

Alexander Pirnie Federal Building Third Floor Courtroom

Audio Enhancement/
Video Evidence Presentation System
Request for Proposals

U.S. District Court
10 Broad Street
Utica, NY 13501

August, 2005

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PART 1- GENERAL

1. SUMMARY

- a. The purpose of the request for proposals seeks a contractor to procure, install, configure and test a complete operational audio enhancement/video evidence presentation system in the Third Floor Courtroom of the Alexander Pirnie Federal Building at 10 Broad Street in Utica, NY.
- b. The installation shall include everything necessary or incidental to complete the installation including but not limited to, receptacle plates, wire, electrical boxes, etc. The contractor shall furnish all necessary information to ensure that a proper system is installed that meets the design requirements and the operational requirements of the Court.
- c. The Contractor shall restore finish hardware to the original condition including painting, wall, millwork and ceiling modifications and attachments.
- d. The Contractor shall provide training on the operation of the operational system.

2. SCOPE OF WORK

- a. The contractor shall furnish all equipment, and materials, whether specifically mentioned herein or not, to ensure a complete and operating system consistent with the design intent. The Not In Contract (NIC) and Government Furnished Equipment (GFE) equipment and materials are specifically exempt from this requirement.
- b. The Contractor shall provide equipment that, where required, shall conform to the applicable requirements of the Underwriter's Laboratories, Inc., local codes, the National Electrical Code and any other governing codes. Such items shall bear a label or mark indicating their conformance to the above requirements.
- c. The Contractor shall provide audiovisual systems compatible with the Government's operations. The burden shall be on the Contractor to coordinate system functionality with the Government. Specifically, control panels and functions shall be reviewed and approved by the Government and Government Representatives.
- d. The Contractor shall perform a "conduit/wiring analysis" of the site before commencing field installation. This is to determine that all the electrical provisions (identified as being provided by others) have been installed. Any discrepancies or deficiencies noted during the inspection shall be documented in writing and be sent to the Contracting Officer within five (5) business days of the inspection.
- e. The Contractor shall generate shop drawings and information for the complete installation and wiring of the system, see Section 3 Submittals. The Contractor shall provide (or sub-contract for) the on-site installation and wiring of the A/V System, and shall provide ongoing supervision and coordination during the installation phase.

- f. The Contractor shall remove any existing audio equipment and wiring that will not be reused. The Contractor shall dispose of the equipment in a manner acceptable to the Government and the Government's Representatives.
- g. The Contractor shall be responsible for the initial adjustment of the systems herein prescribed and shall provide all test equipment for the system acceptance testing and shall provide all test results in writing to the Government and the Government's Representatives at the time of final acceptance testing.
- h. The Contractor shall provide a one (1) year warranty.

3. SUBMITTALS

- a. Provide the Work of this Section in accordance with the Contract Documents.
- b. Pre award submittals shall be provided as part of the bid process and shall include the following:
 - i. Restatement of "Scope of Work" incorporating these criteria by reference.
 - ii. A signed Statement of Compliance, see Appendix D.
 - iii. A detailed schedule showing, for each piece of equipment, the offered make, model, quantity and proposed unit and total prices in spreadsheet format.
 - iv. Manufacturer's specification sheets for each proposed equipment substitution.
- c. Post award and pre-installation submittals shall include but not be limited to, the following:
 - i. Complete system construction and point to point wiring schematic drawings, including all component values and showing complete letter and number identification of all wire and cable as well as jacks, terminals and connectors.
 - ii. Shop drawings of all panels, plates and designation strips, including details relating to terminology, engraving, finish and color.
 - iii. Shop drawings of all custom designed consoles, tables, carts, support bases, and shelves.
 - iv. Schematic drawings of all custom components, assemblies and circuitry.
 - v. Shop drawings of all unusual equipment modifications.
 - vi. Run sheets or field wiring details.
 - vii. Patch panel assignment layout drawings.
 - viii. Front elevation drawings of each equipment rack configuration.
 - ix. All items of equipment whether a stock manufactured item or custom built shall be supported by complete and detailed schematic drawings and replacement parts lists. No "black boxes" or unidentified components shall be acceptable.
 - x. A list of test equipment, giving make and model numbers to be used for all tests an acceptance testing, in spreadsheet format.
- d. At the completion of installation, provide the following information:
 - i. Operation Manuals: Provide two (2) bound Operation Manuals to the Government. Each shall contain printed operating instructions for all system functions whose format has been compiled specifically for each system. The reader of this manual shall be assumed to understand the procedures for using courtroom audio systems, but unfamiliar with this

particular facility. Providing standard factory equipment operating instructions alone is not acceptable. The operation manual should include a single double sided summary sheet of instructions that covers the general use of the system.

