.2 I/A1,II/A1	501.3 I/A1,II/A1	501.4 I/Hot, II/Hot	501.5 I-A1, II
Low Temperature	502.1 I	502.2 I/C3, II/C1	502.3 I/C3, II/C1	502.4 I/C3, II/C1	502.5 I-C3, II
Temperature Shock	503.1 --	503.2 I/A1C3	503.3 I/A1C3	503.4 I	503.5 I-C
Solar Radiation	505.1 II	505.2 I	505.3 I	505.4 I	505.5 I-A1
Rain	506.1 I,II	506.2 I,II	506.3 I,II	506.4 I,III	506.5 I, III
Humidity	507.1 II	507.2 II	507.3 II	507.4 --	507.5 II - Aggravated
Salt Fog	509.1 --	509.2 --	509.3 --	509.4 --	509.5 --
Blowing Dust	510.1 I	510.2 I,II	510.3 I,II	510.4 I,II	510.5 I, II
Vibration	514.1 VIII/F, Curve-W	514.3 I/10, II/3	514.4 I/10, II/3	514.5 I/24	514.6 I-cat.24
Shock	516.1 I,II	516.3 I,IV	516.4 I,IV	516.5 I,IV	516.6 I, V, VI

ENCRYPTION

Supported Encryption Algorithms	ADP, AES, DES, DES-XL, DES-OFB, DVP-XL
Encryption Algorithm Capacity	7
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 48 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CA1 300 mSec
Encryption Keying	Key Loader
Synchronization	XL -- Counter Addressing OFB -- Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-2 FIPS 197

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-30°C / +60°C
Storage Temperature	-40°C / +85°C
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water & Dust Intrusion	IP54, MIL-STD

FCC TYPE ACCEPTANCE ID

Band	Output Power	Transmitter Number
136-174 MHz	25-100 Watt	AZ492FT3821
764-870 MHz	10-35 Watt	AZ492FT5858

* Measured in the analog mode per TIA/EIA 603 under nominal conditions
 ** Accuracy specs are for long-term tracking (95th percentile values >5 satellites visible at a nominal -130 dBm signal strength)
 † Specs includes performance for the non-GNSS/GNSS bands
 †† Output power in to 8 and 3.2 Ohm external speakers respectively

Specifications subject to change without notice. All specifications shown are typical.
Radio meets applicable regulatory requirements.



Motorola, Inc. 1301 E. Algonquin Road, Schaumburg, Illinois 60196 U.S.A. www.motorola.com/governmentandenterprise 1-800-367-2346

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R3-1-2037A

Attachment B

**Request for Quotation
For
Dual Band Portable Radio**

West Virginia

**Department of Health and Human Resources (DHHR),
Bureau for Public Health (BPH) State Trauma and
Emergency Medical System (STEMS)**

1 General Description

The Department of Health and Human Resources, State Trauma and Emergency Medical System, desires to establish a contract for the purchase of a FCC mandated Narrow Band Digital P25 Compliant Dual Band Portable handheld Radio equipment and related accessories. Other entities of West Virginia state government as well as counties, municipalities and Public Safety Agencies shall be able to piggy back on this contract with prior approval from the Agency.

A Dual Band Portable radio is a device that in professional two-way radio systems, allows a user to establish contact with personnel on similar devices in one of two distinct frequency bands on a channel assigned within that band, by the pressing of a single button. It is one end of the communications link.

2 Requirements

Item	Requirement	Compliance	
		Yes	No
General Operation-Dual Band Portable Radio			
2.1	The device shall operate as a Dual Band Portable radio, organized into a primary band Ultra High Frequency, UHF, and secondary band Very High Frequency, VHF, operation.	X	
2.2	The Primary Band shall support UHF frequency range of 403 to 470 mhz.	X	
2.3	In primary Band mode, the device shall be Project 25, P-25, Digital Common Air Interface, CAI, compliant and be able to operate on the West Virginia Interoperable Radio Project, WVIRP, system.	X	
2.4	The Secondary Band shall support VHF frequency range of 136 to 174 mhz.	X	
2.5	The device shall support Conventional Push to Talk, PTT, transmissions.	X	
2.6	The device shall support P-25 Trunk PTT transmissions.	X	
2.7	The device shall have a programmable output power of 2- 5 watts.	X	
2.8	The device shall support Federal Communications Commission, FCC, Narrow Band requirements.	X	
2.8.1	The device shall provide 25 Khz +/- 5 Khz channel spacing.	X	
2.8.2	The device shall provide 12.5 Khz +/- 2.5 Khz channel spacing.	X	
2.8.3	The device shall have the capability to provide 6.25 Khz +/- 2.5 Khz channel spacing.	X	

	Requirements continued		
2.9	The device shall include any other software necessary to enable seamless roaming operation on the WVIRP radio system presently being installed in West Virginia, and shall be capable of supporting multiple zone operation, Dept of Health and Human Resources / STEMS Medical Command Network and West Virginia Department of Natural Resources, WV DNR, Law Enforcement Agency.	X	
2.10	The device shall be capable of receiving and transmitting on a minimum of 512 channels.	X	
2.11	All currently licensable frequencies shall be considered acceptable to the unit.	X	
2.12	Radio shall be capable via programming of wide band and narrow band operation (12.5 khz/25khz) respectively and capable of storing more than 512 channels.	X	
2.13	Each channel shall be individually programmable with regard to wideband/narrowband operation, digital/analog operation, and /or trunked/non-trunked operation.	X	
2.14	There shall be no limitations in the radio with regard to what channels may be programmed into the radio in a given bank and in a particular mix of channels/ talk groups.	X	
2.15	The device shall support Zone selection to allow access to more groups of channels.	X	
2.16	The device shall support UHF and VHF analog Trunk.	X	
2.17	The device shall support UHF and VHF analog conventional.	X	
2.18	Radio shall have programmable encode and decode capability for Continuous Tone Coded Squelch System, CTCSS, tones and digital coded squelch with a minimum of one pair of tones, not necessarily the same, for each programmed channel.	X	
2.19	Radio shall be capable of using and storing user defined scan lists.	X	
2.20	Predefined Scan lists may be edited by the user utilizing buttons on the radio.	X	

	Requirements continued		
2.21	Scan lists shall be able to be established at the user/keypad level.	X	
2.22	Scanning will be enabled and disabled by depressing no more than one button, one time.	X	
2.23	Battery life shall have the capability to be 8 hours or greater. A FM Intrinsically safe Lithium ION battery is acceptable. Nickel Cadmium batteries are not acceptable.	X	
2.23.1	A rapid charge battery shall be provided and be able to achieve full capacity in four hours.	X	
2.23.2	The device shall support duty cycle operation of 5/5/90 per Telecommunications Industry Association/Electronic Industry Alliance, TIA/EIA, Specification 903 (5% Receive/ 5% Transmit/ 90% standby)	X	
2.24	Radio shall include the necessary hardware and software to support Advanced Encryption Standard, AES, encryption.	X	
2.25	Radio shall include the necessary hardware and software to support Advanced Digital Privacy, ADP, encryption.	X	
2.26	Radio shall be capable of holding multiple encryption keys.	X	
2.27	All encryption key loading shall be facilitated by a Motorola KVL3000 Plus.	X	
2.28	A keyloading cable compatible with the Motorola KVL3000 Plus shall be included as an option.	X	
2.29	The device shall have the capability to support P-25 phase II Time Division Multiple Access, TDMA, operation.	X	
2.30	The device shall have the ability to support Over the Air Re-keying.	X	
2.31	The device shall have the ability to support Programming over P25, POP25.	X	
2.32	The device shall have the capability to support autonomous Global Positioning System, GPS, operation.	X	
2.33	The device shall support 1 watt audio speaker output.	X	
2.34	The device shall have the capability to support multiple speaker output.	X	

Requirements continued			
2.35	The device shall support noise cancellation processing for noisy environments.	X	
2.36	The device shall have the capability to support dual microphone noise cancellation processing.	X	
2.37	The device shall provide a user selectable option for audible announcement of selected channel/talk group & Zone.	X	
2.38	The device shall not weigh more than 18 ounces with standard battery.	X	

3 Common Requirements

Item	Requirement	Compliance	
		Yes	No
3.1	Environmental & Physical		
3.1.1	The device shall meet Ingress Protection Rating, IP67 standard.	X	
3.1.2	The device shall meet performance specifications over the temperature range of -30° C to 60° C.	X	
3.1.3	The device shall meet performance criteria of Military 810 C, D, E and F Designed and tested to meet the U.S. military standards approval for Shock, Vibration, Rain & Dust, ensuring its ability to perform in rigorous work environments for mobile radios. for portable radios.	X	
3.1.4	The device shall have FCC type acceptance for full operation.	X	
3.1.5	The device shall meet RoHS. (Restriction of Hazardous Substances)	X	
3.1.6	The device shall have a comprehensive 3 year warranty.	X	

	Common requirements continued		
3.2	USER Interface-Display		
3.2.1	Radio shall have an alphanumeric display with a minimum of 4 rows of 14 characters each.	X	
3.2.2	Radio shall have Identification, ID, display capability	X	
3.2.3	Channel indication shall be by way of an alphanumeric display containing a minimum of 14 digits.	X	
3.2.4	Radio shall have a backlit display	X	
3.2.5	Radio shall have a separate icon for battery status.	X	
3.2.6	Radio shall have the capability to support a Top Display.	X	
3.2.7	For Radios that support a top display, the display shall have a minimum of 1 line of text, 8 characters and a battery status icon.	X	
3.3	USER Interface-Function Access		
3.3.1	Radio shall have a single function Home button that returns the user to the main menu.	X	
3.3.2	Radio shall have a minimum of 3 programmable function buttons.	X	
3.3.3	Radio shall have a menu navigational button capability.	X	
3.3.4	Channel selection will be by way of rotary knob to select a minimum of 16 channels	X	
3.3.5	The device shall have a separate button reserved for Zone selection.	X	
3.3.6	The device shall have an emergency button with a distinct color.	X	

4 Electrical Parameters

Item	Requirement	Compliance	
		Yes	No
4.1	Transmitter Specifications		
4.1.1	The transmitter shall maintain ± 0.000025 % frequency stability	X	
4.1.2	The transmitter shall maintain ± 5 kHz / ± 2.5 kHz modulation limiting.	X	
4.1.3	The transmitter shall have an audio response of +1, -3 dB.	X	
4.1.4	The transmitter shall have a FM Hum and noise rejection of -47dB.	X	
4.1.5	The transmitter shall have an audio distortion of less than 0.50%.	X	
4.2	Receiver Specifications		
4.2.1	The receiver shall have ± 0.000086 % frequency stability.	X	
4.2.2	The receiver in the UHF Band shall have an analog sensitivity at 12 db Sinad of 0.234 microV.	X	
4.2.3	The receiver in the UHF Band shall have a digital sensitivity at 1% Bit Error Rate, BER, of 0.3077 microV, and at 5% BER of 0.207 microV.	X	
4.2.4	The receiver in the VHF Band shall have an analog sensitivity at 12 db Sinad of 0.216 microV.	X	
4.2.5	The receiver in the VHF Band shall have a digital sensitivity at 1% BER of 0.277 microV, and at 5% BER of 0.188 microV.	X	

Electrical Parameters continued			
4.2.6	The receiver in the UHF Band shall have a selectivity at 25khz of 78 dB, at 12.5khz of 68 dB.	X	
4.2.7	The receiver in the VHF Band shall have a Selectivity at 25khz of 79 dB, at 12.5khz of 70 dB.	X	
4.2.8	The receiver in the UHF Band shall have audio distortion of no more than 0.90 %.	X	
4.2.9	The receiver in the VHF Band shall have audio distortion of no more than 1.20 %.	X	
4.2.10	The receiver in UHF and VHF bands shall have 80dB of intermodulation rejection.	X	

5 General Capability

Item	Requirement	Compliance	
		Yes	No
5.1	The vendor shall provide installation manual, user manual and basic repair shop service manual.	X	
5.2	All programming operation software support shall operate on a Microsoft Windows pc with operating systems 2000/XP/Vista/Windows 7.	X	
5.3	The device shall be field software upgradeable.	X	
5.4	All features that are placed into the device by way of programming shall remain for the life of the radio	X	
5.5	Any lost feature (i.e., No. of Channels, type of radio, etc.) will be replaced at no charge during the warranty period.	X	

General Capability continued			
5.6	All firmware needed to correct radio product defects as identified by the user agency must be provided for free during the warranty period. This does not include enhancements or addition of features.	X	
5.7	All programming software for code plug type of data shall be free of charge throughout the warranty period of the device.	X	
5.8	The device shall include any other software necessary to enable seamless roaming operation on the WVIRP radio system presently being installed in West Virginia, Dept of Health and Human Resources / STEMS Medical Command Network, and shall be capable of supporting multiple zone operation, and WV DNR Law Enforcement Agency.	X	
5.9	The vendor shall make available for purchase all programming software and cabling necessary to program the device.	X	
5.10	The vendor shall make available for purchase a version with AES encryption configuration.	X	
5.11	The vendor shall make available for purchase a version with ADP encryption configuration.	X	
5.12	The vendor shall make available for purchase a version with no encryption configuration.	X	

6 Accessories

Item	Requirement	Compliance	
		Yes	No
6.1	A remote microphone with coiled cord shall be provided.	X	
6.1.1	The microphone cable shall be capable of extending to a minimum of 24 inches.	X	
6.1.2	The microphone shall include a spring clip to attach to clothing.	X	

	Accessories continued		
6.1.3	The microphone shall be available as a separate purchasable item.	X	
6.2	A single unit desktop charger shall be provided to allow rapid charging from standard US 117v 60 hz AC power source,	X	
6.2.1	The charger shall be capable of both a fast and trickle charge to return the battery to a fully charged condition in 4 hours.	X	
6.2.2	The charger shall have the capability to incorporate a built in battery conditioner.	X	
6.2.3	The charger shall be available for individual purchase	X	
6.3	A Portable radio black leather belt loop shall be provided.	X	
6.3.1	The leather belt loop shall be available for individual purchase.	X	
6.4	A multi-unit charging device to allow rapid and trickle charging from a standard US 117v AC 60 hz power source shall be available for purchase.	X	
6.5	A vehicular charger that operates from 12 vdc shall be available for purchase.	X	
6.6	A spare FM intrinsically safe Lithium Ion, Lilon, battery shall be available for purchase.	X	
6.7	A plastic swivel belt clip attachment shall be available for purchase.	X	

**RFQ# BPH11084
P25 Dual Band VHF and UHF Digital Portable Radio
Attachment B: Cost Sheet**

The vendor must provide pricing inclusive of all associated costs from the following items including the cost of delivery. The estimated quantities contained on the cost sheet are intended for bid evaluation purposes only. Actual quantities may vary based upon the needs of the agency. Vendors should complete this pricing sheet in lieu of submission of manufacturer's quotes.

TIER	Description	Unit Cost	Estimated Qty.	Extended Cost
1	Digital Dual Band Portable with: AES encryption Top and Front display (includes spare battery and speaker microphone)	\$ 5,693.20	15	\$ 85,398.00
2	Digital Dual Band Portable with: description of alternate encryption) Top and Front display (includes spare battery and speaker microphone)	\$ 5,149.20	5	\$ 25,746.00
3	Digital Dual Band Portable Basic: no encryption Top Display only (includes spare battery and speaker microphone)	\$ 4,849.20	5	\$ 24,246.00
<i>Options for Items 1-3</i>				
A)	Remote Microphone	\$ 77.60	20	\$ 1,552.00
B)	AC desktop Charging Station	\$ 100.00	20	\$ 2,000.00
C)	Black Leather Belt	\$ 9.60	20	\$ 192.00
D)	Multi-unit Charging Station	\$ 630.40	5	\$ 3,152.00
E)	Vehicular Charger Station	\$ 312.00	10	\$ 3,120.00
F)	FM LiION Battery	\$ 140.00	20	\$ 2,800.00
G)	Plastic Swivel Belt Clip	\$ 9.60	20	\$ 192.00
H)	Encryption Key Loader cable (for KVL3000+)	\$ 88.00	1	\$ 88.00
I)	Programming Software	\$ 212.00	5	\$ 1,060.00
J)	Programming Cable	\$ 212.00	5	\$ 1,060.00
K)	FM upgrade to tier 1,2 or 3 devices cost adder	\$ 104.00	0	\$ -
Total Bid:				\$ 148,398.00

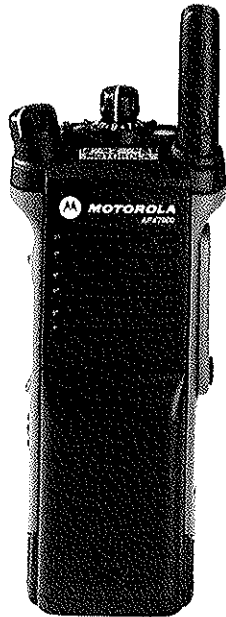
RFQ# BPH11084
P25 Dual Band VHF and UHF Digital Mobile Radio
Attachment B: Equipment List

The vendor must provide manufacturer, model number, and part number for the all equipment bid. Vendors should include with their bid, a copy of the manufacturer's product sheet and any other supporting documentation which demonstrates the vendor's adherence to the mandatory specifications as outlined in the specifications.

TIER	Description	Manufacturer	Model Number	Part Number /Configuration Codes
1	Digital Dual Band Portable with: AES encryption Top and Front display	Motorola	APX 7000	H97TGD9PW1 N, QA00571, QA00574, QA00577, QA00579, Q806, H38, Q361, QA01749, H869, Q829, Q58, PIMMN4065A, NNTN7038
2	Digital Dual Band Portable with: ADP or alternate encryption (please provide description of alternate encryption) Top and Front display	Motorola	APX 7000	H97TGD9PW1 N, QA00571, QA00574, QA00577, QA00579, Q806, H38, Q361, QA01749, Q58, PIMMN4065A, NNTN7038
3	Digital Dual Band Portable Basic: no encryption Top Display only	Motorola	APX 7000	H97TGD9PW1 N, QA00571, QA00574, QA00579, Q806, H38, Q361, QA01749, Q58, PIMMN4065A, NNTN7038
<i>Options for items 1-3</i>				
A)	Remote Microphone			PIMMN4065A
B)	AC desktop Charging Station			NNTN7080A
C)	Black Leather Belt			PMLN5407
D)	Multi-unit Charging Station			NNTN7065
E)	Vehicular Charger Station			NNTN7624A
F)	FM LiION Battery			NNTN7033A
G)	Plastic Swivel Belt Clip			NTN8266B
H)	Encryption Key Loader cable (for KVL3000+)			WPLN6904A
I)	Programming Software			RVN4186AC
J)	Programming Cable			Q157
K)	FM upgrade to Tier 1, 2 or 3			QA00582, NNTN7033

APX™ 7000

Project 25 Multi-Band Portable Radio



Top Display Model:

- Up to 96 channels
- Universal Push-to-Talk
- T-Grip
- Dual Battery Latch
- Orange emergency button
- 16 position rotary knob
- 2 position concentric switch
- 3 position toggle switch
- 3 programmable side buttons
- Transmit LED indicator
- Full Bitmap Top Display
 - 1 line of icons
 - 1 line x 8 characters of text
- No keypad



Dual Display Model:

- Same as APX Top Display model plus the following features:
- 1250 channels
- Dial from pre-stored lists or free-form entry
- Programmable soft keys for easy access to radio menus
- Backlit Keypad
 - Home and Data buttons
 - 3 soft keys
 - 4 direction navigation key
 - 4 x 3 keypad
- Full Bitmap Display
 - 2 lines of icons
 - 4 lines x 14 characters of text
 - Status icons

The APX 7000 Multi-Band P25 Portable Radio delivers exceptional performance combining advanced voice and data technology driven by the challenges of mission critical users.



Motorola's 4th generation P25 subscriber is multi-band (700/800 MHz, VHF, and UHF Range 1), communicates with current and future networks (FDMA and TDMA) and has integrated GPS. Designed specifically for first responders the dual-sided mission critical design has both an audio and data side providing optimal functionality and loud and clear audio in a compact rugged form factor.

SPECIFICATION SHEET

APX 7000
Project 25 Multi-Band Portable Radio

FEATURES AND BENEFITS:

Available in 700/800 MHz, VHF, and UHF Range 1 bands
Optional multi-band operation
Trunking standards supported:

- Clear or digital encrypted ASTRO®25 Trunked Operation
- Capable of SmartZone®, SmartZone Omnilink, SmartNet®

Analog MDC-1200 and Digital APCO P25 Conventional System Configurations
Narrow and wide bandwidth digital receiver (6.25 kHz / 12.5 kHz / 25 kHz)
Embedded digital signaling (ASTRO & ASTRO 25)
Integrated GPS capable
Seamless wideband scan
Intelligent Lighting
Radio Profiles
Unified Call List (Dual Display model only)
Expansion Slot
Micro SD removable memory card
User programmable voice announcement
Meets Applicable Mil Specs 810C, D, E and F

Ships standard IP67 (Submersible at 1 meter, 30 minutes)
Rugged option available
Public Safety Yellow and High Impact Green Rugged Housing options
Custom recessed label areas
Superior Audio Features:

- 1W high audio speaker
- Dual speakers (Dual Display model only)
- Dual microphones
- 2-mic noise canceling technology

Utilizes Windows XP and Vista Customer Programming Software (CPS)

- Supports USB communications
- Built in FLASHport™ support

Full portfolio of accessories including IMPRES batteries, chargers and audio devices

OPTIONAL FEATURES:

Enhanced Encryption capability
Programming Over Project 25
Over the Air Rekey
Text Messaging

TRANSMITTER – TYPICAL PERFORMANCE SPECIFICATIONS

	700 MHz	800 MHz	VHF	UHF Range 1
Frequency Range/Bandsplits	764-776 794-806	806-825 851-870	136-174	380-470 MHz
Channel Spacing	25/20/12.5 kHz	25/20/12.5 kHz	25/12.5 kHz	25/12.5 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Rated RF Output Power Adj ¹	1-3 Watts Max	1-3 Watts	1-6 Watts	1-5 Watts
Frequency Stability ¹ (-30°C to +60°C; +25°C Ref.)	±0.000020 %	±0.000030 %	±0.000025 %	±0.000025 %
Modulation Limiting ¹	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±4 kHz / ±2.5 kHz	±5 kHz / ±2.5 kHz	±5 kHz / ±2.5 kHz
Emissions (Conducted and Radiated) ¹	-75 dB	-75 dB	-75dB	-75dB
Audio Response ¹	+1, -3 dB	+1, -3 dB	+1, -3 dB	+1, -3 dB
FM Hum & Noise	-48 dB	-47 dB	-47 dB	-47dB
Audio Distortion ¹	0.60 %	1 %	0.50 %	0.50 %

BATTERIES FOR APX 7000

Battery Capacity / Type	Dimensions (HxWxD)	Weight	Battery Part Numbers	Battery Capacity
Li-Ion IMPRES 2900 mAh (Ruggedized)	3.07" x 2.34" x 1.65"	6.53 oz	NNTN7038	2900 mAh
Li-Ion IMPRES 4200 mAh Ruggedized (IP67)	5.12" x 2.34" x 1.65"	11.29 oz	NNTN7034	4200mAh
Li-Ion IMPRES 4100 FM ² Ruggedized (IP67)	5.12" x 2.34" x 1.65"	11.29 oz	NNTN7033	4100 mAh
NiMH IMPRES 2100 mAh Ruggedized (IP67)	5.07" x 2.34" x 1.57"	11.82 oz	NNTN7037	2100 mAh
NiMH IMPRES 2000 mAh FM ² Ruggedized (IP67)	5.07" x 2.34" x 1.57"	11.82 oz	NNTN7036	2000 mAh
NiMH IMPRES 2000 mAh FM ² Ruggedized PLUS	5.07" x 2.34" x 1.57"	11.82 oz	NNTN7035	2000 mAh
NiMH IMPRES 2100 mAh Ruggedized PLUS	5.07" x 2.34" x 1.57"	11.82 oz	NNTN7573	2100 mAh

SPECIFICATION SHEET

APX 7000
Project 25 Multi-Band Portable Radio

RECEIVER – TYPICAL PERFORMANCE SPECIFICATIONS

	700 MHz	800 MHz	VHF	UHF Range 1
Frequency Range/Bandsplits	764-776	851-870	136-174 MHz	380-470 MHz
Channel Spacing	12.5/25 kHz	12.5/25 kHz	12.5/25 kHz	12.5/25 kHz
Maximum Frequency Separation	Full Bandsplit	Full Bandsplit	Full Bandsplit	Full Bandsplit
Audio Output Power at Rated ¹	1000mW	1000mW	1000mW	1000mW
Frequency Stability ¹ (-30°C to +60°C; +25°C Ref.)	±0.000080 %	±0.000080 %	±0.000086 %	±0.000086 %
Analog Sensitivity ² 12 dB SINAD	0.250 µV	0.250 µV	0.216 µV	0.234 µV
Digital Sensitivity ⁴ 1% BER	0.347 µV	0.333 µV	0.277 µV	0.307 µV
5% BER	0.251 µV	0.251 µV	0.188 µV	0.207 µV
Selectivity ¹ 25 kHz channel	75.7 dB	75.7 dB	79.3 dB	78.3 dB
12.5 kHz channel	67.5 dB	67.5 dB	70 dB	68.1 dB
Intermodulation	80 dB	80 dB	80.5 dB	80.2 dB
Spurious Rejection	76.6 dB	76.6 dB	93.2 dB	80.3 dB
FM Hum and Noise 25 kHz	-54 dB	-54 dB	-53.8 dB	-53.5 dB
12.5 kHz	-48 dB	-48 dB	-48 dB	-47.4 dB
Audio Distortion ¹	.9 %	.9 %	1.20 %	0.91 %

GPS SPECIFICATIONS

Channels	12
Tracking Sensitivity	-151 dBm
Accuracy ⁵	<10 meters (95%)
Cold Start	<60 seconds (95%)
Hot Start	<10 seconds (95%)
Mode of Operation	Autonomous (Non-Assisted) GPS

RADIO MODELS

	Display	Keypad	Channel Capacity	FLASHport Memory	700/800 MHz (764-870 MHz)	VHF (136-174 MHz)	UHF Range 1 (380-470 MHz)	Buttons/Switches	Embedded GPS	LED
Top Display	Full bitmap monochromatic LCD display 1 line text x 8 characters 1 line of icons No menu support Multi-color backlight	None	96 (using zone bank feature)	64 MB	H97TGD9PW1_N QA00569	H97TGD9PW1_N QA00570	H97TGD9PW1_N QA00571	Large PTT button Angled On/Off Volume knob Orange emergency button 16-position top-mounted rotary knob 2-position concentric switch 3-position toggle switch 3 programmable side buttons	Yes	Multi-color
Dual Display	Top display, plus: Full bitmap color LCD display: 4 lines text x 14 characters 2 lines of icons 1 menu line x 3 menus White backlight	Multi-color backlight Keypad 3 soft keys 4-direction navigation key 4x3 keypad Home and Data buttons	1250	64 MB	H97TGD9PW1_N QA00569 QA00577	H97TGD9PW1_N QA00570 QA00577	H97TGD9PW1_N QA00571 QA00575	Large PTT button Angled On/Off Volume knob Orange emergency button 16-position top-mounted rotary knob 2-position concentric switch 3-position toggle switch 3 programmable side buttons	Yes	Multi-color
Transmitter Certification					AZ489F17036	AZ489F17036	AZ489F17040 (UHF/700/800) AZ489F14886 (UHF/VHF)			
FCC Emissions Designators	11K0F3E, 16K0F3E, 8K10F1D, 8K10F1E, 8K10F1W, 20K0F1E									
Power Supply	One rechargeable Li-Ion 2900 mAh battery, or one optional NiMH									

SPECIFICATION SHEET

APX 7000
Project 25 Multi-Band Portable Radio

DIMENSIONS OF THE RADIOS WITHOUT BATTERY

	Inches	Millimeters
Length	6.29	159.71
Width Push-to-Talk button	2.31	58.69
Depth Push-to-Talk button	1.34	34
Width Top	2.98	75.69
Depth Top	1.6	40.52
Depth Bottom of Battery	1.65	41.78
Weight of the radios without battery	12.2 oz	

PORTABLE MILITARY STANDARDS 810 C, D, E & F

	MIL-STD 810C		MIL-STD 810D		MIL-STD 810E		MIL-STD 810F	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1
Temperature Shock	503.1	-	503.2	I/A1C3	503.3	I/A1C3	503.4	I
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, II
Humidity	507.1	II	507.2	II	507.3	II	507.4	-
Salt Fog	509.1	-	509.2	-	509.3	-	509.4	-
Blowing Dust	510.1	I	510.2	I, II	510.3	I, II	510.4	I, II
Immersion ⁶	512.1	I	512.2	I	512.3	I	512.4	I
Vibration	514.1	VIII/F; Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24
Mechanical Shock	516.1	I, II	516.3	I, IV	516.4	I/IV	516.5	I, IV

ENCRYPTION

Supported Encryption Algorithms	ADP, AES, DES, DES-XL, DES-OFB, DVP-XL
Encryption Algorithm Capacity	8
Encryption Keys per Radio	Module capable of storing 1024 keys. Programmable for 64 Common Key Reference (CKR) or 16 Physical Identifier (PID)
Encryption Frame Re-sync Interval	P25 CA1 300 mSec
Encryption Keying	Key Loader
Synchronization	XL – Counter Addressing OFB – Output Feedback
Vector Generator	National Institute of Standards and Technology (NIST) approved random number generator
Encryption Type	Digital
Key Storage	Tamper protected volatile or non-volatile memory
Key Erasure	Keyboard command and tamper detection
Standards	FIPS 140-3 FIPS 197

RUGGED OPTION SPECIFICATIONS

Leakage (immersion) ⁶	MIL-STD-810 C, D, E, F Method 512.X Procedure I
Housing Availability	Standard, Public Safety Yellow and High Impact Green

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-30° C / +60° C
Storage Temperature ⁷	-40° C / +85° C
Humidity	Per MIL-STD
ESD	IEC 801-2 KV
Water & Dust Intrusion	IP67 MIL-STD

¹ Measured in the analog mode per TIA / EIA 603 under nominal conditions

² When used with an FM approved intrinsically safe radio.

