ORDINANCE No. 165505

* Contract with Motorola Communications and Electronics, Inc. (Motorola) to obtain a complete 800 MHz, Trunking Radio System and provide for payment. (Ordinance)

The City of Portland ordains:

Section 1. The Council finds:

1. On September 18, 1991, the Council passed Ordinance No. 164666. That Ordinance:

   a. Exempted the purchase of this radio system from the provisions of ORS 279.017(1). Those provisions prohibit a specification in a public contract requiring any product by brand name;

   b. Exempted the purchase of this radio system from competitive bidding as required by ORS 279.015;

   c. Exempted the procurement of professional, technical and expert services in connection with the purchase of this radio system from the requirements of City Code Chapter 5.68, pertaining to the procurement of such services; and

   d. Authorized the Bureau of General Services to negotiate with Motorola for the purchase of this system and related services.

2. The Bureau of General Services has negotiated a contract with Motorola to obtain a complete 800 MHz, Trunking Radio System, on the terms set out in Exhibit A, attached to this Ordinance.

NOW, THEREFORE, the Council directs:

a. The Mayor and Auditor are authorized to sign the contract with Motorola for the purchase of the complete 800 MHz, Trunking Radio System for the City, in substantially the form set out in Exhibit A, attached to this Ordinance.

b. The Mayor and Auditor are authorized to draw and deliver warrants chargeable to the appropriate budget, Communications Services Special Appropriation, AU 446, when demand is presented and approved by proper authorities.

Section 2. The Council declares that an emergency exists because a delay in proceeding with the signing of this contract and the purchase of this equipment will result in increase of prices and delay the benefits of the services that will result from the acquisition of the system; therefore, this Ordinance shall be in force and effect from and after its passage by Council.

Passed by the Council JUN 3 1992
Mayor J.E. Bud Clark
J.D. Quail
May 27, 1992

BARBARA CLARK
Auditor of the City of Portland
By _____ Deputy

1038

Agenda No.

ORDINANCE NO. 165505

Title

* Contract with Motorola Communications and Electronics, Inc. (Motorola) to obtain a complete 800 MHz, Trunking Radio System and provide for payment. (Ordinance)

INTRODUCED BY	Filed: MAY 29 1992
Mayor J.E. Bud Clark	Barbara Clark Auditor of the City of Portland
NOTED BY COMMISSIONER	
Affairs	
Finance and Administration J.E. Bud Clark	By: Cay Kershner Deputy
Safety	For Meeting of:
Utilities	Action Taken:
Works	___ Amended
BUREAU APPROVAL	___ Passed to Second Reading
Bureau: General Services	___ Continued to:
Prepared by J.D. Quail	Date 05/27/92
Budget Impact Review:	
X Completed ___ Not Required	
Bureau Head: David O. Kish DOK	

AGENDA		FOUR-FIFTHS AGENDA	COMMISSIONERS VOTED AS FOLLOWS:		
				YEAS	NAYS
Consent	Regular X	Blumenauer	Blumenauer	✓	
NOTED BY		Bogle	Bogle	✓	
City Attorney		Kafoury	Kafoury	✓	
City Auditor		Lindberg	Lindberg	✓	
City Engineer		Clark	Clark	✓	

CONTRACT

This Contract for services and equipment is between the CITY OF PORTLAND, OREGON (City) and MOTOROLA COMMUNICATIONS AND ELECTRONICS INC. (Contractor).

RECITALS

It is the intent of this Contract to obtain a complete 800 Mhz, simulcast, trunking radio system for the City of Portland, Oregon hereafter referred to as" City". The radio system consists of site controllers, trunking base stations, site installation work and other items to provide a complete, installed, functional, and operating communication system. The system also includes radio consoles at the dispatch center operated by the Portland Bureau of Emergency Communications. The contractor will propose a project team with one Project Manager and one Account Manager as the Contractor's responsible project leaders. The system shall be complete, installed, and operational within the time frame established in the statement of work.

The equipment shall be complete, installed, and ready for operation at the City's dispatch center location and at any of the remote sites as required.

All of the trunk radio system equipment supplied will be capable of operation in a Motorola SmartNet Simul-Cast system.

AGREEMENT
SECTION 1

1.1 SCOPE OF CONTRACTOR SERVICES

A. The Contractor shall provide the services and equipment specifically to the Bureau of General Services, Communications Services Division. The Contractor shall provide to the City those services and equipment set out in Exhibit A hereto and implemented under the Statement of Work (SOW), Exhibit B hereto.

B. The Contractor shall provide the services and equipment set out in Subsection A beginning as of the date of execution of this contract. The contract will be completed within the time frame established by the statement of work.

1.2 SCOPE OF CITY SERVICES

A. To assist the Contractor in carrying out her/his obligations hereunder, the City shall provide the following equipment and services set out below:

1. All documentation presently available that is pertinent to the project.
2. Arrange access for all necessary site visits.
3. Arrange any meetings with City and non-City users.
4. All improvements required at the selected radio sites.
5. Radio frequency coordination and licensing.
6. Radio coverage surveys and selection of the sites based upon these surveys.
7. Responsibility for radio coverage from the sites selected based upon those surveys.
8. Installation of all of the mobile and portable equipment.
9. All fixed end equipment antennas, transmission lines, transmitter combiners, and receiver multicouplers per Motorola engineer designed specifications.
10. All DC batteries and racks, including DC power distribution equipment for base station back up power, per Motorola engineer designed specifications.
11. All test equipment per Motorola recommended list.
12. All Central Controller and remote site UPS equipment per Motorola engineer recommendations.
13. Digital Microwave system to all remote sites per Motorola engineer specified minimum path requirements.
14. All microwave multiplex equipment except Motorola supplied multiplex equipment for the 800 MHz Simul-Cast system.
15. All Alarm and Control system equipment.
16. All Console furniture.
17. All 24 or 48 VDC Power System equipment per Motorola engineer specified recommendations.
18. All miscellaneous racks for miscellaneous equipment.
19. Miscellaneous hardware and punchdown blocks.
20. Physical installation of all equipment per Motorola specifications and instructions.
21. Procurement of other miscellaneous Non Motorola hardware, except for those items as specified to be supplied by Motorola in Attachment A.
22. The City will be responsible for the design of the sites and the basic site support equipment (UPS, generators, towers, AC power, etc.).
23. The City will design the DC power distribution to specifications provided by Motorola for the Motorola supplied equipment.
24. The City will design the antenna placement and cable routing at each site.
25. Based on rack layout requirements and information provided by Motorola, the city will design the floor space layout for each site.

26. The City will supply labor and assist the Motorola Field Engineers with the initial level setting and review of the level setting procedure.
27. The City will provide labor and assist the Motorola Field engineers during the system optimization
28. The City will perform the system coverage tests and speech quality tests.
29. The City jointly with Motorola will develop an acceptance test plan for mutual approval to be jointly performed by Motorola and the City.

B. The City shall perform the services set out in Subsection A above within a mutually agreed to time frame between the City and the Contractor.

1.3 COMPENSATION

The City shall pay the Contractor for all work performed and equipment supplied as set out in Exhibit A. The Contractor's billing and the City's payment procedures shall be as set out below:

FIXED END EQUIPMENT

10% Due Upon Delivery of SOW, Factory Staging Test Document, and PERT Chart.
80% Due Upon Delivery.
5% Due Upon Optimization Completion.
5% Due Upon Acceptance or Substantial Beneficial Use.

MOBILES & PORTABLES

100% Due Upon Delivery

ENGINEERING, SERVICES & TRAINING

100% Due Upon Delivery or Implementation of each category or contract service as defined in contract Exhibit A.

Optimization is defined as system meeting technical standards as outlined in the (ATP) Acceptance Test Plan.

Payments will be made no later than 30 days after completion of delivery of the equipment and the receipt and approval of appropriate and complete invoices as required by the City purchasing regulations.

In no case shall payment be made for equipment not delivered or installations not performed.

1.4 EARLY TERMINATION OF CONTRACT

A. The City and Contractor, by mutual written agreement, may terminate this Contract at any time.

B. The City, on thirty (30) days written notice to the Contractor, may terminate this Contract for any reason deemed appropriate in its sole discretion.

C. Either the City or the Contractor may terminate this Contract in the event of a breach of the Contract by the other. Prior to such termination, however, the party seeking the termination shall give to the other party written notice of the breach and of the party's intent to terminate. If the party has not entirely resolved the breach within fifteen (15) days of the notice or such longer period as granted by the non-breaching party, then the party giving the notice may terminate the Contract at any time thereafter by giving a written notice of termination.

1.5 PAYMENT ON EARLY TERMINATION

A. In the event of termination under Subsection 1.4 A or B, EARLY TERMINATION OF AGREEMENT, hereof, the City shall pay the Contractor for work performed and delivered in accordance with the Contract prior to the termination date.

B. In the event of termination under Subsection 1.4 C, EARLY TERMINATION OF CONTRACT, hereof, by the Contractor due to a breach by the City, then the City shall pay the Contractor as provided in Subsection A of this Section.

C. In the event of termination under Subsection 1.4 C, EARLY TERMINATION OF CONTRACT, hereof, by the City due to a breach by the Contractor, then the City shall pay the Contractor as provided in Subsection A of this Section, subject to set off of excess costs. If the cost of completing the work exceeds the amount actually paid to the contractor, plus the remaining unpaid balance of the compensation referred to in Section 1.3, then the contractor shall pay to the city the amount of the excess.

D. In the event of early termination all Contractor's work products delivered to the City will become and remain property of the City.

1.6 PROJECT MANAGEMENT

A. The City Project Manager shall be J. Dennis Quail or such other person as shall be designated in writing by the Communications Services Division manager.

B. The City Project Manager is authorized to approve work and billings hereunder, to give notices referred to herein, to terminate this Contract as provided herein, and to carry out any other City actions referred to herein.

C. Designation of the Contractor's Project Manager and Account Manager shall be subject to approval by the City. If the Contractor's Project Manager or Account Manager is changed during the project the new person or persons will have to be accepted by the City before he/she is assigned to the project. Such approval shall not be unreasonably withheld.

The Contractor's Project Manager is:
T. Pete Weber
Motorola C & E
4900 SW Meadows Road
Suite 220
Lake Oswego, OR, 97035

The Contractor's Account Manager is:
Dennis R. Hille
Motorola C & E
4900 SW Meadows Road
Suite 220
Lake Oswego, OR, 97035

1.7 COMPLIANCE WITH LAWS

A. In connection with its activities under this Contract, the Contractor shall comply with all applicable federal, state, and locals laws and regulations.