- ii. The Operation manual shall describe all typical procedures necessary to activate each system to provide for the functional requirements as listed under the Detailed Specifications. This section shall include as a minimum troubleshooting procedures, gain charts, impedance charts, plots of each equalizer setting measured at the equalizer output and numerical values for all control settings.
 - iii. Maintenance Manuals: Provide two (2) bound Maintenance Manuals to the Government. Each shall contain printed operating instructions for all system functions whose format has been compiled specifically for each system. The reader of this manual shall be assumed to be technically competent, but unfamiliar with this particular facility.
 - iv. The Maintenance Manual shall provide, at a minimum, a recommended maintenance schedule with reference to the applicable pages in the manufacturer's maintenance manuals. Where inadequate information is provided by the manufacturer, the Contractor shall provide the information necessary for proper maintenance. This section shall also include, at a minimum, "as built" schematic wiring diagrams of all systems, internal wiring diagrams of the central rack cabinet and control panels, parts lists, and preventative maintenance notes, standard factory equipment operating instructions, a list of changes to settings and requirements for accessing or changing those settings, and copies of "System Performance Tests and Adjustments" report.
 - v. A System functional block drawing identical to the specification drawing with the addition of all input and output circuit cable and terminal block numbers as well as all jack field circuit I.D. designations. A copy of this drawing shall be framed in protective plastic and mounted on the inner surface of the equipment rack door.
 - vi. Provide simplified one (1) page instructions in a laminate protector.
 - vii. Provide two (2) copies of all control software programming including control screens and all source code. Provide documentation in written form of all source code and screen captures of all control screens. Provide electronic copies of all source code on CD-ROM.
 - viii. All information must be accurate as per written acceptance.
4. DELIVERY, STORAGE, AND HANDLING
- a. Control handling and installation of hardware and equipment items that are not immediately replaceable, so that completion of the work will not be delayed by hardware or equipment losses, both before and after installation.
 - b. Prior to installation, protect exposed surfaces with material that is easily removed without marring finishes.
 - c. The court will not provide additional space to the contractor for the purpose of pre-assembly and testing. Any required pre-assembly and testing must be conducted at the Contractor's facility.
5. SCHEDULING
- a. It shall be the responsibility of the Contractor to coordinate the installation of the system to be

compatible with the Government, the work of the Government Representatives, and the overall construction completion schedule. The Contractor shall attend regularly scheduled progress meetings.

- b. The Contractor shall assemble, install, test, and train Government personnel in the use of the system in compliance with the schedule set forth in Appendix A. Any changes to this schedule shall be submitted for approval and discussed with the Government Representatives.
- c. The Contractor shall assemble and test all equipment racks with associated equipment to verify proper operation before shipping to the courthouse. Testing and shipping shall be coordinated with the Government.
- d. The Contractor shall provide operating personnel with adequate training on the completed system, including at least three (3) training sessions. See Owner Training.

6. QUALITY ASSURANCES

- a. **Quality of Materials and Equipment:** All materials and equipment supplied by the Contractor shall be new and shall meet or exceed the latest published specification of the manufacturer in all respects. The Contractor shall supply the latest model, available at the time of bidding, of each piece of equipment. All equipment is intended to be professional grade and rated for continuous duty. Basic guidelines have been prepared with minimum performance requirements. These must be satisfied, unless a variance (separate document) is submitted and approved by the Government and Government Representatives.
- b. All equipment must be self-supporting. Provide all necessary support hardware.
- c. **Coordination of Work:** Coordinate layout and installation of equipment with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.
- d. **Warranty Statement:** To maintain certain manufacturers' warranties, said equipment must be installed, aligned and serviced by those installers authorized by said manufacturer to perform those duties. If the Contractor is not authorized by said manufacturer, it is his sole responsibility to make the appropriate arrangements and bear all cost and consequences thereof. See Warranty of Products in Section 2, Paragraph 17.

