

Missouri Department of Transportation

SPECIFICATIONS

FOR

FULL-POWER MOBILE RADIO UNITS

THE BIDDER HEREBY AGREES TO FURNISH ITEMS AND SERVICES, AT THE PRICES QUOTED, PURSUANT TO ALL REQUIREMENTS AND SPECIFICATIONS CONTAINED IN THIS DOCUMENT, UPON RECEIPT OF AN AUTHORIZED PURCHASE ORDER FROM THE DIVISION OF GENERAL SERVICES. THE BIDDER FURTHER AGREES THAT THE LANGUAGE OF THIS DOCUMENT SHALL GOVERN IN THE EVENT OF A CONFLICT WITH HIS OR HER BID.

AUTHORIZED SIGNATURE	PRINTED NAME	TITLE
COMPANY		DATE
MAILING ADDRESS		PHONE
CITY	STATE	ZIP

GENERAL

The Missouri Department of Transportation (hereinafter referred to as the Department) desires to establish a contract for the purchase of two-way very high frequency (VHF) radio units with a minimum RF output power of one hundred (100) watts. The radio units shall support a minimum of one hundred twenty-eight (128) transmit-receive/tone frequency combinations. The radio units shall be compatible with and work into the Department's statewide two-way radio system and be FCC type accepted. The units shall transmit and receive on the VHF frequencies assigned by the Department. Continuous "sub audible" tones, as assigned, shall operate with the transmit and receive frequencies.

APPROVED PRODUCTS

Award will only be made on products on the latest revision of the MoDOT Approved Products List for Two Way Radio Equipment.

CONTRACTUAL REQUIREMENTS

CONTRACT PERIOD

The original contract period shall be for one year. The contract shall not bind, nor purport to bind, the Department for any contractual commitment in excess of the original contract period.

CONTRACT PRICE

All prices shall be firm and fixed. The Department shall not pay nor be liable for any other additional costs including but not limited to taxes, shipping charges, insurance, interest, penalties, termination payments, attorney fees, liquidated damages, etc. The contractor shall not invoice federal excise tax unless otherwise required under federal law or regulation.

SUBCONTRACTORS

If approved by the Department in writing, the contractor may subcontract for those services describe herein provided that any subcontracts include appropriate provisions and contractual obligations to ensure the successful fulfillment of all contractual obligations agreed to by the contractor and the Department and to ensure that the Department is indemnified, saved, and held harmless from and against any and all claims of damage, loss, and cost (including attorney fees) of any kind related to a subcontract in those matters described in the contract between the Department and the contractor. The contractor shall expressly understand and agree that he shall assume and be solely responsible for all legal and financial responsibilities related to the execution of a subcontract. The contractor shall agree and understand that utilization of a sub-contractor to provide any of the equipment or services in the contract shall in no way relieve the contractor of the responsibility for providing the equipment or services as described and set forth herein.

INSURANCE

The contractor shall understand and agree that the Department cannot save and hold harmless and/or indemnify the contractor or employees against any liability incurred or

arising as a result of any activity of the contractor or any activity of the contractor's employees related to the contractor's performance under the contract.

CONTRACT EXTENSIONS

The Department shall have the right, at its sole option, to extend the contract for up to two (2) additional one-year periods, or a portion thereof. In the event that the Department exercises its options, all terms, conditions, and provisions of the original contract shall remain the same and apply during the extension period. If the options are exercised, the contractor shall agree that the prices stated in the original contract shall not be increased in excess of the maximum percentage of increases, if any, stated on the pricing page of the contract. Any percentages of increase shall be computed against the original contract price for each extension period. If the pricing page does not include such percentages or if applicable spaces are left blank, or not completed, prices during extension periods shall be the same as during the original contract period. The Department does not automatically exercise its options based upon the maximum percentage of increase without documented justification supporting an increase and reserves the right to offer or to request an extension of the contract at a price less than that price derived from the Contractor's extension percentages, if any.

DELIVERY

Units shall be delivered within 30 calendar days from the date on the purchase order(s) to the Department's office(s) as specified on the purchase order. A list of delivery locations is attached as Appendix A. Charges for delivery shall be included in the bid price.