B. Contractor agrees that he/she has certified with the City's EEO Certification process.

1.8 INDEMNIFICATION

A. The Contractor shall hold harmless, defend, and indemnify the City and the City's officers, agents, and employees against all claims, demands, actions, and suits, including all attorney fees and costs, brought against any of them arising from the Contractor's work or any subcontractor's work under this Contract while on the premises of the City during the delivery, installation and testing of the radio system. In no event shall City or Contractor be liable for any incidental, special or consequential damages.

1.9 LIABILITY INSURANCE

A. The Contractor shall maintain public liability and property damage insurance that protects the Contractor and the City and its officer, agents, and employees from any and all claims, demands, actions, and suits for damage to property or personal injury, including death, arising from the Contractor's work under this Contract. The insurance shall provide coverage for not less than $200,000.00 for personal injury to each person; $1,000,000.00 for each occurrence; and $1,000,000.00 for each occurrence involving property damages; or a single limit policy of not less than $1,000,000.00 covering all claims per occurrence. The limits of the insurance shall be subject to statutory changes as to maximum limits of liability imposed on municipalities of the State of Oregon during the term of the Contract. The insurance shall be without prejudice to coverage otherwise existing and shall name as additional insureds the City and its officer, agents, and employees as described in Exhibit D hereto. Notwithstanding the naming of additional insureds, the insurance shall protect each insured in the same manner as though a separate policy had been issued to each, but nothing herein shall operate to increase the insurer's liability as set forth elsewhere in the policy beyond the amount or amounts for which the insurer would have been liable if only one person or interest had been named as insured. The coverage must apply as to claims between insureds on the policy. The insurance shall provide that the insurance shall not terminate or be canceled without thirty (30) days written notice first being given to the City Auditor. If the insurance is canceled or terminated prior to completion of the contract, the Contractor shall provide a new policy with equivalent terms. The Contractor agrees to maintain continuous uninterrupted coverage for the duration of the contract. The insurance shall include coverage for any damage or injuries arising out of the use of automobiles or other motor vehicles by the Contractor.

B. The Contractor shall maintain on file with the City Auditor a certificate of insurance certifying the coverage required under Subsection A. The adequacy of the insurance shall be subject to the approval of the City Attorney. Failure to maintain liability insurance shall be cause for immediate termination of this Contract by the City.

1.10 WORKERS' COMPENSATION INSURANCE

A. Unless exempt, the Contractor shall, before commencement of work, obtain workers' compensation insurance coverage for all of its workers, employees, and subcontractors either as a carrier-insured employer or a self-insured employer as provided by Chapter 656 of the Oregon Revised Statues. A certification of insurance or copy thereof shall be attached to this Contract as Exhibit D and shall be incorporated herein and made a term and part of this Contract. The contractor further agrees to maintain workers' compensation insurance coverage for the duration of this contract.

B. In the event the Contractor's workers' compensation insurance coverage is due to expire during the term of this Contract, the contractor agrees to timely renew its insurance, either as a carrier-insured employer or a self-insured employer, as provided by Chapter 656 of the Oregon Revised Statutes, before its expiration, and the Contractor agrees to provide the City of Portland such further certification of workers' compensation insurance as renewals of said insurance occur.

C. The Contractor agrees to properly complete the City of Portland's Workers' Compensation Insurance Questionnaire prior to commencing work under this Contract. Questionnaire is attached to this Contract and as Exhibit C and shall remain attached to this Contract and become a part thereof as if fully copied herein.

1.11 SUBCONTRACTING

The Contractor shall not subcontract its work under this Contract, in whole or in part, without the prior written approval of the City. The Contractor shall require any approved subcontractor to agree, as to the portion subcontracted, to fulfill all obligations of the Contractor as specified in this Contract. Notwithstanding City approval of a subcontractor, the Contractor shall remain obligated for full performance hereunder and the City shall incur no obligation other than its obligation to the Contractor hereunder. Contractor agrees that if subcontractors are employed in the performance of this Contract, Contractor and it subcontractors are subject to the requirements and sanctions of ORS Chapter 656, Workers' Compensation. All contractors shall maintain minimum liability insurance as described in Section 1.10.

1.12 ASSIGNMENT

The Contractor shall not assign this Contract, in whole or in part, or any right or obligation hereunder without the prior written approval of the City.

1.13 INDEPENDENT CONTRACTOR STATUS

A. The Contractor is engaged as an independent contractor and will be responsible for any federal, state, and local taxes and fees applicable to payments hereunder.

B. The Contractor, its subcontractors, and their employees, are not employees of the City and are not eligible for any benefits through the City, including without limitation federal social security, health benefits, workers' compensation, unemployment compensation, and retirement benefits.

1.14 BREACH OF CONTRACT

A. The City or the Contractor shall breach this Contract if it fails to perform any substantial obligation under the Contract, except as provided in Subsection B of this section.

B. Neither the City nor the Contractor shall have breached this Contract by reason of any failure to perform a substantial obligation under the Contract if the failure arises out of causes beyond its control and without its fault or negligence. Such causes may include, without limitation, acts of God or the public enemy, acts of the federal, state, or local governments, fires, flood, epidemics, volcanic eruptions, quarantine restrictions, strikes, freight embargoes, and unusually severe weather. Should either the City or the Contractor fail to perform because of a cause described in this subsection, the City and the Contractor shall make a mutually acceptable revision in the Scope of Services, Schedule, or Compensation.

1.15 OWNERSHIP OF DOCUMENTS

A. All work the Contractor performs under this contract shall be considered work made for hire, and shall be the property of the City. The City shall own any and all data, documents, plans copyrights, specifications, working papers, as-built drawings and any other materials the Contractor produces in connection with this Contract. On completion or termination of the Contract, the Contractor shall deliver this material to the City's Project Manager.

B. The Contractor may retain for its own use and at its own cost copies of the materials referred to in subsection A of this section.

C. Any use the City makes of the materials referred to in subsection A of this section, except for purposes of the work contemplated by this Contract, shall be at the City's risk.

1.16 ARBITRATION

A. Any dispute arising out of or in connection with this Agreement, which is not settled by mutual agreement of the Contractor and the City within sixty (60) days of notification in writing by either party, shall be submitted to an arbitrator mutually agreed upon by the parties. In the event the parties cannot agree upon the arbitrator, then the arbitrator shall be appointed by the Presiding Judge (Civil) of the Circuit Court of the State of Oregon for the County of Multnomah. The arbitrator shall be selected within thirty (30) days from the expiration of the sixty (60) day period following notification of the dispute. The arbitration, and any litigation arising out

of or in connection with this Agreement, shall be conducted in Portland, Oregon, shall be governed by the laws of the State of Oregon, and shall be as speedy as reasonably possible. The applicable arbitration rules for the Multnomah County courts shall apply unless the parties agree in writing to other rules. The arbitrator shall render a decision within forty-five (45) days of the first meeting with the Contractor and the City. Insofar as the Contractor and the City legally may do so, they shall be bound by the decision of the arbitrator.

B. Notwithstanding any dispute under this Agreement, whether before or during arbitration, the Contractor shall continue to perform its work pending resolution of the dispute, and the City shall make payments as required by the Agreement for undisputed portions of the work.

1.17 NOTICE

Any notice provided for under this Contract shall be sufficient if in writing and delivered personally to the following addressee or deposited in the United States Mail, postage prepaid, certified mail, return receipt requested, addressed as follows, or to such other address as the receiving party hereafter shall specify in writing:

If to the City:
J. Dennis Quail
Communications Services Division Manager
1130 SW 17th Ave
Portland, OR, 97205

If to the Contractor;
Contractor's Project Manager:
T. Pete Weber
Motorola C & E
4900 SW Meadows Road
Suite 220
Lake Oswego, OR, 97035

1.18 SEVERABILITY

If any provision of this Contract is found to be illegal or unenforceable, this Contract nevertheless shall remain in full force and effect and the provision shall be stricken.

1.19 AMENDMENTS

A. The City and the Contractor may amend this Contract at any time only by written amendment executed by the City and the Contractor. Unless otherwise provided, any amendment that increases the amount of compensation payable to the Contractor must be approved by ordinance of the City Council. If authorized by the City Council, the Project Manager may agree to and execute any other amendment on behalf of the City.

B. Any change in the Scope of Contractor Services shall be deemed an amendment subject to subsection A.

1.20 PROJECT REPORTS

The Contractor shall provide a minimum of monthly progress reports to the City's Project Manager at regularly scheduled meetings. Each progress report shall contain but not be limited to the following information:

A. Work accomplished during the past period.
B. Project problems and solutions
C. Outline of work for the next period.

1.21 INTEGRATION

This Contract contains the entire agreement between the City and the Contractor and supersedes all prior written or oral discussions or agreements.

1.22 NON-WAIVER

The City and the Contractor shall not be deemed to have waived any breach of this Contract by the other party except by an express waiver in writing. An express written waiver as to one breach shall not be deemed a waiver of any other breach not expressly identified, even though the other breach be of the same nature as that waived.

1.23 PROHIBITED INTEREST

A. No City officer or employee, during his or her tenure or for one year thereafter, shall have any interest, direct or indirect, in this Contract or the proceeds thereof.

B. No City officer or employee who participated in the award of this Contract shall be employed by the Contractor during the period of the Contract.

1.24 PAYMENTS TO VENDORS AND SUBCONTRACTORS

The Contractor shall pay timely all suppliers, lessors, and contractors providing it services, materials or equipment for carrying out its obligations under this Contract. The Contractor shall not take or fail to take any actions in a manner that causes the City or any materials that the Contractor provides hereunder to be subject to any claim or lien of any person without the City's prior written consent.

1.25 FUNDS

The City certifies that sufficient funds are available and authorized for expenditure to finance the cost of this contract.

1.26 BUSINESS LICENSE

Unless exempt under PCC 7.06.010, Contractor shall obtain a City of Portland business license prior to beginning work under this contract as required by PCC 7.06.010. The Contractor shall provide a business license number in the space provided at the end of this Contract.