7. APPENDICES

- a. **Appendix A:** The Installation Schedule provided herein is Appendix A. Appendix A provides a timeframe within which phases of installation are to be completed. A precise installation schedule must be provided of similar format to Appendix A noting deviations from the time frame established in Appendix A complete with reasons for deviation as part of a complete submittal.
- b. **Schedule B:** The Bid Spreadsheet provided herein is Schedule B. Schedule B is intended to

represent the major components of the system and to provide information on the quantities of spaces and systems to be installed. Additional equipment required to produce a complete and functional system consistent with the design intent must be added to the provided equipment list. Quantity, unit pricing, and cut-sheets must be provided as part of the submittal for any additional equipment. Schedule B must be filled out noting substitutions and additional equipment as part of a complete submittal.

- c. Appendix C: The Request For Information (RFI) form provided herein is Appendix C. Appendix C shall be used for all RFI's and is the only form acceptable for that purpose. Partially completed forms or RFI's not on Appendix C will be returned without review. Verbal RFI's shall not be acceptable or binding.
- d. Appendix D: The Statement of Compliance form provided herein is Appendix D. Appendix D shall be signed by an officer of the company and returned as part of a complete submittal.

8. SYSTEM DESCRIPTION

- a. Sound Reinforcement
 - i. District Courtroom
 - (1) Microphone assemblies, stands, cables, and wall/floor/ceiling connector assemblies.
 - (a) eleven (11) microphone locations within the courtroom.
 - (2) Automatic microphone mixing, signal processing and amplification equipment in designated equipment racks.
 - (3) Wall mounted loudspeakers arrayed for uniform coverage and zoned with volume control throughout the listening area with consideration taken to account for room architecture and acoustics.
 - (a) Provide two wall mounted loudspeakers to complement the two existing wall mounted speakers
 - ii. Ancillary Areas
 - (1) Loudspeaker and wall-mounted volume controls at three locations within chambers.
- b. Electronic Audio Recording
 - i. District Courtroom
 - (1) Recording of all microphone mixer inputs (including interpretation) and auxiliary and program inputs through a four (4) channel wall connector assembly at the courtroom deputy's position.
 - (2) Recorded audio playback via auxiliary input jack(s) at the specified courtroom deputy's position through sound reinforcement loudspeakers.
- c. Assisted Listening and Language Translation Systems
 - i. District Courtroom
 - (1) Four (4) channels of composite audio from the sound system.
 - (2) Modulated, multi-channel, infrared system for wireless broadcast of sound reinforcement and language translation.

- (3) Portable, battery-operated multi-channel receivers with lightweight headsets for people requiring listening assistance or language translation.
 - (4) Translator input headset and faceplate near the witness location.
- d. Real-time Translation Infrastructure
- i. District Courtroom
 - (1) Provide CAT5 wiring terminated with TIA-568B RJ-45 jacks. Five runs shall be provided one to the judge and one to each of four attorney tables. All runs shall terminate at the court reporter location.
- e. Audio Conferencing
- i. District Courtroom
 - (1) Full duplex communication from all courtroom audio sources through an analog telephone circuit.
 - (2) Far end audio signal played through sound reinforcement loudspeakers.
- f. Video Evidence Presentation
- i. District Courtroom
 - (1) Video display monitors and output face plates in three locations.
 - (a) Judge's desk
 - (b) Courtroom Deputy desk
 - (c) Witness box
 - (2) Video display monitors and poke-thru devices in five locations.
 - (a) Podium
 - (b) Four (4) Attorney Table locations
 - (3) Video display output wall plate for the jury box.
 - (4) VGA Video input in poke-thru device at Four (4) Attorney Table locations
 - (5) Switched Podium Input
 - (a) VGA input with audio
 - (b) VCR/DVD input
 - (c) Document Camera input
- g. Control Systems
- i. Control panels at the judge's bench and courtroom deputy desk to control features of the audio/video system including but not limited to:
 - (1) Shuttle control for all audio source equipment such as compact disc players and audio cassette players.
 - (2) Source control for all video source equipment such as podium or attorney table inputs.
 - (3) Volume control and mute check box for every microphone on a separate microphone volume control page.
 - (4) Remote audio mute to suppress all audio leaving the courtroom.
 - (5) Audio mute with white noise/CD sound over for bench conferences.
 - (6) Video mute to suppress all forward facing video, ie. jurors and attorney tables.
 - ii. The control system shall be programmed to be substantially similar in use and appearance

to the systems currently installed in three other courtrooms in the building. Confer with Government Representatives to ensure the systems meet the usage needs of the Court.