Each radio shall be delivered to the location fully assembled. This assembly cost shall be included in the bid price.

LIQUIDATED DAMAGES

Delivery Damages shall be set at fifty (50) dollars per radio unit per day for each day beyond the thirty (30) calendar day delivery period. Damages shall be assessed in the event that some or all of the components making up a radio unit are not received by the specified delivery date.

In the event that any component of a radio unit received does not comply with the specifications as outlined above, the supplier shall make all corrections necessary to bring the unit into compliance. Any costs resulting from this necessary repair/replacement shall be borne by the supplier and shall be performed within fourteen (14) calendar days of its being reported to the supplier unless otherwise agreed to by the department's representative. Acceptance Damages of fifty (50) dollars per radio unit per day shall be assessed for each unit not in compliance after the fourteen (14) calendar days or the agreed upon deadline. A radio unit is as defined above.

Damages will be limited to fifty (50) percent of the total contract price. When this amount is reached the Commission, at its discretion, reserves the right to cancel the remainder of the contract without being considered in breach of the contract and without any additional payment to the supplier. Prior to the effective date of cancellation by the Commission, the Commission will purchase all units requested, received and found acceptable, less any liquidated damages per location. The Commission will apply liquidated damages per location not fulfilled.

AWARD

Award will be all or none. However, the right is reserved to reject any and all bids or award the bid based on the best interest of the Department. Award of this bid does not constitute final acceptance.

PAYMENT

The Department is willing to make one partial payment per group per delivery point on the equipment received up to fifty (50) percent of the total equipment price for that delivery point prior to final acceptance if, in the opinion of the engineer, the equipment is considered reasonably in conformance with the specifications.

Invoices, per group, per delivery point, in triplicate per payment request per purchase order, should reflect the identical item as listed on the purchase order. These invoices shall include the purchase order number, date of shipment, and a unique serial number for each item.

Final payment for all units will be made in the same manner only after all units have been delivered and found acceptable.

CONTRACTOR REQUIREMENTS

GENERAL REQUIREMENTS

The contractor shall provide radio units for the Department in accordance with the terms and conditions stated herein.

All equipment and services shall be provided to the sole satisfaction of the Department.

Unless stated differently, the contractor shall provide all equipment and personnel needed to fulfill the terms of the contract.

TECHNICAL SPECIFICATIONS

GENERAL SPECIFICATIONS

These units shall be complete with transmitter-receiver, remote mount control head, microphone, external speaker, cabling, and mobile mount antenna. The radio shall support a minimum of one hundred twenty-eight (128) transmit-receive/tone frequency combinations and a minimum of ten (10) channel groups.

POWER REQUIREMENTS

All radios shall operate from the vehicle's 12 volt DC, negative ground electrical system. The radio shall operate without sustaining any memory loss, frequency variation or degradation of any kind when operating from the vehicle's electrical system. Adequate protective devices shall be incorporated into all incoming voltage points to protect the unit from damage from spikes, high-voltage, and all other transients, which may be present or occur in the vehicle's electrical system.

MEMORY BACKUP

The radio shall have one of the following:

1. An internal lithium battery to maintain all programming. The battery shall have a minimum life of 5 years.
2. A non-volatile memory that retains all programming and status without a battery.

IGNITION SENSE

The radio shall be furnished with an ignition sense kit that disconnects power to the radio when the vehicles' ignition is turned off unless otherwise specified on the purchase order.

POWER AMPLIFIER PROTECTION

The radio shall have shutdown circuits to guard against reflected power from a shorted or missing antenna. If shutdown circuits are not present, the design of the final power amplifier transistors and their associated components shall be such that they will not be damaged should the transmitter be operated with a shorted or missing antenna.

INTERNAL SPEAKER

In addition to the required external speaker the radio shall have a built in speaker capable of adequate audio output in a noisy truck environment.

