State of New York
Executive Department
OFFICE OF GENERAL SERVICES
Division of Standards and Purchase
103 Washington Avenue
Albany 1, New York

SPECIFICATION

Group 382 - EMERGENCY COMMUNICATIONS SYSTEM

SPEC-646

Date of Issue: February 7, 1964

BIDDERS ARE REQUESTED TO RETAIN THIS SPECIFICATION FOR FUTURE REFERENCE

(This Specification consists of 15 pages.)

GENERAL INFORMATION

PRICE: Price quoted shall be net, f.o.b. point of destination. Price shall also include installation as called for herein.

PAYMENT: Payment for the complete installation, exclusive of extended service payments, shall be due within thirty (30) days after acceptance except where a question of non-performance is involved and then payment, in whole or in part against which to charge back any adjustment required, shall be withheld at the direction of the Commissioner of General Services.

In the event the contractor has been authorized by the agency to make delivery of certain items to the site but is unable to complete installation through no fault of his own, the Commissioner, upon request from the contractor will consider authorization of payment for the item or items concerned up to 90% of the contract price with the balance to be paid upon completion of the installation and acceptance.

Partial payment may be made, at the request of the contractor, for 25, 50 and 75% of the installation when completed but 10% of each such payment will be withheld by the State until after the completion and acceptance of the entire installation.

DELIVERY:

The equipment listed is required within 30 days after receipt of an order, and guaranteed date of delivery and installation may be taken into consideration in making award.

AWARD: One award shall be made for all items installed in a complete operating system, together with extended service as described herein.

INFORMATION TO BE FURNISHED WITH BID:

The bidder must submit with bid detailed specifications and catalogue cuts of equipment he proposes to furnish. If equipment offered differs from the provisions contained in this specification, such differences must be explained in detail and bid will receive careful consideration if such deviations do not depart from the intent of this specification and are to the best interests of the using agency as interpreted by the Office of General Services, Division of Standards and Purchase.

GUARANTEE WITH BID:

All equipment hereinafter specified shall be new and unused and shall be fully guaranteed by the vendor against any and all mechanical, structural, electronic or electrical defects. Any defects which may occur within one year from the date of completion and acceptance of the installation, with the exception of radio tubes and transistors (but not excepting crystals) shall be fully corrected by the vendor, without expense to the State.

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GENERAL INFORMATION (cont'd.)

GUARANTEE WITH BID: (cont'd.)

Tubes shall be guaranteed for a period of ninety (90) days. Transistors shall carry the manufacturer's standard warranty. Frequency stability of the equipment shall be guaranteed for one year. In addition, the successful bidder shall warrant that the equipment to be delivered hereunder shall conform to the specifications and be free from defects in material, workmanship and title. Equipment shall be in current production by manufacturers having at least five years experience in the communications field. All equipment shall be guaranteed complete when installed and designed for future expansion.

INSTALLATION:

Contractor shall furnish, deliver to building, uncrate, set in place, scribe to walls, level and fasten to floors, walls, etc., all equipment listed herein as required by the New York State Office of Civil Defense. Contract shall also include all the mechanical and electrical connections on and within the equipment required to make a complete installation ready for operation. The agency will supply 230 volt AC power as required. Power will be 60 cps single phase with grounded neutral. Leads to primary power source will terminate in a single breaker panel which will be supplied by the agency. Each transmitter shall be connected by contractor so as to draw primary power via opposing sides of the feed with respect to grounded neutral, and power input to each transmitter will therefore be 115 volts nominal.

Installation shall also include two 35' vertical transmitting whip antennas and remote operated tuning units, and one 18' vertical receiving antenna. One of the 35' antennas shall be mounted with its associated tuning unit at ground level at a point to be designated by the agency. This point will be located approximately 150' from the N.E. corner of the Public Security Building. The contractor shall supply a steel reinforced concrete box or vault which the contractor shall submerge in the ground to accomodate antenna tuning unit. Excavation for the vault shall be provided by the agency. A top plate shall be supplied for mounting the antenna on the concrete box and provision shall be made for connecting antenna and feedline thereto.