PART 2- PRODUCTS

9. GENERAL

- a. All equipment and material shall be new.
- b. Performance criteria or physical characteristics specified herein represent minimum acceptable values unless noted otherwise.
- c. Government Furnished Equipment (GFE):
 - i. Table and other millwork/furniture are GFE.
 - ii. Lecterns are GFE.
 - iii. The personal computer for use in conjunction with the For The Record court recording software and mixer are GFE.
 - iv. Portable displays for jury video are GFE.
 - v. Personal computers, keyboards, and peripherals are GFE.
 - vi. The computer network, Real Time Transcription (RTT) and associated software and cabling are GFE.
 - vii. The telephone network and its associated hardware, including POTS or ISDN lines, NT1's for ISDN lines, T-1 lines, I-MUX's, terminations, T-1 interfaces, etc. are GFE.
 - viii. Power connections to all poke-thru or furniture feeds are GFE.

10. GENERAL EQUIPMENT

- a. Equipment Racks: Provide equipment racks as necessary to house the rack-mounted equipment. Equipment racks shall be a minimum of 16 gauge steel constructions; enclosed with ventilated side panels, square front and vertical corners. Racks shall be sized to accommodate future equipment and technologies. Provide conduit termination.
- b. Power Conditioning: Power Conditioners shall be rack mountable and shall provide at least eight (8) outlets supplying conditioned power on the rear panel, with an illuminated front panel master switch. Spikes shall be clamped to 400Vpk at 500A in accordance with UL-1449. The unit shall absorb a surge current of up to 6500 amperes for 10 ms without damage. RE noise attenuation shall exceed 40 dB in both transverse and common modes from 1 to 100 MHz. A bar-graph AC voltmeter shall be provided on the front panel to read line voltage. It shall read from 90 to 128 volts in steps of two volts. It shall be color coded, and of sufficient brightness to be readable in a dark area from a distance of 20 feet. The voltmeter shall read whenever the unit is plugged into the AC mains, regardless of the master switch position. A 15 amp front panel circuit breaker shall be provided, and the AC cord shall be at least 14 AWG and ten feet long. The unit shall be UL listed. Manufacturer shall be Furman, Samson, or SurgeX.

11. AUDIO EQUIPMENT

- a. **Microphones and Accessories:** Outputs of microphones shall be 150 ohms nominal, balanced with respect to ground. All microphones of the same type shall be from a single manufacturer. Finish of microphones and stands shall be matte black, flat gray, flat beige, or a similar non-reflective color.
- b. **Handheld Microphones:** Handheld microphones shall have a cardioid directional characteristic, a sensitivity of -56.0 dB referenced at 1 dynes/cm², an off-axis attenuation at 1000 Hz of 6 dB at 90° and 270° and 20 dB at 180°, an on-axis frequency response of ±3 dB from 100 Hz to 10 kHz, with an integral windscreen and pop filter. Basis of design is the Shure model SM58.
- c. **Podium Microphones: 18" with shock mount:** Podium microphones shall be functionally designed for podium or desktop applications, with an electret or condenser transducer element, 450mm long shaft with dual goosenecks. Microphones shall have a cardioid directional characteristic, an off-axis attenuation at 1 kHz of 5 dB at 90° and 270° and 18 dB at 180°, an on-axis frequency response of ±3 dB from 80Hz to 15 kHz, a shock isolation mount, a sensitivity of -49 dB referenced at 1 dynes/cm², an be operational from 12V to 48V of phantom power at a maximum current of 2 mA. Basis of design is the Shore model MX4 18.
- d. **Podium Microphones: 18" with desk mount:** Podium microphones shall be functionally designed for podium or desktop applications, with an electret or condenser transducer element, 450mm long shaft with dual goosenecks. Microphones shall have a cardioid directional characteristic, an off-axis attenuation at 1 kHz of 5 dB at 90° and 270° and 18 dB at 180°, an on-axis frequency response of ±3 dB from 80 Hz to 15 kHz, a desk mount, a sensitivity of -49 dB referenced at 1 dynes/cm², an be operational from 12V to 48V of phantom power at a maximum current of 2 mA. Basis of design is the Shure model MX418D.
- e. **Podium Microphones: 12" with desk mount:** Podium microphones shall be functionally designed for podium or desktop applications, with an electret or condenser transducer element, 305mm long shaft with dual goosenecks. Microphones shall have a cardioid directional characteristic, an off-axis attenuation at 1 kHz of 5 dB at 90° and 270° and 18 dB at 180°, an on-axis frequency response of ±3 dB from 80 Hz to 15 kHz, a desk mount, a sensitivity of -49 dB referenced at 1 dynes/cm², an be operational from 12V to 48V of phantom power at a maximum current of 2 mA. Basis of design is the Shure model MX412D.
- f. **Conference Microphones:** Conference Microphones shall be functionally designed for podium or desktop applications, with an omni-directional characteristic, a condenser transducer element and a low profile, boundary type assembly. Microphones shall have an off-axis attenuation at 1 kHz of 5 dB at 90° and 270° and 18 dB at 180°, an on-axis frequency response of ±5 dB from 100 to 10 kHz, a sensitivity of -42 dB referenced at 1 dynes/cm², and be operational from 9V to 48V of phantom power at a maximum current of 2 mA. Basis of design is the Shure model MX391/O.
- g. **Headset Microphones:** Headset Microphones shall be of a split headband type with the microphone capable of being worn on either side. Microphone shall be a dynamic transducer, with a frequency response from 50 Hz to 12 kHz, with a super cardioid pattern, a 1 mVIPa sensitivity,