AUTOMATIC UNIT IDENTIFICATION

All radios shall be equipped with an automatic unit identification system

DETAILED GENERAL SPECIFICATIONS

General Specifications	
Channels – Minimum	128
Channel Groups – Minimum	10
Frequency Range – MHz	144-174
Operating Temperature - °C	-30 to +60
Channel Spacing – kHz	25/12.5
Channel Stepping – kHz	2.5/5.0/6.25
Current Consumption – Max Amps Standby	0.75
Automatic Unit Identification	Included
Ignition Sense Kit	Included
3 dB Gain Mobile Antenna	Included
Microphone	Included
Cabling	Included
External Speaker	Included
Dash Mounting Hardware	Included
Alphanumeric Display – Minimum Characters	8
Warranty – Minimum	1 Year

TRANSMITTER

The transmitter shall have a minimum output of one hundred (100). The transmitter shall have a time-out-timer to shut down the transmitter if on continuously for approximately 60 seconds and send an alarm to the operator after the transmitter is shut down until the push-to-talk is released.

The transmitter shall meet the following minimum requirements:

TRANSMITTER SPECIFICATIONS	
RF Output Power – Watts	100
Time-out-Timer – Seconds	60
Frequency Stability –30°C to +60°C – PPM	+/- 2.5
Modulation/Deviation – kHz	+/- 2.5
Spurious and Harmonics – dB	At least 70 below carrier
Audio Distortion at 1 kHz	3 % or less
FM Hum and Noise – Db	At least –40
Current Consumption at 100 Watt – Max Amps	25.0
Transmit Indicator	Included

RECIEVER

The receiver shall produce an audio output of at least five (5) watts into an external speaker. There shall be no noticeable audio distortion at the maximum volume level.

The receiver shall be equipped with a priority scan feature.

The receiver shall meet the following minimum requirements:

RECEIVER SPECIFICATIONS	
Frequency Stability –30°C to +60°C – PPM	+/- 2.5
Sensitivity EIA 12dB SINAD – mV	0.33
Selectivity adjacent channel – dB	-70
Intermodulation – Db	-65 or better
Audio Output 1 kHz, 4 Ohms, 5 % THD – Watts	4
Current Consumption Receive – Max Amps	3.0
Priority Scan	Included

CONTROLS

The following controls shall be provided.

1. On-off control (can be integrated into the volume control)
2. Volume control
3. Channel control
4. Group/zone up and down
5. A "Transmit" indicator
6. A "Home" button. By pressing the Home button, the radio will bring the user back to a programmable, pre-selected channel.
7. User operated squelch control

FRONT PANEL DISPLAY

The radio shall have a lighted LCD display on the front panel. At a minimum this display shall indicate the channel name, the group name or number, and scan status. The display shall be alphanumeric with a minimum of 8 characters for the channel name.

PROGRAMMING CAPABILITIES

All radios shall be programmable from a personal computer and shall be able to transfer or clone its information to or from another like unit using a connecting cable between radios. Each unit shall be delivered pre-programmed. Programming shall be as shown in Appendix B unless otherwise indicated on the purchase order.

CTCSS CIRCUITRY

All receivers and transmitters shall be equipped with continuous tone coded squelch system (CTCSS) capability programmable by channel. Tones shall be continuously transmitted with the carrier frequency. The CTCSS capability shall be equipped with reverse burst signaling to eliminate squelch tail.

MOUNTING

The radio shall be configured for remote mounting of the control head. The radio shall include the following at no additional cost.

1. A compact, separate control head with all controls, internal speaker and microphone connection. The head shall be furnished with a bracket and hardware permitting dash mounting for the head unit in American-made vehicles and trucks.
2. The power amplifier deck shall be furnished with a mounting bracket and hardware for remote mounting in a trunk, behind a truck seat or other locations.
3. A minimum 15 foot control cable shall be provided. All control cable connections shall be protected with covers to protect them from damage. All hardware, covers, connectors and any other required items shall be provided for complete connection of the cable.

PROVIDED ACCESSORIES

The following accessories shall be included in the bid price of each radio unit.