1.27 COMMENCEMENT OF WORK

Contractor agrees that work being done pursuant to this Contract will not be commenced until after:

A. Workers' compensation insurance is obtained as outlined in Section 1.10, Workers' Compensation Insurance; and,

B. Liability insurance is obtained as outlined in Section 1.9.

C. This Contract is fully executed by the parties and approved by the City Attorney's Office; and

D. The effective date of this contract is the date of its execution.

E. The EEO requirements have been met.

1.28 INSTRUCTIONS TO THE CONTRACTOR

Contractor is cautioned not to make any assumptions as to the implied meaning or intent of any part of the work to be performed in Exhibit A. It is incumbent upon the Contractor to request clarification if needed. Information pertaining to Exhibit A may be obtained only from the following person.

J. Dennis Quail
Communications Services Division Manager
1130 S.W. 17th
Portland, OR 97204
Telephone (503) 823-4183

1.29 VENUE

A. In the event that any litigation should arise concerning the construction or interpretation of any of the terms of the contract, the venue of such action or litigations shall be in the Circuit Court of the State of Oregon in and for the County of Multnomah, and any such contract shall be controlled by the laws of the State of Oregon.

1.30 PRICES

A. The prices of all materials furnished pursuant to this contract shall be FOB Shipping Point Pre-Paid and Added to Invoice. The price shall include all state and local taxes. Any Federal Excise taxes shall not be included. Federal Tax Exemption Certificates will be furnished if required.

1.31 EXAMINATION OF SITES AND CONDITIONS

The Contractor has or will examine the sites of the work and ascertained for himself or herself all of the physical conditions in relation thereto. Failure to take this precaution will not release the Contractor from nor excuse him or her from performing the work in strict accordance with the terms of the contract. No statement made by any officer, agent, or employee of the City in relation to the physical conditions pertaining to the site of the work will be binding on the City.

1.32 FUTURE EQUIPMENT, PARTS AND AVAILABILITY

A. TERM

This Agreement shall be effective for an initial term commencing on the Effective Date and extending for fifteen (15) years after the City's Final Acceptance.

B. WARRANTY AGAINST PLANNED OBSOLESCENCE

The Contractor warrants that the products proposed to and acquired by the City under this Agreement are new and of current manufacture, and that it has no current plans for announcing a replacement line which would be marketed by Contractor as replacements for the products contained herein and would result in reduced support for the product line within which the Radio System furnished to the City is contained.

C. REPLACEMENT PARTS AVAILABILITY

The Contractor warrants that replacement parts for equipment provided under the Agreement will be available for the Radio System for ten (10) years after final acceptance or seven (7) years from product discontinuance. The Contractor shall notify the City one hundred eighty (180) days before the end of ten (10) years after Final Acceptance or seven (7) years from product discontinuance, whichever is later, as to the continuing availability of parts subsequent to this period. If parts will not be available from the Contractor after this period, the City may require the Contractor, and the Contractor is obligated to assist the City in obtaining such parts from another source.

D. PRICE, TERMS AND CONDITIONS PROTECTION

The unit list price percentage discounts stated in the Contractor's Proposal shall not change during the term of the Agreement per Section 1.32 A. The discounted unit prices stated in the Contractor's Proposal shall not be increased for twenty-four (24) months from the date of this agreement. Subsequent discounted unit price adjustments for the following twenty-four (24) months shall not exceed in any twelve month period the change in the CONSUMER PRICE INDEXES FOR THE PORTLAND, OREGON METROPOLITAN AREA as published by the U.S. Bureau of Labor Statistics for the most recent twelve month period.

E. OTHER GOVERNMENTAL AGENCIES

As additional consideration for this Agreement, the Contractor hereby grants to the State of Oregon, Clackamas County, Oregon, Washington County, Oregon and Clark County, Washington, and All governmental agencies within these counties, for a period of four (4) years from the date of this Agreement, an option to purchase any equipment covered by this Agreement, at the same prices as are specified in this Agreement for purchase by the City. The prices stated therein shall be defined as the current catalog price less the discount specified in Attachment A of the contract. The State of Oregon, Clackamas County, Washington County or Clark County or any Governmental Agency within those counties, shall exercise this option by written notice to the Contractor, at the address set out in paragraph 1.17 of this Agreement. The notice of exercise of the option shall describe the equipment to be purchased and the requested delivery date.

F. PRICING CERTIFICATION

Motorola, Inc. will provide and certifies that all 800 MHz Trunked Radio Products listed on their currently published price pages, will be made available to the City of Portland.

As updated price pages for these items are published, Motorola will make them available to the City of Portland as a continuance of this agreement.

As new items are added to the Motorola 800 MHz Trunked Radio Products published price pages, they may be added to this agreement at mutually agreed upon discount levels.

1.33 TIME OF COMPLETION

A. The Contractor shall supply and test all equipment to be furnished under this Agreement, to the City's satisfaction, as specified in this Agreement. The system must be operational within the implementation schedule as defined in this agreement.

1.34 TRAINING AND DOCUMENTATION

A. Contractor shall provide the City at no additional charge with all assistance, detailed documentation and technical information (including updates), advice and training required to permit the City to use, operate and maintain the Radio System according to the specifications. The City shall have the right to reproduce all documentation. Training is defined as attendance to any regularly scheduled training classes offered by Motorola's National Service Training Centers in Schaumburg, Illinois and Plantation, Florida for the products procured under this Contract. Motorola shall offer free of any tuition charge any of the applicable courses to City of Portland personnel for a period of two years from the date of this contract. The City is responsible for any transportation, hotel and living costs for City personnel attending these courses. Additionally, Motorola shall provide the City, at no charge, two weeks (10 school days) on site training on the mobile and portable equipment supplied under this contract.

This clause (1.24 A.) applies only to the City of Portland and is not extended to any other agency or jurisdiction which is authorized to purchase through this Contract.

B. The Contractor shall notify the City of the cost for optional additional hours of training.

C. The Contractor shall coordinate any training schedule with the City 45 days prior to starting any training. The Contractor shall provide a training compendium at that time for City approval.

D. The Contractor shall supply to the City for its approval a sample of all training materials 15 days prior to the start of any training classes.

E. In the event that the City contract is a significant factor in the securing for Motorola an order on the City's system of a minimum of 750 units from other jurisdictions, and which are shippable prior to December 31, 1993; Motorola will issue the City a $50,000 credit which can be applied to additional Motorola training.

1.35 PATENTS - FOR ARTICLES AND PROCESSES

The Contractor shall indemnify, defend, and hold free and harmless the City, its officers and employees from all liabilities, claims, damages, costs, or expenses, including, but not limited to attorney's fees imposed upon them or any of them, for any alleged infringement of patent rights or copyrights of any person or persons in consequence of the use by the city, its officers, employees, agents, and other duly authorized representatives of articles or processes supplied to City by Contractor under this Agreement. The foregoing is subject to the following condition: That should the system, or any part of it, become, or in the Contractor's opinion is likely to become the subject of a claim or a patent or copy right infringement, the City shall permit the Contractor to replace some with non-infringing product or modify it so it becomes non-infringing, so long as the replacement or modification meets all of the specifications set out in the Function Specification Document and agreed to by the City.

1.36 EQUIPMENT TO BE FURNISHED COMPLETE

Unless specifically excepted by the terms of this contract, any parts or accessories ordinarily furnished or required to make the equipment herein specified a complete operating unit or system shall be furnished by the Contractor whether directly mentioned in Exhibit A or not.

1.37 CONTRACTORS'S GUARANTEE

A. The Contractor guarantees that the equipment furnished under the contract meets all of the requirements of these performance specifications and meets or exceeds the manufacturer's published performance specifications. In addition, all equipment furnished shall fully meet all applicable Federal Communications Commission (FCC) Rules, Electronic Industries Association (EIA) specifications and be listed with a nationally recognized testing laboratory.

B. The Contractor guarantees that all subcontractors shall comply with the requirements of this Contract.

1.38 WARRANTY/MAINTENANCE

A. The Contractor shall repair or replace without charge to the City, any equipment or part thereof, that fails in operation during normal use within 12 months from the date of acceptance of the system or the date the system or subsystem is used for its intended purpose, whichever occurs first. All other terms and conditions of Exhibit E, the Contractors attached Standard Commercial Warranty apply.

B. The Contractor shall authorize the City to perform board and module level warranty replacement.

C. The City will ship, at the City's expense, Warranty/Maintenance repair equipment to the Contractor or Contractor's designated repair depot. The Contractor, at the Contractor's expense, will return ship to the City the repaired equipment prepaid via the same type of transportation as received.

1.39 PREVAILING WAGE

The Contractor shall comply with any prevailing wage requirements of the state, county, or municipality as applicable.

1.40 FAILURE TO MEET THE SYSTEM TECHNICAL REQUIREMENTS

A. Obligation To Replace Or Bring Up to Requirements.
Should any of the inspections, tests or operation of the equipment under service conditions show that the system or equipment does not meet the requirements of the SYSTEM TECHNICAL REQUIREMENTS the City may reject the equipment and direct the Contractor to immediately furnish such new equipment or parts thereof, as may be necessary to bring it up to these requirements.

1.41 PERFORMANCE TESTS AND OWNER'S ACCEPTANCE

A. The Contractor shall submit a final performance test plan or test procedure for the City's approval at least 30 days prior to the time of the tests. The test plan shall set forth the test equipment to be used and the procedures to be followed for evaluating the system performance to insure conformance with these specifications.

B. Performance tests shall include, but are not limited to:

(1) Inspection of all installations, workmanship and material supplied.
(2) Overall operation.
(3) System access time.
(4) Audio levels and quality.
(5) Conformance with these specifications.
(6) RF equipment performance.

C. Testing shall be conducted by the City in accordance with the approved plan. All testing shall be under the direction and supervision of and witnessed by designated representatives of the City. The City shall supply all the test equipment required for each test.

D. The Contractor shall notify the City at least thirty days in advance of the time it is ready for the City to make the tests on the entire system. The time and date of the tests shall be agreed to by the Contractor and City. The City shall not unreasonably delay the time and date of the acceptance tests.

E. The City will accept the system when it has operated continuously for a 30-day period without a failure after the successful completion of the (ATP) Acceptance Test Plan. If a system failure occurs during the 30 day period the City may require a restart of the 30 day period. A system failure shall be any failure that results in loss of capacity or functionality. A system failure shall also include multiple failures of a similar nature.

F. The acceptance of equipment or parts thereof will in no way relieve the Contractor of the responsibility for furnishing equipment which meets the requirements of these specifications.