and a 200 ohm impedance. The headphone shall be a dynamic transducer of the closed type, with a frequency response from 30 Hz to 16 kHz, a maximum SPL of 120 dB, a total harmonic distortion of less than 0.5%, with a load rating of 200 mW, and a nominal impedance of 600 ohms. Basis of design is the Sennheiser model HMD 25.

- h. Headphones: Headphones shall be a dynamic transducer of the closed type, with a frequency response from 30 Hz to 16 kHz, a maximum SPL of 120 dB, a total harmonic distortion of less than 0.5%, with a load rating of 200 mW, and a nominal impedance of 600 ohms.
- i. Floor Stands: Floor Stands shall be approximately 4.42 kg, with a 250 mm diameter base, and be adjustable in height over a range of 1 m to 1.6 m in height. Manufacturer shall be AKG, or Atlas/Soundolier.
- j. Custom Interpreter's Breakout Box: Custom interpreter's breakout box shall provide a microphone on/off switch, a volume control for local headphone level and a broadcast switch for contact closure enabling the interpreter to switch the audio feed to the loudspeakers. The basis of this design is the Quantum QT11952.

12. SOURCE EQUIPMENT

- a. Compact Disc Players: Compact Disc Players shall have an optical 3-beam laser pick-up, a 16-bit linear, dual monaural type D/A converter, a frequency response of ± 0.3 dB from 20 Hz to 20 kHz, a signal-to-noise ratio of 96 dB, a dynamic range of 96 dB, a total harmonic distortion of less than 0.005% at rated output, and shall be rack mountable, with balanced outputs. Manufacturer shall be Sony, Kenwood, or Denon.

13. AUDIO MIXERS AND ASSOCIATED EQUIPMENT

- a. Automatic Microphone Mixers: Automatic Microphone Mixers shall have microphone or line level inputs which are electronically balanced and RE filtered, with impedances greater than 2.5 kOhms, with +15dB to -63dB available input gain, plus mute. Mixers shall have tone controls with low-cut 6 dB/octave filters and shelving high-frequency control. Line level outputs 1-8 shall have an output impedance of 200 ohms balanced or 100 ohms unbalanced. Line level outputs 9-12 shall have a selectable output impedance of either 520 ohms balanced and 260 ohms unbalanced or 125 ohms balanced and unbalanced. Mixers shall have a system frequency response of ± 1 dB from 20 Hz to 20 kHz, a total harmonic distortion of less than 0.1%. Basis of design are the Lectrosonics AM Series mixers.
- b. Processing Equipment: Processing Equipment shall have balanced inputs and outputs unless otherwise noted, input impedances of greater than 15 kOhms, output impedances of less than 200 ohms, a +4 dBu nominal operating level, a maximum output level of +22 dBu, a frequency response of ± 1 dB from 20 Hz to 20 kHz, a total harmonic distortion of less than 0.1% at +4 dBu output from 20 Hz to 20 kHz.
- c. Programmable Equalizers/Feedback Suppressors: Programmable Equalizers/Feedback Suppressors shall be of the programmable type with data communication protocol compatible