The remaining 35' vertical transmitting antenna and tuning unit, together with feedline and control cable related thereto shall be mounted atop the superstructure of the Public Security Building. The 18' vertical receiving antenna shall also be mounted atop the Public Security Building with its associated antenna coupling unit and feedline. Locations on the building superstructure shall be designated by the agency.

All components shall match electronically and mechanically with each other to form a properly functioning system. All equipment and installation material required to accomplish the functional objectives specified shall be furnished, whether or not specified or shown on drawing.

All work in conjunction with this installation shall be in accordance with the best engineering practices and EIA requirements.

VISIT THE SITE:

Bidders must acquaint themselves with conditions to be found at the site and shall assume all responsibility for the equipment fitting the space provided and for the equipment meeting the requirements of the specification.

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GENERAL INFORMATION (cont'd.)

QUALIFICATIONS OF BIDDERS:

No bid will be considered unless the firm submitting the bid can meet the following conditions:

(1) That it has in operation a factory adequate for and devoted to the manufacture of the major equipment which it proposes to furnish.

(2) That it has in operation and has had for at least twelve (12) months prior to the time of bid opening, a service station within a reasonable distance of the using agency equipped with spare parts, not assembled, which can be delivered within twenty-four (24) hours.

(3) That it regularly employs in its service station inspectors for the purpose of inspecting, at regular intervals, equipment which is in operation in the branch territory.

(4) That it has installed at least five (5) complete radio systems of similar kind which have been in operation more than two (2) years for government agencies.

(5) That it is duly licensed under all necessary patents required for manufacture or use of apparatus to be furnished on bid.

PERFORMANCE BOND:

The State may require a performance bond on System of 20% based on the total amount of the successful bidder's contract for the faithful performance of all provisions of such contracts.

DRAWINGS:

Drawings numbered L-251, L-252, L-253, L-254, dated 1/9/64 are hereby incorporated into and made a part of this specification and proposal and shall apply except where modified by the specifications. In case of discrepancies between the drawing and the written specifications, the written specifications shall govern. Where details of construction and equipment items are required by the drawing and not shown in the specifications or vice versa, such construction or item shall be furnished as though called for in both places.

SPADE LUGS:

All electrical interconnections between items listed in this proposal shall be made via plug-in method and/or via terminal blocks with the provision that spad lugs shall be used at each screw terminal connection.

MAINTENANCE AND EXTENDED SERVICE:

Contractor shall provide preventive maintenance service on a quarterly basis over a period of five years from the date of acceptance of the complete installation. This service shall include all electrical, electronic and mechanical adjustments, tests and cleaning necessary for proper equipment operation assuring high reliability. Cost of maintenance and service the first year shall be included in the contract price. Cost of maintenance and service for subsequent years shall be quoted separately as required in proposal.

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GENERAL INFORMATION (cont'd.)

SHOCK MOUNTS:

A. Robinson or equal cradle shock mount frames for racks shall be provided. Racks shall be assembled to frames by the contractor. Space shall be provided between racks in the control room to allow for rocking motion in event of severe shock. Note drawing L-254.

B. Console shall be suitably shock mounted. Suitability shall be determined by weighing the console with equipment installed and cabled, the center of gravity computed, and such information furnished to a reputable shock mount manufacturer for computation of design of console shock mount equipment.

PLATFORM:

Platform shall be provided between console and racks to raise position of operator when seated at shock mounted console, to a comfortable height. Suitable provision shall be made in the design to prevent accidental falling off or tripping such as a ramp off either side of the platform having a slope of approximately 45°. Platform shall be provided with raceway for interunit cabling.

SHOP DRAWINGS:

Within fifteen working days after award, the contractor shall submit to the Office of General Services, Division of Standards and Purchase, for approval prior to fabrication five (5) copies of complete drawings indicating the console and platform dimensions including platform raceways. Contractor shall also provide drawings indicating overall dimensions and shock mounting centers of racks and control console. Drawings shall indicate manufacturer and model number of all components.

INSTRUCTION BOOKS:

Two (2) copies of detailed instruction books shall be provided for each major equipment item. Books shall contain schematic diagram, complete replacement parts lists with order numbers and detailed operation and maintenance instructions.

APPLICATION:

The equipment listed in this proposal has been chosen to provide emergency communications in the event of a disaster and resulting public emergency. Shock mounting has been specified wherever possible in order to minimize damage due to severe instantaneous shock.