G. Should the City commence use of the system or any sub-system thereof for their intended purposes, other than for the express purposes of training or testing, prior to system acceptance, final payment for said system or sub-system shall be due net thirty (30) days. The warranty or maintenance periods for such equipment put into use, unless warranty or maintenance has already begun, shall be deemed to have

commenced concurrently with the use of the equipment for its intended purpose. The use of the equipment for its intended purpose shall be deemed to have occurred when the City commences to use and rely primarily on the equipment for its communications.

H. If upon notification by the Contractor that the system is available for acceptance testing, acceptance testing of the system or any subsystem thereof is delayed for reasons beyond the Contractor's control, final payment for the subsystem or system shall become due net thirty (30) days after notice of availability for testing and warranty or maintenance shall commence upon such notice to the City by the Contractor.

1.42 USE OF RADIO SITES

A. The Contractor shall use the sites specified by the City. Contractor shall comply with any interference suppression requirements required at the sites.

B. No equipment shall be installed without written permission of the City.

1.43 SHIPPING, TITLE AND RISK OF LOSS

All sales and deliveries are F.O.B. Shipping Point Pre-Paid and added to Invoice. The Contractor reserves the right to make deliveries in installments and the Agreement shall be severable as to such installments. Title to the equipment shall pass to the City upon delivery to the F.O.B. Delivery Point. After delivery to the F.O.B. Delivery Point, risk of loss and damage to the articles shall be borne by the City. The above notwithstanding title to software and any third party supplied software shall not pass upon payment of the license fee therefor or under any circumstances.

1.44 CHANGES IN THE WORK

A. The City may, at any time, by written order, make changes within the general scope of the work, including but not limited to revisions of, or additions to, portions of the work, or changes in method of shipment or packaging and place of delivery.

B. If any order under this Section 1.44 causes an increase or decrease in the cost of or time required for the performance of any part of the work under this Agreement, an equitable adjustment shall be made in the Agreement price or delivery schedule, or both, and the Agreement shall be modified in writing accordingly. The Contractor is not obligated to comply with any order hereunder unless and until the parties reach agreement as to the aforementioned equitable adjustment and same is reflected as an addendum to this Agreement.

1.45 SOFTWARE LICENSE AND WARRANTY

Contractor will, in the course of fulfilling this agreement, deliver to the City, on a licensed basis, one or more computer programs which run on processors which are in the Equipment including, without limitation, a revised substitute for a delivered program and documentation related to each program ("Product Program"). Contractor may deliver a Product Program to the City in a variety of mediums including, without limitation, an encoded machine executable form using media such as magnetic disc, diskette or tape or in a computer chip form. Unless otherwise agreed to in a separate written license agreement signed by an authorized representative of both parties, delivery of each Product Program by Contractor and acceptance of same by the City shall be made only under the terms and conditions that follow:

A. Product License: Contractor grants to the City a perpetual nonexclusive license to use each Product Program delivered to the City hereunder. Each such license granted authorizes the City to use the Product Program only in its distributed form for the City's own internal use and only in a single processor which is in a single item of Equipment. Except as provided for in Paragraph (c) below, no such license may be assigned, sublicensed or otherwise transferred by the City without Contractor's prior written consent. Any prohibited assignment, sublicense or transfer shall be null and void. The City shall pay all sales, use and excise taxes, and any other assessments in the nature of taxes however designated, on the Product Programs, their license or use or on or resulting from this license agreement, unless the City furnishes Contractor with a certificate of exemption from payment of such taxes in a form reasonably acceptable to Contractor.

B. Title; Security; Copies.

(1) Title to the original of any Product Program delivered hereunder and any copies made by the City in whole or in part is and shall at all time remain in Contractor.

(2) the City acknowledges that the Product Programs contain valuable proprietary information and trade secrets and that unauthorized dissemination of the Product Programs (including, without limitation, disassembly, decompiling or reverse engineering) could cause irreparable harm to Contractor, and thus the City agrees not to make the Product Programs available to any person without Contractor's written consent, and unless the City has taken appropriate action with such persons permitted access to the Product Programs so as to satisfy the City's obligations under this license agreement. If the City receives a request under the Oregon Public Records Law for disclosure of the Product program, the City will notify the Contractor of the request; and the City will take all reasonable steps to obtain an exemption from disclosure for the Product Program.

(3) The City shall not make copies of the Product Program except that a single reserve copy of a magnetically recorded Product Program that is delivered on tape or magnetic disk media may be made to protect against Product Program destruction. The City will reproduce and include all copyright and other proprietary notices on any copies made in accordance with Contractor's or its suppliers' instructions. The City shall not adapt or merge the Product Programs with other programs.

C. License Transfers.

(1) In the event the City transfers an item of Equipment to a third party, the City may also transfer to the third party the license for each Product Program which runs on a processor in such item of Equipment provided that the City transfers its entire interest in each such item of Equipment and Product Program to the transferee and further provided that prior to such transfer, the transferee agrees, in writing, to be bound by the terms and conditions of this License.

(2) Contractor may, in the course of the transaction for the products identified in the Agreement, agree to transfer to the City certain programs supplied to Contractor by its suppliers for use with such products. For any such program transfer, the City agrees to accept the terms and conditions of the program supplier's license agreement for such programs.

D. Term; Termination.

(1) Any license granted hereunder may be terminated by the City upon one (1) month's prior written notice. If the City is in default of any of the terms and conditions hereof, any license affected thereby is automatically revoked and Contractor, in addition to its other rights and remedies at law or in equity, may terminate each such license and repossess the affected Product Programs.

(2) Within one (1) month after termination of any license, the City will furnish to Contractor a document certifying with respect to each Product Program affected by such termination that through its best efforts the original and all copies, in whole or in part, in any form, have been destroyed.

E. Product Program Warranty. For one hundred twenty (120) days from the date of acceptance, Contractor warrants that a Product Program shall be free from reproducible defects that cause the Product Program to fail to conform in a material fashion to Contractor published specifications for the Product Program. Contractor does not warrant that the operation of a Product Program will be uninterrupted or error free or that each defect in a Product Program will be corrected. This express warranty is extended by Motorola Communications and Electronics., 1301 E. Algonquin Road, Schaumburg, Illinois 60196 to the City, as the original purchaser, and only to those acquiring the Product Program for commercial, industrial or governmental use. *THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES FOR THE PRODUCT PROGRAMS EXPRESS OR IMPLIED WHICH ARE SPECIFICALLY EXCLUDED INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.*

In the event of a defect during the applicable period stated above, Contractor, at its option, will either repair or replace the Product Program or refund the purchase price of the single item of Equipment identified in the contract that is affected by the Product Program defect, and such action on the part of Contractor shall be the full extent of Contractor's liability, and the City's exclusive remedy, for breach of the Product Program warranty. All warranty service will be performed at service locations designated by Contractor. Travel and associated expenses of the City or such expenses incurred by Contractor for visits to the City's location by Contractor personnel are not covered by this warranty. This warranty does not cover Product Programs (i) being used in other than its normal and customary manner; (ii) being subjected to misuse; (iii) being subjected to modifications by the City or by any party other than Contractor without the prior written consent of Contractor. Non-Motorola owned programs are excluded from this warranty but such programs are subject to the warranty provided by their manufacturers, a copy of which will be supplied to the City on specific written request. Any claim for breach of this warranty shall be waived unless the City notifies Contractor at the above address, Attention: Quality Assurance Department, within the applicable warranty period. This warranty applies only to the City as the original purchaser and only within the 50 United States.

F. Patent and Copyright Indemnity for Product Programs. Contractor agrees to defend, at its expense, any suits against the City based upon a claim that any Product Program furnished hereunder infringes a U.S. patent or copyright and to pay costs, damages, and attorney's fees finally awarded in any suit; provided that Contractor is notified promptly in writing of the suit and at Contractor's request and at its expense is given control of said suit and all requested assistance for defense of same. If the use of any Product Program furnished hereunder is enjoined as a result of such suit, Contractor, at its option and at no expense to the City shall obtain for the City the

right to use said Product Program or shall substitute an equivalent Product Program reasonably acceptable to the City and extend this indemnity thereto or, if the foregoing alternatives are not, in Contractor's opinion, reasonably available, Contractor may terminate the license for and accept the return of the affected Product Program. This indemnity does not extend to any suit based upon any infringement or alleged infringement of any patent or copy right by the combination of any Product Program furnished by Contractor and other elements nor does it extend to any product(s) of the City's design or formula. The foregoing states the entire liability of Motorola for patent or copyright infringement related to the Product Programs.

G. *LIMITATION OF LIABILITY. THE ENTIRE CONTRACTOR LIABILITY TO the CITY FOR DAMAGES CONCERNING PERFORMANCE OR NONPERFORMANCE BY MOTOROLA UNDER THIS LICENSE OR IN ANY WAY RELATED TO THE SUBJECT MATTER OF THIS LICENSE, REGARDLESS OF WHETHER THE CLAIM FOR SUCH DAMAGES IS BASED IN CONTRACT WARRANTY, TORT OR OTHERWISE, AND the CITY'S SOLE AND EXCLUSIVE REMEDY SHALL BE LIMITED TO THE PAYMENT BY CONTRACTOR OF ACTUAL DAMAGES NOT TO EXCEED THE AMOUNT PAID TO Contractor FOR THE LICENSE PRODUCT PROGRAM(S).*

IN NO EVENT SHALL Contractor BE LIABLE FOR ANY LOSS OF PROFITS OR SAVINGS OR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES TO THE FULL EXTENT SUCH MAY BE DISCLAIMED UNDER THE LAW.

H. General. The terms of this section shall prevail notwithstanding any variance with the terms and conditions of any order submitted by the City. Contractor shall not be liable for any failure to perform due to causes beyond its reasonable control. This license agreement does not include Product Program source code. If any provision of this license agreement is contrary to, prohibited by, or deemed invalid under applicable laws, rules or regulations, such provision shall be deemed omitted, to the extent so contrary, prohibited or invalid, but the remainder shall not be invalid and should be given effect insofar as possible. This license supersedes in full all prior discussions and agreements between the parties relating to the subject matter of this license section and constitutes the entire agreement between the parties relating to Product Programs and may be modified or supplemented only by a written document signed by an authorized representative of both parties.