1. Mobile Mount Antenna Kit. Each radio shall be provided with 3 dB gain NMO mobile mount whip antenna and a through-hole NMO type antenna mount with a minimum of 15 feet of coaxial cable. The cable shall be equipped with an end compatible with the radio. The antenna shall be designed to operate in the frequency range of the radio.
2. External Speaker. Each radio shall be equipped with a heavy duty external speaker. The external speaker shall have a 4 inch round speaker mounted in a matched enclosure and capable of handling a minimum of 30 watts. The speaker shall have a maximum impedance of 4 ohms. The speaker shall produce no noticeable distortion at the maximum volume setting on the radio. The speaker shall be equipped with a mobile mount bracket.
3. Hand Microphone. A heavy-duty mil-spec matched hand microphone shall be provided with each radio. The microphone shall include a matched hanger.
4. Cabling. Each radio unit shall be provided with a 15 foot minimum fused power cable, fused ignition sense cable, external speaker cable, remote head cable, and any other cables required for proper operation.

FCC COMPLIANCE

All radios shall by type accepted for use with 47 CFR Part 90.

MANUALS AND DOCUMENTATION

OPERATING MANUAL

One operating manual shall be delivered with each radio. At a minimum, the manuals shall include information on installation, setup, configuration and programming (if applicable), operating guidelines, safety, and connections. The cost of the operating manuals shall be included in the bid price.

SERVICE MANUAL

Twelve (12) service manuals showing all circuits, part numbers, part installations, operating voltage, theory of operation, programming, and maintenance procedures shall be furnished at no additional charge. One (1) service manual shall be furnished to each District and two (2) service manuals shall be provided for General Headquarters Traffic.

SERVICE BULLITENS

Service bulletins shall also be provided, at no additional charge, to each delivery location and to General Headquarters Traffic for a minimum of seven (7) years from the date of the purchase order. The service bulletin shall show all updates pertaining to maintenance of the units.

PROGRAMMING AND SOFTWARE

Twelve (12) sets of programming software (compatible with the following Operating Systems: Windows 98/NT/2000/XP) and licenses, for Department furnished computers, and connecting cables need for programming shall be provided at no additional charge. One (1) programming software set shall be furnished to each District and two (2) programming software sets shall be provided for General Headquarters Traffic. The Department shall receive all software updates for a minimum of five (5) years from the date of purchase order at no charge to the Department.

The bidder shall include the following in the bid price:

1. Twelve (12) sets of programming software and licenses. The bidder shall include a programming manual with each software package.
2. Twelve (12) connecting cables and all necessary equipment used in the cloning process.
3. Twelve (12) connecting cables used between the radio and a computer along with twelve (12) individual software package rights for department furnished computers. The programming cable shall be fully equipped to connect to a standard 9-pin male D-sub serial connector on the computer.

OPTIONAL EQUIPMENT

The following optional equipment must be available for purchase at the Department's discretion:

1. Tester, if required for troubleshooting or bench work the bidder shall include as a separate bid item the cost of such testers. The bidder shall also provide technical data sheets for the tester.
2. Replacement hand microphone identical to the microphone provided with radio.
3. DTMF hand microphone compatible with the unit offered.
4. Voice-activated (with push-to-talk option) microphone/headset combination compatible with the unit offered.

5. A minimum 25 foot control cable meeting the specifications above.

These optional bid items will not be considered as part of the bid, but are required to be available. A firm quote should be given for each item, should the Commission deem it necessary to purchase such accessories as identified on the purchase order.

OTHER OPTIONAL EQUIPMENT AND ACCESSORIES

The Department shall have the option to purchase additional accessories at the percent discount off of Manufacture's List Price as indicated on the Pricing Page.

SERVICE AND SUPPORT

SERVICE

The bidder shall supply location, contact and shipping information for the authorized company or associated service shop where warranty work can be accomplished.

The successful bidder shall also provide contact information (name, address, phone, e-mail) for technical support representative(s). The representative(s) shall be available during normal weekday hours by phone and e-mail to assist with setup, programming, operation and other technical aspects of the equipment. All costs for technical support shall be included in the bid price.

The contractor must make available spare parts for a minimum of seven (7) years from the date of installation as recorded on the installation measurements records.

WARRANTY

All parts and materials shall be guaranteed to be free from defects or defective workmanship for a minimum of one (1) year from the date of installation or initial operation as recorded by Department staff. For the guarantee limits, it will be considered that all units will be placed in service within twelve (12) months after receipt.