HARDENED ANTENNAS:

Blank panel space shall be provided in one equipment cabinet rack for the purpose of terminating transmission lines from hardened antenna system to be installed by others. The contractor is required to cooperate with the company which will install the hardened antenna system in a manner necessary to effect the successful linking of the two systems. The linking method wherever practical will be done by manual means but consideration must be given to the layout and placement of equipment.

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GENERAL INFORMATION (cont'd.)

INTENT: The intent of this specification is to procure facilities equal to th se shown on the drawings.

ACCEPTANCE:

The complete equipment will not be accepted by the agency until it has met all requirements of the specifications as interpreted by the Commissioner of General Services and the requirements of the Federal Communications Commission.

SCOPE:

The work to be performed under this contract shall be the complete installation of all necessary equipment to provide a medium and high frequency network operating within the frequency range of 1750 kc to 30 mc. Transmitters final amplifier input power shall be an average of 1000 watts and be capable of operation on a continuous duty basis, and capable of the following modes of transmission: CW, AM, ISB, SSB, FSK, and FAX.

All networks will operate on existing Amateur Radio RACES frequencies and shall be subject to all existing FCC rules and Regulations as set forth under Part 12 subparts A & B.

FREQUENCIES:

Basic frequencies to be utilized are as follows:

1757.5 k.c.	3992.0 k.c.
1768.5 k.c.	3993.5 k.c.
1819.5 k.c.	7097.5 k.c.
3501.3 k.c.	7102.5 k.c.
3510.5 k.c.	7124.0 k.c.
3548.5 k.c.	7380.0 k.c.

All transmitting and receiving crystals needed for operation of these basic frequencies shall be provided. These shall include a complete set for each of the general purpose receivers and for the non-synthesized transmitters (described in detailed specifications as "Transmitter B"), and a set of operating crystals for each of the receivers having plug-in drawers for operation on 3501.3 k.c., 3510.5 k.c., 7102.5 k.c.

DETAILED SPECIFICATIONS

TRANSMITTER "A"

Frequency stability shall be 1 part in 10^8. Capabilities shall be SSB, ISB, AM, CW, FSK and FAX. Transmitter shall include tone intelligence system, sideband generator, 1 KW average power input (2 kw P.E.P.),linear final RF amplifier, and antenna tuning system complete with control cables which shall remotely operate antenna tuner at antenna base. Antenna tuner shall include remote monitoring facilities including readings of forward and reflected pow r and V.S.W.R. Transmitter shall be designed for continuous duty at rated power output. Frequency range shall be continuously tuneable over the range from 1750 kc to 30 mc, in 100 cycl increments (synthesiz d).

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DETAILED SPECIFICATIONS (cont'd.)

TRANSMITTER "A" (cont'd.)

All band changes shall be via switch rather than plug-in coils. Front panel met rs shall monitor the operation of all critical circuits. Automatic load and drive control shall provide limitation of distortion during high drive peaks and transients. Output impedance shall be 70 ohms unbalanced, harmonic suppr ssion shall be at least 40 db below PEP at 2nd harmonic, and at least 50 db below PEP at 3rd. Signal to distortion ratio shall be at least 35 db below either tone of a standard two tone test from 2 to 32 mcs. Unwanted sideband rejection shall be at least 60 db down, measured with 1 kc modulation. Carrier insertion shall be variabl -55 db to full output. Audio frequency response shall be 330 to 3,300 cps . Coaxial antenna relay and receiver meeting circuit shall be included. Cooling shall be by filtered forced air. Full interlock and overload protection shall be provided. Transmitter shall be designed for operation in any ambient temperature between 0^{o} and 50^{o} C and relative humidity to 90%.

TRANSMITTER "B"

Shall be equal to transmitter "A" with the following exceptions: frequency stability shall be 1 part in 10^{6}. Capabilities shall be SSB, ISB, AM and CW, FSK and FAX. Transmitter shall include transmitting mode selector and 1 kw linear RF amplifier, frequency range shall be continuously tuneable over the entire range from 1750 kc to 30 mc (unsynthesized); remote antenna tuner as described and monitoring facilities related thereto may be accessory items, but shall be provided for operation with this transmitter.