I. SOFTWARE SOURCE CODE

In the event that Motorola shall discontinue support for an item of Motorola-owned Software furnished under the Contract and City is not in breach of the Contract, then Motorola shall, at its option, arrange for support by an entity that has access to the source code for such Software item and other information necessary to provide

support, or grant City a license, under separate terms and conditions, to use Motorola-owned source code corresponding to such Software item for City's internal use by City's employees and City's agent, consultants and independent contractors (provided that prior to their access to such source code City's agents, consultants and independent contractors enter into a non-disclosure agreement if form and substance that is reasonably satisfactory to Motorola) solely as a trouble analysis aid for isolating, diagnosing and fixing problems in such Software. If non-Motorola owned programs are incorporated and are required with Motorola owned source code for the aforestated Software item, Motorola shall use reasonable efforts to assist City in becoming a licensee of such code or a sub-licensee of Motorola, as appropriate.

J. IMPROVEMENTS AND OTHER MODIFICATIONS OF SOFTWARE

Contractor shall make software modifications, including improvements and program changes, available to the City prior to or at the same time such modifications are available to any of Contractor's customers.

A. IMPROVEMENTS

Improvements in the software (which shall mean any additions of modifications made by Contractor or the software vendor to or in the software at any time after installation) which improve the efficiency and effectiveness of the basic program functions and which do not change such functions or create on or more new ones, shall be furnished to the City at no charge. Installation of improvements shall be done only with the City's approval, and shall be done at the City's expense if Contractor is not responsible for Full Maintenance Service at the time of installation.

B. PROGRAM CHANGES

If, at any time after installation, Contractor or the software vendor shall develop any changes in the software which change the basic program functions of the software or add one or more new ones, the City shall have the right to obtain such program changes at the lesser of (i) Contractor's or the software vendor's standard prices then in effect for installing such changes, or (ii) the difference between the then current price of the software including such changes and the applicable fees and charges for the software reflected here in.

K. EQUIPMENT AND SOFTWARE EVALUATION OPTION

In the event that the Contractor offers, the City may, at its sole option, test any item of equipment or software which is supplied by the Contractor and can be connected to the Radio System or installed on the Radio System, for a trial period of up to ninety (90) days, without cost. If the City elects this option, the City will reimburse the Contractor for actual freight, installation, and removal costs.

SECTION 2
RADIO SYSTEM
TECHNICAL/OPERATIONAL REQUIREMENTS

2.1 General

2.1.1 As discussed in Section 1.1.1 these specifications are for a trunked radio system for all of the bureaus in the City of Portland. These operational specifications are written around an operational concept that fits the needs of the City. Various equipment configurations may or may not meet all of the operational requirements. The Contractor will provide systems that best meet these requirements but should not be overly concerned with taking exceptions for minor specification exceptions.

2.1.2 The term "channel" in these specifications refers to a communications circuit and not specifically a radio frequency. It could also mean a "group" or "sub-fleet" for trunking systems. The term RF channel will be used to refer specifically to a radio frequency.

2.1.3 The system should be as easy to operate as possible.

2.1.4 The proposed system will have to provide coverage for all of Multnomah County. The City of Portland police, fire and EMS have county wide responsibility. Also the Water Bureau has to be able to communicate throughout the Bull Run Watershed which is in the far east end of the county. The city will assume responsibility for site selection and coverage.

Multnomah County is located at the confluence of the Columbia and Willamette Rivers in Northwest Oregon. The county covers an area of 465 square miles and has a population of approximately 550,000.

The systems that will be replaced are 150 MHz and 450 MHz. These serve police, fire, medical and all of the other bureaus of the City. Multnomah County departments and the cities of Gresham, Troutdale, Fairview and Wood Village may opt to become part of the system.

The City of Portland mobiles and portables will number approximately 1900. 1000 more units will be added if the east county departments join in the system.

MDT's and AVL will eventually become part of the system so the system will have to be designed with this in mind.

All bureaus and agencies on the system will have mutual aid responsibilities with the three adjoining counties; Washington, Clackamas and Clark. Interoperability will be of prime importance in the system design.

2.2 System Concept

2.2.1 The proposed radio system shall provide public safety grade coverage not only in the City of Portland, but also in the areas surrounding Portland. The Portland Fire Department provides mutual aid to fire districts for several miles outside of Portland. The Portland Police and Fire Departments are dispatched by the Bureau of Emergency Communications (BOEC). This center dispatches for the other major cities in the Portland area and for several fire districts. The City of Portland, as well as the other agencies dispatched by BOEC, are currently on VHF high-band and UHF frequencies. The City of Portland Police and Fire departments require constant intercommunication with the other agencies dispatched by BOEC.

2.3 System Functions

2.3.1 The system shall use "simul-cast" technology or other system concept to allow extended communications over the coverage area.

2.3.2 The RF channels shall be automatically assigned to users based on RF channel availability, user priority, and time of channel request. This system shall use "trunking technology."

2.3.3 The system shall have 20 RF channels initially. The Contractor shall provide the cost on a per channel basis to expand the system up to 28 channels.

2.3.4 Redundancy is mandatory where failure of a system component will cause total system down time to exceed 10 seconds.

2.3.5 When one or more voice channels in the system are not in use, the system shall have an access time of less than 500 ms in the clear mode or 700 ms in the secure mode. Access time shall be measured from any PTT to activation of a voice path through the system to audio at the receiver audio output.

2.3.6 The failure of any portion of a base station, repeater, controller, or related equipment shall result in an indication at the dispatch center of a failure and the type of failure. The system shall remove defective repeaters/base stations from use if a failure causes system degradation. A failure of any central control electronics shall result in the system remaining operational. However, reduced capability is allowed. The contractor shall fully describe in exact detail the operation of the system in any failed mode. Clarify how the redundant controller operates.

2.3.7 The system shall provide a display of the current mobile or portable unit address when that unit is transmitting. This display will appear on the CAD terminals and on the scrollable talk-group control modules using alphanumeric displays.

2.3.8 All signalling between dispatch console electronics and the prime site controller shall be compatible with T1, fiber or microwave transmission standards.

2.3.9 Each user of the system shall be able to select a mode of operation that permits broadcast to all or a selected number of groups as may be assigned to satisfy operational needs.

2.3.10 The system shall be capable of incorporating voting receivers and associated voting equipment if necessary to meet future coverage requirements. The Contractor shall describe the methods available for expanding the coverage of the system. In particular, the Contractor shall detail the individual cost (excluding tower and building) of adding an additional base station site and a voting receiver site. The Contractor shall also detail any system operational effects these additions would have (e.g., increased access time).

2.3.11 The system shall allow mobiles to be assigned to logical talk "groups" that allow a mobile unit to hear and participate only in those groups to which it is assigned.

2.3.12 The initial system shall be configured to allow 250 talk groups with a maximum of 2,000 units assigned to a group. The system shall be capable of being expanded to 1,000 talk groups with a maximum of 4,000 units assigned to each group.

2.3.13 The trunking system shall provide the following features:

1. Busy Queuing and Callback
   Requests for a channel shall be placed in a queue if no RF channel is available. Units shall be granted an RF channel based on their place in the queue and their priority level.

2. Multiple Priority Levels
   The system shall have a minimum of eight priority levels. The highest priority shall allow immediate access to an RF channel.

3. Automatic Retry
   The system shall allow automatic retry by a mobile unit if the first transmission by the unit requesting a channel is not acknowledged.

4. Emergency Signalling
   The system shall support an emergency signal from the units. This signal shall be sent to the dispatcher via the signalling channel. The dispatcher shall be alerted and the mobile units ID number displayed.

5. Selective Radio Inhibit
   The system shall have the capability to deny access to the system of any radio or portable in the system. This includes both transmit and receive.

6. Selective Calling
   The system shall have the capability to selectively call any individual unit regardless of the unit's group programming. Selective calling shall be capable of being initiated by the dispatch center or any mobile unit properly equipped.

7. Recent Transmission Priority
   The units that have had recent access to the system, either transmitting or receiving, shall have priority over other units of the same priority. This priority shall end after a system programmable time-out period of 3 to 15 seconds.

8. Regrouping
   The system shall allow two types of unit regrouping. This regrouping shall allow the assignment of individual units to a common group. The system shall allow this in real-time via the system manager terminal. The system shall also provide for pre-assigned regrouping. This shall allow for the pre-assignment of individual units to a common group. This would typically be used for disaster plans, special police incidents, or hazardous material responses, etc. The system shall allow a minimum of one pre-assigned group for every 15 talk groups on the system. The pre-assigned groups shall be activated from the system manager terminal. The Contractor shall describe in detail how the regrouping functions and the operations required to enable it. This function shall be enabled without manually reprogramming the mobile units. A maximum of 50 preassigned regrouping plans will be required.

2.3.14 The system shall support multiple system manager terminals. One system manager terminal shall be located at the a location designated the City Project Manager. The Contractor shall provide the cost as an option to add additional system manager terminals. The system manager terminal shall perform the following functions:

1. Regrouping
2. Unit inhibit
3. Alarm reporting
4. Display of unit IDs

5. Activating units
6. Priority level control
7. Activity logging (real-time and summary)
8. Local and remote maintenance and diagnostics

2.3.15 The system shall provide a printout of usage at user programmable intervals. The usage count shall provide activity by unit, channel, group, and associated air times.

2.3.16 The system shall continuously transmit RF channel direction and assignment information on the signalling channel so that any mobile unit turned-on in the middle of a transmission will join the group currently selected. This shall occur within 2 seconds of radio power up at the maximum capacity of the system.

2.4 Dispatch Interface

2.4.1 The Contractor shall identify the number of communications circuits and the quality or grade of the circuits required between the dispatch center and the other sites.

2.4.2 The trunking system, some of the existing VHF and UHF radio system, and the new consoles shall be interconnected so that the operation of the system is transparent to the dispatcher. The dispatcher shall continue to use the same transmit module and controls. A dispatch shall be heard on both the VHF or UHF and trunking channel simultaneously. This shall function in a manner similar to the system installed in Kent, Washington.

2.4.3 The Contractor shall be responsible for all interface connections required between the dispatch system, VHF/UHF system, and 800 MHz trunking system. The City will be responsible for bringing these circuits to the BOEC trunking controller and CEB equipment location and terminating on punch blocks.

2.4.4 The dispatcher shall hear the 800 MHz trunking system audio over the same speaker as the VHF system.

2.4.5 The dispatch, VHF, UHF and trunking system shall provide interconnection of the following:

1. All present 450 MHz Police nets.
2. Fire Channel 1.
3. All EMS 450 MHz channels now in use.

2.4.6 The dispatcher shall have access to an available trunking RF channel within 500 ms in the clear mode or 700 ms in the secure mode when transmitting on one of the channels listed in 2.4.5. The Contractor shall describe in detail how this interconnection will work. The system shall have dispatcher priority.