³ Measured conductively in analog mode per TIA / EIA 603 under nominal conditions

⁴ Measured conductively in digital mode per TIA / EIA IS 102.CAAA under nominal conditions

⁵ Accuracy specs are for long-term tracking (95th percentile values >5 satellites visible at a nominal -130 dBm signal strength)

⁶ For rugged models only

⁷ Temperatures listed are for radio specifications. Battery storage is recommended at 25°C, ±5°C to ensure best performance

Specifications subject to change without notice. All specifications shown are typical. Radio meets applicable regulatory requirements.



Motorola, Inc. 1301 E. Algonquin Road, Schaumburg, Illinois 60196 U.S.A. www.motorola.com/governmentandenterprise 1-800-367-2346

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Attachment C

Request for Quotation
For
Digital Remote Controlled Base
Station System

West Virginia

**Department of Health and Human Resources (DHHR),
Bureau for Public Health, (BPH), State Trauma and
Emergency Medical System (STEMS)**

1 General Description

The Department of Health and Human Resources, State Trauma and Emergency Medical System, desires to establish a contract for the purchase of a Federal Communications Commission, FCC, mandated Narrow Band Digital Project 25, P25, Compliant Digital Remote Control Base Station System and related accessories. Other entities of West Virginia state government as well as counties, municipalities and Public Safety Agencies shall be able to piggy back on this contract with prior approval from the Agency.

The digital remote controlled Base Station System is a Push to Talk, PTT, radio solution that allows the Radio Frequency, RF, base station component to be remotely located from the user interface by up to 1000 ft. It is to use digital encoded frequency tones between the user interface and the RF base station device. Full control of normal base station operation and PTT exchanges is required.

The digital remote controlled Base Station System is composed of three devices: a RF base station device that connects to the external RF environment, a device that aggregates user access and a desk set device for the user.

The base station device provides the RF circuitry to communicate to other base stations, repeaters or RF elements on the selected frequency channels in a P-25 compliant network.

The aggregate device allows several separately located end user devices to interface with the RF base station. The purpose of the adapter is to allow several desk set devices to utilize the base station and to condition signal levels appropriate for proper operation.

The desk set device is similar in function to a business grade telephone. It provides the user a voice and audio path to the Two-Way communication system. The desk set also provides the user control of the base station parameters. It has a corded handset, display for status, and internal speaker and microphone.

2 RF Base Station Requirements

item	Requirement	Compliance	
		Yes	No
2.1	General Operation-RF Base Station		
2.1.1	The device shall operate as a RF base Station.	X	
2.1.2	The Primary Band shall support Ultra High Frequency, UHF, frequency range of 403 to 470 MHz.	X	
2.1.3	The device shall be P-25 Digital Common Air Interface, CAI, compliant and be able to operate on the West Virginia Interoperable Radio Project, WVIRP, system.	X	
2.1.4	The device shall support Conventional PTT transmissions.	X	
2.1.5	The device shall support P-25 Trunk PTT transmissions.	X	
2.1.6	The device shall have a minimum output RF power of 40 watts.	X	
2.1.7	The device shall support FCC Narrow Band.	X	
2.1.8	The device shall provide 25 Khz +/- 5 Khz channel spacing.	X	
2.1.9	The device shall provide 12.5 Khz +/- 2.5 Khz channel spacing.	X	
2.1.10	The device shall include any other software necessary to enable seamless roaming operation on the WVIRP radio system presently being installed in West Virginia, and shall be capable of supporting multiple zone operation, the Dept. of Health and Human Resources/STEMS Medical Command Network, and West Virginia Department of Natural Resources, WV DNR, Law Enforcement Agency.	X	

RF Base Station Requirements contd.			
2.1.11	The device shall be capable of receiving and transmitting on a minimum of 870 channels.	X	
2.1.12	All currently licensable frequencies shall be considered acceptable to the unit.	X	
2.1.13	Radio shall be capable via programming of wide band and narrow band operation (12.5 khz/25khz) respectively and capable of storing more than 870 channels.	X	
2.1.14	Each channel shall be individually programmable with regard to wideband/narrowband operation, digital/analog operation, and /or trunked/non-trunked operation.	X	
2.1.15	There shall be no limitations in the radio with regard to what channels may be programmed into the radio in a given bank and in a particular mix of channels/talk groups	X	
2.1.16	The device shall support Zone selection to allow access to more groups of channels.	X	
2.1.17	The device shall support UHF and Very High Frequency, VHF, analog Trunk.	X	
2.1.18	The device shall support UHF and VHF analog conventional.	X	
2.1.19	Radio shall have programmable encode and decode capability for continuous tone coded squelch system, CTCSS, tones and digital coded squelch with a minimum of one pair of tones, not necessarily the same, for each programmed channel.	X	
2.1.20	Radio shall include necessary hardware and software to support Advanced Encryption Standard, AES, encryption.	X	

RF Base Station Requirements contd.			
2.1.21	Radio shall include necessary hardware and software to support Advanced Digital Privacy, ADP, encryption.	X	
2.1.22	Radio shall be capable of holding multiple encryption keys.	X	
2.1.23	All encryption key loading shall be facilitated by a Motorola KVL3000 Plus.	X	
2.1.23	A keyloading cable compatible with the Motorola KVL3000 Plus shall be included as an option.	X	
2.1.24	The device shall be capable of a minimum of 7.5watts of audio output.	X	
2.1.25	The device shall support Over the Air Re-keying.	X	
2.1.26	The device shall support Programming over P25, POP25.	X	

2.2 Electrical Parameters

Item	RF Base Station Requirement	Compliance	
		Yes	No
2.2.1	Transmitter Specifications	X	
2.2.1.1	The transmitter shall maintain 2 parts per million, ppm, frequency stability.	X	
2.2.1.2	The transmitter shall maintain ± 5 kHz / ± 2.5 kHz modulation limiting.	X	
2.2.1.3	The transmitter shall have an audio response of +1, -3 dB.	X	
2.2.1.4	The transmitter shall have a FM Hum and noise rejection of 40 dB.	X	
2.2.1.5	The transmitter shall have an audio distortion of less than 3%.	X	

Electrical Parameters continued			
2.2.2	Receiver Specifications		
2.2.2.1	The receiver shall have 2 ppm frequency stability.	X	
2.2.2.2	The receiver in Band shall have an analog sensitivity at 12 db Sinad of 0.3 microV.	X	
2.2.2.3	The receiver in Band shall have a digital sensitivity at 1% Bit Error Rate, BER, of 0.4 microV, and at 5% BER of 0.3 microV.	X	
2.2.2.4	The receiver in Band shall have a Selectivity at 25khz of 82 dB, at 12.5khz of 75 dB.	X	
2.2.2.5	The receiver in Band shall have audio distortion of no more than 3 %.	X	
2.2.2.6	The receiver in band shall have 85dB of intermodulation rejection.	X	

2.3 Environmental & Physical Requirements

Item	RF Base Station	Compliance	
		Yes	No
2.3.1	The device shall meet Ingress Protection Rating, IP54, standard.	X	
2.3.2	The device shall meet performance specifications over the temperature range of -30° C to 60° C.	X	
2.3.3	The device shall meet performance criteria of Military 810 C, D, E and F for Rf Base station devices. Designed and tested to meet the U.S. military standards approval for Shock, Vibration, Rain & Dust, ensuring its ability to perform in rigorous work environments for mobile radios.	X	
2.3.4	The device shall have FCC type acceptance for full operation.	X	

Environmental & Physical Requirements continued			
2.3.5	The device shall meet Restriction of Hazardous Substances, RoHS.	X	
2.3.6	The device shall have a comprehensive 3 year warranty.	X	
2.3.7	The device shall operate from either 13.8vdc or 120 vac 60 hz power supply.	X	
2.3.8	The device shall have a desk or table self supporting mount.	X	
2.3.9	The device shall provide alternate remote mount hardware.	X	
2.3.10	The device shall be equipped with a UHF antenna.	X	

3 Desk Set Device Requirements

Item	Desk Set Device Requirement	Compliance	
		Yes	No
3.1.1	The device shall control up to 4 base stations	X	
3.1.2	The device shall provide individual channel select, transmit indicator and transmit control	X	
3.1.3	The device shall allow speaker selection and control.	X	
3.1.4	The device shall allow individual volume control per channel	X	
3.1.5	The device shall allow mute (-24db) on a channel basis.	X	
3.1.6	The device shall provide a dedicated logging recorder output, 600 ohm reference.	X	
3.1.7	The device shall provide ability to patch any two channels together.	X	
3.1.8	The device shall provide ability to simultaneously select up to four channels.	X	

	Desk Set Device Requirements continued		
3.1.9	The device shall support PTT.	X	
3.1.10	The device shall support full duplex operation.	X	
3.1.11	The device shall provide an internal microphone for hands free operation.	X	
3.1.12	The device shall provide monitor Light Emitting Diode, LED, indicator	X	
3.1.13	The device shall provide an internal speaker.	X	
3.1.14	The device shall operate from a 120 vac 60 hz power supply	X	
3.1.15	The device shall provide an intercom to parallel desk set devices.	X	
3.1.16	The device shall be programmable from the front panel	X	
3.1.17	The device shall be wall mountable.	X	
3.1.18	The device shall have a minimum of a 2 line 20 character back lit display.	X	
3.1.19	The device shall display the Unit Identification, ID, or Aliases of the caller	X	
3.1.20	The device shall provide Voice alert, and call alert to a remote user.	X	
3.1.21	The device shall display status and message codes.	X	
3.1.22	The device shall be able to enable or disable a remote portable.	X	
3.1.23	The device shall be able to perform a radio check.	X	
3.1.24	The device shall support emergency alarm via display, audible tone, or external output signal.	X	
3.1.25	The device shall have a minimum of 18 programmable buttons.	X	
3.1.26	The device shall support a minimum of 16 frequency tones for remote control purposes.	X	
3.1.27	The device shall provide all capabilities at a distance up to 1000ft of either a 2 or 4 conductor standard 600 ohm telephone cable.	X	

Desk Set Device Requirements contd.			
3.1.28	The device audio output shall be 0.8w minimum at no more than 3% THD.	X	
3.1.29	Receive and transmit audio shall be adjustable from -30 to +11 dbm.	X	
3.1.30	The device audio frequency response shall be from 300 to 3300 Hz +3, -3 dB @ less than 3% distortion	X	
3.1.31	Device shall operate over the temperature range 0 ^o to +50 ^o deg C	X	
3.1.32	The device shall not use DC signals for base station control.	X	

4 Aggregate Device Requirements

Item	Requirement	Compliance	
		Yes	No
4.1.1	The device shall connect up to 10 desk set stations.	X	
4.1.2	The device shall support a minimum of 16 frequency tones for control purposes.	X	
4.1.3	The device shall allow a RF base station to be controlled by a desk set device.	X	
4.1.4	The device shall provide LED indicators for Power, PTT activity, monitor, and squelch detect.	X	
4.1.5	The device shall support a local desk style microphone.	X	
4.1.6	The device shall support both 2 or 4 wire audio.	X	
4.1.7	The device shall support local audio level adjustments.	X	
4.1.8	The device shall be rack mountable or desk top mountable.	X	
4.1.9	The device shall support PTT.	X	
4.1.10	The device shall support full duplex operation.	X	
4.1.11	The device shall provide RJ 11 receptacles for desk set connections.	X	

Aggregate Device Requirements continued			
4.1.12	The device shall support/maintain operation located a maximum of 10 ft from the RF base station device.	X	
4.1.13	The device shall provide a DB 25 connector for connection to the RF base station device.	X	
4.1.14	The device shall provide all capabilities at up to 1000ft of both 2 or 4 conductor standard 600 ohm telephone cable to the desk set device.	X	
4.1.15	Device shall operate over the temperature range 0° to +50° deg C	X	
4.1.16	The device shall not use DC signals for desk set control.	X	
4.1.17	The device shall operate from 120 vac 60 hz power supply	X	
4.1.18	Receive and transmit audio shall be adjustable from -30 to +11 dbm.	X	
4.1.19	The device audio frequency response shall be from 300 to 3300 Hz +3, -3 dB @ less than 3% distortion	X	
4.1.20	Device shall operate over the temperature range 0° to +50° deg C	X	

5 General

Item	Requirement	Compliance	
		Yes	No
5.1	The vendor shall provide installation manual, user manual and basic repair shop service manual.	X	
5.2	All programming operation software support shall operate on a Microsoft Windows pc with operating systems 2000/XP/Vista/Windows 7.	X	
5.3	The device shall be field software upgradable.	X	

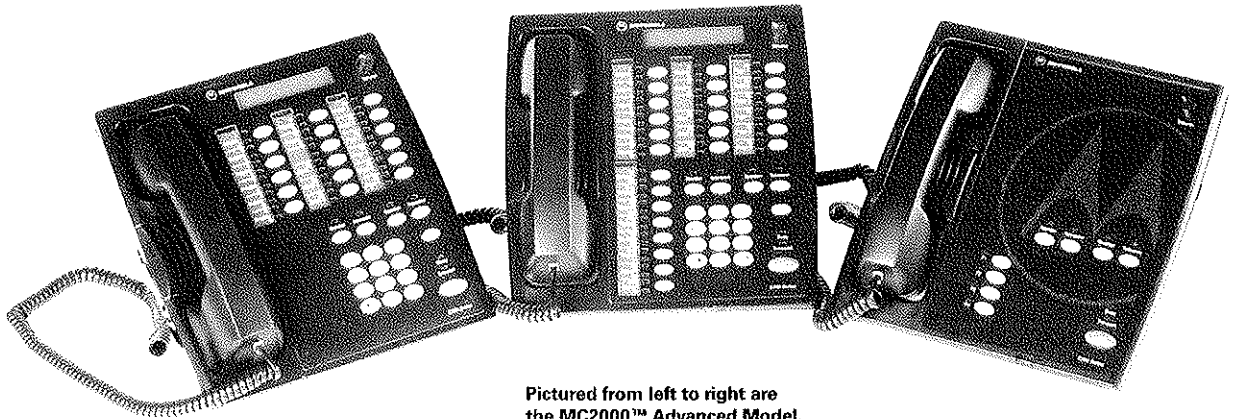
	General continued		
5.4	All features that are placed into the device by way of programming shall remain for the life of the radio	X	
5.5	Any lost feature (i.e., No. of Channels, type of radio, etc.) will be replaced at no charge during the warranty period.	X	
5.6	All firmware needed to correct radio product defects as identified by the user agency must be provided for free during the warranty period. This does not include enhancements or addition of features.	X	
5.7	All programming software for code-plug type of data shall be free of charge throughout the warranty period of the device.	X	
5.8	The device shall include any other software necessary to enable seamless roaming operation on the WVIRP radio system presently being installed in West Virginia, Dept of Health and Human Resources / STEMS Medical Command Network, and shall be capable of supporting multiple zone operation, and WV DNR Law Enforcement Agency.	X	
5.9	The vendor shall make available for purchase all programming software and cabling necessary to program the device.	X	
5.10	The vendor shall have a 100 watt RF power version for purchase	X	
5.11	The vendor shall make available for purchase a version with AES encryption configuration.	X	
5.12	The vendor shall make available for purchase a version with ADP encryption configuration.	X	
5.13	The vendor shall make available for purchase a version with no encryption configuration.	X	

6 Accessories

Item	Requirement	Compliance	
		Yes	No
6.1	The vendor shall make available for purchase all three of the components, RF base station, Aggregator, and Desk Set individually.	X	
6.2	The vendor shall make available for purchase antennae for UHF R1 frequencies.	X	
6.3	The vendor shall make available for purchase an externally mounted speaker.	X	
6.4	The vendor shall make available for purchase a control head with display for the RF base station for local control.	X	
6.4.1	The device shall have an alphanumeric display with a minimum of 2 rows of 14 characters each.	X	
6.4.2	The device shall have ID display capability.	X	
6.4.3	Channel indication shall be by way of an alphanumeric display containing a minimum of 14 digits.	X	
6.4.4	The device shall have a backlit display	X	
6.5	The vendor shall make available for purchase a hand held microphone for the RF base station for local PTT functions.	X	

MC SERIES

Deskset Controllers



Pictured from left to right are the MC2000™ Advanced Model, the MC2500™ Multi-channel Model, and the MC1000™ Basic Model.

STANDARD FEATURES

- Multiple models for various applications
 - Extended Local Control for controlling an on-site radio up to 1000 feet away
 - Tone or DC Remote Control for controlling a station with 600 ohm telephone lines
- Multiple control points allow up to 10 units to operate in parallel
- Internal microphone, intercom, and speaker for convenient operation
- Push-to-talk (PTT) handset for private communications
- Monitor switch for monitoring channel activity before transmitting

PRODUCT OVERVIEW

The MC Series Desktop Controllers allow remote access to the functions of a compatible station (base station, repeater, or control station). These desktop controllers support tone, DC, and E&M signalling for keying and control of stations.

DATA SHEET

MC SERIES
Deskset Controllers

MC1000 BASIC MODEL (non-signaling) FEATURES

For Local Control Models

- Single Frequency and Single Station Control
- Push-to-Talk Handset
- Speaker
- Speaker on/off (receive audio is heard through handset and speaker simultaneously)
- Volume Control
- Full Duplex Capability
- Internal Mic (for use without handset)
- Transmit Button with LED
- Monitor Button with LED
- Front panel programming (easy setup – no RSS required)
- Intercom between MC1000 units and stations
- Operator cross mute
- 10 units can operate in parallel
- Parallel Operator Busy Indication
- 120 Vac - 60 Hz Power Supply
- Can be wall mounted

For Tone and DC Control Models Only in addition to Local Features

- 4 Frequency Single Station Control
- 2- or 4-Wire Audio
- Takeover/Line Select allows a supervisory unit to override other parallel units or allows connection of two base stations for back-up control (Main/Alt operation)

MC2000 ADVANCED MODEL (signaling) FEATURES

• All MC1000 Basic Model features plus:

- 110/220 Vac 50/60 Hz Power Supply
- Parallel Status (Tone model only) Each deskset operator knows the selected frequency and status of the station
- Programmable Voice Delay User can speak immediately after pressing PTT or Transmit bar without message truncation
- Desk Mic Compatible Allows another choice of audio accessory
- MDC1200 Signaling and Paging..... Operator can selectively signal pagers, portables, or mobile radios Supports the following: (E/D; E = Encode, D = Decode)
 - PTT Unit ID (E/D) Displays unit ID of caller (250 aliases)
 - Voice Alert..... Allows dispatcher to alert specific user prior to critical voice transmission
 - Call Alert/Short Call Alert (E/D) Informs the user to call-in by sending a “page” to their portable or mobile
 - Status/Message (D) Displays received status and message codes
 - Radio Enable/Disable (E)..... Allows operator to remotely enable and disable a lost or stolen portable
 - Radio Check (E)..... Console operator can determine if a radio is on the air and within range without disturbing the radio user

DATA SHEET

MC SERIES
Deskset Controllers

MC2000 ADVANCED MODEL (signaling) FEATURES *(cont'd)*

- MDC1200 Signaling and Paging *(cont'd)*
 - Emergency Alarm (D) Flashing display, audible tone, and an output for external alarms can alert the console operator of emergency situations
 - Recent User Stack Allows last nine records to be stored for review at a later time
 - RS232 Printer Port Allows RSS programming via computer or the logging of MDC1200 inbound/outbound message activity for permanent record keeping on a serial printer
 - Alert Tone 3 alert tones are supported
- Paging Encoder Integrated paging encoder supporting 2 Tone, Quik-Call I & II, DTMF, 5 Tone, 6 Tone, GE99, NEC5, NEC6, Reach 1+1, Pulse and custom 2-tone with aliasing
- 18 Programmable Buttons Allows for deskset flexibility. Button usage may include single button paging, fast access to paging or MDC1200 signalling, alert tones, frequency selection, speaker mute, relay control and wildcards
- Frequency Control 16 Frequency Control (Tone) and 4 Frequency Control (DC) with alias names
- DTMF Decode Allow ANI (Automatic Number Identification) or selective call mode of operation
- Securenet Compatible Allows control of coded/clear modes of operation on Motorola secure equipped stations
- RSS Programming Available Allows the console to be customized to fit customer requirements
- External connectors For power, RSS/printing, base station connections, and desk mic
- 2 line x 20 character backlit display Displays important, easy to read information to the operator such as channel status, alias names, emergency ID's, status/message information and VU meter

DATA SHEET

MC SERIES
Deskset Controllers

MC2500 MULTI-CHANNEL MODEL FEATURES

• All MC2000 Advanced Model features plus:

- 4 channel control..... Controls up to 4 radios or base stations. Includes ability for DC control on 1 channel
- Individual channel select and instant transmit..... Individual status indicators and control
- Unselect speaker connector Allows connection of unselect speaker to separate audio for ease of operation
- Individual volume control Each channel has individual volume control
- All mute Mutes audio on the unselected channels
- Dedicated logging recorder output Fixed 600 Ohm output (no keying tones) with all audio summed for recording
- Radio Patch Patch any two channels
- Multi-Select..... All four channels can be selected for simultaneous transmit

ACCESSORIES

For Extended Local Control

- Junction Box connects up to six local desksets to the station. When 7-10 desksets are operating in parallel, two junction boxes are required.

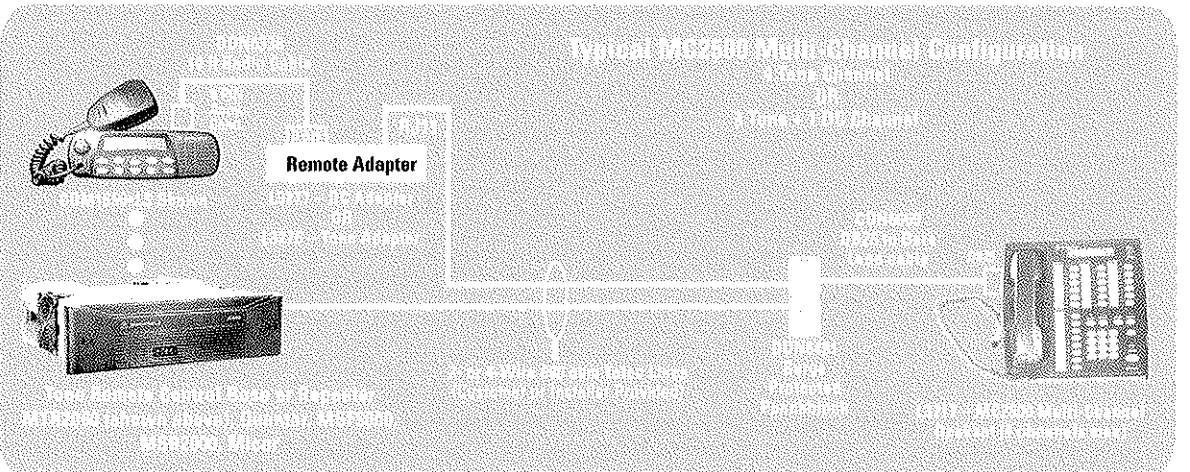
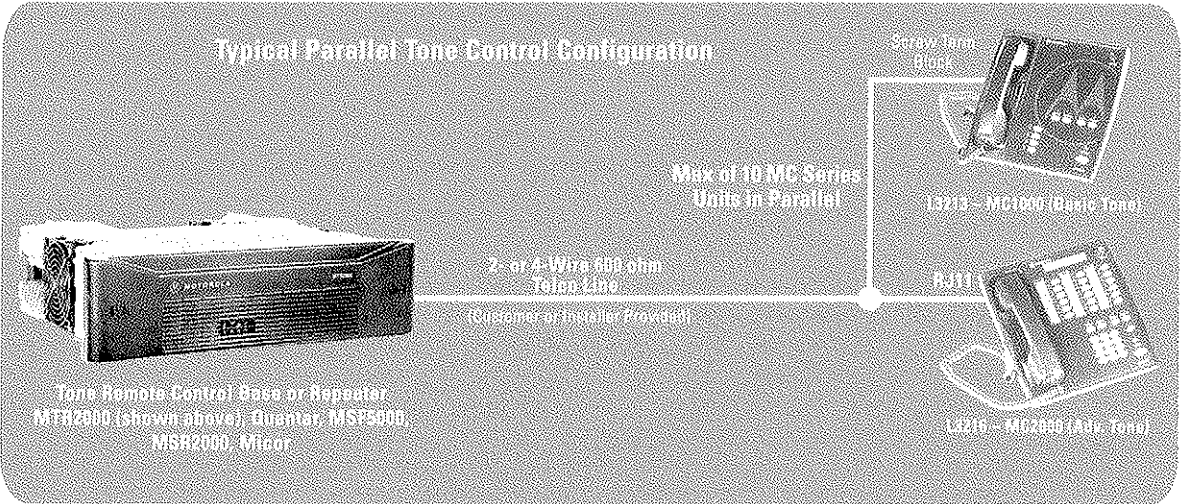
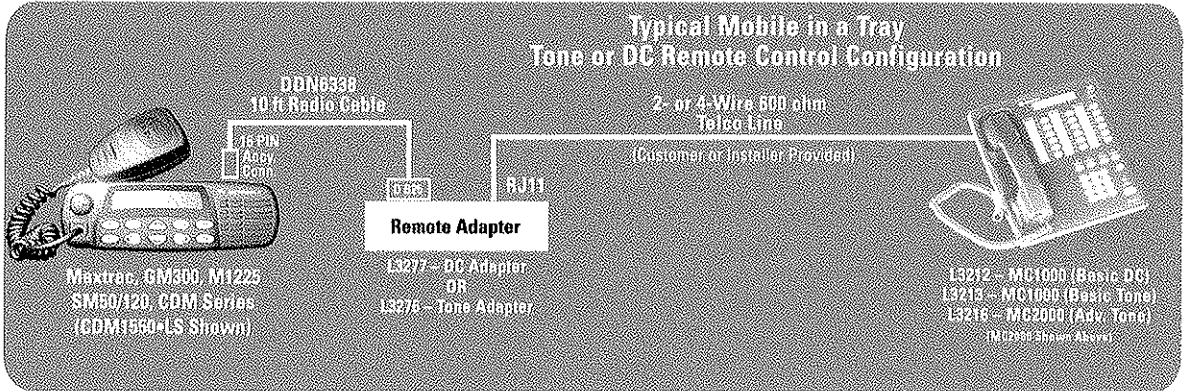
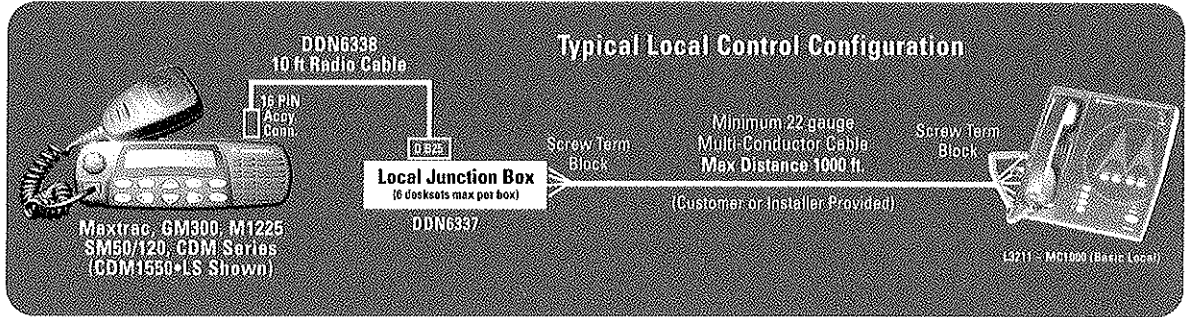
TONE AND DC REMOTE CONTROL ADAPTERS

Tone and DC Remote Adapters allow local control base stations to be controlled remotely via a Tone or DC Remote Deskset. Each adapter will accept up to 10 desksets.