TONE INTELLIGENCE KEYER:

Shall provide CW and FSK or FAX modes of operation when used with SSB transmitter. Clean, transient-free frequency shift keying shall be obtained through reactance control of a 200 kc oscillator. Desired frequency shift shall be adjustable from 12 to 1,000 cycles through precisely calibrated dial adjustment. The following crystal controlled center frequencies shall be provided through switch selection: 1900 cps, 2,000 cps, and 2,550 cps. 1 kc CW channel shall also be provided. Crystal and oscillator components shall be temperature compensated. Keying speeds shall be up to 75 bands (100 wpm) FS, and up to 140 bands CW. Output level shall be adjustable to 0 dbm, and shall be measured by front panel mounted output level meter calibrated in db. Unit including components, shall be manufactured in accordance with JAN/MIL specifications wherever practicable.

SPEECH PROCESSING UNIT:

Shall provide speech clipping and pre-amphasis to provide improved articulation during adverse signal reception conditions. Unit shall also include dynamic audio compression up to 40 db while maintaining output within -2 db. Decay timing shall be adjustable. Inputs shall include balanced 600 ohm line at 0 db level, carbon microphone at -25 db, high and low impedance microphones at -55 db, anti-vox input, push-to-talk keying and CW key input. Audio pre-emphasis shall provide 6 db/ octave slope peaked at 2,500 cps. Audio output shall be selectable as follows: upper sideband and lower sideband, at 0 db level, 600 ohms balanced. Distortion shall be 5% nominal, or better. Front panel controls shall include power switch, input gain, clipper and pre-emphasis "in-out" switch, output line level, local-remote-CW switch, vox gain and vox release, squelch, output selector for USB, LSB, DSB and push-to-talk/vox selector. Output line levelmeter shall als be provided. Unit and components shall be manufactured in accordance with JAN/MIL specifications wherever practicable.

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DETAILED SPECIFICATIONS (cont'd.)

RF POWER DISSIPATOR

Shall provide antenna dummy load for transmitters. Impedance shall be 70 ohms, frequency range from DC to 30 mc, VSWR 1.15:1, average power dissipation capability shall be 1,750 watts, peak envelope power dissipation capability shall b 3,500 watts. Operating temperature shall be -40° C to +75° C ambient. Internal spark gaps shall be provided for lightning protection.

FOUR CHANNEL TONE EQUIPMENT

Shall be transistorized 4 channel telegraph and data transmission syst m having the capability to provide up to 16 individual sending and receiving teletypewriter channels at speeds up to 75 bands in either national or CCITT international standard channel spacing. Frequency, space or polarization diversity reception facilities shall be provided with diode selection of the best of two tone channels to minimize transient signals. Unit shall accept data or teletypewriter singals either polar or neutral and shall transform such signals into audio frequency shifted tones which shall be combined and proc ssed for RF transmission. The receive section shall accept the demodulated aggregate tones from the receiver equipment and separate and transform the frequency shifted tones into DC signals for keying the receive teletypewriter machines.

Protection against failure shall be provided through the use of individual power supplies in the tone transmitters and receivers.

The following shall also be included: line amplifiers for controlling the level of aggregate tone signals, signal monitor units for monitoring DC and audio intelligence units, DC and audio distribution panel, power distribution panel and control of DC and audio signals via normal through patch panel facilities.

MISCELLANEOUS:

The contractor shall furnish the following additional items or service: At the operating console position at the designated location there shall be installed and connected to associated equipment, one microphone, two sp ed keys and two hand keys for CW operation, 2 sets of earphones. All equipment shall be of commercial communication quality.

Microphone shall be Electrovoice Model 605 or approved equal, speed keys shall be Johnson Vibroplex De-luxe or approved equal, and hand keys shall be E. F. Johnson Standard or approved equal with black wrinkle base. Terminal plugs shall match jacks provided on the equipment.

Contractor shall also provide 10 copies of FCC Rules & Regulations, Part 12, Subparts A & B; regulations related to Disaster Communications Service and Special Emergency Service.

INSTRUCTION:

Contractor shall provide a complete and informative instructional course at the installation site upon completion of installation to acquaint the operating personnel with proper operation and maintenance procedure conducive to good operating practice for all equipment installed.