2.4.7 One system manager terminal shall be located at a location designated by the Communications Services Division. It shall have two dial-up ports.

2.4.8 The Contractor shall provide an interface from the trunking system to the CAD system to pass along radio IDs, status messages, and emergency alerts.

All future hardware and software upgrades to the Central Controllers will be compatible to the existing data base.

2.5 Trunking - VHF and UHF System Interface

2.5.1 The VHF and UHF channels described in Section 2.4.5 shall be connected to trunking groups for automatic simultaneous transmission of signals received by a VHF or UHF receiver on the associated trunking group.

2.5.2 The system shall send a request for channel within 100ms of receipt of a voter select signal from the VHF system and/or 100ms from RF channel assignment on the trunking system.

2.5.3 The audio levels and operation of the interconnection shall be such that as much as practical the units will be unaware they may be talking to units on another frequency. The City acknowledges that some differences will occur because of the operation on 800 MHz and the operation on VHF or UHF.

2.6 Channels

2.6.1 The system shall be initially capable of providing the following group assignments as a minimum:

Police - 24 talk groups
Fire - 21 talk groups
Water - 22 talk groups
Transportation - 19 talk groups
Tfc Mgt. - 4
Buildings - 7
Env. Svcs - 16
Computer Svcs - 2
General Svcs - 11
Mayor - 1
Commissioners - 1 each = 4
Licenses - 2
Neighborhoods - 2
Parks - 12

The assignments listed above are not to be considered final. They are given to show the Contractor a channel assignment concept which the City requires.

SECTION 3
RADIO SITE
TECHNICAL REQUIREMENTS

3.1 General

3.1.1 This section describes the requirements for the basic site equipment. General installation requirements are specified in the Installation Section.

3.1.2 All equipment shall have specifications, features, controls, and operating characteristics required to comply with the other sections of this specification even though not specifically mentioned in this section.

3.1.3 The tower and coaxial cables shall be grounded per the manufacturer's recommendation.

3.2 Dispatch Center Site

3.2.1 This site houses the existing dispatch consoles for the 800 MHz and VHF/UHF radio equipment control.

3.2.2 The trunking/VHF/UHF interface shall be at the dispatch center. As much as practical, all of the electronics shall be installed in the electronic equipment room.

3.2.3 Any antennas required shall be mounted only at locations approved by the City Project Manager.

3.2.4 The primary system manager terminal shall be at location(s) determined by the City Project Manager.

3.2.5 The Contractor shall be responsible for all interfaces to the existing system to make the Trunking/VHF/UHF interface function as specified.

3.3 Council Crest Site

3.3.1 The City owns the tower and the building. The City Project Manager will designate the locations of antennas and equipment.

3.3.2 The transmitters shall be combined into as few antennas as is practical. The combiners shall be chosen so as to minimize the loss.

3.3.3 The City will perform such tests as are necessary to identify interference problems. The Contractor will assist the City in these tests and recommend the solution to these problems.

3.4 Willalatin Water Tank Site

3.4.1 The site is controlled by the City. A building will have to be built next to the water tower. The water tank will be used as an antenna support.

3.4.2 All of the items in 3.3 Council Crest Site will apply to this site.

3.5 Lookout Point

3.5.1 All of the technical items in 3.3 Council Crest Site will apply to this site.

3.6 Mt. Scott

3.6.1 All of the technical items in 3.3 Council Crest Site will apply to this site.

3.7 Biddle Butte

3.7.1 All of the technical items in 3.3 Council Crest Site will apply to this site.

3.8 Other Site Information

3.8.1 The Contractor will recommend any additional site requirements; HVAC, room space, floor loading, power requirements and tower requirements.

SECTION 4
ADDITIONAL SYSTEM TECHNICAL REQUIREMENTS

4.1 Component Ratings

Each and every component part of the equipment shall be operated within the manufacturer's continuous commercial-duty rating under any combination of operating conditions specified.

4.2 Overload Protection

Adequate fuses and/or circuit breakers shall be included to protect the equipment from internal and external faults. In the event these fusing devices are employed in circuits exhibiting switching surges, a suitable time-delay element shall be incorporated in the fuse device to preclude false operation and yet protect the equipment from a sustained overload.

4.3 Printed Circuit Connections

Gold plated over nickel over copper (or City approved equivalent), printed circuit board connections shall be used exclusively for all printed circuit edge connections and in all inter-module connectors within a particular module panel assembly. Where panel-end cable connections are necessary to extend and interconnect the circuits to other module panels, wire cables may be used, but they shall be made with stranded wire and of sufficient gage, and secured so as to equal the quality and reliability achieved from the printed circuit inter-module connections within a panel. Solid-wire cables shall not be used where cables will be flexed.

4.4 Material And Workmanship

Material and workmanship shall be of the type and grade most suitable for the application and shall conform as a minimum unless otherwise specified to the latest applicable standards, specifications, recommended practices and procedures of such standardizing bodies as the IEEE, EIA, NEMA, NEC, FCC, etc. In particular, applicable EIA standards shall be fully met except as otherwise specified. This will also include all panel and equipment mounting rails, except as required by special circumstances. Upon completion of installation, all material shall be free from defects, corrosion, scratches, or other such conditions as to present an other-than-new appearance. All of the equipment and material shall be of recent manufacture and design, new and unused.

4.5 Test Procedures

All test procedures shall be conducted as outlined in the EIA standards and IEEE specifications unless otherwise specified.

4.6 Identification

Operational controls and adjustments, counter/totalizers, plug-in-cards, sockets and terminal strips shall have suitable nameplates or stamps for the identification of function or purpose.

4.7 Servicing

All units shall be readily available for routine servicing. If module or card extenders are required for servicing then one of each required type shall be furnished for every site installed. Three spare sets will also be provided.

4.8 Instruction Books

One set Ten complete, comprehensive sets of instructions, schematics, diagrams, and operating manuals shall be furnished for each type of equipment supplied. Each instruction book shall contain the following as a minimum:

1. Complete schematic diagrams including information outlining method of operation, supply voltages, etc., for all equipment.

2. Circuit diagrams showing internal wiring of all equipment and components.

3. Complete instructions covering operation, theory of operation and maintenance of all equipment and accessories.

4. Servicing manuals, instructions and procedures shall be of sufficient detail in order to perform detailed maintenance down to the circuit board level.

5. Diagrams showing inter-equipment wiring and cabling, including terminal block connections.

6. Normal point-to-point operating voltages, current and power levels for test and adjustment purposes.

7. Detailed installation instructions.

8. A detailed list of all replacement spare parts.

9. Block and level diagrams.
   The Contractor shall provide one user manual with each mobile and portable unit.

4.9 As-Built Drawings

One set of vellum along with the CAD computer file of as-built drawings shall be supplied to the City indicating the location of the equipment, exterior equipment wiring, cabling, block and level diagrams, and any other details that are either different or omitted from the instructions books supplied.

These initial draft drawings shall be 90% correct and the City shall be responsible for final updates of the drawings to be generated from the CAD computer file supplied.

4.10 Electrostatic Protection

None of the equipment that comprises the radio and dispatch system shall be affected by an electrostatic discharge of 15,000 Volts from a 125 pF capacitor with a 500-ohm series resistor. This simulates the typical electrostatic discharge from human body. This discharge may be applied to any exterior surface of the common control unit, cabling, radio sets and any associated items.

4.11 Electromagnetic Susceptibility

The radio component and dispatch equipment of the radio system may be operated in an equipment room with up to 100 watt VHF (150 MHz), UHF (450 MHz), and 800 MHz transmitters and microwave transmitters with up to 1 watt output power. The system shall not adversely affect or be affected by any of these other radio systems.

SECTION 5
CONSOLES AND REMOTE CONTROL

5.1 General

5.1.1 The City has several locations throughout Multnomah County that will require remote radio control. One of these locations is the Bureau of Emergency Communications (BOEC) at Kelly Butte, 2950 S. E. 103rd Drive, Portland, OR. The City is presently formulating plans for a building to house BOEC at another location but these console requirements will remain the same.

BOEC dispatches for the Portland Police Bureau, Multnomah County Sheriff, and the cities of Troutdale, Wood Village, Gresham and Fairview. BOEC also dispatches for Multnomah County EMS. There are presently 9 police dispatch positions and 2 EMS positions. Sometime during 1992-1993 the Portland Fire Bureau radio dispatch will be moved to the BOEC location. This will add 4 more positions for a total of 15 dispatch positions.

Some of the other locations in the City will employ 2 to 8 channel remote control units or small consoles. These may be remoted from the console system central electronics bank at BOEC or used in conjunction with control transmitters. In some instances there will be two units used in parallel. In these configurations the units will have to be able to share the standard multiple remote control functions (e.g. cross mute, site select, recording, parallel transmitter control busy light and intercom) as well as 2 or 4 wire audio, DC and tone control, alternate line selection, etc.

There will be other locations which will use individual desktop control transmitters.

When the term channel is used it means conventional channel, talk group or intercom unless otherwise identified.

5.2 Radio Consoles

5.2.1 The BOEC central electronic equipment will have to be able to support 30 operating positions. The operating positions may or may not be in the same building.

5.2.2 Each operating position will have following features:

1. The operator position will consist of a single 19" module with 6 scrollable control modules.
2. Select speaker
3. Unselect speaker
4. All switch surfaces will be able to withstand an electrostatic discharge of 15KV from a 125 pf capacitor with a 500 ohm resistor in series. The contractor will make recommendations regarding humidity control, carpet materials or any other techniques that will alleviate high static electrical discharge.
5. Indicator lamps will clearly show what has been selected
6. Color options will be provided for easy identification of controls
7. Control panels designed for EIA 19" rack

8. Headset:
   - o Two headset jacks will be wired in parallel
   - o Headset jacks will be located so they will not interfere with chair movement
   - o Headsets will have their own individual receive gain control
   - o Headset will disconnect audio from the SELECT speaker
9. Alpha/numeric displays will be provided on the channel modules to identify the talk groups, unit ID, conventional channel, etc.
10. Individual speaker pads will be provided for the SELECT and UNSELECT speakers
11. Receive channel busy indicator
12. Patching
13. Telco interconnect
14. Paging
15. Zetron interface; one module at one console position only, plus one spare.
16. Alerting tone(s)

5.3 Central electronics equipment

1. The City must be able to perform all maintenance on the console equipment; hardware and software.
2. There will be no test tones on the recording links
3. Logging recorder input levels will be independent of the operator receive audio controls
4. All cables will terminate on punch-down blocks
5. All circuits on these blocks will be identified
6. All plugs and sockets will be color-coded or otherwise identified to insure proper mating
7. Failure detection alarms will appear on the dispatch supervisor's position and in the technician's shop.