STANDARD FEATURES	
Tone (L3276)	DC (L3277)
LED Indicators for Power, Line PTT, Monitor, Squelch Detect, Accessory Port and Desk Mic	LED Indicators for Power, Line PTT, Monitor, Squelch Detect, Accessory Port F1, F2, F3 and F4
Local Desk Mic Port	N/A
16 Function Tone Decode	5 DC Current Detects
2 or 4-wire Audio	
Accessory Port used for local deskset or data applications	
Accessible audio level adjustments	
Rackmountable	

DATA SHEET

MC SERIES
Deskset Controllers



DATA SHEET

MC SERIES
Deskset Controllers

DESKSET SPECIFICATIONS

	Local Deskset	DC Remote Deskset	Tone Remote Deskset
	MC1000 - L3211	MC1000 - L3212	MC1000 - L3213
		MC2500 - L3217	MC2000 - L3216
			MC2500 - L3217
Dimension	3.75" H x 8.5" W x 9.9" D (9.53 cm H x 21.59 cm W x 25.14 cm D)		
Weight	Maximum 3.75 lb. (1.7 kg)		
Temperature Range	32°F to 122°F (0°C to 50°C)		
Humidity	95% at 122°F (50°C) (non-condensing)		
Power Input:			
MC1000 Models	+12 Vdc/1 A max		
MC2000 Model	+12 Vdc/2.5 A Max		
MC2500 Models	+12 Vdc/1 A, -12 Vdc/0.2 A, +5 Vdc/2 A		
Frequency Response	300 to 3300 Hz +3, -3 dB @ less than 3% distortion		
Hum and Noise	45 dB below rated output at any port		
Audio Distortion	Less than 3% THD		
Audio Output to Speaker	.8 W (1 W peak)		
Line Impedance	600 or 10 K Ohm, or differential		
Receive Audio Input	300 mv AC	Adjustable from -30 to +11 dBm	
Transmit Audio Output	80 mv AC	Adjustable from -30 to +11 dBm	
Maximum Number of Desksets	10 in Parallel		
Control Functions (Maximum):			
MC1000 Models	PTT + Monitor	4 Freq Select + Monitor	4 Freq Select + Monitor
MC2000 Models	PTT + Monitor	4 Freq Select + Monitor	15 Freq Select + Monitor
MC2500 Models		4 Freq Select + Monitor	15 Freq Select + Monitor
Number of Radios:			
MC1000 and MC2000 Models	1	1	1
MC2500 Models		1 Max	4 Max
Outputs and Inputs:			
PTT Relay	Form C dry closure. 150 mA, 60 Vdc non-inductive load.		
Monitor/Aux Outputs	Form C dry closure. 150 mA, 60 Vdc non-inductive load.		
Aux Inputs	Opto-coupled inputs, 5 K Ohms impedance, 5 to 20 MA input current, unbalanced.		
Recorder Port (MC2500 only)	Nominal output -10 dBm @ 600 Ohm		
Auxiliary/Paging Input (MC2500 only)	Nominal output -10 dBm, balanced 600 Ohm input		
All Mute (MC2500 only)	-24 dB or full muting of unselected channels, timer programmable 1 to 255 seconds or infinite durations.		

DATA SHEETMC SERIES
Deskset Controllers**REMOTE ADAPTER SPECIFICATIONS**

	DC (L3277)	Tone (L3276)
Dimensions	Approximately 8.2" W (20.8 cm) x 7.3" L (18.5 cm) x 1.3" H (3.3 cm)	
Weight	Approximately 1.55 lbs (.7 kg)	
Operating Temperature Range	-22°F to 140°F (-30°C to +60°C)	
Humidity	95% at 122°F (50°C) (non-condensing)	
Power Input	10.5 to 16 Vdc max.; 250 mA typical 650 mA max.	10.5 to 16 Vdc max.; 350 mA typical 650 mA max.
Frequency Range	±3 dB from 300 to 3000 Hz @ 1 KHz ref.	±3 dB from 300 to 3000 Hz @ 1 KHz ref. except at 2175 Hz notch filter
Hum and Noise	Less than -45 dB below rated output	
Audio Distortion	Less than 3% THD @ 1 KHz	
Radio Rx Input (from Radio)	32 mVac to 4.5 Vac (nominal 300 mVac). Jumper selectable to between range: 32 mVac to 500 mVac (default) or 500 mVac to 4.5 Vac	
Radio Tx Output (to Radio)	32 mVac to 800 mVac (nominal 80 mVac). Jumper selectable to between range: 32 mVac to 500 mVac (default) or 500 mVac to 800 mVac	
Line Rx Input (from consoles/desksets)	-24 dBm to 0 dBm (nominal -10 dBm into 600Ω)	
Line Tx Output (to consoles/desksets)	-15 dBm to +10 dBm (nominal -10 dBm into 600Ω)	
Max. Number of Desksets Supported	10	
Control Functions (Max.)	4 Freq. + Monitor	15 Freq. + Monitor
Input Tolerance	±20%	±2%

DIGITAL JUNCTION BOX SPECIFICATIONS

Dimension	8-2/16" W (20.5 cm) x 8-1/4" L (21 cm) x 1-3/8" (3.5 cm)
Weight	1.5 pounds (680 grams)
Audio Distortion	Less than 3% THD (total harmonic distortion)
Audio Transmit	0.78 Vac nominal
Audio Receive	0.78 Vac nominal
Data Interface	RS-485 standard
Frequency Response	±3 dB from 300-3000 Hz @ 1 kHz ref.
Hum and Noise	Less than -45 dB below rated outputs
Humidity	95% at 122°F (50°C)
Maximum distance between Master Digital Junction Box and console/deskset	5000 feet (1524 meters) [50 feet [15 meters] for RCH 3000]
Maximum distance to digital radio	50 feet (15 meters)
Power Input	10.5 to 16 Vdc maximum
Temperature Range	32°F to 122°F (0°C to 50°C)

Specifications subject to change without notice.

DATA SHEET

MC SERIES
Deskset Controllers



Motorola, Inc. 1301 E. Algonquin Road, Schaumburg, Illinois 60196 U.S.A. www.motorola.com/us/government 1-800-367-2346

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R3-13-2003C POD

XTL™ 2500 RB & XTL™ 1500 RB

Mobile Radios for 800 MHz Rebanding

SPECIFICATION SHEET



XTL™ 2500 RB

MODEL FEATURES

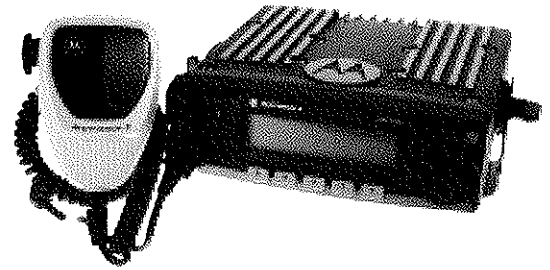
- Frequency Band – 806-869 MHz
- Power Level – 10-35 Watt
- 255 channels (Standard)
- Type II Trunking Only
- 5 Programmable buttons x 4 deep in menu functions
- 14 digit character display
- Tri-color backlit LCD display
- Emergency button
- Multi level dim button
- Dash/Remote mount
- Meets Military Specs 810 (C,D, E & F)
- Utilizes Windows®-based customer programming
- Built in FLASHport™ support
- Optional keypad microphone
- External Speaker
- Dual Control Head
- USB/RS232 connectivity
- Optional Siren PA
- Optional Direct Entry Keypad

For details of radio configurations

XTL™ 1500 RB

MODEL FEATURES

- Frequency Band – 806-869 MHz
- Power Level – 10-35 Watt
- 48 Channels
- Emergency button
- Dash mount
- Meets Military Specs 810 (C,D, E and F)
- Utilizes Windows®-based customer programming
- Built in FLASHport™ support
- Internal Speaker



Upgradeable Features:

- Dual mode operation (ASTRO Digital & Analog)
- 9600 & 3600 Baud capable
- Project 25 operation on Conventional & Trunking systems
- Project 25 compliant interoperable voice signaling features
- Integrated voice & data operation

Encryption Capable:

- Type III (optional)
- Allows for MultiKey for single algorithms ONLY
- Algorithms supported:
 - DVI-XL - DES
 - DVP-XL - DES-XL
 - AES - DES-OFB
 - Advanced Digital Privacy (ADP)

Reuse of most ASTRO/MCS accessories



Upgradeable Features:

- Dual mode operation (ASTRO Digital and Analog)
- Optional Keypad microphone
- 255 Channels
- Integrated voice and data capable

These mobile radios are specifically designed to meet the needs of your organization for Rebanding replacement models and are only available as replacement radios for Rebanding systems. This specification sheet can be used to help you determine which radios best fit the configurations you are replacing.

Motorola's XTL 2500 RB mobile radio is tough and well suited as a replacement radio for users in Police, Fire, EMS, and State/Local/Federal Government agencies. Motorola's XTL 1500 RB mobile radio is tough and well suited for users in a construction, utility, petroleum, or local law enforcement environment. Taking into consideration your work environment and various job responsibilities, these robust mobile radios support the type of consistent, high quality communication you need with the features agencies most use.

The XTL 2500 RB mobile radio works with many of the the accessories used with the XTL 5000 mobile radio and it can be upgraded to a full XTL 2500 including dual mode support for ASTRO Digital, 700 MHz Operation and Project 25. The XTL 1500 RB radio works with some of the accessories common to the XTL 2500 mobile radio and can be upgraded to a full XTL 1500 including support for Project 25 and 700 MHz Operation.

GENERAL PERFORMANCE SPECIFICATIONS

Frequency range	806-869 MHz
Channel Bandwidth	
Analog	12.5/20/25 kHz
Digital	12.5 kHz

RECEIVER

Frequency	800 MHz
Channel Spacing	12.5 / 20 / 25 kHz
Maximum Frequency Separation	Full Bandsplit
Analog Sensitivity	
20 db Quieting	.30 μ V
12 db SINAD per EIA	.25 μ V
Intermodulation	80 dB
Spurious Response Rejection	80 dB
Audio Output Power at 3% distortion	7.5 W (ext. speaker)
(External/Internal Speaker)	3 W (int. speaker)
Adjacent Channel Rejection Selectivity	65 dB 80 dB
(12.5 kHz/25 kHz)	

MOBILE

Dimensions	Radio Transceiver
	2" x 7" x 7.8" (50.8 x 177.8 x 198.1 mm)
	Control Head
	2.35" x 7.1" x 2.5" (59.7 x 180.3 x 63.5 mm)
	Radio Transceiver and Control Head – Dash Mount
	2.35" x 7.1" x 9.1" (59.7 x 180.3 x 231.1 mm)
Weight	Radio Transceiver and Control Head
	6.1 lbs (2.77 kg)

TRANSMITTER

Frequency	806-825 MHz
	851-870 MHz
RF Power	10-35W
Max Freq Separation	Full Bandsplit
Freq Stability Operating Freq Accuracy	
(-30°C to +60°C; +25°C Ref)	1.5 ppm
Modulation Limiting	
25/20 kHz channel	\pm 5 kHz, +/-4 kHz (NPSPEC)
12.5 kHz channel	\pm 2.5 kHz
Channel Spacing Analog	12.5/20/25 kHz
FM Hum and Noise	
20/25 kHz	40 dB
12.5 kHz	34 dB
Emissions	Conducted Radiated
	--70 dBc --85 dBc
Audio Response	
(6 dB/Octave Pre-emphasis	
from 300 to 3000 Hz)	+1, -3 dB (EIA)
Audio Distortion per EIA	2%

Features Common to Both XTL 2500 RB & XTL 1500 RB

POWER AND BATTERY DRAIN

Model Type	806-869 MHz
Minimum RF Power Output	10-35 Watt
Operation	12V DC Negative Ground
Standby at 13.8V	0.7A
Receive at Rate Audio at 13.8V	3.0A
Transmit at Rated Power	8A (15W), 13A (35W)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-30°C / +60°C
Storage Temperature	-55°C / +85°C
International Protection	IP54 certified

SPEAKER

Dimensions	5.5" x 5.5" x 2.5" (139.7 x 139.7 x 63.5 mm) (Excluding mounting bracket)
Weight	1.5 lbs (0.68 kg)

FCC TYPE ACCEPTANCE ID

Transmitter	
Power Output	10-35 W
Number	AZ492FT5823

MILITARY STANDARDS 810 C, D, E, & F

	MIL-STD - 810C		MIL-STD - 810D		MIL-STD - 810E		MIL-STD - 810F	
	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.	Method	Proc./Cat.
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II
High Temperature Storage	501.1	I	501.2	I/A1	501.3	I/A1	501.4	I/Hot
High Temperature Storage	501.1	II	501.2	II/A1	501.3	II/A1	501.4	I/Hot
Low Temperature Storage	502.1	I	502.2	I/C3	502.3	I/C3	502.4	I/C3
Low Temperature Operational	502.1	I	502.2	II/C1	502.3	II/C1	502.4	II/C1
Temperature Shock	503.1	-	503.2	I/A1-C3	503.3	I/A1-C3	503.4	I/Hot-C3
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I
Rain Blowing	506.1	I	506.2	I	506.3	I	506.4	I
Rain Steady	506.1	II	506.2	II	506.3	II	506.4	III
Humidity	507.1	II	507.2	II	507.3	II	507.4	-
Salt Fog	509.1	-	509.2	-	509.3	-	509.4	-
Blowing Dust	510.1	I	510.2	I	510.3	I	510.4	I
Blowing Sand			510.2	II	510.3	II	510.4	II
Vibration Minimum Integrity	514.2	VIII/F Curve-W	514.3	I/10	514.4	I/10	514.5	I/24
Vibration Loose Cargo			514.3	II/3	514.4	II/3	514.5	II/5
Shock Functional	516.2	I	516.3	I	516.4	I	516.5	I
Shock Crash Hazard	516.2	III	516.3	V	516.4	V	516.5	V
Shock Bench Handling	516.2	V	516.3	VI	516.4	VI	516.5	VI



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 R3-1-2030A

GENERAL PERFORMANCE SPECIFICATIONS

Frequency range	806-869 MHz
Channel Bandwidth	
Analog	12.5/20/25 kHz
Digital	12.5 kHz

RECEIVER

Frequency	800 MHz
Channel Spacing	12.5 / 20 / 25 kHz
Maximum Frequency Separation	Full Bandsplit
Analog Sensitivity	
20 db Quieting	.30 μ V
12 db SINAD per EIA	.25 μ V
Intermodulation	80 dB
Spurious Response Rejection	80 dB
Audio Output Power at 3% distortion	7.5 W (ext. speaker)
(External/Internal Speaker)	3 W (int. speaker)
Adjacent Channel Rejection Selectivity (12.5 kHz/25 kHz)	65 dB 80 dB

TRANSMITTER

Frequency	806-825 MHz 851-870 MHz
RF Power	10-35W
Max Freq Separation	Full Bandsplit
Freq Stability Operating Freq Accuracy (-30°C to +60°C; +25°C Ref)	1.5 ppm
Modulation Limiting	
25/20 kHz channel	\pm 5 kHz, \pm 4 kHz (NPSPEC)
12.5 kHz channel	\pm 2.5 kHz
Channel Spacing Analog	12.5/20/25 kHz
FM Hum and Noise	
20/25 kHz	40 dB
12.5 kHz	34 dB
Emissions	Conducted Radiated
	-70 dBc -85 dBc
Audio Response (6 dB/Octave Pre-emphasis from 300 to 3000 Hz)	+1, -3 dB (EIA)
Audio Distortion per EIA	2%

MOBILE

Dimensions	Radio Transceiver and Control Head 2.6" x 7.3" x 9.8" (65 x 185 x 248 mm)
Weight	Radio Transceiver and Control Head 5.2 lbs (2.34 kg)

XTM™ 1500 RR

Attachment D

**Request for Quotation
For
Base Station Devices**

West Virginia

**Department of Health and Human Resources (DHHR),
Bureau for Public Health (BPH), State Trauma and
Emergency Medical System (STEMS)**

1 General Description

The Department of Health and Human Resources, State Trauma and Emergency Medical System, desires to establish a contract for the purchase of a Federal Communications Commission, FCC, mandated Narrow Band Compliant Conventional, Analog, Ultra High Frequency, UHF, and Very High Frequency, VHF, Base Stations. Other entities of West Virginia state government as well as counties, municipalities and Public Safety Agencies shall be able to piggy back on this contract with prior approval from the Agency.

This request for quotation contains specifications for two Base Station types, a UHF model and a VHF model. The contract may be awarded for each item individually or for both, dependent upon the responses.

A base Station is a device that in a professional two-way radio system is used to maintain contact with a dispatch fleet of hand-held or mobile radios. The base station is one end of the communications link.

Item	Requirement	Compliance	
		Yes	No
2	General Operation-UHF	X	
2.1	The device shall operate as a Base Station.	X	
2.2	The device shall operate on Analog signals	X	
2.3	The device shall support Conventional Push to Talk, PTT, transmissions.	X	
2.4	The device shall operate in the UHF frequency range of 403 to 470 Mhz	X	
2.5	The device shall support a minimum of 16 channels.	X	
2.6	The device shall support FCC Narrow Band.	X	
2.6.1	The device shall provide 25 Khz +/- 5 Khz channel spacing.	X	
2.6.2	The device shall provide 12.5 Khz +/- 2.5 Khz channel spacing.	X	
2.6.3	The device shall have the capability to provide 6.25 Khz +/- 2.5 Khz channel spacing.	X	
2.7	The device shall not require the use of an external timing reference in order to achieve channel spacing, bandwidth, and operation.	X	
2.8	The device shall transmit at full power of 100 watts in a continuous duty cycle on all channels and over the full channel bandwidth.	X	
2.9	The device shall contain software which will allow it to be field configurable for Time Division Multiple Access, TDMA, Repeater operation.	N/A	per Addendum 2
2.10	The device when configured for Digital Repeater operation shall support single site operation.	N/A	
2.11	The device when configured for Digital Repeater operation shall support multi-site IP connect.	N/A	
2.12	The device shall support field configuration to allow it to operate in a Digital Trunk system.	N/A	
2.13	The device shall provide front panel access for a service speaker.	X	
2.14	The Device shall provide front panel access for a service microphone.	X	

item	Requirement	Compliance	
		Yes	No
3	General Operation-VHF	X	
3.1	The device shall operate as a Base Station.	X	
3.2	The device shall operate on Analog signals	X	
3.3	The device shall support Conventional PTT transmissions.	X	
3.4	The device shall operate in the VHF frequency range of 150 to 174 Mhz	X	
3.5	The device shall support a minimum of 32 channels.	X	
3.6	The device shall support FCC Narrow Band.	X	
3.6.1	The device shall provide 25 Khz +/- 5 Khz channel spacing.	X	
3.6.2	The device shall provide 12.5 Khz +/- 2.5 Khz channel spacing.	X	
3.7	The device shall not require the use of an external timing reference in order to achieve channel spacing, bandwidth, and operation.	X	
3.8	The device shall transmit at full power of 100 watts in a continuous duty cycle on all channels and over the full channel bandwidth.	X	

4 Common Requirements for the UHF and VHF Base Station

Item	Requirement	Compliance	
		Yes	No
4.1	Environmental & Physical		
4.1.1	The device must operate within the performance specifications listed in this document from standard single phase AC voltage and frequency available at the main supply range of 85 – 264 VAC and 47-63 Hz.	X	

Common Requirements continued			
4.1.2	The device shall meet performance specifications over the temperature range of - 30° C to 60° C.	X	
4.1.3	The device performance shall conform to testing standards outlined in Telecommunication Industry Association, TIA-603-B.	X	
4.1.4	The device shall have FCC type acceptance for full operation.	X	
4.1.5	The Device shall not require adjunct cooling devices or mechanism other than convectional air flow.	X	
4.1.6	The device shall meet Restriction of Hazardous Substances, RoHS.	X	
4.1.7	The device shall fit in 4 rack units (7 inches) in an EIA standard 19" rack.	X	
4.1.8	The device shall have a comprehensive 2 year warranty.	X	

4.2	USER Interface		
4.2.1	The device shall provide illuminated indicator for power and status. It shall illuminate Green, for power on and normal operation. It shall illuminate Red for power on and detected failure.	X	
4.2.2	The device shall provide illuminated indicators for Transmit and Receive. It shall illuminate Green for enabled operation.	X	
4.2.3	The device shall support US based Tone Remote control.	X	

4.3	Transmitter/Receiver Specifications		
4.3.1	The device transmit audio response shall be +1,-3 dB from 6 dB per octave pre-emphasis.	X	
4.3.2	The device transmit audio distortion shall be Less than 3% at 1000 Hz; 60% RSD.	X	
4.3.3	The devices receive selectivity per TIA 603-D shall be 75 dB.	X	
4.3.4	The device receive audio response shall be +1,-3 dB from 6 dB per octave pre-emphasis.	X	
4.3.5	The device receive audio distortion shall be Less than 3% at 1000 Hz; 60% RSD.	X	

4.4	General Capability		
4.4.1	The vendor shall provide installation manual, user manual and basic repair shop service manual.	X	
4.4.2	All programming operation software support shall operate on a Microsoft Windows pc with operating systems 2000/XP/Vista/Windows 7.	X	
4.4.3	The device shall contain software which will allow it to be field configurable for Analog Repeater operation.	X	
4.4.4	The device shall be field software upgradable.	X	
4.4.5	The device shall support field configuration to allow it to operate in an Analog Trunk system.	X	
4.4.6	The device shall have the necessary software to connect to the Department of Health and Human Resources, State Trauma and Emergency Medical System Medical Command Network.	X	



MOTOROLA

MTR3000

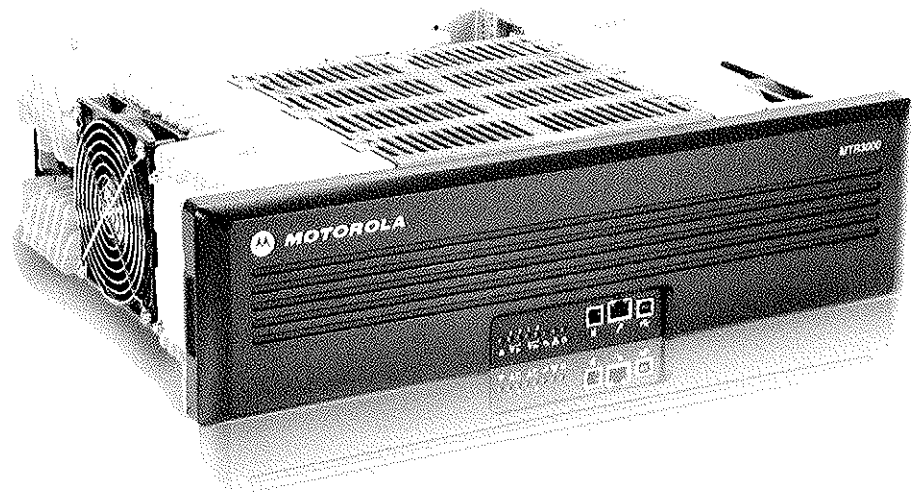
BASE STATION/REPEATER

MTR3000 is a MOTOTRBO™ integrated voice and data base station/repeater designed to meet the requirements of small public safety, utilities and professional organizations.

The MTR3000 operates in digital mode in MOTOTRBO Conventional, IP Site Connect, and Capacity Plus systems delivering increased capacity, spectral efficiency, integrated data applications and enhanced voice communications.

In addition the MTR3000 can also operate in analog mode for conventional and LTR/Passport Trunking systems providing a flexible high power base station/repeater.

For systems currently using the high power MTR2000 base station/repeater a simple MTR3000 upgrade kit is available so the station can operate in a MOTOTRBO system and allow the user to leverage their current investment.



MTR3000 STANDARD FEATURES:

Operates in analog or MOTOTRBO digital mode with a LED indicating mode of operation.

Reliable 100W Continuous Duty Cycle Operation

12.5 or 25 kHz programmable channel spacing.

Analog and digital conventional are all standard in one base station without the cost of additional software or hardware.

Power supply functions over a wide range of voltages.

RoHS (Restriction of Hazardous Substances) compliant.

MTR3000 PROGRAMMED IN MOTOTRBO MODE PROVIDES:

Supports two simultaneous voice paths in digital 12.5 kHz TDMA.

Divides existing channel into two timeslots delivering twice the capacity through a single repeater.

Supports MOTOTRBO IP Site Connect for increased wide area coverage.

Supports MOTOTRBO Capacity Plus single site trunking without a separate hardware controller.

MTR3000 SERVICEABILITY:

Repeater diagnostic and control software provides remote or local site monitoring.

Easy to replace components with functionally separate Field Replaceable Units (FRU).

Software based design simplifies feature upgrades.

Easy access to station ports (no need to remove the front panel) shortening installation and maintenance time.

For ease of installation, minimal station alignment is needed.

Backed by Motorola's Standard 1-year Warranty.