TECHNICAL ORIENTATION

The successful bidder shall present a complete course of instruction to the Department's radio maintenance personnel. The course shall cover programming, operation, troubleshooting, and maintenance of the radio. This course will be held in Jefferson City or other Missouri city at a time mutually agreeable by the bidder and the Department. The bidder shall provide all equipment and instruction materials necessary for the course. This course shall be at no cost to the Department.

~ End of Specification ~

PRICING PAGE

In the Event that the Department exercises its options to renew the contract for two (2) additional one-year periods pursuant to the applicable provisions outlined in this document, the Contractor shall provide below the maximum percentage of increase or minimum percentages of decrease for each renewal period. The Contractor is cautioned that the percentages shall be computed against the ORIGINAL contract prices during renewal periods shall be the same as during the original contract period. Furthermore, the Contractor is advised that the Department does not automatically grant increases at the time of renewing the contract and that if an increase is requested, documentation of need must be provided at the time of renewal.

First Renewal Period _____ % of maximum increase and/or
_____ % of maximum decrease

Second Renewal Period _____ % of maximum increase and/or
_____ % of maximum decrease

In the Event that the Department exercises its option to purchase additional accessories (with the exception of those required above under "OPTIONAL EQUIPMENT") all accessories will be offered to the Department.

_____ % *Discount off of the Manufacturer's Current List Price.*

This discount is not affected by the increase/decrease associated with the renewal of the contract.

Signature of Contractor's Authorized Representative

Date Signed

APPENDIX A

Potential Delivery Locations

District 1
St. Joseph, MO

District 2
Macon, MO

District 3
Hannibal, MO

District 4
Lee's Summit, MO

District 5
Jefferson City, MO

District 6
Chesterfield, MO

District 7
Joplin, MO

District 8
Springfield, MO

District 9
Willow Springs, MO

District 10
Sikeston, MO

MoDOT General Headquarters
Jefferson City, MO

APPENDIX B

Channel Listings

Ch Name	Group/Zone Name	Receive Frequency (MHz)	Transmit Frequency (MHz)	CTCSS Decode Tone	CTCSS Encode Tone	Narrow/Wide Band	Maximum Power Output (Watts)*
MRTNSVL	D1	151.130	156.135	156.7	114.8	N	100
SKIDMORE	D1	151.130	156.135	156.7	127.3	N	100
POLO1	D1	151.130	156.135	156.7	141.3	N	100
STJOE	D1	151.130	156.135	156.7	156.7	N	100
MACON	D2	151.040	156.045	156.7	127.3	N	100
FAYETTE	D2	151.040	156.045	156.7	141.3	N	100
QNCITY	D2	151.040	156.450	156.7	156.7	N	100
HUGHSVL2	D2	151.040	156.045	156.7	167.9	N	100
HARRIS	D2	151.040	156.045	156.7	179.9	N	100
AVALON	D2	151.040	156.045	156.7	88.5	N	100
MEXICO	D3	151.070	156.015	156.7	114.8	N	100
FAIRMONT	D3	151.070	156.015	156.7	127.3	N	100
EOLIA	D3	151.070	156.015	156.7	156.7	N	100
MNROCTY	D3	151.070	156.015	156.7	179.9	N	100
WRNTON3	D3	151.070	156.015	156.7	192.8	N	100
POLO4	D4	151.070	156.015	156.7	141.3	N	100
PLATCITY	D4	151.070	156.015	156.7	156.7	N	100
HUGHSVL4	D4	151.070	156.015	156.7	167.9	N	100
URICH4	D4	151.070	156.015	156.7	179.9	N	100
KC	D4	151.070	156.015	156.7	192.8	N	100
METRO4	D4	151.100	151.045	156.7	118.8	N	100
MKSCRK5	D5	151.130	156.135	156.7	114.8	N	100
FREEBURG	D5	151.130	156.135	156.7	127.3	N	100
COLECAM	D5	151.130	156.135	156.7	156.7	N	100
HUGHSVL5	D5	151.130	156.135	156.7	167.9	N	100
WRNTON5	D5	151.130	156.135	156.7	192.8	N	100
ASHLAND	D5	151.130	156.135	156.7	88.5	N	100
HSSPRNGS	D6	151.040	156.045	156.7	114.8	N	100
NCOUNTY	D6	151.040	156.045	156.7	127.3	N	100
TAUMSK6	D6	151.040	156.045	156.7	179.9	N	100
WRNTON6	D6	151.040	156.045	156.7	192.8	N	100
LSBURG6	D6	151.040	156.045	156.7	88.5	N	100
METRO6	D6	151.385	156.135	156.7	103.5	N	100
RIDGLEY	D7	151.130	156.135	156.7	127.3	N	100
AVILLA	D7	151.130	156.135	156.7	141.3	N	100
URICH7	D7	151.130	156.135	156.7	179.9	N	100
JRCOSPR	D7	151.130	156.135	156.7	192.8	N	100
MKSCRK8	D8	151.040	156.045	156.7	114.8	N	100
STRAFFRD	D8	151.040	156.045	156.7	127.3	N	100
ROMANCE8	D8	151.040	156.045	156.7	141.3	N	100
FLAT8	D8	151.040	156.045	156.7	156.7	N	100
MTNGROV8	D8	151.040	156.045	156.7	167.9	N	100
HUMANSVL	D8	151.040	156.045	156.7	179.9	N	100
LEBANON	D8	151.040	156.045	156.7	192.8	N	100
BRANSON	D8	151.040	156.045	156.7	88.5	N	100