SECTION 6
CONSOLE
TECHNICAL REQUIREMENTS

6.1 General

6.1.1 The console shall be designed to enhance the dispatcher's capabilities in performing their resource management job and minimize the effort and concentration required for radio control. This shall be accomplished by the use of radio control switch groups in each of the consoles. Single keystroke operations shall be required to activate the controlling functions of "instant" transmit, and site selection as applicable.

6.1.2 The electrical circuitry employed throughout the console shall utilize solid state circuitry, and shall be microprocessor based. The only exception allowed shall be relays, which shall be either sealed or have a dust cover over the contacts. All indicators shall be solid state, incandescent lamps will not be accepted.

6.2 System Electronics

6.2.1 The console system shall incorporate distributed, independent, systems to provide a multiple level of redundancy. The console associated with each dispatcher shall be fully capable of independent operation. In the event that one or more of these units fail, the remaining consoles shall still be capable of carrying on radio and telephone operations. Any common control equipment shall be redundant. All common control power supplies shall be redundant. It is not a requirement for individual channel or operator modules to be redundant.

6.2.2 The system shall use distributed microprocessor control technology. The interconnection between the consoles and the common control unit shall be in a star arrangement. Daisy-chaining between consoles will not be accepted.

6.2.3 It shall be possible for a dispatcher to manually select more than one channel for simultaneous transmission or reception. A preprogrammed group select shall also be available to provide a one-button select of common channels for bulletin announcements. Group select will be retained in memory.

6.2.4 It shall be possible to release all group selected channels by a single switch action. When pressed, all remaining unselect channels will be routed to the unselect speakers.

6.2.5 An all-mute function shall be provided that mutes all unselected speakers. The select audio speaker or headset shall not be effected by this switch. Once this switch is depressed, it will release the function after an adjustable period of 30-60 seconds or the switch is depressed a second time.

6.2.6 Redundant equipment shall be active or automatically switched-in upon failure of the operating unit without any manual intervention. It is desirable that the capability to manually switch to the redundant equipment for testing shall be provided.

6.2.7 The common equipment shall be supplied installed in a seven-foot high standard EIA 19-inch relay rack(s) located in the equipment room.

6.2.8 The Supervisor's console position shall have the capability of seizing channel transmit control from the other console positions by activation of the channel's transmit switch after operation supervisory take-over.

6.2.9 The Supervisor's console position shall have the capability to restrict other console positions accessing a specific channel or disable an entire console position.
When a console has been excluded from a channel, it shall not transmit or receive audio on the channel and all of the associated channel status LEDs shall be turned off, except the busy indication, which shall remain lit to indicate the disabled condition.

6.3 Control Panel

6.3.1 The control panels in all consoles shall contain the following as a minimum:

(1) A selected audio speaker mounted inside the console.
(2) An unselected audio speaker mounted inside the console.
(3) Additional speakers, as required, dedicated to Owner-specified audio (may be mounted externally).
(4) Individual adjustable speakers, regardless of whether they are mounted internally or externally to the consoles.
(5) A front-panel mounted audio level indicator.
(6) A digital 24-hour electronic clock
(7) A simul-select switch.
(8) An intercom switch for communicating to the site of the control stations and other consoles.
(9) An alert-tone switch.
(10) An alert-warble tone switch.
(11) An alert-pulsed tone switch.
(12) An all-mute switch and timer, adjustable to at least 60 seconds. This shall mute all unselected audio at the associated console position.

(13) A coded-squelch disable monitor switch.
(14) A patch-transmit switch on the supervisor's console.
(15) A transmit switch to key-selected transmitters.
(16) Individual channel volume controls.
(17) A memory select switch to automatically select a preprogrammed combination of channels.
(18) Switches and indicators to perform the functions as indicated herein.

6.4 Transmit/Receiver (T/R) Control Functions

6.4.1 Each channel shall be equipped with the following control functions as a minimum:

(1) Call Indicator
This shall illuminate a colored indicator which shall flash approximately 2 pulses per second when receiver audio is present on the console selected channel or a steady indicator when the console channel is in the unselected mode.

(2) Select Switch
Depressing this switch shall allow the channel to be selected individually or with any or all other radio channels for simultaneous transmission. It shall also route the selected channel's receive audio to the selected speaker. To release the simultaneous function, only the select switch of the desired channel need be momentarily depressed causing all other channels to revert to the unselected mode. Selecting a channel resets any and all other channels unless the Simul-switch is simultaneously depressed.

(3) Channel Busy Indicator
This shall illuminate a colored indicator whenever a parallel console is transmitting on the channel. A busy indication on a console shall inhibit that console from transmitting on the busy channel but provide audio monitoring of the transmission. Jumpers or programming shall be provided to disconnect the monitoring feature if desired.

(4) Select Indicator
This shall illuminate a colored indicator when the channel is in the selected mode.

(5) Instant Transmit Switch
This shall provide immediate access to and instant transmitting on any channel without first placing that channel in a selected mode or unselecting other channels. This function shall be a single keystroke operation and not override supervisory control.

(6) Transmitter Indicator
This shall be a red panel indicator when the transmit switch is depressed or when transmission is made on that channel in the Select mode.

(7) Patch Switch (supervisor's only)
This switch shall allow the channel's receive audio to be retransmitted (cross-patched) into another radio channel.

(8) Patch Indicator (supervisor's only)
This shall illuminate a colored indicator when the patch switch has been activated.

(9) Take-Over Switch
This shall be on the supervisory console only. It shall allow the operator to transmit on a given channel even though the busy circuits are activated. It shall prevent parallel-connected channels from accessing the station transmitter. The operator overridden shall be alerted of the take-over and will automatically be able to monitor the supervisory console's transmissions.

(10) Take-Over Indicator
This shall illuminate a colored indicator at the module and all parallel console channels when the take-over switch has been activated.

(11) Volume Controls
Allows adjustment of audio level of any individual channel. This is in addition to the volume control associated with each speaker.

(12) Frequency Select Switch (if required by the 150MHz or 450MHz base station) Allows selection of the desired frequency in the base stations. An indicator shall identify which frequency the base station is currently set on. A change on one console shall be indicated on all consoles in the same logical group.

(13) Talk group select shall be by scrollable display module.

6.5 Indicators

6.5.1 Incandescent lamps shall not be used as indicators, and will not be accepted. Switch buttons, legends, and illuminated indicators shall be color-coordinated to minimize operator confusion, simplify operation and reduce operator fatigue.

6.6 Identification Strips

6.6.1 Control functions that are associated with each channel shall be identified with the channel name or other City designated identification, e.g., Police Net 1, Net 2 and Fire 1 etc.

6.6.2 The channel name identifier shall appear across the top of the various operational switch groups. These identifiers shall be easily changed or replaced in the field. They shall be rugged and shall not break during normal use.

6.6.3 The illuminated indicators shall be identified by function, e.g., select, busy, etc.

6.6.4 The switches shall be identified either by engraving the fronts of the switches, or employing legendable removable keycaps, or a combination thereof.

6.6.5 Alphanumeric readouts will be available on the individual channel/talk group select modules. These modules will have scrolling capability so a module can be operator assigned to more than one channel/talk group.

6.7 Headset and Lipmike

6.7.1 A microphone-receiver headset may be employed as desired at each dispatcher position. These will be Pacific Plantronics Starset Supra model HSB553-1 headsets or equivalent having a nominal transmit level of 85 millivolts with an impedance of 50 ohms and HSO 343-1 and 308-1 at 300 ohms. The headsets will be furnished by the Owner. Connection to the console will be on a plug-in basis to the headset jack which will automatically disconnect the microphone when plugged-in.

6.7.2 A headset/handset switch shall be provided. This switch shall connect or separate the telephone console from the telephone panel. This shall allow the dispatcher to be able to separate the radio and telephone audio. When operated, the radio audio shall be diverted to the select speaker when the telephone is answered, and the telephone audio shall be heard in the headset. Otherwise the headset shall be used for radio operation only with a handset being used for the telephone console.

6.8 Headset Jack Box

6.8.1 Each console shall be supplied with two individual headset jack boxes. Each jack box shall accommodate one Pacific Plantronics headset as specified and be equipped with an individual volume control. Plugging a headset into the jack shall connect the headset microphone audio to the transmit amplifiers. Each jack box shall be supplied with a minimum of six feet of cable and appropriate plugs as required. One box shall be mounted to the left of the dispatcher and one to the right. The headset jack shall provide connection to a headset PTT function if used by the dispatcher.

6.8.2 Each jack-box shall contain a switch that shall have two positions ("normal" and "training"). The "normal" position shall allow normal operation of the headset. The "training" position shall disable the audio path from the headset microphone, but shall still allow the headset to receive power and receive audio so that the headset operates in a "receive only" mode. When headsets are plugged into both jack-boxes, the headsets shall both function normally except that one headset may be in the "training mode." The exact location of the headset jack-boxes shall be coordinated with the Owner prior to installation. The Contractor will supply wiring documentation to the City for the City installation personnel to wire this special switching.

6.8.3 A switch shall be provided that shall allow the received audio on the select channel to be heard both on the select speaker and in the headset.

6.9 Foot Switches

6.9.1 Each console shall have connections to accommodate foot switches. Foot switches shall key the selected channel(s) when operated.

6.10 Alert Tones

6.10.1 Each of the three alert tones listed below shall key the selected transmitter(s) and transmit the appropriate alert tone as long as the button is held down (timed for a maximum of 6 seconds of tone).

(1) A switch-selectable continuous nominal 1,000 Hz tone shall be provided for use as an alerting device prior to actual voice transmission, or as a convenient test tone source.
(2) A switch-selectable two frequency warble tone shall be provided for use as an alerting device.
(3) A switch-selectable nominal 1,000 Hz tone shall be provided that is pulsed at the nominal rate of 2 pps.

6.10.2 A three-pulse 1000 Hz tone at a nominal 2 Hz rate that automatically keys the selected channel shall be provided. There should be no extension of the PTT function after the third tone pulse. The alert tone level will be adjustable.