SPECIFICATION SHEET

MTR3000 Base Station/Repeater

General Specifications		
Model Number	T3000A T2003A - Upgrade kit for MTR2000 stations	
Number of Frequencies	Up to 16	
Modulation	FM & 4FSK	
Frequency Generation	Synthesized	
Channel Spacing	12.5 kHz, 25 kHz	
Mode of Operation	Semi-duplex / Duplex	
Temperature Range	-30°C to +60°C*	
Antenna Connectors	Transmit and Receive, Type "N" Female	
Input Voltage AC	85-264 VAC, 47-63 Hz	
Optional DC Only Operation	28.8 VDC, 25.7-31.4VDC (Full rated output power)	
	Dimensions	Weight
Base Station Repeater	5.25 x 19 x 16.5 in. (133 x 483 x 419 mm)	40 lbs (19 kg)

UHF Input Power Neg. Gnd. or Battery Revert		
	AC Line 117 Volts / 220 Volts	28 VDC
100 W Standby	0.6A / 0.4A	1.0A
100 W Transmit	4.5A / 2.5A	11.5A

Transmitter (UHF)		
	Model T3000A	Model T2003A
Frequency	403-470, 470-524 MHz	403-435, 435-470 MHz
Power Output	8-100 watts	25-100 watts
Bandwidth		Full Band
Output Impedance		50 Ohms
Intermodulation Attenuation		40 dB
Maximum Deviation (RSD)	25 kHz 12.5 kHz	+5 kHz +2.5 kHz
Audio Sensitivity		60% RSD @ 80 mV RMS
Spurious and Harmonic Emissions Attenuation		85 dB
FM Hum and Noise (750 µs de-emphasis)	25 kHz 12.5 kHz	50 dB nominal 45 dB nominal
Frequency Stability (for temperature and aging variation)		1.5 PPM/External Ref (optional)
Audio Response		+1, -3 dB from 6 dB per octave pre-emphasis; 300-3000 Hz referenced to 1000 Hz at line input
Audio Distortion		Less than 3% at 1000 Hz; 60% RSD
Emission Designators		FM Modulation: 12.5 kHz: 11K0F3E; 25 kHz: 16K0F3E 4FSK Modulation: 12.5 kHz - Data Only: 7K60FXD; 12.5 kHz - Data & Voice: 7K60FXE

Receiver (UHF)		
	Model T3000A	Model T2003A
Frequency	403-470, 450-524 MHz	403-470 MHz
Selectivity (TIA603)	25 kHz 12.5 kHz	80 dB 70 dB
Selectivity (TIA603D)	25 kHz 12.5 kHz	75 dB 45 dB
Sensitivity 12 dB SINAD		0.30 µV
Digital Sensitivity 5% BER		0.30 µV
Signal Displacement Bandwidth	12.5 / 25 kHz	1 kHz / 2 kHz
Intermodulation Rejection	12.5 and 25 kHz	85 dB
Spurious and Image Response Rejection		85 dB
Audio Response		+1, -3 dB from 6 dB per octave de-emphasis; 300-3000 Hz referenced to 1000 Hz at line input
Audio Distortion		Less than 3% at 1000 Hz; 60% RSD
Line Output		330 mV (RMS) @ 60% RSD
FM Hum and Noise (750µs de-emphasis)	Receive signal 25 kHz 12.5 kHz	50 dB nominal 45 dB nominal
RF Input Impedance		50 Ohms

FCC Type Acceptance			
Frequency Range in MHz	Type	Power Output in Watts	US Type Acceptance Number
403-470	Transmitter	8-100	Pending
403-470	Receiver	N/A	Pending
470-524	Transmitter	8-100	Pending
450-524	Receiver	N/A	Pending

MTR3000 product specifications are preliminary and subject to FCC approval. This product cannot be sold until authorization is obtained.
Note: Specifications per TIA/EIA 603.

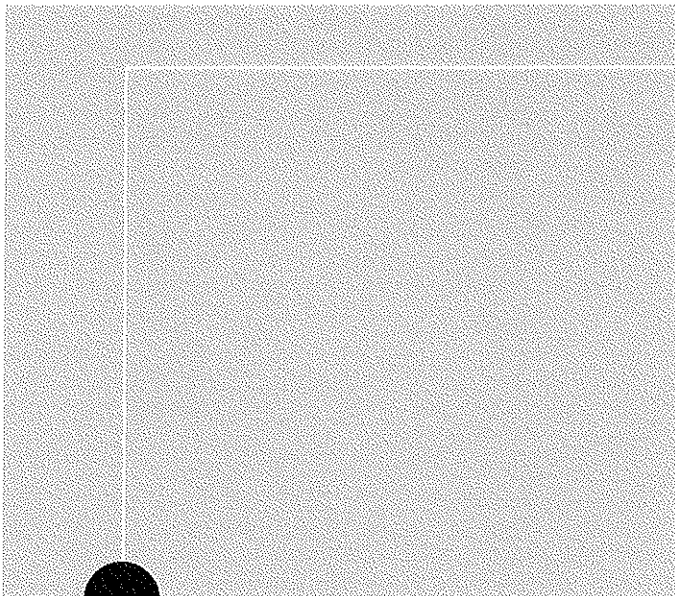
Specifications subject to change without notice.



MOTOROLA

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R3-2-2010



MTR2000™
Station/Repeater/Receiver

R4-2-97D
June 2005

*PRODUCT PLANNER AND
ORDERING GUIDE*

Specifications (Continued)

General Specifications

Following are the MTR2000 Specifications, as measured per the revised EIA/TIA 603 Standards:

GENERAL SPECIFICATION	MTR2000 VHF	MTR2000 350 MHz	MTR2000 UHF	MTR2000 800 MHz	MTR2000 900 MHz
Tx Sub-band Range High Power	132-154/ 150-174 MHz	NA	403-435/ 435-470 MHz	851-870 MHz	935-941MHz
Tx Sub-band Range Low Power	132-174 MHz	335-405 MHz	403-470 MHz	NA	NA
Rx Range Wideband Electronic Preselector	132-174 MHz	335-405 MHz	403-470 MHz	806-825 MHz	896-915 MHz
Rx Sub-band Range Narrow Preselector	132-154/ 150-174 MHz	NA	403-435/ 435-470 MHz	NA	NA
Number of Channels	32	32	32	32	32
Channel Spacing	30 kHz/25 kHz/ 12.5 kHz	25 kHz/ 12.5 kHz	25 kHz/ 12.5 kHz	25 kHz/ 12.5 kHz	12.5 kHz
Frequency Generation	Synthesized	Synthesized	Synthesized	Synthesized	Synthesized
Power Supply Type	Switching	Switching	Switching	Switching	Switching
Power Supply Input Voltage	85-264 VAC	85-264 VAC	85-264 VAC	85-264 VAC	85-264 VAC
Power Supply Input Frequency	47-63 Hz	47-63 Hz	47-63 Hz	47-63 Hz	47-63 Hz
DC Only Operation (Full Power)	14.2V (1-40W, 1-30 W) 28.6V (25-100W)	14.2V (2-40W)	14.2V (2-40W, 2-30 W) 28.6V (25-100W)	28.6V (20-75W)	28.6V (20-75W)
DC Revert Operation	14.2V (1-40W, 1-30 W) 28.6V (25-100W)	14.2V (2-40W)	14.2V (2-40W, 2-30 W) 28.6V (25-100W)	28.6V (20-75W)	28.6V (20-75W)
T/R Separation (With Duplexer)	31.5 MHz	NA	5 MHz	45 MHz	39 MHz
External Reference Input Impedance Voltage	50Ω 1 V p-p	50Ω 1 V p-p	50Ω 1 V p-p	50Ω 1 V p-p	50Ω 1 V p-p
Temperature Range (Ambient)	-30°C to 60°C	-30°C to 60°C	-30°C to 60°C	-30°C to 60°C	-30°C to 60°C

Continued on next page

Specifications (Continued)

MTR2000 Transmitter Specifications

TRANSMITTER SPECIFICATION	MTR2000 VHF	MTR2000 350 MHz	MTR2000 UHF	MTR2000 800 MHz	MTR2000 900 MHz
Power Output	1-30W, 1-40W 25-100W	2-40W	2-30W, 2-40W 25-100W	20-75W	20-75W
Electronic Bandwidth	Full sub-band	Full sub-band	Full sub-band	Full sub-band	Full sub-band
Isolation Internal Circulator External Circulator Internal + External Circulator	40 dB (30W only) 70 dB 70 dB	No Circulators offered with 350 MHz	40 dB (30W only) 70 dB 70 dB	40 dB 70 dB 70 dB	40 dB 70 dB 70 dB
Spurious and Harmonic Emissions Attenuation	-85 dBc	-85 dBc	-85 dBc	-80 dBc	-80 dBc
Deviation 25/30 kHz 12.5 kHz	±5 kHz ±2.5 kHz	±5 kHz ±2.5 kHz	±5 kHz ±2.5 kHz	±5 kHz ±2.5 kHz	NA ±2.5 kHz
Line Audio	-20 dBm to 0 dBm variable	-20 dBm to 0 dBm variable	-20 dBm to 0 dBm variable	-20 dBm to 0 dBm variable	-20 dBm to 0 dBm variable
Audio Response 300-3000 Hz referenced to 1000 Hz at line input.	+1, -3 dB from 6 dB per octave preemphasis.	+1, -3 dB from 6 dB per octave preemphasis.	+1, -3 dB from 6 dB per octave preemphasis.	+1, -3 dB from 6 dB per octave preemphasis.	+1, -3 dB from 6 dB per octave preemphasis.
Audio Distortion	Less than 3% @ 1000 Hz @ 60% RSD	Less than 3% @ 1000 Hz @ 60% RSD	Less than 3% @ 1000 Hz @ 60% RSD	Less than 3% @ 1000 Hz @ 60% RSD	Less than 3% @ 1000 Hz @ 60% RSD
FM Hum and Noise for 1 kHz tone @ 60% RSD with 750µs deemphasis (300to 3000 Hz Bandwidth) Wireline Output 25/30 kHz 12.5 kHz	50 dB nominal 45 dB nominal	45 dB nominal 45 dB nominal	50 dB nominal 45 dB nominal	50 dB nominal 45 dB nominal	NA 45 dB nominal
Frequency Stability	1.5 PPM External Reference Optional	1.5 PPM External Reference Optional	1.5 PPM External Reference Optional	1.5 PPM External Reference Optional	External Reference Required
RF Output Impedance	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω

Continued on next page

Specifications (Continued)

MTR2000 Receiver Specifications

RECEIVER SPECIFICATION	MTR2000 VHF	MTR2000 350 MHz	MTR2000 UHF	MTR2000 800 MHz	MTR2000 900 MHz
IF Frequencies (1st, 2nd)	44.85 MHz/ 450 kHz	73.35 MHz/ 450 kHz	73.35 MHz/ 450 kHz	73.35 MHz/ 450 kHz	73.35 MHz/ 450 kHz
Electronic Preselector Tuning Range	42.0 MHz	70.0 MHz	67.0 MHz	19.0 MHz	19.0 MHz
Narrow Preselector Bandwidth	4.0 MHz	NA	4.0 MHz	NA	NA
Sensitivity 12 dB Sinad					
30 kHz	0.35 μ V	NA	NA	NA	NA
25 kHz	0.35 μ V	0.35 μ V	0.35 μ V	0.35 μ V	NA
12.5 kHz	0.35 μ V	0.35 μ V	0.35 μ V	0.35 μ V	0.35 μ V
Sensitivity 20 dBQ	0.50 μ V	0.50 μ V	0.50 μ V	0.42 μ V	0.42 μ V
Selectivity					
30 kHz	80 dB				
25 kHz	80 dB	80 dB	80 dB	80 dB	NA
12.5 kHz	75 dB	75 dB	75 dB	70 dB	70 dB
Intermodulation Rejection					
30 kHz	85 dB				
25 kHz	85 dB	82 dB	85 dB	85 dB	NA
12.5 kHz	80 dB	79 dB	80 dB	85 dB	85 dB
Spurious and Image Rejection with High Performance Narrow Preselector	90 dB	NA	90 dB	NA	NA
Spurious and Image Rejection with Electronic Preselector (Nominal Values)	85 dB	85 dB	85 dB	90 dB	90 dB
Off Channel Acceptance	≥ 2 kHz	≥ 2 kHz	≥ 2 kHz	≥ 2 kHz	≥ 2 kHz
Wireline Output	-20 dBm to 7 dBm, 1 kHz tone	-20 dBm to 7 dBm, 1 kHz tone	-20 dBm to 7 dBm, 1 kHz tone	-20 dBm to 7 dBm, 1 kHz tone	-20 dBm to 7 dBm, 1 kHz tone

Continued on next page

Specifications (Continued)

Receiver Specifications, Continued

RECEIVER SPECIFICATION	MTR2000 VHF	MTR2000 350 MHz	MTR2000 UHF	MTR2000 800 MHz	MTR2000 900 MHz
Audio Response	+1, -3 dB from 6 dB / octave deemphasis. 300-3000 Hz referenced to 1000 Hz at line output.	+1, -3 dB from 6 dB per octave deemphasis. 300-3000 Hz referenced to 1000 Hz at line output.	+1, -3 dB from 6 dB per octave deemphasis. 300-3000 Hz referenced to 1000 Hz at line output.	+1, -3 dB from 6 dB per octave deemphasis. 300-3000 Hz referenced to 1000 Hz at line output.	+1, -3 dB from 6 dB per octave deemphasis. 300-3000 Hz referenced to 1000 Hz at line output.
Audio Distortion	≤3 % 1000 Hz @ 60% RSD	≤3 % 1000 Hz @ 60% RSD	≤3 % 1000 Hz @ 60% RSD	≤3 % 1000 Hz @ 60% RSD	≤3 % 1000 Hz @ 60% RSD
FM Hum and Noise for 1 kHz tone @ 60% RSD with 750 μs deemphasis (300 to 3000 Hz Bandwidth) Wireline Output: 25/30 kHz 12.5 kHz	50 dB nominal 45 dB nominal	50 dB nominal 45 dB nominal	50 dB nominal 45 dB nominal	50 dB nominal 45 dB nominal	NA 45 dB nominal
Frequency Stability	1.5 PPM External Reference Optional	1.5 PPM External Reference Optional	1.5 PPM External Reference Optional	1.5 PPM External Reference Optional	External Reference Required
RF Input Impedance	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω

Input Power (Varies with Options)

	ABB/Ascom/Delta units -- shipped before mid-2005		ASTEC units -- shipped after mid-2005					
All measurements in amps	AC Line (non-PFC) 120V/240V		AC Line (PFC) 120V/240V		14 VDC		28 VDC	
Power Output	Standby	Transmit	Standby	Transmit	Standby	Transmit	Standby	Transmit
VHF								
40/30 Watt	0.5/0.3	2.3/1.3	0.33/0.28	1.4/0.7	1.7	11.5	--	--
100 Watt	0.6/0.4	4.5/2.5	0.28/0.25	2.6/1.4	--	--	1	11.5
350 MHz								
40 Watt	0.5/0.3	2.4/1.3	0.34/0.26	1.4/0.74	1.5	9.0	--	--
UHF								
40/30 Watt	0.5/0.3	2.4/1.3	0.34/0.26	1.4/0.74	1.7	8.5	--	--
100 Watt	0.6/0.4	5.4/2.9	0.36/0.29	3.1/1.6	--	--	1	13
800 MHz								
75 Watt	0.5/0.25	4/2	0.32/0.26	2.6/1.3	--	--	1	11
900 MHz								
75 Watt	0.5/0.25	4/2	0.34/0.26	3.1/1.6	--	--	1	10

Continued on next page

Attachment E

Request for Quotation
For
Base Station Antenna and
Supporting Equipment

West Virginia

**Department of Health and Human Resources (DHHR),
Bureau for Public Health (BPH), State Trauma and
Emergency Medical System (STEMS)**

1 General Description

The Department of Health and Human Resources, State Trauma and Emergency Medical System desires to establish a contract for the purchase of tower site grade antenna for Ultra High Frequency, UHF, and Very High Frequency, VHF, frequencies and site supporting equipment. Other entities of West Virginia state government as well as counties, municipalities and Public Safety Agencies shall be able to piggy back on this contract with prior approval from the Agency.

2 UHF Antenna Requirements Tier 1

Item	Requirement	Compliance	
		Yes	No
2.1	The device is a low Passive Intermodulation, PIM, External grade Dipole antenna for UHF frequencies.	X	
2.1.1	The device shall be tuned over the bandwidth from 400 Mhz to 520 Mhz.	X	
2.1.2	The device shall have a Voltage Standing Wave Ratio, VSWR, less than 1.5:1 (14dB).	X	
2.1.3	The device shall have a maximum power rating of 500 watts.	X	
2.1.4	The device shall have a nominal impedance of 50 ohms.	X	
2.1.5	The device shall have a nominal gain of 6dBd.	X	
2.1.6	The horizontal beam width shall be Omni directional +/- 0.5 dB.	X	
2.1.7	The vertical beam width shall be 30 degrees.	X	
2.1.8	The PIM shall be -140 dBc.	X	
2.1.9	The device shall have mounting brackets.	X	
2.1.10	The device shall withstand up to 149 miles per hour, mph, gusts, no ice.	X	
2.1.11	The device shall withstand up to a 117 mph gust with ice.	X	
2.1.12	The device shall have no downward tilt.	X	
2.1.13	The device shall be approximately 83" in length.	X	

3 UHF Antenna Requirements tier 2

item	Requirement	Compliance	
		Yes	No
3.1	The device is a low PIM External grade Dipole antenna for UHF frequencies.	X	
3.1.1	The device shall be tuned over the bandwidth from 400 Mhz to 520 Mhz.	X	
3.1.2	The device shall have a VSWR less than 1.5:1 (14dB).	X	
3.1.3	The device shall have a maximum power rating of 500 watts.	X	
3.1.4	The device shall have a nominal impedance of 50 ohms.	X	
3.1.5	The device shall have a nominal gain of 6dBd.	X	
3.1.6	The horizontal beam width shall be Omni directional +/- 0.5 dB.	X	
3.1.7	The vertical beam width shall be 9 degrees.	X	
3.1.8	The PIM shall be -140 dBc.	X	
3.1.9	The device shall have mounting brackets.	X	
3.1.10	The device shall withstand up to 134 mph gusts, no ice.	X	
3.1.11	The device shall withstand up to a 104 mph gust with ice.	X	
3.1.12	The device shall have 0 degree or 3 degree downward tilt.	X	
3.1.13	The device shall be approximately 197" in length.	X	

4 VHF Antenna Requirements tier 1

item	Requirement	Compliance	
		Yes	No
4.1	The device is a low PIM External grade Dipole antenna for VHF frequencies.	X	
4.1.1	The device shall be tuned over the bandwidth from 136 Mhz to 174 Mhz.	X	
4.1.2	The device shall have a VSWR less than 1.5:1 (14dB).	X	
4.1.3	The device shall have a maximum power rating of 750 watts.	X	
4.1.4	The device shall have a nominal impedance of 50 ohms.	X	
4.1.5	The device shall have a nominal gain of 3dBd.	X	
4.1.6	The horizontal beam width shall be Omni directional +/- 0.5 dB.	X	
4.1.7	The vertical beam width shall be 35 degrees.	X	
4.1.8	The PIM shall be -140 dBc.	X	
4.1.9	The device shall have mounting brackets.	X	
4.1.10	The device shall withstand up to a 149 mph gusts, no ice.	X	
4.1.11	The device shall withstand up to a 115 mph gust with ice.	X	
4.1.12	The device shall have no downward tilt.	X	
4.1.13	The device shall be approximately 138" in length.	X	

5 VHF Antenna Requirements tier 2

Item	Requirement	Compliance	
		Yes	No
5.1	The device is a low PIM External grade Dipole antenna for VHF frequencies.	X	
5.1.1	The device shall be tuned over the bandwidth from 136 Mhz to 174 Mhz.	X	
5.1.2	The device shall have a VSWR less than 1.5:1 (14dB).	X	
5.1.3	The device shall have a maximum power rating of 750 watts.	X	
5.1.4	The device shall have a nominal impedance of 50 ohms.	X	
5.1.5	The device shall have a nominal gain of 6dBd.	X	
5.1.6	The horizontal beam width shall be Omni directional +/- 0.5 dB.	X	
5.1.7	The vertical beam width shall be 18 degrees.	X	
5.1.8	The PIM shall be -140 dBc.	X	
5.1.9	The device shall have mounting brackets.	X	
5.1.10	The device shall withstand up to a 114 mph gusts, no ice.	X	
5.1.11	The device shall withstand up to a 89 mph gust with ice.	X	
5.1.12	The device shall have 0 degree or 3 degree downward tilt.	X	
5.1.13	The device shall be approximately 248" in length.	X	

6 UHF Antenna Supporting Equipment Requirements

Item	Requirement	Compliance	
		Yes	No
6.1	The device is an UHF Circulator and Isolator for RF transmission systems.	X	
6.1.1	The device shall support 15 and 60 watt loading.	X	
6.1.2	The device shall operate over the 406 to 512 Mhz frequency band.	X	
6.1.3	The device shall have an insertion loss 1.0 DB at 125 w power rating.	X	
6.1.4	The device shall include a harmonic filter.	X	
6.1.5	The device shall have a reverse isolation of 50 DB over a band width 12 mhz	X	
6.2	The device is an UHF Duplexor for RF transmission systems.	X	
6.2.1	The device shall operate over the 406 to 512 MHz frequency band.	X	
6.2.2	The device shall have an insertion loss of 1.5 dB and a frequency separation of 0.8 MHz.	X	
6.2.3	The device shall have an isolation of 75 DB minimum and 90 DB maximum.	X	
6.2.4	The device shall have an input power rating of 350 w.	X	
6.2.5	The device shall be 19" standard rack mounting.	X	
6.2.6	The device shall occupy no more than 4 rack units, (1 ru= 1.75 inches)	X	

	UHF Antenna Supporting Equipment Requirements continued	X	
6.3	The device is an UHF Combiner for RF transmission systems.	X	
6.3.1	The device shall operate over the 406-512 MHz frequency band.	X	
6.3.2	The device shall have a maximum insertion loss of 3.7 DB with minimum spacing of 200 KHz.	X	
6.3.3	The device shall have 70 DB isolation from TX to TX input.	X	
6.3.4	The device shall support 125w per input.	X	
6.3.5	The device shall be offered in either 2 or 4 channel input.	X	
6.3.6	The device shall fit in a standard 19" rack.	X	

7 VHF Antenna Supporting Equipment Requirements

Item	Requirement	Compliance	
		Yes	No
7.1	The device is a VHF Circulator and Isolator for RF transmission systems.	X	
7.1.1	The device shall support 60 watt loading.	X	
7.1.2	The device shall operate over the 132 to 174 Mhz frequency band.	X	
7.1.3	The device shall have an insertion loss 0.4 DB at 125 w power rating.	X	
7.1.4	The device shall have a reverse isolation of 35 DB over a band width 5 mhz	X	
7.2	The device is a VHF Duplexor for RF transmission systems.	X	

	VHF Antenna Supporting Equipment Requirements continued	X	
7.2.1	The device shall operate over the 132 to 174 MHz frequency band.	X	
7.2.2	The device shall have an insertion loss of 1.5 dB and a frequency separation of 0.5 MHz.	X	
7.2.3	The device shall have an isolation of 80 DB.	X	
7.2.4	The device shall have an input power rating of 350 w.	X	
7.2.5	The device shall be 19" standard rack mounting.	X	
7.2.6	The device shall occupy no more than 4 rack units, (1 ru= 1.75 inches)	X	
7.3	The device is a VHF Combiner for RF transmission systems.	X	
7.3.1	The device shall operate over the 132 to 174 MHz frequency band.	X	
7.3.2	The device shall have a maximum insertion loss of 3.2 DB with minimum spacing of 150 KHz.	X	
7.3.3	The device shall have 70 DB isolation from TX to TX input.	X	
7.3.4	The device shall support 125w per input.	X	
7.3.5	The device shall be offered in either 2 or 4 channel input.	X	
7.3.6	The device shall fit in a standard 19" rack.	X	

**RFQ# BPH11084
Base Station Antenna
Attachment B: Cost Sheet**

The vendor must provide pricing inclusive of all associated costs for the following items including the cost of delivery. The estimated quantities contained on the cost sheet are intended for bid evaluation purposes only. Actual quantities may vary based upon the needs of the agency. Vendors should complete this pricing sheet in lieu of submission of manufacturer's quotes.

TIER	Description	Unit Cost	Estimated Qty.	Extended Cost
1U	Base Station Antenna	\$ 1,816.40	100	\$181,640.00
	UHF 3dBd			
	With Mounting Hardware			
1V	Base Station Antenna	\$ 2,348.40	100	\$234,840.00
	VHF 3dBd			
	With Mounting Hardware			
2U	Base Station Antenna	\$ 2,424.40	50	\$121,220.00
	UHF 6dBd			
	With Mounting Hardware			
2V	Base Station Antenna	\$ 6,834.30	50	\$341,715.00
	VHF 6dBd			
	With Mounting Hardware			
Options for Items 1-2				
A)	UHF Circulator and Isolator	\$ 1,773.65	20	\$35,473.00
B)	UHF Isolator	included in option A	20	
C)	UHF Duplexor	\$ 1,425.00	20	\$28,500.00
D)	UHF Combiner 4 circuit	\$ 10,986.75	20	\$219,735.00
E)	VHF Circulator and Isolator	\$ 1,593.15	20	\$31,863.00
F)	VHF Isolator	included in option E	20	
G)	VHF Duplexor	\$ 3,990.95	20	\$79,819.00
H)	VHF Combiner 4 circuit	\$ 8,663.05	20	\$173,261.00
I)	UHF Combiner 2 circuit	\$ 5,257.30	0	\$0.00
J)	UHF Cavity Filter	\$ 711.55	0	\$0.00
K)	VHF Combiner 2 circuit	\$ 4,481.15	0	\$0.00
Supplemental				
	Base Station Antenna,UHF, 9dBd, 3 deg tilt	\$ 5,491.00	0	\$0.00
	Base Station Antenna,VHF, 6dBd, 3 deg tilt	\$ 6,835.25	0	\$0.00
Total Bid:				\$1,274,805.00

65

**RFQ# BPH11084
Base Station Antenna
Attachment B: Equipment List**

The vendor must provide manufacturer, model number, and part number for all the equipment bid. Vendors should include, with their bid, a copy of the manufacturer's product sheet and any other supporting documentation which demonstrates the vendor's adherence to the mandatory specifications as outlined in the specifications.