HARDWARE:

The contractor shall provide and install all necessary mounting hardware associated with all equipment.

All rack mounted components shall be mounted on detented, pull out and tilt slide drawers for ease of maintenance.

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DETAILED SPECIFICATIONS (cont'd.)

The contractor shall provide and install th following:

Speakers - Six Panel mounted loudspeakers with bridging monitor amplifiers, each with gain control.

RTTY - Complete teletype sending, receiving, tape perforating and reperforator machines and all necessary accessory and conversion units required for RTTY operation. Machines shall be capable of sending and receiving simultaneously; and complete teletype perforating machines and associated tables.

Console - Console to provide operating, monitoring, instrument and supervisory control for all equipment necessary to its particular function. Console shall be provided with an AC power strip, junction box and cableways for internal interconnections of modules. Console shall be provided with top indirect lighting for the operating table and equipment.

Clock - Console shall include one 115V - AC 24-hour clock equipped with on-off switch to facilitate setting.

VR Transformer - VR transformer shall supply regulated 115V 60 cycle to all console mounted units and RTTY unit.

Phone Patch - Phone patching equipment of the hybrid type arranged for patching.

Tape Recorder - 15-minute endless tape recorder, frequency response 100-3000 cycle arranged for patching.

PATCHING SYSTEM:

In the control room a method of patching transmitting and receiving antennas, audio, DC and other functions as necessary to provide the greatest flexibility for console use shall be incorporated. Reference is made to drawing [illegible]-252 f r suggested patching system.

TRANSMITTING AND RECEIVING ANTENNAS:

1. The antenna system at the site shall include two 35 foot vertical whip antennas, each with insulated base. Each whip shall be provided with a remotely tuned matching network which will permit each vertical radiator to be used on any of the prescribed frequencies and also be tunable throughout to frequency range from 1750 kc to 30 mc. System shall also include one vertical receiving antenna and multicoupler.

2. Transmitting antennas and their coupling systems shall be capable of 1000 watts average power, at 100 percent AM modulation, on a continuous duty cycle. The remotely tuned systems shall be provided with safety overload systems which will open transmitter interlock circuits when the following conditions occur:
   A. When transmitter input power exceeds any presetable level up to 1 kilowatt average.
   B. When power exceeds 100 watts during the process of remote tuning.
   C. When the standing wave ratio exceeds any presetable value up to 2.5 t 1.

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DETAILED SPECIFICATIONS (cont'd.)

TRANSMITTING AND RECEIVING ANTENNAS: (cont'd.)

3. Provision shall be made for continuously monitoring of both forward and reflected power in watts and a direct and simultaneous indication of the Voltage Standing Wave Radio is required. The VSWR meters shall be mount d in each coaxial transmission line between each transmitter and antenna.

4. Antenna and insulators, and all connections thereto, shall conform with good engineering practice.

5. Transmission lines shall be coaxial type, of 70 ohm impedance throughout to match all transmitting and receiving equipment impedances. Peak power rating shall be at least 29 kw at unity VSWR and maximum attenuation shall be 2 db per 1000 feet at 30 mcs. Line shall be Phelps-Dodge 7/8" Foamflex or approved equivalent.

6. All RF and protective grounds shall be bonded together and connected to the transmitter and building grounding system. Grounding system will be provided by the agency.

7. Vertical Receiving Antenna: Shall be broad band 18' telescopic whip, constructed of stainless steel or aluminum telescoping sections with weatherproof cast aluminum alloy equipment case at the antenna base. Antenna case shall shall contain broad band impedance matching transformer having frequency response flat within ±1.5 db from 2 to 32 mc. Suitable cable connectors and mounting hardware shall be provided. Equipment shall also include internal adjustable spark gap for lightning protection.