with the control system. Units shall support dual or single channel operation, have 31 digital filters per channel on ISO one-third octave band centers, user selectable dynamic or fixed center frequency and filter depth on parametric filters, an internal noise gate, internal digital delay with user selectable delay time from 1.4 ms to 1001 ms in 2 μ sec steps, front panel controls for storage and recall of settings, 12 DSP controlled feedback notch filters, have a feedback elimination time of 0.3 seconds at 1000 Hz, a user selectable filter gain range of ± 6 dB and ± 12 dB, a 12 dB per octave high cut filter variable from 1 kHz to 20 kHz, a 12 dB per octave low cut filter variable from 20 kHz to 3 kHz. Unit shall be rack mountable, with balanced inputs and outputs. Manufacturer shall be Sabine or Shure.

14. POWER AMPLIFIERS AND ASSOCIATED EQUIPMENT

- a. Power Amplifiers, Six Channel: Amplifiers shall have positive protection of components in event of input overload and/or output short circuit and/or output overload and/or open or mismatched loads and/or overloaded power supply; withstand overdrive up to 10 dB and/or short-circuited output for 0.5 minute without causing blown fuses. Units shall have a sensitivity of 1.0V rms, a frequency response of ± 0.5 dB from 30 Hz to 20 kHz at rated output. Units shall be rack mountable with balanced inputs, momentary output mute at turn on, and have an output power of 150 watts. Manufacturer shall be Crown or QSC.
- b. Headphone Distribution Amplifiers: Headphone Distribution Amplifiers shall support impedances from 32 to 600 ohms, with active balanced or unbalanced inputs up to +20dBu. Units shall have (4) or (6) stereo amplifiers. Units shall have an LED indicator light for overload, a ± 3 dB frequency response from 10 Hz to 45 kHz, a common mode rejection ratio of at least 40 dB from 20 Hz to 20 kHz, a signal-to-noise ratio of at least 94dB at 200mW into 150 ohms. Units shall be rack mountable, Basis of design is the Rane HC series amplifiers.

15. LOUDSPEAKER EQUIPMENT

- a. Wall Mounted Loudspeakers: Wall Mounted Loudspeakers shall incorporate an 8" cone driver and a 1" high frequency driver with a built in crossover and a ± 3 dB frequency response from 80 Hz to 20 kHz, 100 watts RMS power handling and 200 watt program power handling with a sensitivity of 94 dB for a 1 watt input at a distance of 1 meter, a 120° horizontal dispersion, 60° vertical dispersion, and be able to be easily wall mounted and adjusted. The basis of this design is the JBL Control 5.
- b. Volume Attenuators: Volume Attenuators for 70.7-volt application shall be stereo or mono. Attenuation shall be accomplished in ten steps with a positive off position. The three lowest steps shall be 1.5 dB, and the next six steps shall be 3 dB, for a total attenuation of 22.5 dB. Insertion loss shall be no greater than 0.5 dB. Mount and wire as per manufacturer's specifications. Manufacturer shall be Atlas Sound model WSMS- 15,
- c. Desktop Monitor Speakers: Desktop Monitor Speakers shall incorporate a 3" x 5" driver with a ± 3 dB frequency response from 200 Hz to 20 kHz, 30 watts continuous power handling and 120 watts peak power handling, with an 87 dB sensitivity for a 2.83V input at 1M, a 120° horizontal dispersion, 90° vertical dispersion, and nominal dimensions of 110 mm high by 166 mm wide by

90 mm deep. Basis of design is the Tannoy model SAT1.

- d. Custom Judge's Desktop Speaker: Speakers shall incorporate a 3" x 5" driver with a ± 3 dB frequency response from 200 Hz to 20 kHz, 30 watts continuous power handling and 120 watts peak power handling, with an 87 dB sensitivity for a 2.83V input at 1M, a 120° horizontal dispersion, 90° vertical dispersion. The device shall contain a feed switch which will allow the user to select one of two input feeds to be played through the driver. The device shall also contain a volume attenuation knob. Attenuation shall be accomplished in ten steps with a positive off position. The three lowest steps shall be 1.5 dB, and the next six steps shall be 3 dB, for a total attenuation of 22.5 dB. Insertion loss shall be no greater than 0.5 dB.
- e. Assisted Listening System: System shall be RF infrared based, with audio inputs modulated onto one of two channels. Manufacturer shall be Sennheiser.
- f. Infrared Modulators: Infrared Modulators shall have an operating voltage from 24-35 VDC, with balanced XLR-type inputs, an input sensitivity from 50 mV to 5V, BNC-type RE outputs, an output terminating impedance of 50 Ohms, and be rack mountable.
- g. Infrared Emitters: Infrared Emitters shall have an operating voltage from 24-35 Volts DC provided by Infrared Modulator. Emitters shall have a minimum of 72 infrared diodes, an average radiating power of 2 W, and a transmission coverage area of 1,600 sq. ft.
- h. Infrared Receivers: Infrared Receivers shall have a frequency response from 18 Hz to 18 kHz, a total harmonic distortion of less than 1%, and a battery life of approximately 5 hours. Provide one charger unit for every ten receivers.