TIER	Description	Manufacturer	Model Number	Part Number /Configuration Codes
1U	Base Station Antenna UHF 3dBd With Mounting Hardware	TXRX	BA80-67	DSBA4067DIN, TDN6017
1V	Base Station Antenna VHF 3dBd With Mounting Hardware	TXRX	BA40-41	DSBA4041DIN, TDN6017
2U	Base Station Antenna UHF 6dBd With Mounting Hardware	TXRX	BA160-67	DSBA8067DIN, TDN6017
2V	Base Station Antenna VHF 6dBd With Mounting Hardware	TXRX	BA80-41	DSBA8041DIN, DSPA4241DIN, TDN6017
<i>Options for Items 1-2</i>				
	A) UHF Circulator and Isolator	Motorola		TDE7120
	B) UHF Isolator	included in option A		
	C) UHF Duplexor			TDE6960
	D) UHF Combiner 4 circuit			TDE6860
	E) VHF Circulator and Isolator			TDD7190
	F) VHF Isolator	included in option E		
	G) VHF Duplexor			TDD6459
	H) VHF Combiner 4 circuit			TDD6940
	I) UHF Combiner 2 circuit			TDE6840
	J) UHF Cavity Filter			TDE6910, TDN9369
	K) VHF Combiner 2 circuit			TDD6920
Supplemental	Base Station Antenna, UHF, 9dBd, 3 deg tilt			DSBA16067DIN, TDN6017
	Base Station Antenna, VHF, 6dBd, 3 deg tilt			DSBA8041DIN, DSPA4241T3DIN, TDN6017

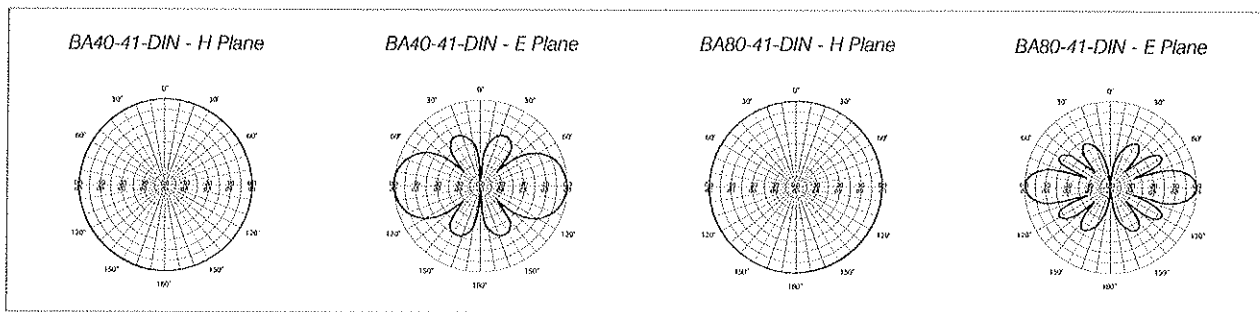


Electrical Specifications

Model Number	BA40-41-DIN	BA4040-41-DIN	BA80-41-DIN
Nominal Gain <i>dBd</i>	3	2 x 3	6
Frequency <i>MHz</i>		136 - 174	
Tuned Bandwidth		Entire band	
VSWR (Return Loss)		<1.5 :1 (14 dB)	
Nominal Impedance Ω		50	
Downlift	Not offered	Not offered	0° Std, -3° See note (2)
Vertical Beamwidth	35°	2 x 35°	18°
Horizontal Beamwidth		Omni +/-0.5 dB	
Input Power (Watts)		750	
Passive IM 3rd order (2x20W) <i>dBc</i>	-150	-140	-140

Mechanical Specifications

Model Number	BA40-41-DIN	BA4040-41-DIN	BA80-41-DIN
Construction & Configuration	4 dipoles (2 bays) Turnstile stacked Single section support	2 x 4 dipoles (2 bays) Turnstile stacked Dual section support	8 dipoles (4 bays) Turnstile stacked Dual section support
Length <i>inches</i>	138	248	248
Weight <i>lbs</i>	32	68	68
Shipping Weight <i>lbs</i>	192	288	288
Shipping Dimensions <i>inches</i>	H	26	26
	W	26	32
	L	146	146
Termination	7/16 DIN female with 20" 9142 cable tail		
Mounting Area	20" x 2.5" diam. aluminum	20" x 3.0" diam. aluminum	20" x 3.0" diam. aluminum
Suggested Clamps (not included)	91-00-104	91-00-114	91-00-114
Projected Area <i>ft²</i>	No ice	4.5	8.9
	With ice	7.7	14.3
Lateral Thrust @ 100mph <i>lbs</i>	111	221	221
Wind Gust Rating <i>mph</i>	No ice	149	114
	With ice	115	89
Torque @ 100mph <i>ft-lbs</i>	455	1921	1921



(1) Single section arrays are rated to -150dBc PIM rating. Dual section (BA80-41-DIN) arrays are rated at -140dBc.
 (2) Factory pre-set downlift of 3° may be specified on BA80-41-DIN antennas by adding -T3 to the part number ordered e.g. BA80-41-DIN-T3
 RoHS Compliant



US39628-1



RF Measurement and Management in Your World



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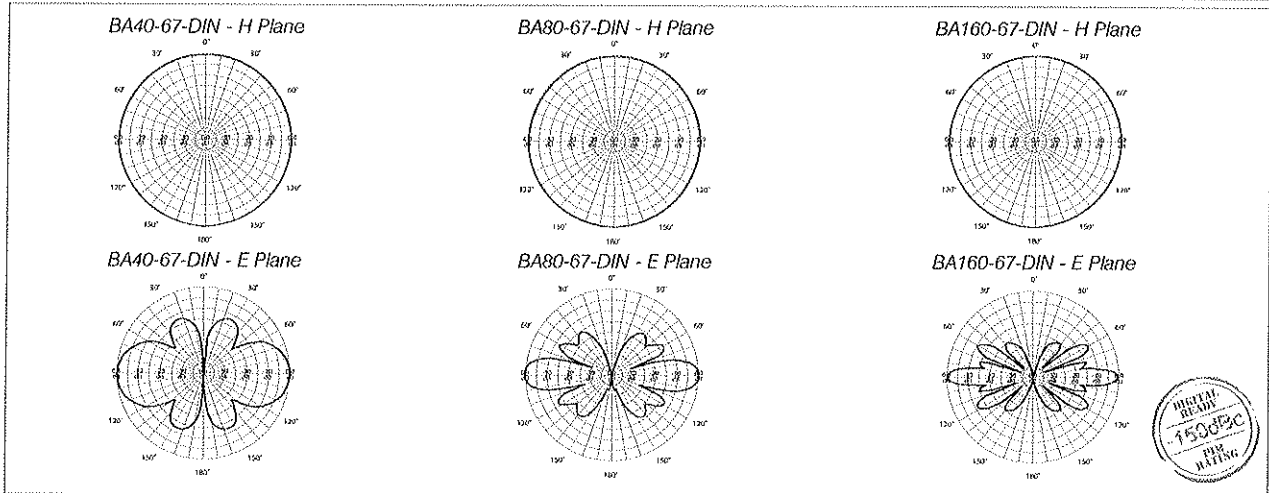


Electrical Specifications

Model Number	BA40-67-DIN	BA80-67-DIN	BA160-67-DIN
Nominal Gain <i>dBd</i>	3	6	9
Frequency <i>MHz</i>	400-520		
Tuned Bandwidth	Entire band		
VSWR (Return Loss)	<1.5 :1 (14dB)		
Nominal Impedance Ω	50		
Downtilt	Not offered		0° Std or -3° See note (2)
Vertical Beamwidth	30°	16°	9°
Horizontal Beamwidth	Omni +/-0.5dB		
Input Power (Watts)	500		
Passive IM 3rd order (2x20W) <i>dBc</i>	-150		-140

Mechanical Specifications

Model Number	BA40-67-DIN	BA80-67-DIN	BA160-67-DIN
Construction & Configuration	4 dipoles (2 bays) Turnstile stacked Single section support	8 dipoles (4 bays) Turnstile stacked Single section support	16 dipoles (8 bays) Turnstile stacked Dual section support External final harness
Length <i>inches</i>	83	118	197
Weight <i>lbs</i>	11	18	44
Shipping Weight <i>lbs</i>	76	84	124
Shipping Dimensions <i>inches</i>	H	17	17
	W	17	22
	L	87	126
Termination	7/16 DIN female with 20' 9142 cable tail		
Mounting Area	20" x 1.9" diam. aluminum		20" x 2.5" diam. aluminum
Suggested Clamps (not included)	91-00-104	91-00-104	91-00-114
Projected Area <i>ft²</i>	No ice	2.0	3.3
	With ice	3.2	5.9
Lateral Thrust @ 100mph <i>lbs</i>	No ice	49	82
	With ice	149	161
Wind Gust Rating <i>mph</i>	No ice	117	112
	With ice	117	104
Torque @100mph <i>ft-lbs</i>	82	268	1045



(1) Single section arrays are rated to -150dBc PIM rating. Dual section (BA160) arrays are rated at -140dBc.
 (2) Factory pre-set downtilt of 3° may be specified on BA160-67-DIN antennas by adding -T3 to the part number ordered e.g. BA160-67-DIN-T3
 BA160-67-DIN will be shipped in the configuration of 2 arrays (BA8080-67-DIN) along with an external harness PA42-67-DIN. Detailed instruction is provided for field assembly.

RoHS Compliant

US39223-7



RF Measurement and Management in Your World



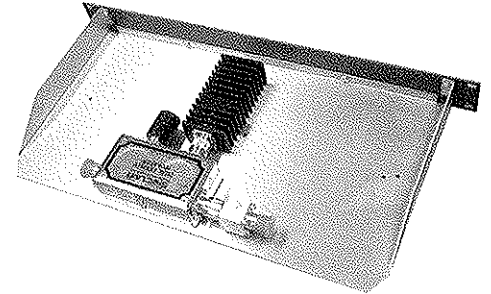
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PC2213

Intermod suppression panel, rack mount, dual stage isolator with 60 Watt load

- High performance dual stage isolator provides 75 dB isolation
- Covers 132-174 MHz band and comes with built-in harmonic filters
- Compact design shipped precisely tuned to customer specified frequency

Sinclair's PC series panels incorporate high performance single- or dual-stage isolators with various load terminations and Sinclair-built harmonic filters. These compact units offer optimum intermodulation control in a 19-inch rack mounted configuration. They are shipped precisely tuned to customer specified frequency, and exhibit 35 dB or 75 dB isolation when equipped with single- or dual-stage isolators respectively. Various load configurations are available depending on system power level and VSWR protection required.



www.sincltech.com

Region	United States	Europe, Middle East and Africa	Caribbean and Latin America	Canada and rest of the world
Telephone	USA: 1 800 263 3275	International: +44 (0) 1487 84 28 19	International: +1 905 726 7676	Canada: 1 800 263 3275 International: +1 905 727 0165
E-mail	salesusa@sincltech.com	salesuk@sincltech.com	salesla@sincltech.com	salescan@sincltech.com
Product Specification Sheet		PC2213	Issue: 94	Dated: 26-10-10

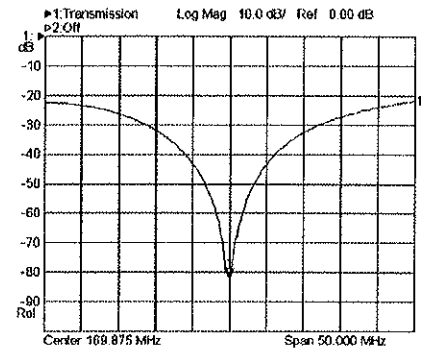
Notes
*1 : 3% of Center Frequency

Electrical Specifications

Frequency Range	MHz	132 to 174	
VSWR (max)		1.25:1	
Insertion loss (max) Tx to Ant	dB	1	
Insertion loss (typ) Tx to Ant	dB	0.7	
Isolation (typ)	dB	75	
Average Power Input (max)	W	125	
Bandwidth	MHz	4.6	*1
Isolation (min)	dB	50	

Mechanical Specifications

Length/ Height	in (mm)	1.75 (44)
Width	in (mm)	19 (483)
Depth	in (mm)	9.13 (232)
Actual Shipping weight	lbs (kg)	20 (9.08)
Shipping dimensions	in (mm)	26x19x7 (660x483x178)



Isolation

Environmental Specifications

Temperature range	°F (°C)	-22 to +140 (-30 to +60)
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www.sinclairelect.com

TJ2214

4 channels dual stage isolators

- Four channel cavity-ferrite combiner in compact configuration
- Dual low-loss isolator
- High Q bandpass cavity filters

Sinclair's 'TJ' series cavity ferrite transmitter combiners are available in 2- to 5-channel configurations for use in systems from 132-960 MHz. Each channel on these combiners includes a low-loss single or dual-stage isolator and Sinclair-developed High 'Q' bandpass cavity filter. The 806-960 MHz 'TJ' series utilizes very high 'Q' three-quarter wavelength cavities, and is especially suitable for close channel separations, typically 250 kHz. All models are 19-inch rack mountable and can be retuned in the field with simple test equipment. The 'TJ' series combiner is easily expanded to 20 channels, and is the building block used in many Sinclair combining systems. Common electrical specifications are shown below. To select the combiner ideally suited to your application, please consult your Sinclair representative. Sinclair has developed an extensive range of cellular combiners, designed to meet the operational requirements of both large and small cellular systems. The 'RCC' and 'CCC' series described below illustrate some of the available configurations. Our engineering and manufacturing capabilities permit us to provide combining equipment to your exact specifications. Consult your Sinclair representative for assistance. The specifications below provide optimum performance for standard North American analog systems. The 'S' in our model number, RCC*-***RS, etc., indicates single-stage isolators are used. Dual-stage isolators may also be ordered by substituting 'D' for 'S' in the model number. This will add 0.3 dB (typ.) to the insertion losses shown, but provide additional isolation where this is required. Alternate frequency spacings and power levels are also available, as are ETACS and



Application Notes

- Specs for 2 channel shown here

www.sinctech.com

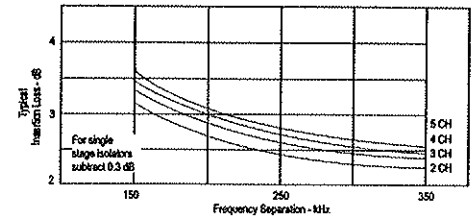
Region	United States	Europe, Middle East and Africa	Caribbean and Latin America	Canada and rest of the world
Telephone	USA: 1 800 263 3275	International: +44 (0) 1487 84 28 19	International: +1 905 726 7676	Canada: 1 800 263 3275 International: +1 905 727 0165
E-mail	salesusa@sinctech.com	salesuk@sinctech.com	salesla@sinctech.com	salescan@sinctech.com

Electrical Specifications

Frequency Range	MHz	138 to 174
Insertion loss (max) Tx to Ant	dB	3.5
Input VSWR (max)		1.25:1
Number of Cavities		2
Input Connectors		N (female)
Output Connectors		N (female)
Power (Per Channel)	W	125
Frequency separation (min)	MHz	0.15
Isolation Tx to Tx	dB	70
Isolation antenna to Tx	dB	60
Output VSWR		2:1
Number of channels		4

Mechanical Specifications

Length/ Height	in (mm)	30.5 (775)
Width	in (mm)	19 (483)
Depth	in (mm)	15 (381)
Outer Conductor Material		aluminum
Weight	lbs (kg)	31 (14.07)
Finish		chemical conversion
Actual Shipping weight	lbs (kg)	50 (22.7)
Shipping dimensions	in (mm)	20x19x38 (508x483x965)
Cavity width or diameter	in (mm)	7 (178)



Environmental Specifications

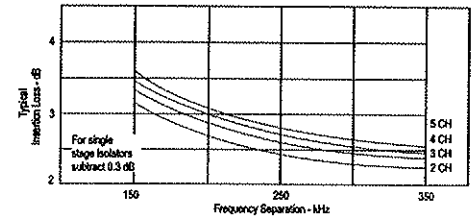
Temperature range	°F (°C)	-22 to +140 (-30 to +60)
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Electrical Specifications

Frequency Range	MHz	138 to 174
Insertion loss (max) Tx to Ant	dB	3.2
Input VSWR (max)		1.25:1
Number of Cavities		2
Input Connectors		N (female)
Output Connectors		N (female)
Power (Per Channel)	W	125
Frequency separation (min)	MHz	0.15
Isolation Tx to Tx	dB	70
Isolation antenna to Tx	dB	60
Output VSWR		2:1
Number of channels		2

Mechanical Specifications

Length/ Height	in (mm)	30.5 (775)
Width	in (mm)	19 (483)
Depth	in (mm)	7.5 (191)
Outer Conductor Material		aluminum
Weight	lbs (kg)	17 (7.72)
Finish		chemical conversion
Actual Shipping weight	lbs (kg)	30 (13.62)
Shipping dimensions	in (mm)	20x10x34 (508x254x864)
Cavity width or diameter	in (mm)	7 (178)



Environmental Specifications

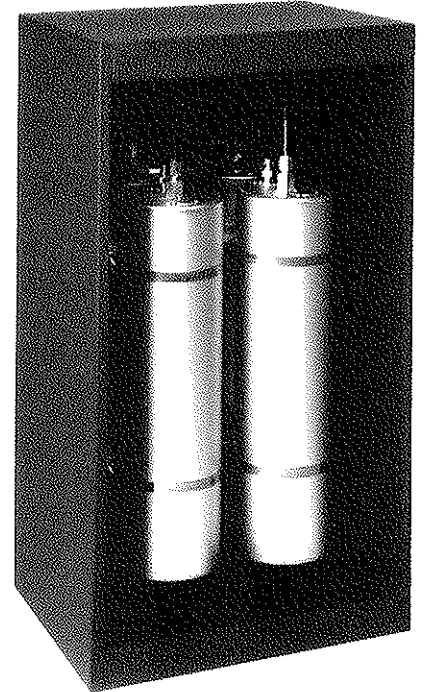
Temperature range	°F (°C)	-22 to +140 (-30 to +60)
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Q202GC-2

Duplexer, base station, Q-Circuit, cabinet mount, 148- 174 MHz

- Four cavity configuration provides very high attention at extremely close frequency separation
- Quasi-bandpass response results in suppression of spurious and sideband transmitter noise
- Easy cabinet mount configuration

The Q-202GC-2 is a 4 cavity duplexer for use with frequency separations of 500 kHz or greater, in the 148-174 MHz band. Comes with cabinet.



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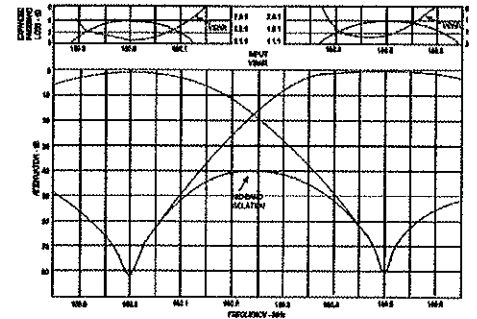
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Telephone	USA: 1 800 263 3275	International: +44 (0) 1487 84 28 19	International: +1 905 726 7676	Canada: 1 800 263 3275 International: +1 905 727 0165
E-mail	salesusa@sinctech.com	salesuk@sinctech.com	salesla@sinctech.com	salescan@sinctech.com
Product Specification Sheet EPR 017641		Q202GC-2	Issue: 45	Dated: 25-10-10 Dated: 06-04-01

Electrical Specifications

Frequency Range	MHz	148 to 174
Insertion loss (max) Tx to Ant	dB	1.5
Input VSWR (max)		1.5:1
Impedance	Ω	50
Average Power Input (max)	W	350
Connectors		N (female)
Frequency separation (min)	MHz	0.5
Isolation (min)	dB	80

Mechanical Specifications

Length/ Height	in (mm)	40.4 (1026)
Width	in (mm)	18 (457)
Depth	in (mm)	22 (559)
Weight	lbs (kg)	132 (59.93)
Finish		shadow bronze
Actual Shipping weight	lbs (kg)	145 (65.83)
Shipping dimensions	in (mm)	22x22x43 (559x559x1092)



Environmental Specifications

Temperature range	°F (°C)	-22 to +140 (-30 to +60)
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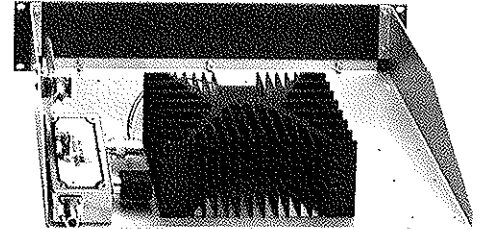
www.sinclairelectronics.com

PC3213

Intermod suppression panel, rack mount, dual isolator, 60 watt load

- High performance dual stage isolator provides 75 dB isolation
- Covers 406-512 MHz band and comes with built-in harmonic filters
- Compact design shipped precisely tuned to customer specified frequency

Sinclair's PC series panels incorporate high performance single- or dual-stage isolators with various load terminations and Sinclair-built harmonic filters. These compact units offer optimum intermodulation control in a 19-inch rack mounted configuration. They are shipped precisely tuned to customer specified frequency, and exhibit 35 dB or 75 dB isolation when equipped with single- or dual-stage isolators respectively. Various load configurations are available depending on system power level and VSWR protection required.



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E-mail	salesusa@sinctech.com	salesuk@sinctech.com	salesla@sinctech.com	salescan@sinctech.com
Product Specification Sheet		PC3213	Issue: 95	Dated: 26-10-10

Electrical Specifications

Frequency Range	MHz	406 to 512
VSWR (max)		1.25:1
Insertion loss (max) Tx to Ant	dB	0.9
Average Power Input (max)	W	125
Bandwidth	MHz	12
Isolation (min)	dB	50

Mechanical Specifications

Length/ Height	in (mm)	1.75 (44)
Width	in (mm)	19 (483)
Depth	in (mm)	9.13 (232)
Actual Shipping weight	lbs (kg)	20 (9.08)
Shipping dimensions	in (mm)	26x19x7 (660x483x178)

Environmental Specifications

Temperature range	°F (°C)	-22 to +140 (-30 to +60)
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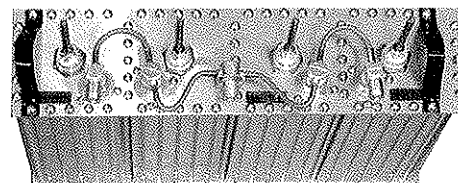
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Q3220E

Duplexer, Q-Circuit, rack mount, 406-512 MHz

- Compact design provides excellent performance while conserving rack space
- Isolation of greater than 75 dB at 5 MHz separation and less than 0.8 dB insertion loss
- Rugged Res-Lok design reduces inter-cavity cabling

Designed for operation in the 406-512 MHz band, this compact 4-cavity duplexer provides excellent performance while conserving valuable rack space. At 5 MHz separation, this unit provides isolation in excess of 75 dB with less than 0.8 dB insertion loss.



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Region	United States	Europe, Middle East and Africa	Caribbean and Latin America	Canada and rest of the world
Telephone	USA: 1 800 263 3275	International: +44 (0) 1487 84 28 19	International: +1 905 726 7676	Canada: 1 800 263 3275 International: +1 905 727 0165
E-mail	salesusa@sinclat.com	salesuk@sinclat.com	salesla@sinclat.com	salescan@sinclat.com
Product Specification Sheet EPR 017483		Q3220E	Issue: 42	Dated: 25-10-10 Dated: 20-12-02

Notes

*1 : Referenced to 50 ohms

Electrical Specifications

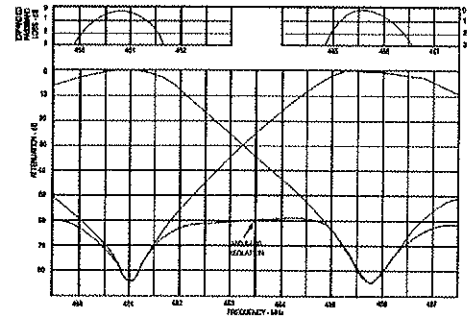
Frequency Range	MHz	406 to 512	
Insertion loss (max) Tx to Ant	dB	0.8	
Input VSWR (max)		1.5:1	*1
Impedance	Ω	50	
Average Power Input (max)	W	350	
Connectors		N (female)	
Frequency separation (min)	MHz	5	
Isolation (min)	dB	75	

Ordering Information

Specify transmit and receive frequencies when ordering.

Mechanical Specifications

Length/ Height	in (mm)	4.17 (106)
Width	in (mm)	19 (483)
Depth	in (mm)	16.3 (414)
Weight	lbs (kg)	13.5 (6.13)
Finish		chromate conversion
Actual Shipping weight	lbs (kg)	25 (11.35)
Shipping dimensions	in (mm)	19x8x22 (483x203x559)



Environmental Specifications

Temperature range	°F (°C)	-40 to +140 (-40 to +60)
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TJ3214

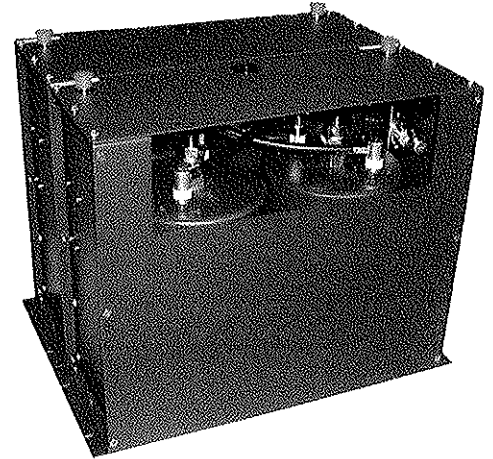
Cavity-ferrite Tx combiner, 4 channels, dual stage isolator, 406-512 MHz

- Four channel cavity-ferrite combiner in compact configuration
- Dual low-loss isolator
- High Q bandpass cavity filters

Sinclair's 'TJ3' series cavity ferrite transmitter combiners are available in 2 to 5 channel configurations for use in systems from 380-512 MHz. Each channel on these combiners includes a low-loss single or dual-stage isolator and Sinclair-developed High 'Q' bandpass cavity filter. They utilize very high 'Q' three-quarter wavelength cavities, and is especially suitable for close channel separations, typically 250 kHz.

All models are 19-inch rack mountable and can be retuned in the field with simple test equipment. High power, special filtering and special mounting versions are also available. The 'TJ' series combiner is easily expanded to 20 channels, and is the building block used in many Sinclair combining systems.

Common electrical specifications are shown below. To select the combiner ideally suited to your application, please consult your Sinclair representative.



www.sinctech.com

Region	United States	Europe, Middle East and Africa	Caribbean and Latin America	Canada and rest of the world
Telephone	USA: 1 800 263 3275	International: +44 (0) 1487 84 28 19	International: +1 905 726 7676	Canada: 1 800 263 3275 International: +1 905 727 0165
E-mail	salesusa@sinctech.com	salesuk@sinctech.com	salesla@sinctech.com	salescan@sinctech.com
Product Specification Sheet EPR 017764		TJ3214	Issue: 44	Dated: 25-10-10 Dated: 22-05-02

Notes

*1: Maximum

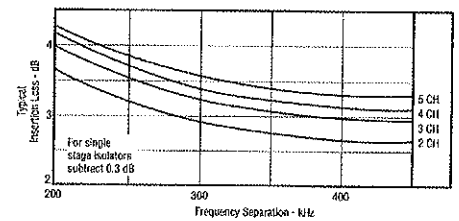
Electrical Specifications

Frequency Range	MHz	406 to 512
Input VSWR (max)		1.25:1
Number of Cavities		4
Average Power Input (max)	W	125
Input Connectors		N (female)
Output Connectors		N (female)
Frequency separation (min)	MHz	0.2
Insertion loss Tx to antenna (typ)	dB	4.2
Isolation Tx to Tx	dB	70
Isolation antenna to Tx	dB	60
Output VSWR		2:1
Cavity electrical length		0.25
Number of channels		4

*1

Ordering Information

Specify channel frequencies when ordering.