6.10.3 A steady and adjustable level 1004 Hz tone which will not automatically key any channel, but will be routed to a channel by either a PTT or an intercom function shall be provided. This function will be used for the purpose of alerting and level testing. Release of this switch shall immediately cease the tone.

6.11 Control, 2-Wire/4-Wire Audio
(This applies to the conventional 150MHz and 450MHZ equipment.)

6.11.1 Each transmit/receive channel module or equipment shall be supplied with jumpers for field selection to permit any channel to operate with either 2-wire or 4-wire audio.

6.11.2 All radio channels shall be tone keyed.

6.11.3 Each conventional channel shall be equipped with a relay providing a dry set of form C contracts. The relay shall operate whenever the transmitter on that channel is operated. The relay contacts shall be capable of handling 1.0 ampere at the supplied DC keying voltage.

6.12 Line Transformer

6.12.1 Each transmit channel shall be equipped with a split-winding line transformer providing a balanced 600-ohm nominal impedance or by jumper option a 10,000-ohm bridging impedance. This transformer shall not have its core saturated or audio degraded by a DC current of up to 20 mA flowing through the line side. A DC blocking capacitor shall also be incorporated between the split windings.

6.13 Power Supplies

6.13.1 Power supplies shall incorporate an electronic "crowbar" circuit to protect external equipment from excessive voltage should a malfunction occur. A short-circuit protection and current-limiting circuit shall also be incorporated to protect the supply from accidental shorts or excessive current drains. The power supplies shall have capacities to operate the equipment to be supplied plus a total of eight additional channels at each console.

6.14 Speakers

6.14.1 Speakers shall be supplied with each console as follows:

1. One for the selected audio.
2. One for the unselected audio
3. Additional unselect speakers at each dispatch position

The speakers may be installed inside of each console or supplied as stand-alone enclosed desk-top external speakers, except as specified otherwise.

6.14.2 The selected audio and each unselected speaker shall be separated spacially so that the dispatcher can easily determine which speaker the audio is coming from.

6.14.3 Speakers shall be high-quality and sized to handle the maximum output of the audio amplifiers without adding any appreciable distortion and to reflect the proper load to the audio amplifiers output. Each speaker shall have its own volume control. The volume control shall have a jumper option to allow the volume to be turned completely off or a minimum low level.

6.14.4 Externally-mounted speakers, if used, shall be solidly mounted to the console furniture system. The exact locations shall be approved by the Owner. All wiring to the speakers shall be concealed. Loose speakers or wiring will not be accepted.

6.15 Amplifiers

6.15.1 Digital Level Memory amplifiers shall be provided in the transmit path and each receive channel.

6.15.2 Transmit amplifiers, receive amplifiers, monitor amplifiers or any other amplifiers required to provide the service as specified herein shall be provided.

6.15.3 Any system that automatically adjusts the transmit or receive audio level shall have any prior gain compensation reset at the beginning of each transmission. This applies to both analog and digital systems. The gain control system shall have a "fast attack" so that the intelligibility of the first word transmitted is not lost.

6.15.4 The capability to mute like channels on other consoles when another console is transmitting shall be provided. This feature shall also be user programmable either by software or hardware change, per channel, for mute or monitor. The Supervisor console will monitor all console transmissions except as required in Section 6.33.

6.16 Function Tones

(This applies to the conventional 150MHz and 450MHz equipment.)

6.16.1 The tone-keying control-system encoder shall be capable of operating over 2- or 4-wire audio lines or over any path used for speech, such as microwave multiplex channels or radio control transmitters. The encoder shall generate the continuous keying tone 2175 Hz and function selection tones for the control of the control functions herein specified. This shall include timing functions required for the selection and controlling of transmitter functions. The system shall be supplied having at least 12 different function tones spaced at 100 Hz starting at 950 Hz through 2200 Hz.

6.16.2 The length of the function tones shall be Owner programmable for compatibility with any radio link transmitters.

6.16.3 The system shall provide "on the air" operation within 250 ms after the push-to-talk switch is activated for conventional transmitters. The system shall cease transmitting after the release of the push-to-talk switch within 150 ms for carrier squelch station and 350 ms for coded-squelch stations. Two sequential tones shall operate all functions.

6.16.4 The function tones shall be compatible with the existing base stations.

6.17 Filters

6.17.1 Notch filters shall be provided to prevent the keying tones and any internal test tones from being heard on the console speakers, recorders, and remote monitor speakers, as applicable. A notch-type reject filter shall also be incorporated in the system to prevent speech interference with the continuous keying tone. The filters shall be sufficiently narrow so as not to affect the clarity and intelligibility of the audio signals.

6.18 Intercom

6.18.1 An intercom switch and indicator shall be provided to permit the console operator to intercom to any console and to any base station site connected to the system.

6.18.2 Intercom equipment required at the base station ends where appropriate is not to be supplied under this con-tract.

6.19 Interconnecting Cables

6.19.1 THIS SECTION REMOVED

6.20 Logging Recorder Output

6.20.1 A separate 2-wire, balanced 600-ohm, 0 dBm audio output circuit for each channel/talk group shall be provided for connection to a multi-channel, long-term recorder. Audio mixing facilities shall be provided to permit each channel's received audio and its associated transmit audio to be recorded on a single channel of the recorder.

6.21 Digital Clock

6.21.1 A solid-state 24-hour synchronized electronic digital clock displaying hours, minutes, and seconds shall be provided in each console. All console clocks shall be synchronized to a common time base.

6.21.2 An IRIG interface or equivalent shall be provided for supplying a single-clock time source for CAD, consoles, and log-tape recording equipment if desired. The display may also provide intercom and system diagnostics prompting and will have an LED bar-type audio level meter that will respond to selected channel and receive audio.

6.22 Diagnostics

6.22.1 The system shall be equipped with diagnostic facilities which continuously test, monitor, and verifies the proper operation of the system. When a fault is found, a visual display and an audible alarm will sound at the Dispatch Coordinators's console which alerts the operator that a fault has occurred.

6.22.2 An RS232C output shall be provided which will interface to a full-page Epson or equal printer. The printer shall print out in plain English the diagnostic fault output, type, date and time of the fault. A push-button switch shall also be provided that initiates interrogation of the status of the system, initiates diagnostics and provides a printout. The printer is to be supplied under this contract. If a terminal is required to interrogate the system for maintenance or status, it shall also be provided. This system will support remote diagnostics via dial-up ports.

6.23 Circuit Board Status Indicators

6.23.1 Circuit boards shall be equipped with status LED indicators that illuminate when a fault occurs, identifying the faulty board(s). The equipment shall be designed to permit the removal and replacement of the circuit boards without turning off the power to the system.

6.24 Programming

6.24.1 The equipment shall be field programmable by the City. The equipment shall be supplied with either:

1. Built-in programming facilities with the associated software or;
2. Separate software program(s) that will run on an IBM XT, AT, or compatible computers that will program the equipment on an RS232C interface basis.

6.24.2 Future program updates that enhance the operation of this equipment shall be made available at a nominal cost to the City.

6.25 Paging and Signalling

6.25.1 The system shall contain two types of built-in paging functions incorporated within a paging encoder. (1) User selectable paging, and (2) Pre-Programmed page selection.

6.25.2 All paging parameters shall be customer programmable. As a minimum the following programmable parameters shall be provided: key-up delay, tones, tone durations, inter-space gap, stack delay between calls, channel and site selection, channel busy monitor for up to four primary channels to disable the page until channel is inactive, programmable answer-back delay, and programmable beep tones alerts.

6.26 General Electrical Specifications

6.26.1 Receive Specifications:

Audio Input:	600 ohms (balanced)
Transformer Line Balance:	Better than 70 dB at 1,000 Hz
Receive Sensitivity for Beginning of Compression:	Adjustable, maximum sensitivity -25 dBm at 1,000 Hz
Call Light Sensitivity:	Adjustable, maximum sensitivity -30 dBm at 1,000 Hz
Compression:	With increase of 30 dB beyond start of compression, output level shall increase less than 3 dB
Frequency Response:	-3 to +1 dB, 300 Hz to 3,200 Hz (1,000 Hz reference)
Hum and Noise Level:	50 dB below 5.0 watts
Audio Output:	Not less than 5 watts. 2% distortion maximum throughout compression range.
Line Isolation (crosstalk):	A tone at -10 dB impressed on a line input shall not produce a signal in excess of -80 dBm on any other line. (-10 dBm input sensitivity reference.)

6.26.2 Transmit Specifications:

Frequency Response:	+1 to -3 dB, 300 Hz to 3,200 Hz (1,000 Hz reference)
Compression:	With audio input increase of 30 dB beyond start of compression, output increases less than 3 dB
Hum and Noise Level:	50 dB below +8 dBm
Audio Output:	+8 dBm at less than 2% distortion throughout compression range into 600 ohm load

6.27 Phone Patch

6.27.1 The phone patch shall permit inter-connection of a central office type telephone line to any one or more than one channel/talk groups through the console. Through the use of voice-operated circuitry (VOX) a "first come, first served" priority shall be provided.

6.27.2 The Contractor shall provide any required protective network between the phone patch and the telephone company lines.

6.27.3 The dispatcher shall supervise and have complete control over the patch. Patch audio shall be monitored in the select or unselected speaker depending upon the select status of each patched channel. A visual indicator shall show voice activity.

6.27.4 The dispatcher shall have the capability to join in instantaneously and talk to all parties in the patch merely by depressing the patch "Xmit" switch on the master control switches.

6.27.5 The patch system shall be designed such that the channels involved in the patch need not be selected for transmission. The dispatcher shall be able to receive or transmit on any channel not in the patch without disrupting the patch operation.

6.27.6 Priority buttons shall be provided to allow the dispatcher to force the simplex voice paths in either direction. This feature shall provide a manual override function for telephone lines which vary in noise and signal levels. If the voice signal is insufficient to trigger the VOX circuit, the console dispatcher shall be able to manually activate the circuit or, if the line is so noisy that the VOX will not drop out, the dispatcher shall be able to manually override, thereby forcing drop-out of the VOX.

6.27.7 The dropout delay provided in the VOX circuit for the telephone line party shall be adjustable from approximately 0.5 to 2 seconds. This adjustment shall allow the transmitter to remain keyed between short pauses or between words. The circuit shall also contain a compressor to accommodate signal variations of as much as 30 dB.

6.27.8 An indicator LED shall be provided that flashes after there has been no activity on the patch bus for approximately 30 seconds (adjustable) to remind the dispatcher to break down the patch setup.