   A. Antenna Multicoupler: Shall be broad band electronic coupling device designed to couple the vertical receiving antenna to the system receivers. The frequency range 2 to 32 mc shall be covered. The following performance specifications shall apply:

      Gain: Nominally 3 db
      Noise Factor: Less than 10 db
      Intermodulation Characteristics:
      (a) 2nd order (A ± B = C): at least 55 db for two .25 volt signals
      (b) 3rd order (A ± 2B = C): at least 55 db for two .25 volt signals
      Harmonic distortion: shall be neglibible at .25 volt signal level
      Input Impedance: 70 ohms nominal, unbalanced.
      Output Impedance: 70 ohms nominal, unbalanced.
      Back to Front Ratio: Average 70 db
      Isolation Between connected Receivers: Average 60 db.
      Six (6) outputs shall be provided

COMMUNICATIONS RECEIVER EQUIPMENT:

A. Plug-In Receiver:
1. Shall include both crystal and VFO controlled reception over th range 2 mc to 32 mc. Band change shall be accomplished via the use f plug-in tuner drawers. Drawers shall be supplied to cover the ranges from 2 to 4 mc, 4 - 8 mc, 8 - 16 mc and 16 - 32 mc. Each receiver shall include one 2 - 4 mc plug-in unit installed. Total number of these receivers shall be three (3).

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DETAILED SPECIFICATIONS (Cont'd.)

COMMUNICATIONS RECEIVER EQUIPMENT: (cont'd.)

A, Plug-In Receiver: (cont'd.)

2. Also, three (3) tuning drawer storage units, each having storage units each having storage for two (2) plug-in units shall be provided. Storage units shall keep plug-in units in a stand-by condition with filament voltage applied in order to minimize warm-up and drift when spare plug-in units ar inserted in the receiver for use.

3. Plug-In tuning units to be included in the storage units shall be supplied as follows:

2 each 4 - 8 mc
2 each 8 - 16 mc
2 each 16 - 32 mc

Performance specifications for the above described receivers shall b as follows:

Modes: AM, CW, MCW
Input Impedance: 75 ohms unbalanced, 300 ohms balanced
Sensitivity: Better than 1 microvolt for 10 db S/N ratio
Image Ratio: Better than 60 db, 2 mc to 16 mc; and not less than 40 db, 16-32 mc.
AVC: Output constant within 12 db with an 80 db change in input signal.
Output Impedance: 8 ohm and 600 ohms unbalanced
Output Power: 2 watts
Hum Level: 60 db down or better
Selectivity: at 6 db points shall be 5 kc
at 60 db points shall be 25 kc
Noise Limiter shall be included.
Front Panel Controls: Noise limiter switch
Pilot Light
A.F. Gain
Phone Jack
BFO master/slave switch
AVC/Manual Switch
BFO on/off Switch
RF Gain
BFO Pitch
Power on/off Switch
Tuning Drawer Controls: Tuning Dial and Dial Lock
HFO Master-Slave switch
Crystal Trimmer
Other Facilities, preferably Rear Panel Mounted:

HFO Control	RF Gain
HFO In-Out	IF Out
BFO Control	Diode Load
BFO In-Out	Speaker Terminals
AVC on-off	75/300 Ohm Antenna
AVC Bus	Line Output Terminals

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DETAILED SPECIFICATIONS (cont'd.)

COMMUNICATIONS RECEIVER EQUIPMENT: (cont'd.)

B. General Purpose Receiver:

Shall be dual conversion bandswitching receiver having continuous frequency coverage from 540 kc to 32 mc in six bands. The following performance specifications shall apply:

Modes: SSB, AM, CW, MCW, FSK, FAX and ISB
Input Impedance: Nominally 70 ohms
Noise Figure: 6 db, 2 to 30 mc
Sensitivity: A 1 microvolt signal at 7.5 kc bandwidth shall produce at least 15 db signal and noise to noise ratio.
Crystal Calibration: Shall provide 100 kc check points for receiver VFO calibration.
Frequency Stability: .003% after 12 hour warmup period.
Intermodulation: Better than 35 db on two tone test
Image Ratio: Better than 80 db from 2 to 32 mcs.
Noise Limiter: Shall provide adjustable level peak noise limiter circuit for CW/SSB. Switch shall be provided to remove limit r from circuit.
IF Selectivity: Shall be variable from 0.5 kc through 15 kc symmetrical bandwidth. Plug-in crystal filter shall be available for improved skirt selectivity.
Audio Output: Shall be 1 mw across 600 ohm load, balanced and center-tapped;; 1 watt minimum into 4/8/16 ohm load; 600 ohm headphone load.
Hum Level: Better than 50 db below rated output.
Metering: Combined "S"/VU meter with selector switch.
Component Ratings: Shall be mil spec where practicable.
Front Panel Controls