Mechanical Specifications

Length/ Height	in (mm)	14 (356)
Width	in (mm)	19 (483)
Depth	in (mm)	15.3 (389)
Outer Conductor Material		aluminum
Weight	lbs (kg)	28 (12.71)
Finish		alodine
Cavity width or diameter	in (mm)	7 (178)

Environmental Specifications

Temperature range	°F (°C)	-22 to +140 (-30 to +60)
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Notes

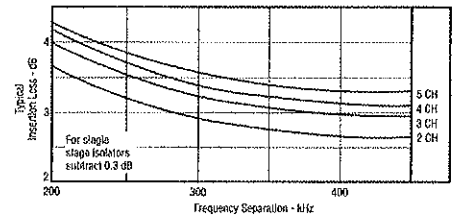
*1 : Maximum

Electrical Specifications

Frequency Range	MHz	406 to 512	
Input VSWR (max)		1.25:1	
Number of Cavities		2	
Average Power Input (max)	W	125	
Input Connectors		N (female)	
Output Connectors		N (female)	
Frequency separation (min)	MHz	0.2	
Insertion loss Tx to antenna (typ)	dB	3.7	*1
Isolation Tx to Tx	dB	70	
Isolation antenna to Tx	dB	60	
Output VSWR		2:1	
Number of channels		2	

Mechanical Specifications

Length/ Height	in (mm)	7 (178)
Width	in (mm)	19 (483)
Depth	in (mm)	15.3 (389)
Outer Conductor Material		aluminum
Weight	lbs (kg)	14 (6.36)
Finish		alodine (gold)
Cavity width or diameter	in (mm)	7 (178)



Environmental Specifications

Temperature range	°F (°C)	-22 to +140 (-30 to +60)
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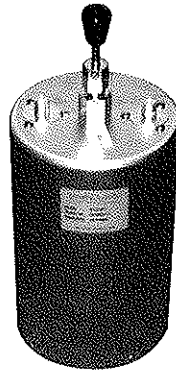
www.sincltech.com

FP30107-3

Cavity filter, bandpass, high Q, one 7" can, 406-512 MHz

(FP30107*3)

- Aluminum cylinder with brass and copper coaxial inner conductor
- Silver plating and chromate conversion coating limit corrosion and enhance performance
- Temperature compensated for extremely low frequency drift



Sinclair's FP series cavity filters are the building blocks of the finest antenna systems. These filters pass a band of frequencies while attenuating frequencies on either side of the desired frequency band. The insertion loss of the passband may be preset at the factory or adjusted in the field. The amount of attenuation (selectivity) can be increased by increasing the insertion loss or using multiple cavities in series. Filter design must recognize the extremely close tolerances required to assure flawless performance over temperature when small variations in electrical wavelength mean significant changes in frequency response curves.

The FP series band pass filters are designed to:

- Protect one receiver further from front-end overload by carriers of co-located transmitters.
- Suppress IM generation in one transmitter by protecting it further from incoming carriers of co-located transmitters (usually in conjunction with a ferrite isolator).
- Suppress sideband noise of a single transmitter on co-located receiver frequencies.
- Generally, "Protect One from Many."

www.sinctech.com

Region	United States	Europe, Middle East and Africa	Caribbean and Latin America	Canada and rest of the world
Telephone	USA: 1 800 263 3275	International: +44 (0) 1487 84 28 19	International: +1 905 726 7676	Canada: 1 800 263 3275 International: +1 905 727 0165
E-mail	salesusa@sinctech.com	salesuk@sinctech.com	salesla@sinctech.com	salescan@sinctech.com
Product Specification Sheet EPR 017821		FP30107-3	Issue: 63	Dated: 25-10-10 Dated: 18-12-02

Attachment F

**Request for Quotation
For
Service Monitor**

West Virginia

**Department of Health and Human Resources (DHHR),
Bureau for Public Health (BPH), State Trauma and
Emergency Medical System (STEMS)**

1 General Description

The Department of Health and Human Resources, State Trauma and Emergency Medical System, desires to establish a contract for the purchase of a complete Two Way Radio service monitor and analyzer. The service monitor device will allow the service technician to perform real time Project 25, P25, and P25 Trunk parametric analysis, monitoring, Radio Frequency, RF, spectrum usage, transmit power levels, PSD masks validation, and audio quality and distortion evaluation. It is a critical tool in the maintenance and trouble shooting of the equipment in the field at the tower sites and in the control buildings. Other entities of West Virginia state government as well as counties, municipalities and Public Safety Agencies shall be able to piggy back on this contract with prior approval from the Agency.

2 Service Monitor Requirements

2.1.1	The device shall achieve rated accuracy over the frequency range from 10 Mhz to 1 Ghz with un-calibrated measurements down to 100khz.	X	
2.1.2	The device shall have an option to support measurements over the spectrum range from 1 Mhz to 2.7 Ghz.	X	
2.1.3	The device shall support Direct coupled measurements of RF power up to 125W	X	
2.1.4	The device shall be able to measure RF signals applied to an antenna input port as low as -100 dBm and -115 dBm with the aid of an internal pre-amp.	X	
2.1.5	The device shall utilize a temperature compensated time base accurate to 0.01parts per million, ppm, for all RF measurements.	X	
2.1.6	The device shall have 1 dB level accurate RF generator for use in receiver performance.	X	
2.1.7	The device shall provide a spectrum analyzer mode covering the spectrum from 1 Mhz to 2.7 Ghz, with -140dBm DANL (300 hz RBW).	X	
2.1.8	The device shall support Channel analysis, being able demodulate the carrier in a 5 MHz spectral window. In effect allows channel analysis while a push to talk, PTT, call is in progress.	X	
2.1.9	The device shall provide a 4 MHz oscilloscope mode of operation.	X	
2.1.10	The device shall support 50 ppm accurate Audio generator over the 20 hz to 40 Khz band, at levels from 1 mV to 8 V rms.	X	

	Service Monitor Requirements contd.		
2.1.11	The device shall support GPIB and network connectivity for automated and remote controlled operation of all device functions.	X	
2.1.12	The device shall apply straight forward, easy to use, with ergonomic panel layouts, and menu system.	X	
2.1.13	The device shall have a multi-color display.	X	
2.1.14	The device shall have a direct printer output port.	X	
2.1.15	The device shall support connection and control for standard pointing device i.e., mouse.	X	
2.1.16	The device shall demodulate audio signals from an RF input signal to provide spectral analysis of the audio signal.	X	
2.1.17	The device shall demodulate audio signals from the audio input to provide quality analysis of the audio signal.	X	
2.1.18	The device shall support the ability to analyze frequency responses of duplexers and filter banks through the use of calibrated return loss bridge attachment.	X	
2.1.19	The device shall have a digital multi-meter mode and isolated input connections to allow measurement of AC/DC volts, amps and resistance.	X	
2.1.20	The device shall be able to measure P25 conventional systems for power, frequency error, transmit BER as specified by TIA-EIA-102.	X	
2.1.21	The device shall allow site simulation of a P25 control channel in all frequency bands to allow P25 Trunking operation validation.	X	

	Service Monitor Requirements contd.		
2.1.22	The device shall support P25 Data Encryption Standard, DES, Output Feedback, OFB, and Advanced Encryption Standard, AES, encryption formats and decoding validation.	X	

2.2 Environmental & Physical Requirements

Item		Compliance	
		Yes	No
2.2.1	The device shall meet Standard for Safety Electrical Measuring and Testing, UL 61010B-1 safety standards for test devices.	X	
2.2.2	The device shall meet performance specifications over the temperature range of -0° C to 50° C.	X	
2.2.3	The device shall have a comprehensive 1 year warranty.	X	
2.2.4	The device shall operate from 120 vac 60 hz power supply.	X	
2.2.5	The device shall be desk or table self supporting mount.	X	
2.2.6	The device shall have a 1 yr calibration cycle.	X	
2.2.7	The device shall be supplied with an UHF, VHF and 700/800 MHz antenna.	X	
2.2.8	The vendor shall provide instruction manual, user manual and self calibration manual.	X	
2.2.9	The device shall be constructed to allow for transportable operation.	X	

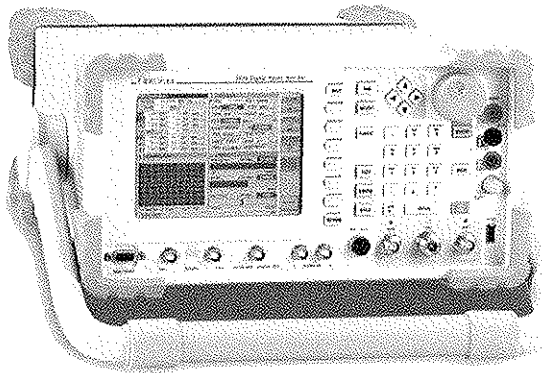
3 Accessories

Item	Requirement	Compliance	
		Yes	No
3.1	The vendor shall make available for purchase and must be field installable options to support listed analysis processors individually.	X	
3.2	The vendor shall make available for purchase antennae for UHF, VHF, HF and 700 and 800 MHz public safety frequency.	X	
3.3	The vendor shall make available for purchase connectors, interface cables, specialized probes, and reference impedance matching networks.	X	
3.4	The vendor shall make available for purchase connectors, interface cables, specialized probes, and reference impedance matching networks for microwave analysis.	X	

Wireless

3920 Series Analog and Digital Radio Test Platform

AEROFLEX
A passion for performance.



Featuring Advanced Automatic
Test and Alignment operation for
the latest digital radios

New Generation PMR Test Platform
Now Includes DMM Standard!

- 1 GHz frequency range standard (2.7 GHz frequency range optionally available)
- Sensitive receiver with built-in pre-amp for off air measurements
- -140 dBm (typical) DANL spectrum analyzer with 8 markers
- Tracking generator
- IQ generator for use with IQ Creator™
- Color coded pass/fail results
- GPIB, Ethernet, USB and RS-232 interfaces
- Software upgradeable in the field
- High performance FM/AM/SSB analog duplex features
- HP/Agilent 8920B remote emulation
- EIA/TIA-603 land mobile radio test software
- P25 advanced parametric/protocol analysis
- P25 Trunking
- SmartNet™/SmartZone™ Trunking
- Automatic alignment for Motorola ASTRO®, EF Johnson and BK DPHx radios
- DMR (MOTOTRBO™) mobile and repeater tests
- TETRA mobile, base station and DMO tests
- HPD® (High Performance Data) base and mobile simulation
- NXDN™
- dPMR
- ARIB STD-T98

The 3920 is the latest radio test solution from Aeroflex for engineering, production and field service applications. The instrument provides a comprehensive range of general purpose analog measurement facilities as well as advanced digital test options for P25, TETRA, HPD®, NXDN™, dPMR, DMR and ARIB STD-T98 systems.

Standard features include:

- Full AM, FM and SSB test capabilities
- 5 MHz channel spectrum analyzer
- Full-span spectrum analyzer to 1 GHz or 2.7 GHz (with option 392XOPT058)
- Dual-Channel oscilloscope to 4 MHz
- Full audio analysis for AF level, frequency, SINAD and distortion measurements
- Full RF parametric tests for power, frequency error, deviation (FM) and modulation index (AM)
- Three high accuracy audio modulators/function generators
- Three high accuracy audio baseband generators
- DTMF and DCS generators
- DTMF and DCS decode
- Encode and decode of tone remote, two tone sequential and 5/6- tone formats
- Variable notch SINAD, distortion and SNR meters
- Color coded Pass/Fail meter functions for fast test capabilities
- Accurate broadband and in band power meters
- Digital multimeter

The digital architecture of the 3920 delivers faster, accurate and more repeatable measurements than any of its predecessors and provides for future technology enhancements as new digital technology becomes available.

Combining the power of an onboard PC with a 30 GB hard-drive and Linux OS, the 3920 also supports USB mouse and keyboard

For the very latest specifications visit www.aeroflex.com

SPECIFICATION

RF SIGNAL GENERATOR

FREQUENCY	
Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Resolution	1 Hz
Accuracy	Frequency standard ± 1 count
OUTPUT LEVEL	
Range	T/R Port: -130.0 to -30.0 dBm Duplex: -130.0 to +10.0 dBm (+10 dBm max for CW or FM; 0 dBm max for complex modulation)
Resolution	0.1 dB
Accuracy	1.0 dB for levels > -110 dBm (Typical better than 0.6 dB) 1.5 dB for levels ≤ -110 dBm (Typical better than 1.0 dB)

SPECTRAL PURITY

Residual FM	<15 Hz (300 Hz to 3 kHz bandwidth)
Residual AM	<0.1% RMS (300 Hz to 3 kHz bandwidth)
Harmonics	<-25 dBc (Typically -30 dBc, RF level set at +10 dBm)
Non-Harmonics	<-55 dBc (all freq. except Crossovers) <-35 dBc (Crossover freq. = 3411.4 MHz - Gen freq.)
Phase Noise	<-93 dBc/Hz (20 kHz offset, RF <1.05 GHz) <-90 dBc/Hz (20 kHz offset, RF >1.05 to 2.7 GHz)

MODULATION

Selections	OFF, AM, FM, FM50us, FM75us, FM750us, AM USB, AM LSB, IQGEN
Waveforms	Sine, Square, Triangle, Ramp, DCS, DTMF
THD	<1% (1 kHz rate, 30 to 70% AM, 300 Hz to 3 kHz BW, Sine)
INTERNAL FM	
Deviation Range	± 0.001 to ± 150 kHz, OFF
Accuracy	3% (From ± 1 kHz to ± 100 kHz deviation, 20 Hz to 15 kHz rate)
Resolution	1 Hz
Deviation Rate	20 Hz to 20 kHz
INTERNAL AM	
Modulation Range	0 to 100%
Accuracy	1% (Modulation from 10% to 90% 20 Hz to 15 kHz rate)
Resolution	0.1%
Rate	20 Hz to 20 kHz
INTERNAL SSB	
Modulation Selection	Upper SideBand (USB) or Lower SideBand (LSB)
Modulation Range	0 to 100%
Resolution	0.1%
Rate	300 Hz to 20 kHz
EXTERNAL AM/FM/SSB	
AUDIO INPUTS	With 1 Vrms, AM/FM/SSB have same characteristics as internal sources, $\pm 10\%$ of indicated setting. (Audio 1 or Audio 2 input from 20 Hz to 15 kHz [300 Hz to 3 kHz SSB] unbalanced). 8 Vrms maximum modulation input level.
MICROPHONE INPUT	With 50 mVrms, AM/FM/SSB have same characteristics as internal sources, $\pm 10\%$ of indicated setting. (MIC Input from 100 Hz to 15 kHz [300 Hz to 3 kHz SSB]).
INTERNAL IQ GEN	
Sample Rate	<1.89 Msamples/sec
Size	<3.8 million samples
Source	File created by IQCreator

RF RECEIVER

RF RECEIVER	
Demod Selections	AM, FM, FM50us, FM75us, FM750us, AM USB, AM LSB
Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Sensitivity	<-100 dBm (10 dB SINAD, FM, 25 kHz, 1 kHz rate, 6 kHz FM Deviation, 300 Hz to 3.4 kHz AF Filter, Pre-amp OFF) <-113 dBm (10 dB SINAD, FM, 25 kHz, 1 kHz rate, 6 kHz FM Deviation, 300 Hz to 3.4 kHz AF Filter, Pre-amp ON)
DEMOD OUTPUT LEVEL	
FM	2.5 Vrms $\pm 10\%$ (for deviation $\pm 1/2$ of selected BW; ± 25 kHz BW same output level as 30 kHz BW)
AM	3.0 Vrms $\pm 10\%$ (for 100% AM)

RF MEASUREMENTS

RF POWER METER (BROADBAND)	
Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 2 MHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 2 MHz)
Level Range	100 mW to 125 W (Usable from 10 mW)
Resolution	4 digits for W or 0.1 dB
Accuracy	10%, 1 digit
Signal	CW, FM, C4FM, 4FSK
RF POWER METER (INBAND)	
Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (Freq Ext Opt) (Usable from 100 kHz)
Level Range	T/R Port: -60 to +5.1 dBm Lowest reading is receiver BW dependent (Narrower bandwidths can measure lower levels). ANT Port: -100 to +10 dBm Lowest reading is receiver BW dependent (Narrower bandwidths can measure lower levels).
Resolution	0.1 dB
Accuracy	±1 dB (Input level above minimum for selected BW [display not yellow]; typically better than 0.6 dB)
AM Filter BW	6.25, 8.33, 10, 12.5, 25 and 30 kHz
FM Filter BW	6.25, 10, 12.5, 25, 30, 100, and 300 kHz
Signal	CW, FM, AM, C4FM, 4FSK, QPSK, QAM
RF COUNTER	
Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz, Auto-tune) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz, Auto-tune)
Resolution	1 Hz
Accuracy	Frequency standard ±1 count
Level Range for Auto-tune	T/R Port: -10 to +50 dBm (Find level is selectable) ANT Port: -60 to +10 dBm (Find level is selectable)
Signal	CW, FM, AM <70% modulation
RF ERROR METER	
Range	0 to ±2.5 MHz from receiver frequency (6 MHz IF BW)
Resolution	1 Hz
Accuracy	Frequency Standard ±1 count
Level Range	T/R Port: -10 to +50 dBm ANT Port: -60 to +10 dBm
Signal	CW, FM, AM <70% modulation

DEMODULATION MEASUREMENTS

RF CHARACTERISTICS	
Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Input RF Level	T/R Port: -10 to +50 dBm ANT Port: -80 to +10 dBm
DEMOD COUNTER	
Range	20 Hz to 20 kHz (1 to 100 kHz FM Deviation, IF BW set appropriately for the received modulation BW) 20 Hz to 10 kHz (30 to 90% AM, IF BW set appropriately for the received modulation BW)
Resolution	0.1 Hz
Accuracy	±50 ppm (±10 ppm typical)
Waveform	Sine or Square
FM DEVIATION METER	
Range	0 to 150 kHz
Resolution	10 Hz
Accuracy	±3% plus source residual, ±1 count (1 to 150 kHz FM deviation, IF BW set appropriately for the received modulation BW)
FM Rate	20 Hz to 20 kHz (IF BW set appropriately for the received modulation BW)
AM DEVIATION METER	
Range	0 to 100%
Resolution	0.1%
Accuracy	±3% + source residual, ±1 count (30 to 90% AM, IF BW set appropriately for the received modulation BW)
AM Rate	20 Hz to 1.5 kHz (IF BW set appropriately for the received modulation BW)

AUDIO AND MODULATION MEASUREMENTS

Audio Input Characteristics for the following meters	AF Counter, AF Level Meter, SINAD Meter, Distortion Meter, Hum and Noise Meter, Signal-to-Noise Meter
Front Panel Audio Inputs	Audio 1 or Audio 2 (unbalanced, chassis reference) Audio 1 and Audio 2 (balanced, 600 Ω differential input)
Audio Input Impedance (Audio 1 and 2)	Hi-Z (>10 kΩ) - Unbalanced input 600 Ω - Unbalanced input (8 Vrms MAX input*) 600 Ω - Balanced input (Audio 1 and 2) * Note - 600 Ω unbalanced will auto-switch to Hi-Z @ 8 Vrms
AF COUNTER	
Range	20 Hz to 20 kHz (usable from 10 Hz)
Resolution	0.1 Hz
Accuracy	±50 ppm max, ±10 ppm typical
Wave shape	Sine or square
Level Range (Audio)	20 mV to 30 Vrms
AF LEVEL METER	
Range	0 to 30 Vrms

Resolution	Volts: 1 mV (input <1 V), 10 mV (input ≥1 V) dB, dBV, dBm: 0.01 dB
Accuracy	5% (Unbalanced, Hi-Z, 300 to 3 kHz, 0.1 to 30 Vrms)
Frequency Range	20 Hz to 20 kHz
SINAD METER	
Range	0 to 60 dB
Resolution	0.01 dB
Accuracy	±1 dB, ±1 count (SINAD >3 dB, ≤40 dB, 5 kHz LP AF filter)
Frequency Range	300 Hz to 5 kHz
Level Range (Audio)	0.1 to 30 Vrms
DISTORTION METER	
Range	0.0 to 100.0%
Resolution	0.1%
Accuracy	<±0.5% (Distortion 1 to 10%, 5 kHz LP AF Filter) <±1.0% (Distortion 10 to 20%, 5 kHz LP AF Filter)
Frequency Range	300 Hz to 5 kHz
Level Range (Audio)	0.1 to 30 Vrms
HUM AND NOISE	
Range	-100 dB to 0 dB
Resolution	0.01 dB
Accuracy	±1 dB, ±1 count (>-60 dB, ≤-20 dB)
Signal Frequency	300 Hz to 5 kHz
Audio Input Level	0.1 to 30 Vrms
RF Input Level	T/R Port: -10 to +50 dBm ANT Port: -80 to +10 dBm
SIGNAL-TO-NOISE RATIO	
Range	-100 to 0 dB
Resolution	0.01 dB
Accuracy	±1 dB, ±1 count (>-60 dB, ≤-20 dB)
Signal Frequency	300 Hz to 5 kHz
Audio Input Level	0.1 to 30 Vrms
RF Input Level	T/R Port: -10 to +50 dBm ANT Port: -80 to +10 dBm

Modes (For Hum and Noise and Signal-to-Noise Ratio)

Mode	Stimulus	Stimulus Port	Measurement Input	Measurement Port
1	RF Generator	TR/Gen	AF Input	Audio In 1 or 2
2	AF Generator	Fctn Gen Out	RF Receiver	TR/Antenna

AUDIO FILTERS (CHARACTERISTIC RESPONSE)				
Filter	Type	Ripple	-1 dB	-60 dB
NONE	No Filter			
300 Hz	Low-Pass	<0.23 dB, above 20 Hz	330 Hz	590 Hz
5 kHz	Low-Pass	<0.02 dB, above 20 Hz	5.5 kHz	6.7 kHz
15 kHz	Low-Pass	<0.01 dB, above 20 Hz	16.1 kHz	17.8 kHz
20 kHz	Low-Pass	<0.01 dB, above 20 Hz	20.4 kHz	21 kHz
0.3 to 3.4 kHz	Band-Pass	<1.7 dB	320 Hz/ 3.8 kHz	60 Hz/ 5.2 kHz
0.3 to 5 kHz	Band-Pass	<1.7 dB	320 Hz/ 5.2 kHz	60 Hz/ 9.6 kHz
0.3 to 15 kHz	Band-Pass	<1.7 dB	320 Hz/ 16.1 kHz	60 Hz/ 19.9 kHz
0.3 to 20 kHz	Band-Pass	<1.7 dB	200 Hz/ 20.4 kHz	60 Hz/ 21 kHz
PSOPH C-MSG	Band-Pass	Per C-MSG Spec	Per C-MSG Spec	Per C-MSG Spec
PSOPH CCITT	Band-Pass	Per CCITT Spec	Per CCITT Spec	Per CCITT Spec
300 Hz	High-Pass	<1.7 dB	320 Hz	60 Hz

AUDIO FUNCTION GENERATOR(S)

WAVE SHAPE	Sine, Square, Triangle, Ramp, Digital Coded Squelch, DTMF
FREQUENCY	
Range	Sine: 20 Hz to 40 kHz (usable 1 Hz to 40 kHz) Square, Triangle and Ramp: 20 Hz to 4 kHz (usable 1 Hz to 40 kHz)
Resolution	0.1 Hz
Accuracy	±50 ppm, ±10 ppm typical
LEVEL	
Range	1 mV to 5V RMS into a 10 kΩ load
Resolution	0.1 mV
Accuracy	±1% of setting (10 kΩ load)
Impedance	<10 Ω
Spectral Purity	<0.5% (1 kHz, 5 Vrms, 80 kHz BW, 10 kΩ load, Sine) <1.0% (Typical, 20 Hz to 20 kHz, 100 mV to 5 Vrms, 80 kHz BW, 10 kΩ load, Sine)

OSCILLOSCOPE

DISPLAY	
Traces	2
Trace Types	Live, captured, accumulated
Markers	2
Marker Functions	Time with amplitude, deviation or % depth Delta marker (including 1/Δ t, e.g. Hz)
VERTICAL	
3 dB Bandwidth	16 MHz
Frequency Range	DC to 4 MHz (40 MS/s sampling rate)

Input Range	0 to 100 Vpeak Max, Category II
Scales	2 mV to 20 V/division in a 1, 2, 5 sequence (8[h] x 10 [w] graticule display)
Accuracy	5% of full scale (DC to 1 MHz) 10% of full scale (1 to 4 MHz)
Resolution	Better than 1% of full scale
Coupling	DC, AC, GND
HORIZONTAL	
Sweep Factors	1 μ Sec to 1 Sec/division in a 1, 2, 5 sequence
Accuracy	>1.5% of full scale
Resolution	>1% of full scale
Input Impedance	1 M Ω , 20 pF
TRIGGER	
Trigger Source	Trace A, Trace B, EXT, (or Trace C with no CH1 or CH2 input)
Trigger Edge	Rising/falling
Trigger Mode	Auto/normal Continuous/single shot
External Trigger Level	Hi-Z BNC input on the rear panel of the unit Adjustable from -5 to +5 V

DIGITAL MULTIMETER

AC/DC VOLTMETER	
Full Scale Range	200 mV, 2 V, 20 V, 200 V, 2000 V, Auto (150 VAC RMS, or VDC MAX input, Category II)
Resolution	3-1/2 digits (2000 counts)
Accuracy	DC \pm 1% Full Scale \pm 1 count AC \pm 5% Full Scale \pm 1 count
AC Volts Frequency Range	50 Hz to 20 kHz
AC/DC AMMETER	
Full Scale Range	200 mA, 2 A, 20 A, Auto (20 A range uses optional shunt connected to Voltmeter)
Maximum Open Circuit Input Voltage	30 Vrms referenced to common or earth ground, Category I
Resolution	3-1/2 digits (2000 counts)
Accuracy	\pm 5% Full Scale \pm 1 count
AC Volts Frequency Range	50 Hz to 10 kHz
OHMMETER	
Full Scale Range	200 ohms, 2 kohms, 20 kohms, 200 kohms, 2 Mohms, 20 Mohms, Auto
Resolution	3 1/2 digits (2000 counts)
Accuracy	\pm 5% Full Scale \pm 1 count
EXTERNAL CURRENT SHUNT (OPTIONAL)	
Rating (Category I)	10 amps, 100 mV 20 amps - ON 1 minute, OFF 4 minutes
Accuracy (18 $^{\circ}$ to 28 $^{\circ}$ C)	DC to 10 kHz: \pm 0.25%
Temperature Coefficient	0.005%/ $^{\circ}$ C

RF SPECTRUM ANALYZER

FREQUENCY	
Range	10 MHz to 1.05 GHz (standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Resolution	1 Hz
Accuracy	Same as frequency standard
SPAN	
Mode	Start/Stop, Center/Span and Zero Span
Range	Selection list is 2 kHz to Full Span in a 1, 2, 5 sequence, plus Zero Span (Span may be entered numerically down to 1 Hz resolution)
Display Accuracy	Span Accuracy + Frequency Accuracy +50% of RBW
Span Accuracy	\pm 1% of span width
Marker Accuracy	\pm 1% of span width
LEVEL	
Ref Level Range	T/R Port: -50 to +50 dBm ANT Port: -90 to +10 dBm
Vertical Scales	1, 2, 5, 10 dB/division
Reference Level Resolution	0.1 dB
Ref Level Units	dBm, dB μ V, dBmV
Dynamic Range	70 dB (Antenna, no attenuation, Ref Level -30 dBm, 30 kHz RBW)
Bandwidth Switching Error	\pm 1 dB (After Normalize)
Log Linearity	\pm 1 dB (RBW: 3 kHz, 30 kHz, 60 kHz, 300 kHz, 6 MHz) \pm 1 dB (300 Hz RBW typical)
Accuracy	\pm 1 dB (Input signal -10 dB from Ref Level, Normalized, preamp off)
Attenuator Selections	0 to 50 dB of attenuation, controlled by changing the Ref Level
3rd Order Intermodulation	-60 dBc (Input Level of -30 dBm, Ref Level at -20 dBm)
Harmonic Spurious	-55 dBc (Input Level of -30 dBm, Ref Level at -20 dBm)
Non-Harmonic Spurious	-60 dBc (Input Level of -30 dBm, Ref Level at -20 dBm)
Displayed Average Noise Level (DANL)	-125 dBm (Typical, 300 Hz RBW, ANT Port terminated, 20 sweep average)
RESOLUTION BANDWIDTH	
RBW Selections	300 Hz, 3 kHz, 30 kHz, 60 kHz, 300 kHz, 6 MHz
RBW 60 dB/3 dB Filter Shape	>10:1
Selectivity - Filter Shape	60 dB/3 dB ratio better than 10:1
Accuracy	\pm 10% of RBW for 3 kHz, 30 kHz, 60 kHz, 300 kHz -10%/+25% of RBW FOR 6 MHz \pm 20% of RBW for 300 Hz
Bandwidth Switching Error	\pm 1 dB
VIDEO BANDWIDTH	
Range	10 Hz to 1 MHz in a 1, 3, 10 sequence, plus NONE