16. MISCELLANEOUS AUDIO EQUIPMENT

- a. Telephone Hybrids: Telephone Hybrids shall be compatible with acoustic echo canceller or automatic microphone mixer. Unit shall support single channel operation, with integral caller ID, DTMF dialer / detector, automatic gain control, user selector entry and exit tones. Unit shall be RS-232 remote controllable. Manufacturer shall be Lectrosonics, ASPI, or Gentner.
- b. Audio Distribution Amplifiers: Audio Distribution Amplifiers shall be compatible and linkable to Video Distribution Amplifiers.

17. ELECTRONIC AUDIO RECORDING

- a. Four Track Mixer: Four Track Mixer shall be a standalone 4-channel digital mixer system to support a PC based recording system. Basis of design is the FTR DMX8.
- b. External Clock Display: An external clock display to support the PC based recording system shall be provided. Basis of design is the FTR USB/Serial Clock Display.
- c. Recording Software: FTR Gold: FTR Reporter software to be installed on GFE laptop at the courtroom deputy position.

18. VIDEO EVIDENCE PRESENTATION EQUIPMENT

- a. Lectern Video Switch: The lectern video switch shall provide the ability to connect four (4) inputs and one (1) output. The switch shall be integrated with the control system at the Courtroom Deputy's desk. Basis of design is the Extron model MLS 304SA.
- b. Lectern Document Camera: The lectern document camera shall provide document presentation through the lectern video switch to all monitors in the courtroom. Basis of design is the ELMO model HV-5100XG.
- c. System Rack Video Switch: The system video switch shall be rack mounted in the system rack location. It will be able to handle eight (8) inputs and twelve (12) outputs. The switch shall be integrated with the control system at the Courtroom Deputy's desk. Manufacturer shall be Extron.
- d. Video Displays: The eight video displays shall be 15" LCD Monitors with a black bezel. A 15" display shall be provided for the judge, each attorney table, the podium, the witness and the courtroom deputy. Basis of design is the Sony model SDM-S53.

19. CONTROL EQUIPMENT

- a. General: All Control Equipment shall be of the same manufacturer.
- b. Central Processing Equipment
 - i. Integrated Controllers: Integrated Controllers shall provide (6) data ports for RS-232/422/485 control with XON/XOFF and CTS/RTS, (8) 300 to 115 200 baud IR/Serial ports with carrier frequencies up to 1.14 MHz, (8) contact closures from 0 V dc to 5 V dc, and (12) relays. Units shall be expandable via a variety of expansion cards. Units shall have LED indicators for all integral inputs and outputs. Units shall be Ethernet addressable. Provide necessary power supplies, cabling, and hardware to support required accessories and options. Manufacturer shall be AMX.
- c. Wired Control Panels
 - i. Tilt Touch Screens: Tilt Touch Screens shall tilt for best viewing angle, have a DB9 type male PC/mouse input, with 5 MB of standard memory, and a resolution of 640 x 480 pixels. Manufacturer shall be AMX. Basis of design is the AMX model AXT-MCP.
- d. Control Accessories
 - i. Control Modules: Control modules which extend ports via control bus connectivity to the control system head-end shall be provided for remote control of devices via RS-232 ports, infrared/serial ports, relays, etc.

- ii. Control System Power Supplies: Control System Power Supplies shall be compatible with the control system and meet or exceed all of the manufacturer's requirements. Provide power supplies as suggested by control system manufacturer.
- e. Control System Programming
 - i. Control System Programming: Contractor shall coordinate the programming of the control system with the Government and Government's Representatives to ensure an interface that meets with Government's approval and performs the functional intent of the design as outlined herein.