Main tuning dial bandspread dial	Band Selector
BFO Pitch	Calibrate Switch
RF gain	Send-Receive Switch
Power on/off	Manual - AVC Switch
AM/SSB/CW Mode Selector	AF Limiter-Off
CW limiter	RF/AF Meter Switch
RF Noise Limiter	Oscillator Internal/External
IF Selectivity	HFO Trim
Squelch	Monitor Audio
Antenna Tuning	Tone

Other Facilities, Preferably rear Panel Mounted:
Antenna connectors (BNC preferred)
Fuse
Audio Output Connectors
IFO Input)
HFO Input) BNC preferred
BFO Input)
AVC
Diode Load
Accessory AC outlet
IF Outputs (2)

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DETAILED SPECIFICATIONS (cont'd.)

COMMUNICATIONS RECEIVER EQUIPMENT: (cont'd.)

C. Crystal Oscillator:

Shall be designed for application with above General Purpose Receiver to provide diversity operation. Stability shall be 1 part in 10^6 per day or better. Selection of any one of 10 high frequency oven controlled crystals shall be available via front panel control. IF and [illegible] crystals, oven controlled, shall also be provided for interconnection with General Purpose Receivers. Output shall be 1 volt rms across 50 ohms.

FREQUENCY SHIFT CONVERTER:

Shall convert radioteletype mark and space tones from diversity or single receiver outputs into DC pulses capable of operating teleprinter, tape recorder or other device requiring make and break signals. Converter shall contain comparison circuitry to select the better of two signals in diversity. Unit shall accept frequency shifts up to 1 kc and shall provide uninterrupted output with circuit drift of ± 750 cps.

The following performance specifications shall apply:
Input Impedance: 600 ohms
Input Level: -30 to + 30 dbm
Input Limiting: 50 to 60 db, each channel
Input Frequency Shift Limits: Up to 1 kc shift anywhere in the AF spectrum with center frequency as low as 2 kc and as high as 3 kc.
Tuning Indicator: 2" C.R.T.
Keying Speeds: 100 to 600 words/minute in high speed mode; up to 100 wpm in low speed mode.
Controls shall include: Threshhold
Primary Power
Channel 1 on/off
Channel 2 on/off
Test Switch (Mark, space, line)
Sense Switch
Mark Bias
Oscilloscope Controls
Speed Switch (High, Low)

CONSOLE:

Reference is hereby made to drawing #L-254 for preferred placement of equipment within the operations control console, and for preferred approximate dimensions of the console and the positioning thereof in the control room, relative to racks and other system components. Note further reference to console construction under "Miscellaneous" heading.

RADIOTELETYPE TEST PULSE GENERATOR:

Shall produc controllabl RTTY test pulses simulating signal reception und r adverse conditi ns f r purpose of system adjustment for optimum c py, and for the predetermination f system performance and r liability. Generator shall be Digit ch model DT-113 or approved equal.

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DETAILED SPECIFICATIONS (cont'd.)

TUBE TESTER:
Shall be mutual conductance tester. Unit shall be Hickock Model 752 or approved equal.

24-HOUR CLOCK:
Shall be Seth Thomas or approved equal.

TAPE RECORDER:
Shall be Ameco Model 535B or approved equal.

POWER SUPPLY:
Shall provide DC source for telepriater equipment. Shall include output current meters and output current range screen bias potentiometer. Output rang shall be 5 mc to 75 ma. Maximum rating shall be 75 ma into 200 ohm load. Output current polarity reversal switch shall be provided at rear apron.

SPECTRUM ANALYZER:
Shall provide analysis of intermodulation distortion, hum and noise, through visual display of RF signals in any portion of the RF spectrum within the frequency range of 2 to 64 mc.

Unit shall be mounted on a 4-wheel castered dolly to permit unit t be mov d to the equipment which is to be tested. All controls and test connections shall be front panel oriented and all test leads and connecting hardware shall be supplied. Highly stable VFO shall be included as an integral part of th equipment. VRO range shall be 2 to 64 mc.