SWEEP	
Frequency Sweep Time	100 mS to 100 S in a 1, 2, 5 sequence
Zero Span Sweep Time	50 mS to 100 S in a 1, 2, 5 sequence
Sweep Trigger Source	Internal and external
Trigger Modes	Continuous (repeat), single (single-shot)
FUNCTION/FEATURE	
Display Modes	Live, average, max hold
Averages	1 to 100
MARKERS	
Track	Frequencies (or time) and amplitudes
Number of Markers	8
Marker Functions	Marker to Peak Marker to Next Right/Left Marker to Minimum Marker to Ref Level Marker to Center Frequency Marker sets Span Marker sets Vertical Scale (Zero Span only)

TRACKING GENERATOR (OPTIONAL)

TRACKING GENERATOR OUTPUT	Refer to RF SIGNAL GENERATOR section for: - Frequency range and accuracy - Output level range, resolution and accuracy - Spectral purity
SPAN AND SWEEP TIME	Same as Spectrum Analyzer
TRACKING GENERATOR CONTROLS	Output port selection, RF level, Reference cal

HARMONICS AND SPURIOUS (OPTIONAL)

HARMONIC LEVEL	
Range	0 to -60 dBc
Resolution	0.1
Accuracy	Same as RF Spectrum Analyzer
SPURIOUS LEVEL	
Range	0 to -60 dBc
Resolution	0.1
Accuracy	Same as RF Spectrum Analyzer

AUDIO SPECTRUM ANALYZER (OPTIONAL)

FREQUENCY	
Range	Start and Stop Frequency - 0 Hz to 24,000 Hz
Resolution	1 Hz
Accuracy	±50 ppm (±10 ppm Typical)
Span	2 kHz min to 24 kHz max

LEVEL	
Vertical Scales	1, 2, 5, 10, 20 dB per division
Reference Level	0 dB Full Scale (dBr)
Dynamic Range	Greater than 120 dB
Accuracy	±1 dB from 300 Hz to 15 kHz
MARKERS	
Number of Markers	2

FREQUENCY STANDARD I/O

INTERNAL FREQUENCY STANDARD OUTPUT	
Frequency	10 MHz (nominal)
Output Level	1 Vpp (nominal) into 50 Ω
Temperature Stability (0 to 50°C)	±0.01 ppm
Aging Rate	±0.1 ppm/year after 1 month continuous use
Warm Up Time	Less than 5 min. to ±0.02 ppm
EXTERNAL FREQUENCY INPUT	
Frequency	10 MHz
Input Level	1 to 5 Vpp for sine waves 3.3/5 V TTL for square waves
Connector	BNC socket (10 kΩ Input/50 Ω Output)

INPUT/OUTPUT CONNECTORS

ANT (RF INPUT)	
Connector Type	TNC
Function	Receiver input
Impedance	50 Ω (nominal)
VSWR (with Attenuation ≤10 dB):	Better than 1.44:1 (RF freq. <1.05 GHz) Better than 1.58:1 (RF freq. >1.05 GHz to <2.7 GHz)
Input Protection	10 W with warning above +17 dBm (Remove power immediately when alarm sounds)
GEN (RF INPUT)	
Connector Type	TNC
Function	Generator high-level output
Impedance	50 Ω (nominal)
VSWR (with level <0 dBm):	Better than 1.7:1 (RF freq. <1.05 GHz) Better than 1.9:1 (RF freq. >1.05 GHz to <2.7 GHz)
Input Protection	10 W with warning above +23 dBm (Remove power immediately when alarm sounds)
T/R (RF INPUT/OUTPUT)	
Connector Type	Type N
Function	RF power input, generator low-level output)

Impedance	50 Ω (nominal)
VSWR	Better than 1.2:1 (RF freq. <1.05 GHz) Better than 1.3:1 (RF freq. >1.05 GHz to <2.7 GHz)
Input Protection	200 W with warning above 135 W or power termination temp >100°C. Recommended max of 30 s ON and minimum of 2 min OFF for power levels above 50 W. (Remove power immediately when alarm sounds.)
GPIO	
Connector Type	24 pin IEEE
Function	IEEE-488.1-1997
ETHERNET	
Connector Type	8 Position, RJ-45 100/10 Mbit/s
Function	10/100 Base-T network connection
RS-232	
Connector Type	9-pin, D-sub, Male
Baud Rates	300, 600, 1200, 2400, 4800, 9600, 19.2k, 38.4k, 57.6k, 115.2k
Stop Bits	1 or 2
Parity	Odd, even, none
VIDEO	
Connector Type	15-pin, D-sub, VGA
Function	VGA for external monitor
IF OUTPUT	
Connector Type	BNC
Function	10.7 MHz Receiver IF
Output Level	Proportional to Receive Signal Level
MIC/ACCESSORY	
Connector Type	8 position, female DIN
Function	Microphone connection, modulation input, demod output, PTT operation
PARALLEL PORT	
Connector Type	25 position, female D-sub
Function	Printer interface
USB	
Connector Type	Twin USB standard connection (rear panel) Single USB standard connection (front panel)
Function	USB Version 1.1 interface
TEST PORT	
Connector Type	15 position, female 3 tier D-sub
Function	Programmable I/O and voltage output (optional interface)
AUXILIARY IF INPUT	
Connector Type	High-density dual inline
Function	External digital receiver input (optional interface)

AC POWER REQUIREMENTS

Voltage	100 V to 120 VAC @ 60 Hz 220 V to 240 VAC @ 50 Hz
Power Consumption	Nominally 120 W (200 W Max)
Mains Supply Voltage Fluctuations	\leq 10% of the nominal voltage
Fuse Requirements	3 A, 250 V, Type F

ENVIRONMENTAL/SAFETY

OPERATING TEMPERATURE	0 to 50°C (Tested in accordance with MIL-PRF-28800F Class 3)
WARM-UP TIME	15 minutes
STORAGE TEMPERATURE	-40 to 71°C (Tested in accordance with MIL-PRF-28800F Class 3)
RELATIVE HUMIDITY	80% up to 31°C decreasingly linearly to 50% at 40°C (Tested in accordance with MIL-PRF-28800F Class 3)
ALTITUDE	4,000 m (13,123 ft) (MIL-PRF-28800F Class 3)
SHOCK AND VIBRATIONS	30 G Shock (functional shock) 5-500 Hz random vibrations (Tested in accordance with MIL-PRF-28800F Class 3)
USE	Pollution degree 2
EMC	EN 61329, Class A
RELIABILITY	>8,000 hour calculated MTBF (MIL-HDBK-217F, notice 2)
Safety Standards	UL 61010B-1 EN 61010-1 CSA C22.2 No.61010-1

DIMENSIONS AND WEIGHT

Height	7.75" (19.7 cm)
Width	14" (35.6 cm)
Depth	20.5" (52.0 cm)
Weight	36.8 lbs. (16.5 kg)
LCD Display Screen Size	6.4" diagonal (162.6 mm diagonal)

GENERAL CHARACTERISTICS

LCD DISPLAY Screen Size	6.4" diagonal 162.6 mm diagonal
Active Area	5.1" (h) x 3.8" (v) 129.6 mm (h) x 97.44 mm (v)
Resolution	640 x 480 pixels
Disk Storage	Internal 30 GByte hard disk available for user storage

OPTIONAL SYSTEMS

P25 (OPTIONAL)

RF SIGNAL GENERATOR

FREQUENCY	
Range	10 MHz to 1.05 GHz (standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Resolution	1 Hz
Accuracy	Frequency standard ± 1 count
OUTPUT LEVEL	
Range	T/R Port: -130.0 to -40.0 dBm Gen Port: -130.0 to +0.0 dBm
Resolution	0.1 dB
Accuracy	1.0 dB for levels > -110 dBm (Typical better than 0.6 dB) 1.5 dB for levels ≤ -110 dBm (Typical better than ± 1.0 dB)
Modulation	C4FM, CQPSK, LSM
Test Patterns	STD 1011, STD CAL, STD SILENCE, STD INTFR, STD BUSY, STD IDLE, STD 511 (0.153), STORED SPCH, VOICE, 1011, SILENCE

RF RECEIVER

Frequency Range	10 MHz to 1.05 GHz (standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Resolution	1 Hz
Level Range	T/R Port: -10 to +50 dBm ANT Port: -60.0 to +10 dBm (with preamp -63)

P25 MEASUREMENTS

MODULATION FIDELITY	
Range	0 to 20%
Resolution	0.01%
Accuracy	$< 5.0\%$ of reading (2.5 to 10%)
SYMBOL DEVIATION	
Range	1500 Hz to 2100 Hz
Resolution	0.1 Hz
Accuracy	± 10 Hz (1620 to 1980 Hz)
SYMBOL CLOCK ERROR	
Range	± 1000 mHz
Resolution	0.01 mHz
Accuracy	1 ppm (± 48 mHz)

FREQUENCY ERROR	
Range	± 4000 Hz
Resolution	0.01 Hz
Accuracy	Frequency Standard ± 1 count
UUT TX/RX Bit Error Rate	
Range	0 to 20%
Resolution	0.1%
SIGNAL POWER	
Range	T/R Port: -60 to +51 dBm ANT Port: -100 to +10 dBm
Resolution	0.1 dB
Accuracy	± 1 dB (typically better than ± 0.6 dB)
ERROR VECTOR MAGNITUDE	
Range	0 to 20%
Resolution	0.01%
CARRIER FEEDTHROUGH	
Range	0 to -80.00 dB
Resolution	0.01 dB

GRAPHICAL DISPLAYS

MODULATION FIDELITY DISPLAYS	
Constellation	Line graph of the deviation at the symbol point.
Distribution	Graph of the statistical distribution of the deviation at the symbol point. This is a graph of the deviation at the symbol point versus the percentage of occurrence of that deviation.
Eye Diagram	Graph of the demodulated signal versus time, synchronized with the symbol points. The number of symbol periods is selectable. Range is 2 to 16.
Trajectory	Graph of the demodulated signal in the complex domain. This graph shows the Inphase versus the Quadrature phase of the demodulated C4FM, CQPSK, or LSM signal.

PROTOCOL

DATA LINK	
Header	MFID, ALG, KEY, TGID, MI
Voice Frame	Frame #, NAC, DUID, KEY, ALG, MI, RAW, LCO, Protect, SF, EMG, LSD, STS 1, STS 2
CONVENTIONAL MODE SIMULATION	
	NAC, Call Type, TGID, UID, Alg ID, Key ID
PHASE 1 TRUNKING SIMULATION	
System Plans	Basic 800, Basic UHF, Basic VHF, Basic 700, plus multiple user defined
User defined fields	System ID, WACN, RFSS ID, Site ID, Announcement Group Address, Local Registration Area, Service Class, Active Network, Local/Global Affiliation, Group Affiliation, Registration, WGID Mapping, WUID mapping, Protected 16 Channel IDs with Base Frequency, Bandwidth, TX Offset, Channel Spacing

Trunking Control	Base Simulation sets System Plan, Implicit/Explicit mode, Control Channel ID/NUM/Frequency, Control Channel power level, Control Channel modulation, Traffic Channel ID/NUM/Frequency, Traffic Channel power level, Traffic Channel modulation.
Simulator	Call Type, TGIID, UID, Alg ID, Key ID
Encryption	Supports DES Encryption (AES available with restrictions)

TETRA

RF SIGNAL GENERATOR

FREQUENCY	
Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Resolution	1.0 Hz
Accuracy	Frequency standard ± 1 count
OUTPUT LEVEL	
Range	T/R Port: -130.0 dBm to -40.0 dBm Gen Port: -130.0 dBm to 0 dBm
Resolution	0.1 dB
Accuracy	1.0 dB for levels > -110 dBm (typical better than 0.6 dB) 1.5 dB for levels ≤ -110 (typical better than 1.0 dB)
MODULATION	
Type	$\pi/4$ DQPSK, 18 ksymbols/sec, TETRA filter (RRC with ≤ 0.35)
Accuracy	$< 3\%$ RMS $< 6\%$ peak
Residual Carrier Power	< -35 dBc
TEST SIGNALS	
TETRA MS	Main Control Channel (MCCH) Traffic Channel (TCH/S) containing silence or 1 kHz tone or talk-back, Fast Associated Control Channel (FACCH)
TETRA MS T1	T1 test signals (in accordance with ETSI EN 300 394-1) T1 type 1 (TCH/7.2), T1 type 2 (SCH/F), T1 type 3 (BSCH + SCH/HD), T1 type 4 (TCH/2.4), T1 type 15 (TCH/S), T1 type 17 (TCH/4.8)
TETRA BS T1	T1 test signals (in accordance with ETSI EN 300 394-1) T1 type 7 (TCH/7.2), T1 type 8 (SCH/F), T1 type 9 (STCH+ STCH UL), T1 type 10 (TCH/2.4), 18 Frame PRBS, Framed PRBS, Unframed PRBS
TETRA DM	Traffic Channel (TCH/S) containing silence or 1 kHz tone or talk-back

RF RECEIVER

Frequency Range	10 MHz to 1.05 GHz (Standard) (Usable from 100 kHz) 10 MHz to 2.7 GHz (392XOPT058) (Usable from 100 kHz)
Level Range	T/R Port: -40 dBm to +40 dBm ANT Port: -80 dBm to 0 dBm
Burst Types	MS: Control Burst (CB), Normal Uplink Burst (NUB) BS: Normal Downlink Burst (TS1+2, TS1, and TS2), Synchronization Burst, PRBS with no training sequence

TETRA MEASUREMENTS

POWER	Average power across the useful part of the burst measured at the symbol points through a TETRA filter
Resolution	0.1 dB
Accuracy	± 1.0 dB (± 0.6 dB typical)
MODULATION ACCURACY	Modulation accuracy measures the displacement of symbol points from their ideal position
Range	20.0% RMS vector error 40.0% Peak vector error 20.0% Residual carrier
Resolution	0.1%
Accuracy	$\pm 0.5\%$ at 10% error
BURST TIMING ERROR	Timing error relative to downlink results available for avg, max, min and worst case for a sample of up to 250 bursts
Range	± 510.00 symbols
Resolution	0.01
Accuracy	± 0.05 symbols
Timing offset range	± 999.99 symbols
FREQUENCY ERROR	
Range	± 500.0 Hz
Resolution	0.1 Hz
Accuracy	± 15 Hz +frequency standard accuracy
BER Testing (TETRA MS T1 mode)	BER, MER and PUEM
BER Testing (TETRA MS mode)	BER, RBER and MER
BER Testing (TETRA BS T1 mode)	BER, MER and PUEM

GRAPHICAL DISPLAYS

POWER PROFILE DISPLAY	Display of power versus time for a complete burst or ramp up/ramp down intervals measured at the symbol points and displayed relative to a TETRA mask (TETRA limits or user defined) with pass/fail indication. Measured through a TETRA filter referenced (0 dB) to average power.
Dynamic Range	70 dB
Vertical Scale	20 dB/div or 0.1 dB/div in 1, 2, 5 steps
Accuracy	±1.0 dB (±0.6 dB typical) at symbol points for levels greater than -10 dB
CONSTELLATION DISPLAY	Polar display of amplitude versus phase at the symbol point measured over all symbols (SNO ~ SN max) through a TETRA filter. Also available as a rotated constellation display where all symbol point values are mapped to a single constellation point.
PHASE TRAJECTORY DISPLAY	Polar display of amplitude versus phase continuously measured over the duration (SNO ~ SN max) through a TETRA filter.
VECTOR ANALYSIS DISPLAYS	Vector error (%), magnitude error (%) and phase error (degrees) measured at symbol points (SNO ~ SN max) through a TETRA filter.
Vertical Scaling	Vector error 0.1%/div to 20%/div in 1, 2, 5 steps Phase error ±0.1°/div to ±20°/div in 1, 2, 5 steps Magnitude error ±1.0 %/div to ±20%/div in 1, 2, 5 steps

TETRA CHANNEL PLANS AND SIGNALING

Channel Plans	TETRA 380-400 (0 Hz or 12.5 kHz offset) TETRA 410-430 (0 Hz, -6.25 kHz or 12.5 kHz offset) TETRA 450-470 (0 Hz or 12.5 kHz offset) TETRA 805-870 (0 Hz or 12.5 kHz offset) TETRA 870-921 (0 Hz or 12.5 kHz offset) No plan and user defined
System Identity	Mobile Country Code, MCC Mobile Network Code, MNC Base Color Code, BCC Location Area Code, LA
Signaling Functions	Mobile parameter control for SSI, GSSI, power class, receiver class Registration, test mode registration and de-registration Private (individual) call, group call, phone call, emergency call, user defined call (mobile terminated) Call timer and trunking type selection Cell-re-selection (requires two test sets and a power splitter)

Short data service Status message and SDS types 1 to 4 call control (simplex calls) Power control and Frequency control Frequency handoff RF loopback control (TT) Display of mobile information Demodulated and channel decoded data Protocol history display Talk back, silence and test tone (1 kHz digitally encoded)

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Number	Description
3920	Analog and Digital Radio Test Platform
Accessories Standard with 3920	
Front/Rear Cover 2 X Adapter (BNC-F to TNC-M) Adapter (N-M to BNC-F) 3900 Series Operation Manual (CD-ROM) Antenna (BNC) (450 MHz) Antenna (BNC) (800 MHz) Antenna (BNC) (150 MHz) 3900 Series Getting Started Manual Warranty Packet, 2 Year 2 X Fuse, 3 Amp, 250V Power Cord (configuration for use in the UK) Power Cord (configuration for use in North America) Power Cord (configuration for use in Continental Europe) 3-Wire (grounded) power cord	
Options	Description
390XOPT051	Site Monitoring Application
390XOPT054	IQ Gen Modulation (for IQ Creator waveforms)
390XOPT055	Audio Analyzer
392XOPT058	2.7 GHz Frequency Range Extension Option
390XOPT059	Auto-Test II Analog
390XOPT060	Harmonics & Spurious Measurements
390XOPT061	Tracking Generator
390XOPT064	Analog Duplex Power Between Markers
390XOPT090	Chinese GUI
390XOPT110	TETRA MS (Mobile Station Testing)
390XOPT111	TETRA BS (Base Station Testing)
390XOPT112	TETRA DM (Direct Mode Testing)
390XOPT114	TETRA Energy Economy Mode (Requires 390XOPT110)
390XOPT 115	TETRA Auto-Test II 81532 - TETRALOG Protocol logging and Analysis Software (Requires 390XOPT110 and 390XOPT111)
390XOPT200	P25 Conventional Operation (with DES OFB Type III)
390XOPT201	P25 Trunking Operation VHF/UHF/700/800 MHz (Requires 390XOPT200)
390XOPT204	LSM Generate and Receive/Analysis (Requires 390XOPT200)

390XOPT206	P25 Control Channel Logger Option (Requires 390XOPT200)
390XOPT207	SmartNet™/SmartZone™ Option (Requires 390XOPT200)
390XOPT209	KVL Keyloader Option (Requires 390XOPT200)
390XOPT210	Analog Simulcast Option (Requires 390XOPT055)
390XOPT212	Explicit Mode Trunking (Requires 390XOPT200 and 390XOPT201)
390XOPT213	Unit to Unit Call (Requires 390XOPT200, 390XOPT201 and 390XOPT212)
390XOPT214	Adjacent Channel Broadcast Message (Requires 390XOPT200 and 390XOPT201)
390XOPT215	Secondary Control Channel Broadcast Message (Requires 390XOPT200 and 390XOPT201)
390XOPT218	Auto-Test II for P25 Radio Systems (Requires 390XOPT200)
390XOPT219	X2-TDMA™ Test Suite (Requires 390XOPT200 and 390XOPT201) - (Available through Motorola Only)
390XOPT230	Off Air Monitor Software for P25 Message Logging - Protocol Analysis Tool (Requires 390XOPT200 and 390XOPT206)
390XOPT240	P25 AES Encryption (Requires 390XOPT200)
390XOPT245	X2-TDMA™ Mobile Emulator (Requires 390XOPT200 and 390XOPT201) - (Available through Motorola only)
390XOPT250	Occupied Bandwidth for P25 (Requires 390XOPT200)
390XOPT260	P25 Performance Test Triggers
390XOPT261	X2-TDMA™ Advanced Test Suite - Combines 390XOPT219 and 390XOPT245 (Requires 390XOPT200, 390XOPT201 and 390XOPT219) - (Available through Motorola Only)
390XOPT300	Motorola HPD® Testing Option (Available through Motorola Only)
390XOPT301	Motorola HPD® Advanced Analysis Package (Available through Motorola Only)
390XOPT302	Motorola HPD® Testing Suite Combines 390XOPT300 and 390XOPT301
390XOPT303	Auto-Test II for HPD® Radio Systems (Requires 390XOPT300)
390XOPT400	DMR (MOTOTRBO™) ETSI 102-361
390XOPT401	Auto-Test for DMR Radio Systems (Requires 390XOPT400)
390XOPT402	DMR XML Channel Logger Option (Requires 390XOPT400)
390XOPT420	dPMR - ETSI 102-490
390XOPT421	Auto-Test II for dPMR Radio Systems (Requires 390XOPT420)
390XOPT440	NXDN™
390XOPT441	Auto-Test II for NXDN™ Radio Systems (Requires 390XOPT440)
390XOPT460	ARIB T98
390XOPT461	Auto-Test II for ARIB T98 Radio Systems (Requires 390XOPT460)
390XOPT600	XTS-5000 Auto-Test/Alignment Software (Requires 390XOPT200, 390XOPT218)

390XOPT601	XTS-3000 Auto-Test/Alignment Software (Requires 390XOPT200, 390XOPT218)
390XOPT602	XTL-2500, XTL-5000 Power Alignment Option for Auto-Test II (Requires 390XOPT600, 390XOPT200, 390XOPT218, 392XOPT053 and AC24011)
390XOPT603	TIA/EIA-603 Land Mobile Test Software (Requires 390XOPT059)
390XOPT606	EF Johnson Radio Alignment Software (Requires 390XOPT200, 390XOPT218)
390XOPT607	BK DPHx Radio Alignment Software (Requires 390XOPT200, 390XOPT201)

Accessories for 3920

AC24009	DMM Test Leads for use with 392XOPT053 Category 3 rated
AC24011	10 Amp Current Shunt 0.01 Ohm
AC24012	Rack Mount Kit
AC25011	Case, Transit W/Wheels
AC25012	Case, Soft Padded Carrying
AC25013	Kit, 10/20 dB Pads, TNC
AC25014	Scope Probe Kit
AC25023	Front/Rear Cover
AC25027	Adapter (BNC-F to TNC-M)
AC25029	Accessory Pouch
AC25036	DC to AC Converter, 12 VDC to 110-120 VAC
AC25042	Antenna (BNC) (50 MHz)
AC25043	Antenna (BNC) (450 MHz)
AC25044	Antenna (BNC) (800 MHz)
AC25045	Antenna (BNC) (150 MHz)
AC25059	6 dB / 150 Watt 1.5 GHz Attenuator
AC25060	10 dB / 150 Watt 1.5 GHz Attenuator
AC25061	50 ohm 250 Watt 5 GHz Termination
AC25081	Site Survey Software
AC4105	Return Loss Bridge (1.3 GHz)
AC8645	Microphone
CALFB390X	Calibration Certificate

**Aeroflex High Performance Low Loss Blue Streak Cables
(with Cable Loss vs. Frequency Certification)**

AC25046	4 ft Blue Streak BNC-M to TNC-M cable
AC25047	4 ft Blue Streak N-M to N-M cable
AC25049	4 ft Blue Streak BNC-M to N-M cable
AC25050	QMA "Quick Connect" SMA - QMA Jack Adapter
AC25053	3 ft Blue Streak N-M to QMA-M quick connect cable
AC25054	Quick Connect Combo Kit AC25053 + AC25050 Cable and Adapter
AC25055	QMA Adapter Kit (Includes 24 assorted adapters)
AC25056	4 ft Blue Streak QMA to QMA quick connect cable
AC25057	AC25055 + AC25056 Combo

Extended Standard Warranties for 3920

W390X/203	Extended Warranty 36 Months
W390X/205	Extended Warranty 60 months

Extended Standard Warranties with Calibration for 3920

W390X/203C	Extended Warranty 36 Months with scheduled calibration
W390X/205C	Extended Warranty 60 months with scheduled calibration

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.

Master Purchase Agreement

Motorola, Inc. ("Motorola") and the State of West Virginia Department of Health and Human Resources ("Customer") enter into this "Agreement", pursuant to which Customer may purchase and Motorola will sell those Products and services as described below. Seller and Customer may be referred to individually as a "Party" and collectively as the "Parties."

For good and valuable consideration, the Parties agree as follows:

Section 1 EXHIBITS

The exhibits listed below are incorporated into and made a part of this Agreement. In interpreting this Agreement and resolving any ambiguities, the main body of this Agreement takes precedence over the exhibits and any inconsistency between the exhibits will be resolved in their listed order.

Exhibit A Motorola "Software License Agreement"
Exhibit B "List of Products and Pricing" dated December 1, 2010

Section 2 DEFINITIONS

Capitalized terms used in this Agreement have the following meanings:

- 2.1. "Confidential Information" means any information that is disclosed in written, graphic, verbal, or machine-recognizable form, and is marked, designated, or identified at the time of disclosure as being confidential or its equivalent; or if the information is in verbal form, it is identified as confidential at the time of disclosure and is confirmed in writing within thirty (30) days of the disclosure. Confidential Information does not include any information that: is or becomes publicly known through no wrongful act of the receiving Party; is already known to the receiving Party without restriction when it is disclosed; is or becomes, rightfully and without breach of this Agreement, in the receiving Party's possession without any obligation restricting disclosure; is independently developed by the receiving Party without breach of this Agreement; or is explicitly approved for release by written authorization of the disclosing Party.
- 2.2. "Contract Price" means the price for the ordered Products or services, excluding any applicable sales or similar taxes and freight charges, as shown on the List of Products and Pricing, Exhibit B.
- 2.3. "Effective Date" means that date upon which the last Party executes this Agreement.
- 2.4. "Eligible Purchaser" means Customer and those other government agencies, bodies, districts, or entities described in Section 3.4 below.
- 2.5. "Equipment" means the equipment listed in the List of Products and Pricing, Exhibit B, that Customer purchases from Motorola.
- 2.6. "Force Majeure" means an event, circumstance, or act of a third party that is beyond a Party's reasonable control (e.g., an act of God, an act of the public enemy, an act of a government entity, strikes or other labor disturbances, hurricanes, earthquakes, fires, floods, epidemics, embargoes, war, and riots).
- 2.7. "Infringement Claim" means a third party claim alleging that the Equipment manufactured by Motorola or the Motorola Software directly infringes a United States patent or copyright.
- 2.8. "Motorola Software" means Software that Motorola or its affiliated company owns.
- 2.9. "Non-Motorola Software" means Software that another party owns.