Ch Name	Group/Zone Name	Receive Frequency (MHz)	Transmit Frequency (MHz)	CTCSS Decode Tone	CTCSS Encode Tone	Narrow/Wide Band	Maximum Power Output (Watts)*
PBLUFF9	D9	151.070	156.015	156.7	114.8	N	100
ALTON	D9	151.070	156.015	156.7	127.3	N	100
ROMANCE9	D9	151.070	156.015	156.7	141.3	N	100
FLAT9	D9	151.070	156.015	156.7	156.7	N	100
MTNGROV9	D9	151.070	156.015	156.7	167.9	N	100
TAUMSK9	D9	151.070	156.015	156.7	179.9	N	100
WINONA	D9	151.070	156.015	156.7	192.8	N	100
LSBURG9	D9	151.070	156.015	156.7	88.5	N	100
PBLUFF10	D10	151.130	156.135	156.7	114.8	N	100
BELLCITY	D10	151.130	156.135	156.7	127.3	N	100
WARDELL	D10	151.130	156.135	156.7	141.3	N	100
PERRYVL	D10	151.130	156.135	156.7	156.7	N	100
SIKESTON	D10	151.130	156.135	156.7	167.9	N	100
TAUMSK10	D10	151.130	156.135	156.7	179.9	N	100
TANTA	TA	151.130	151.130	NONE	NONE	N	100
TANTB	TA	151.040	151.040	NONE	NONE	N	100
TANTC	TA	151.070	151.070	NONE	NONE	N	100
TATA	TA	151.130	151.130	156.7	156.7	N	100
TATB	TA	151.040	151.040	156.7	156.7	N	100
TATC	TA	151.070	151.070	156.7	156.7	N	100
NWS1	WX	162.400	N/A	NONE	NONE	W	N/A
NWS2	WX	162.425	N/A	NONE	NONE	W	N/A
NWS3	WX	162.450	N/A	NONE	NONE	W	N/A
NWS4	WX	162.475	N/A	NONE	NONE	W	N/A
NWS5	WX	162.500	N/A	NONE	NONE	W	N/A
NWS6	WX	162.525	N/A	NONE	NONE	W	N/A
NWS7	WX	162.550	N/A	NONE	NONE	W	N/A
VCALL	IOP	155.7525	155.7525	NONE	NONE	N	50
VTAC1	IOP	151.1375	151.1375	NONE	156.7	N	50
VTAC2	IOP	154.4525	154.4525	NONE	156.7	N	50
VTAC3	IOP	158.7375	158.7375	NONE	156.7	N	50
VTAC4	IOP	159.4725	159.4725	NONE	156.7	N	50
MTAC	IOP	154.6800	154.6800	NONE	156.7	W	50

* Channels shall be programmed to the maximum power available for the radio up to but not exceeding the specified maximum

March 26, 2003