Two AF and RF tones shall be provided. The frequencies of the AF ton s shall be selected to permit visual analysis of the 3rd, 4th and 7th order products. The two RF tones shall provide a system test of the spectrum analyzer itself.

Analyzer shall be TMC model PTE-3 or approved equal.

RTTY PAGE PRINTER, PERFORATOR:
Shall comprise complete high capacity send-receive message station with tape punch and tape reader units, and shall be designed to serve as the messag transmission system center. Shall provide for direct interchange of transmitted data, recording information in printed page form; provide automatic transmission of data under control of perforated tape utilizing a tape reader unit, provide punched tape as a by-product of transmission and reception and high speed preparation of punched tapes for subsequent transmission. Unit shall be Teletyp Model 28ASR or approved equal.

TRANSMITTER-DISTRIBUTOR:
Shall be fixed head single contact type tape reader. Shall convert tape perforation code into electrical impulses in contact box assembly and automatically distribute them on a sequential basis to one or more receiving points. Unit shall include 3 position start/stop/free-wheeling manual control switch. Transmitter-distributor shall be Teletype Model 14 or approved equal.

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DETAILED SPECIFICATIONS (Cont'd.)

RADIO FREQUENCY PATCH PANEL (LOW LEVEL):

Shall be normal-thru type connections. Connectors shall be dual QDS t dual BNC. Twenty-two connectors front and twenty-two connectors rear shall be provided on each panel. Coaxial switching or its equivalent shall be accomplished internally to open or close the normal circuit as the patch cord is inserted or removed. Connectors shall have rhodium flash plating over silver plate to reduc oxidation and produce hard outer surface, and shall have teflon insulation and gold plated switching contacts. VSWR shall be held to 1.02 to 1 over 2 to 32 mc range. Isolation with normals terminated shall be 42 db at 30 mc.

OUTPUT RF PATCH PANEL:

Shall have front mounted quick disconnect coaxial connectors. Rear connections shall be UHF type. Panel shall have 4 front and rear connectors. Switching shall provide automatic shorting. Panel shall be utilized for patching between transmitter outputs and antennas. Teflon insulation, gold plated switch contacts and rhodium flash plating shall be provided as upon low level RF patch panel.

AUDIO PATCH PANEL:

Shall be RCA BJ-24 or approved equal.

AUDIO PATCH CORDS:

Shall be RCA MI4652-B or approved equal.

RF PATCH CORDS:

Twelve RF patch cords shall be furnished of which four shall be TMC CA-480-24-24 and eight shall be TMC CA-480-18-24 or approved equals. Length shall be 2 feet each.

2-WIRE/4-WIRE TELEPHONE TERMINAL:

Shall be used in conjunction with transmitter equipment. Item shall be Hayes model WA-623 or approved equal.

MARK AND SPACE TONE FILTER:

Shall be designed for use at the input to the Frequency Shift Converter to provide acceptance of mark and space tones and rejection of all other signal frequencies.

Input impedance shall be 600 ohms.
Insertion loss shall be less than 7 db.
Output impedance shall be 600 ohms.
Bandwidth shall be as follows:

Space Filters: Center frequency 2125 cps. Flat within 3 db to ± 100 cps. Down not less than 40 db at 340 cps.

Mark Filters: Center frequency 2975 cps. Flat within 3 db to ± 125 cps. Down not less than 45 db at 475 cps.

Front panel phone jacks shall be provided in each channel. Operating controls shall include panel out/filter out/filter in switch for each of two chann ls which shall be designated as channel 1 and channel 2, or channels A and B.

(continued on page 15)

DETAILED SPECIFICATIONS (cont'd.)

DC PATCH PANEL:

Shall be single jack panel having tip-ring-sleeve jacks. Panel shall be TMC Type JJ304 or approved equal.

DC PATCH CORDS:

Shall have tip-ring-sleeve jack plugs designed for use with above DC patch panel. Length of cords shall be 2 feet. DC patch cords shall be Audio Devices Corp. PJ-86 or approved equal.

SINGLE SIDEBAND FILTER:

Shall be designed for use with Plug-In Receivers to produce SSB reception capability. Unit shall be TMC Receiving Mode Selector Type MSR-9 or approved equal.

THE END.

mdp