2.10. "Open Source Software" (also called "freeware" or "shareware") means software that has its underlying source code freely available to evaluate, copy, and modify.

2.11. "Products" mean the Equipment and Software provided by Motorola under this Agreement.

2.12. "Proprietary Rights" means the patents, patent applications, inventions, copyrights, trade secrets, trademarks, trade names, mask works, know-how, and other intellectual property rights in and to the Equipment and Software, including those created or produced by Motorola under this Agreement and any corrections, bug fixes, enhancements, updates or modifications to or derivative works from the Software whether made by Motorola or another party.

2.13. "Software" means the Motorola Software and Non-Motorola Software in object code format that is furnished with the Products.

2.14. "Warranty Period" means one (1) year from the date of shipment of the Product or, for services, for one hundred twenty (120) days from the date of performance.

Section 3 SCOPE OF AGREEMENT AND TERM

3.1. **SCOPE OF AGREEMENT.** This Agreement is a Master Purchase Agreement, whereby during the term of this Agreement Customer has the right, but not the duty, to purchase from time to time Products and related services from Motorola's Government and Enterprise business, including parts but excluding Products and services offered by Motorola's Integrated Solutions Division. Pricing for the Products and services will be pursuant to the List of Products and Pricing, Exhibit B. Motorola will provide, ship, and install (if applicable) the Products, and perform the services and its other contractual responsibilities, all in accordance with this Agreement. Customer will perform its contractual responsibilities in accordance with this Agreement.

3.1.1. **Products.** Pricing for the Products is based upon Motorola's then current published list domestic prices ("DNUP") less the specified discount percentage.

3.1.2. **Services.** Customer may purchase engineering, project management, system technologist, or installation services at the per diem rates shown in the List of Products and Pricing, Exhibit B, (normal eight hour work day, excluding weekends and holidays) with a half-day minimum. Beginning with calendar year 2010, these per diem rates will be increased by 5% or as otherwise agreed by the Parties. This Agreement does not cover any other type of services, services related to a system sale, or maintenance and support of the Products except as provided under any applicable warranty. If Motorola deems it to be appropriate, it will prepare a statement of work to describe the particular services to be provided, a test plan, or a performance schedule. If Customer wishes to purchase a system or maintenance and support, upon Customer's request, Motorola will provide a proposal that will include a separate Communications System Agreement or Maintenance and Support Agreement, as the case may be.

3.2. **MOTOROLA SOFTWARE.** Any Motorola Software, including subsequent releases, is licensed to Customer solely in accordance with the Software License Agreement. Customer (and any Eligible Purchaser purchasing from this Agreement) hereby accepts and agrees to abide by all of the terms and restrictions of the Software License Agreement.

3.3. **NON-MOTOROLA SOFTWARE.** Any Non-Motorola Software is licensed to Customer in accordance with the standard license, terms, and restrictions of the copyright owner on the Effective Date unless the copyright owner has granted to Motorola the right to sublicense the Non-Motorola Software pursuant to the Software License Agreement, in which case it applies and the copyright owner will have all of Licensor's rights and protections under the Software License Agreement. Motorola makes no representations or warranties of any kind regarding Non-Motorola Software. Non-Motorola Software may include Open Source Software. All Open Source Software is licensed to Customer in accordance with, and Customer agrees to abide by, the provisions of the standard license of the copyright owner and not

the Software License Agreement. Upon request by Customer, Motorola will use commercially reasonable efforts to determine whether any Open Source Software will be provided under this Agreement; and if so, identify the Open Source Software and provide to Customer a copy of the applicable standard license (or specify where that license may be found); and provide to Customer a copy of the Open Source Software source code if it is publicly available without charge (although a distribution fee or a charge for related services may be applicable).

3.4. ELIGIBLE PURCHASERS. Customer and all of its agencies, and any city or governmental district, body or agency located within the State of West Virginia, may purchase from this Agreement. Eligible Purchasers have the same rights and responsibilities as Customer under this Agreement with respect to their purchases from this Agreement. [

3.5. EXCLUSIVE METHOD FOR PLACING ORDERS. During the term of this Agreement, Customer (and any other Eligible Purchaser) may order Products or the services described above in Section 3.1.2, if they are then available for sale by Motorola. Each order must refer to this Agreement (**Motorola Contract No.10-24125 and** must specify the Product by model number, the unit price, the number of units being purchased, and the extended price; concerning services, each order must specify the type of services being purchased. Motorola will make reasonable efforts to deliver the ordered Products within eight (8) weeks from receipt of order or sooner and to perform the services in a reasonably prompt manner. Alternatively, Customer may register with and place orders through Motorola Online ("MOL"), and this Agreement will be the "Underlying Agreement" for those MOL transactions rather than the MOL On-Line Terms and Conditions of Sale. MOL registration and other information may be found at <http://www.motorola.com/businessandgovernment/> and the MOL telephone number is (800) 814-0601. The applicable provisions of this Agreement will govern the purchase and sale of the Products and services, notwithstanding any different terms and conditions contained in an order or acknowledgment of an order.

Section 4 TERM OF AGREEMENT

Unless otherwise terminated in accordance with the provisions of this Agreement or extended by mutual agreement of the Parties, the term of this Agreement begins on the Effective Date and continues for one (1) year the Effective Date. Expiration of this Agreement will not affect any warranty period that has not yet expired.

Section 5 PAYMENT OF CONTRACT PRICE

5.1. CONTRACT PRICE. Customer will pay the Contract Price as correctly stated in an order when due in U.S. dollars.

5.2. INVOICING AND PAYMENT. Motorola will submit invoices to Customer for Products when they are shipped and for services, if applicable, when they are performed. Customer will make payments to Motorola within thirty (30) days after the date of each invoice. Customer will make payments when due in the form of a wire transfer, check, or cashier's check from a U.S. financial institution. Overdue invoices will bear simple interest at the maximum allowable rate. For Customer's reference, the Federal Tax Identification Number for Motorola, Inc. is 36-1115800.

5.3. FREIGHT, TITLE, AND RISK OF LOSS. Motorola will pre-pay and add all freight charges to the invoices. Title and risk of loss to the Equipment will pass to Customer upon shipment. Title to Software will not pass to Customer at any time. Motorola will pack and ship all Equipment in accordance with good commercial practices.

5.4. INVOICING AND SHIPPING ADDRESSES. Invoices will be sent to the Customer at the following address:

The city which is the ultimate destination where the Equipment will be delivered to Customer is:

The Equipment will be shipped to the Customer at the following address (insert if this information is known):

Customer may change this information by giving written notice to Motorola. Any Eligible Purchaser other than Customer will provide in writing to Motorola the information identified in this Section 5.4 immediately upon becoming an Eligible Purchaser.

Section 6 SITES AND SITE CONDITIONS

6.1. ACCESS TO SITES. If Motorola is providing installation or other services, Customer will provide all necessary construction and building permits, licenses, and the like; and access to the work sites or vehicles as reasonably requested by Motorola so that it may perform its contractual duties.

6.2. SITE CONDITIONS. If Motorola is providing installation or other services at Customer's sites, Customer will ensure that these work sites are safe, secure, and in compliance with all applicable industry and OSHA standards. Customer will ensure that these work sites have adequate physical space; air conditioning and other environmental conditions; electrical power outlets, distribution and equipment; and telephone or other communication lines, all for the installation, use and maintenance of the Products.

Section 7 ACCEPTANCE

Acceptance of the Products will occur upon delivery to Customer unless a statement of work or acceptance test plan exists and provides for acceptance verification or testing, in which case acceptance of the Products will occur upon successful completion of the acceptance verification or testing. Notwithstanding the preceding sentence, Customer's use of the Products for their operational purposes will constitute acceptance.

Section 8 REPRESENTATIONS AND WARRANTIES

8.1. EQUIPMENT WARRANTY. During the Warranty Period, Motorola warrants that the Equipment under normal use and service will be free from material defects in materials and workmanship.

[Note: If parts are offered under this MPA, it is OK to add the parts warranty.]

8.2. MOTOROLA SOFTWARE WARRANTY. Unless otherwise stated in the Software License Agreement, during the Warranty Period, Motorola warrants the Motorola Software in accordance with the terms of the Software License Agreement and the provisions of this Section that are applicable to the Motorola Software.

8.3. EXCLUSIONS TO EQUIPMENT AND MOTOROLA SOFTWARE WARRANTIES. These warranties do not apply to: (i) defects or damage resulting from: use of the Equipment or Motorola Software in other than its normal, customary, and authorized manner; accident, liquids, neglect, or acts of God; testing, maintenance, disassembly, repair, installation, alteration, modification, or adjustment not provided or authorized in writing by Motorola; Customer's failure to comply with all applicable industry and OSHA standards; (ii) breakage of or damage to antennas unless caused directly by defects in material or workmanship; (iii) Equipment that has had the serial number removed or made illegible; (iv) batteries (because they carry their own separate limited warranty) or consumables; (v) freight costs to ship Equipment to the repair depot; (vi) scratches or other cosmetic damage to Equipment surfaces that does not affect the operation of the Equipment; and (vii) normal or customary wear and tear.

8.4. **WARRANTY CLAIMS.** To assert a warranty claim, Customer must notify Motorola in writing of the claim before the expiration of the Warranty Period. Upon receipt of this notice, Motorola will investigate the warranty claim. If this investigation confirms a valid warranty claim, Motorola will (at its option and at no additional charge to Customer) repair the defective Equipment or Motorola Software, replace it with the same or equivalent product, or refund the price of the defective Equipment or Motorola Software. That action will be the full extent of Motorola's liability for the warranty claim. If this investigation indicates the warranty claim is not valid, then Motorola may invoice Customer for responding to the claim on a time and materials basis using Motorola's then current labor rates. Repaired or replaced product is warranted for the balance of the original applicable Warranty Period. All replaced products or parts will become the property of Motorola.

8.5. **SERVICES WARRANTY.** During the Warranty Period, Motorola warrants that the services have been performed in a good and workmanlike manner. Customer's exclusive remedy for a breach of this services warranty is, at Motorola's option, to re-perform the services at no cost to the Customer or refund the Contract Price of the services that were not performed in a good and workmanlike manner.

8.6. **ORIGINAL END USER IS COVERED.** These express limited warranties are extended by Motorola to the original user purchasing the Products or services for commercial, industrial, or governmental use only, and are not assignable or transferable.

8.7. **DISCLAIMER OF OTHER WARRANTIES.** THESE WARRANTIES ARE THE COMPLETE WARRANTIES FOR THE EQUIPMENT, MOTOROLA SOFTWARE, AND SERVICES PROVIDED UNDER THIS AGREEMENT AND ARE GIVEN IN LIEU OF ALL OTHER WARRANTIES. MOTOROLA DISCLAIMS ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Section 9 DELAYS

Neither Party will be liable for its non-performance or delayed performance if caused by a Force Majeure. Each Party will notify the other if it becomes aware of any Force Majeure that will significantly delay performance. The notifying Party will give the notice promptly (but in no event later than fifteen (15) days) after it discovers the Force Majeure. If a Force Majeure occurs, the Parties will execute a change order to extend the performance schedule for a time period that is reasonable under the circumstances.

Section 10 DISPUTES

The Parties will use the following procedure to address any dispute arising under this Agreement (a "Dispute").

10.1. **GOVERNING LAW.** This Agreement will be governed by and construed in accordance with the laws of the State in which the System is installed.

10.2. **NEGOTIATION.** Either Party may initiate the Dispute resolution procedures by sending a notice of Dispute ("Notice of Dispute"). The Parties will attempt to resolve the Dispute promptly through good faith negotiations including 1) timely escalation of the Dispute to executives who have authority to settle the Dispute and who are at a higher level of management than the persons with direct responsibility for the matter and 2) direct communication between the executives. If the Dispute has not been resolved within ten (10) days from the Notice of Dispute, the Parties will proceed to mediation.

10.3. **MEDIATION.** The Parties will choose an independent mediator within thirty (30) days of a notice to mediate from either Party ("Notice of Mediation"). Neither Party may unreasonably withhold consent to the selection of a mediator. If the Parties are unable to agree upon a mediator, either Party may request that American Arbitration Association nominate a mediator. Each Party will bear its own costs of mediation, but the Parties will share the cost of the mediator equally. Each Party will participate in the mediation in good faith and will be represented at the mediation by a business executive with authority to settle the Dispute.

10.4. LITIGATION, VENUE and JURISDICTION. If a Dispute remains unresolved for sixty (60) days after receipt of the Notice of Mediation, either Party may then submit the Dispute to a court of competent jurisdiction in the state in which the System is installed. Each Party irrevocably agrees to submit to the exclusive jurisdiction of the courts in such state over any claim or matter arising under or in connection with this Agreement.

10.5. CONFIDENTIALITY. All communications pursuant to subsections 10.2 and 10.3 will be treated as compromise and settlement negotiations for purposes of applicable rules of evidence and any additional confidentiality protections provided by applicable law. The use of these Dispute resolution procedures will not be construed under the doctrines of laches, waiver or estoppel to affect adversely the rights of either Party.

Section 11 DEFAULT AND TERMINATION

If either Party fails to perform a material obligation under this Agreement, the other Party may consider the non-performing Party to be in default (unless a Force Majeure causes the failure) and may assert a default claim by giving the non-performing Party a written and detailed notice of the default. Except for a default by Customer for failing to pay any amount when due under this Agreement which must be cured immediately, the defaulting Party will have thirty (30) days after receipt of the notice of default to either cure the default or, if the default is not curable within thirty (30) days, provide a written cure plan. The defaulting Party will begin implementing the cure plan immediately after receipt of notice by the other Party that it approves the plan. If Customer is the defaulting Party, Motorola may stop work on the project until it approves the Customer's cure plan. If the non-performing Party fails to cure the default, the performing Party may terminate any unfulfilled portion of this Agreement and recover damages as permitted by law and this Agreement.

Section 12 PATENT AND COPYRIGHT INFRINGEMENT INDEMNIFICATION

12.1. Motorola will defend at its expense any suit brought against Customer to the extent it is based on a third-party claim alleging that the Equipment manufactured by Motorola or the Motorola Software ("Motorola Product") directly infringes a United States patent or copyright ("Infringement Claim"). Motorola's duties to defend and indemnify are conditioned upon: Customer promptly notifying Motorola in writing of the Infringement Claim; Motorola having sole control of the defense of the suit and all negotiations for its settlement or compromise; and Customer providing to Motorola cooperation and, if requested by Motorola, reasonable assistance in the defense of the Infringement Claim. In addition to Motorola's obligation to defend, and subject to the same conditions, Motorola will pay all damages finally awarded against Customer by a court of competent jurisdiction for an Infringement Claim or agreed to, in writing, by Motorola in settlement of an Infringement Claim.

12.2. If an Infringement Claim occurs, or in Motorola's opinion is likely to occur, Motorola may at its option and expense: (a) procure for Customer the right to continue using the Motorola Product; (b) replace or modify the Motorola Product so that it becomes non-infringing while providing functionally equivalent performance; or (c) accept the return of the Motorola Product and grant Customer a credit for the Motorola Product, less a reasonable charge for depreciation. The depreciation amount will be calculated based upon generally accepted accounting standards.

12.3. Motorola will have no duty to defend or indemnify for any Infringement Claim that is based upon: (a) the combination of the Motorola Product with any software, apparatus or device not furnished by Motorola; (b) the use of ancillary equipment or software not furnished by Motorola and that is attached to or used in connection with the Motorola Product; (c) Motorola Product designed or manufactured in accordance with Customer's designs, specifications, guidelines or instructions, if the alleged infringement would not have occurred without such designs, specifications, guidelines or instructions; (d) a modification of the Motorola Product by a party other than Motorola; (e) use of the Motorola Product in a manner for which the Motorola Product was not designed or that is inconsistent with the terms of this Agreement; or (f) the failure by Customer to install an enhancement release to the Motorola Software that

is intended to correct the claimed infringement. In no event will Motorola's liability resulting from its indemnity obligation to Customer extend in any way to royalties payable on a per use basis or the Customer's revenues, or any royalty basis other than a reasonable royalty based upon revenue derived by Motorola from Customer from sales or license of the infringing Motorola Product.

12.4. This Section 12 provides Customer's sole and exclusive remedies and Motorola's entire liability in the event of an Infringement Claim. Customer has no right to recover and Motorola has no obligation to provide any other or further remedies, whether under another provision of this Agreement or any other legal theory or principle, in connection with an Infringement Claim. In addition, the rights and remedies provided in this Section 12 are subject to and limited by the restrictions set forth in Section 13.

Section 13 LIMITATION OF LIABILITY

Except for personal injury or death, Motorola's total liability, whether for breach of contract, warranty, negligence, strict liability in tort, indemnification, or otherwise, will be limited to the direct damages recoverable under law, but not to exceed the price of the Equipment, Software, or services with respect to which losses or damages are claimed. **ALTHOUGH THE PARTIES ACKNOWLEDGE THE POSSIBILITY OF SUCH LOSSES OR DAMAGES, THEY AGREE THAT MOTOROLA WILL NOT BE LIABLE FOR ANY COMMERCIAL LOSS; INCONVENIENCE; LOSS OF USE, TIME, DATA, GOOD WILL, REVENUES, PROFITS OR SAVINGS; OR OTHER SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO OR ARISING FROM THIS AGREEMENT, THE SALE OR USE OF THE EQUIPMENT OR SOFTWARE, OR THE PERFORMANCE OF SERVICES BY MOTOROLA PURSUANT TO THIS AGREEMENT.** This limitation of liability provision will survive the expiration or termination of this Agreement and applies notwithstanding any contrary provision. No action for contract breach or otherwise relating to the transactions contemplated by this Agreement may be brought more than one (1) year after the accrual of the cause of action, except for money due upon an open account.

Section 14 CONFIDENTIALITY AND PROPRIETARY RIGHTS

14.1. **CONFIDENTIAL INFORMATION.** During the term of this Agreement, the Parties may provide each other with Confidential Information. Each Party will: maintain the confidentiality of the other Party's Confidential Information and not disclose it to any third party, except as authorized by the disclosing Party in writing or as required by a court of competent jurisdiction; restrict disclosure of Confidential Information to its employees who have a "need to know" and not copy or reproduce the Confidential Information; take necessary and appropriate precautions to guard the confidentiality of Confidential Information, including informing its employees who handle the Confidential Information that it is confidential and not to be disclosed to others, but those precautions will be at least the same degree of care that the receiving Party applies to its own confidential information and will not be less than reasonable care; and use the Confidential Information only in furtherance of the performance of this Agreement. Confidential Information is and will at all times remain the property of the disclosing Party, and no grant of any proprietary rights in the Confidential Information is given or intended, including any express or implied license, other than the limited right of the recipient to use the Confidential Information in the manner and to the extent permitted by this Agreement.

14.2. **PRESERVATION OF MOTOROLA'S PROPRIETARY RIGHTS.** Motorola, the third party manufacturer of any Equipment, and the copyright owner of any Non-Motorola Software own and retain all of their respective Proprietary Rights in the Equipment and Software, and nothing in this Agreement is intended to restrict their Proprietary Rights. All intellectual property developed, originated, or prepared by Motorola in connection with providing to Customer the Equipment, Software, or related services remain vested exclusively in Motorola, and this Agreement does not grant to Customer any shared development rights of intellectual property. Except as explicitly provided in the Software License Agreement, Motorola does not grant to Customer, either directly or by implication, estoppel, or otherwise, any right, title or interest in Motorola's Proprietary Rights. Customer will not modify, disassemble, peel components, decompile, otherwise reverse engineer or attempt to reverse engineer, derive source code or create derivative works from, adapt, translate, merge with other software, reproduce, or export the Software, or

permit or encourage any third party to do so. The preceding sentence does not apply to Open Source Software which is governed by the standard license of the copyright owner.

Section 15 GENERAL

15.1. **TAXES.** The Contract Price does not include any excise, sales, lease, use, property, or other taxes, assessments or duties, all of which will be paid by Customer except as exempt by law. If Motorola is required to pay any of these taxes, Motorola will send an invoice to Customer and Customer will pay to Motorola the amount of the taxes (including applicable interest and penalties) within twenty (20) days after the date of the invoice. Customer will be solely responsible for reporting the Equipment for personal property tax purposes, and Motorola will be solely responsible for reporting taxes on its income or net worth.

15.2. **ASSIGNABILITY AND SUBCONTRACTING.** Except as provided herein, neither Party may assign this Agreement or any of its rights or obligations hereunder without the prior written consent of the other Party, which consent will not be unreasonably withheld. Any attempted assignment, delegation, or transfer without the necessary consent will be void. Notwithstanding the foregoing, Motorola may assign this Agreement to any of its affiliates or its right to receive payment without the prior consent of Customer. In addition, in the event Motorola separates one or more of its businesses (each a "Separated Business"), whether by way of a sale, establishment of a joint venture, spin-off or otherwise (each a "Separation Event"), Motorola may, without the prior written consent of the other Party and at no additional cost to Motorola, assign this Agreement such that it will continue to benefit the Separated Business and its affiliates (and Motorola and its affiliates, to the extent applicable) following the Separation Event. Motorola may subcontract any of the work, but subcontracting will not relieve Motorola of its duties under this Agreement.

15.3 **WAIVER.** Failure or delay by either Party to exercise a right or power under this Agreement will not be a waiver of the right or power. For a waiver of a right or power to be effective, it must be in a writing signed by the waiving Party. An effective waiver of a right or power will not be construed as either a future or continuing waiver of that same right or power, or the waiver of any other right or power.

15.4. **SEVERABILITY.** If a court of competent jurisdiction renders any part of this Agreement invalid or unenforceable, that part will be severed and the remainder of this Agreement will continue in full force and effect.

15.5. **INDEPENDENT CONTRACTORS.** Each Party will perform its duties under this Agreement only as an independent contractor. The Parties and their personnel will not be considered to be employees or agents of the other Party. Nothing in this Agreement will be interpreted as granting either Party the right or authority to make commitments for the other. This Agreement will not constitute, create, or in any way be interpreted as a joint venture, partnership or formal business organization of any kind.

15.6. **HEADINGS AND SECTION REFERENCES; CONSTRUCTION.** The section headings in this Agreement are inserted only for convenience and are not to be construed as part of this Agreement or as a limitation of the scope of the particular section to which the heading refers. This Agreement will be fairly interpreted in accordance with its terms and conditions and not for or against either Party.

15.7. **GOVERNING LAW.** This Agreement and the rights and duties of the Parties will be governed by and interpreted in accordance with the laws of the State in which the Customer accepts the Products.

15.8. **ENTIRE AGREEMENT.** This Agreement, including all Exhibits, constitutes the entire agreement of the Parties regarding the subject matter of the Agreement and supersedes all previous agreements, proposals, and understandings, whether written or oral, relating to this subject matter. This Agreement may be amended or modified only by a written instrument signed by authorized representatives of both Parties. The preprinted terms and conditions found on any Customer purchase order, acknowledgment or other form will not be considered an amendment or modification of this Agreement, even if a representative of each Party signs that document.

15.9. NOTICES. Notices required under this Agreement to be given by one Party to the other must be in writing and either delivered personally or sent to the address shown below by certified mail, return receipt requested and postage prepaid (or by a recognized courier service, such as Federal Express, UPS, or DHL), or by facsimile with correct answerback received, and will be effective upon receipt:

Motorola, Inc.
Attn: Law Dept./Commercial Counsel
1301 E. Algonquin Road MD SH5
Schaumburg, IL 60196
Email: john.santeler@motorola.com

Customer
Attn: _____

fax: _____

15.10. COMPLIANCE WITH APPLICABLE LAWS. Each Party will comply with all applicable federal, state, and local laws, regulations and rules concerning the performance of this Agreement or use of the System. Customer will obtain and comply with all Federal Communications Commission ("FCC") licenses and authorizations required for the installation, operation and use of the Products before the scheduled installation of the Equipment.

15.11. AUTHORITY TO EXECUTE AGREEMENT. Each Party represents that it has obtained all necessary approvals, consents and authorizations to enter into this Agreement and to perform its duties under this Agreement; the person executing this Agreement on its behalf has the authority to do so; upon execution and delivery of this Agreement by the Parties, it is a valid and binding contract, enforceable in accordance with its terms; and the execution, delivery, and performance of this Agreement does not violate any bylaw, charter, regulation, law or any other governing authority of the Party.

15.12. SURVIVAL OF TERMS. The following provisions survive the expiration or termination of this Agreement for any reason: Section 3.2 (Motorola Software), Section 3.3 (Non-Motorola Software); if any payment obligations exist, Sections 5.1 and 5.2 (Contract Price, and Invoicing and Payment); Subsection 9.7 (Disclaimer of Implied Warranties); Section 10 (Disputes); Section 13 (Limitation of Liability); Section 14 (Confidentiality and Proprietary Rights); and all of the General terms in this Section 15.

15.13. INSURANCE. Motorola maintains and will maintain during the term of this Agreement the following: General and Products Liability in the general aggregate amount of \$5,000,000 (combined single limit for bodily injury and property damage); automobile liability in the amount of \$5,000,000 (aggregate and per occurrence, combined single limit); statutory workers' compensation; and employer liability in the amount of \$1,000,000. Upon written request from Customer, Motorola will provide an industry standard certificate of insurance.

The Parties hereby enter into this Agreement as of the Effective Date.

Motorola, Inc.

Customer: State of West Virginia (Dept. of Health & Human Resources)

By: _____
Name: _____
Title: _____
Date: _____

By: _____
Name: _____
Title: _____
Date: _____

Exhibit A

SOFTWARE LICENSE AGREEMENT

This Exhibit A Software License Agreement ("Agreement") is between Motorola, Inc., ("Motorola"), and State of West Virginia Department of Health and Human Resources ("Licensee").

For good and valuable consideration, the parties agree as follows:

Section 1 DEFINITIONS

1.1 "Designated Products" means products provided by Motorola to Licensee with which or for which the Software and Documentation is licensed for use.

1.2 "Documentation" means product and software documentation that specifies technical and performance features and capabilities, and the user, operation and training manuals for the Software (including all physical or electronic media upon which such information is provided).

1.3 "Open Source Software" means software with either freely obtainable source code, license for modification, or permission for free distribution.

1.4 "Open Source Software License" means the terms or conditions under which the Open Source Software is licensed.

1.5 "Primary Agreement" means the agreement to which this exhibit is attached.

1.6 "Security Vulnerability" means a flaw or weakness in system security procedures, design, implementation, or internal controls that could be exercised (accidentally triggered or intentionally exploited) and result in a security breach such that data is compromised, manipulated or stolen or the system damaged.

1.7 "Software" (i) means proprietary software in object code format, and adaptations, translations, de-compilations, disassemblies, emulations, or derivative works of such software; (ii) means any modifications, enhancements, new versions and new releases of the software provided by Motorola; and (iii) may contain one or more items of software owned by a third party supplier. The term "Software" does not include any third party software provided under separate license or third party software not licensable under the terms of this Agreement.

Section 2 SCOPE

Motorola and Licensee enter into this Agreement in connection with Motorola's delivery of certain proprietary Software or products containing embedded or pre-loaded proprietary Software, or both. This Agreement contains the terms and conditions of the license Motorola is providing to Licensee, and Licensee's use of the Software and Documentation.

Section 3 GRANT OF LICENSE

3.1. Subject to the provisions of this Agreement and the payment of applicable license fees, Motorola grants to Licensee a personal, limited, non-transferable (except as permitted in Section 7) and non-exclusive license under Motorola's copyrights and Confidential Information (as defined in the Primary Agreement) embodied in the Software to use the Software, in object code form, and the Documentation solely in connection with Licensee's use of the Designated Products. This Agreement does not grant any rights to source code.

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