20. MISCELLANEOUS EQUIPMENT

- a. Contractor shall provide an itemized list of any miscellaneous equipment required to complete the successful installation of the above mentioned electronic systems. This list should include, but is not limited to:
 - i. Floor Poke-thru Device: The floor poke-through device at six locations shall be Wiremold/Walker AV-3 devices. Devices at the Lectern shall be equipped with Extron MAAP plates to accommodate microphone input, VGA input, VGA output, and two (2) CAT5 RJ45 jacks. Devices at the Attorney tables shall be equipped with Extron MAAP plates to accommodate microphone input, VGA input, VGA output and two (2) CAT5 RJ45 jacks. The device at the portable video display location shall be equipped with a Extron MAAP plates to accommodate VGA output and two (2) CAT5 RJ45jacks.
 - ii. Alternate Poke-thru Device: The floor poke-thru devices at the Attorney tables may be substituted with furniture feed devices and jacks located in a manner to provide the same functionality at each desk. Microphone input, VGA input, VGA output and two (2) CAT5 RJ45 jacks shall be part of this system. This item will be dependant upon the courtroom furniture which is GFE.
 - iii. Audio Cables
 - (1) Microphone, Line Level, and Line Level Stereo Cabling: Cabling shall be #22 AWG conductors, with a capacitance of 10.4 pF/m between conductors. Cabling shall be twisted pair, stranded, color-coded conductors, 100% overall shielded with stranded copper or turned-copper drain wire, and insulated. Manufacturer shall be American, Belden, or West Penn.
 - (2) Microphone Extension Cables: Cables shall incorporate strain relief on connectors, and shall be constructed of cables and connectors as specified herein. Cables shall be terminated female XLR to male XLR. Manufacturer shall be Neutrik, Switchcraft or Whirlwind. Provide appropriate cables for each microphone such that each desktop mounted microphone shall have 915 mm of slack.
 - (3) Control Cables: Control Cables shall be shielded conductor pairs, color-coded, and composed of minimum #22 AWG conductors. Manufacturer shall be American, Belden, RS Cable, or West Penn.
 - (4) Loudspeaker Cables: Loudspeaker Cables shall be composed of twisted pair, color-coded, stranded minimum #12 AWG conductors, insulated, and unshielded. Size

cables to limit the signal loss to 0.5dB maximum for entire length of run. Manufacturer shall be American, Belden, or West Penn.

- (5) 70 Volt Loudspeaker Cable: 70 Volt Loudspeaker Cable shall be composed of twisted pair, color-coded, stranded conductors of minimum #16 AWG conductors, insulated, unshielded. Size cables to limit the signal loss to 0.5dB maximum for entire length of run. Manufacturer shall be American, Belden, or West Penn.

iv. Audio Connectors and Terminations

- (1) General: Receptacles and connectors referred to as XLR-type shall conform to ETA 297-A-1970.

v. Video Cables

- (1) Video Cables (RG-59): RG-59 cabling shall be Class 2 or CM rated for non-plenum use and Class 2P or CMP for plenum use per NFPA 70-1999. Cabling shall have an impedance of 75 ohms, center conductors shall be #20 AWG solid bare copper with 32 ohms/kin of dc resistance. Shield shall be copper braid with 95% shield coverage. Cabling shall have a nominal capacitance of 70 pF/m, maximum, and attenuation of 3.0 dB/10 m at 10 MHz and 6.2 dB/100 m at 50 MHz. Manufacturer shall be Belden model 8281A188281, or West Penn model 815/25815.
- (2) Video Cables (RG-1 1): RG-1 1 cabling shall be Class 2 or CM rated for non-plenum use and Class 2P or CMP rated for plenum use per NFPA 70—1999. Cabling shall have an impedance of 75 ohms, center conductors shall be #14 AWG solid bare copper with 10 ohms/km of dc resistance. Shield shall be copper braid with 95% shield coverage except plenum cable where combination copper braid and aluminum foil is acceptable. Cabling shall have a nominal capacitance of 56 pF/m, maximum, and an attenuation of 1.6 dB/100 in at 10 MHz and 3.3 dB/100 in at 50 MHz. Manufacturer shall be Belden model 89292, or West Penn model 811/25811.
- (3) RGB-HV Cables: RGB-HV Cables shall be Class 2 or CM rated per NFPA 70- 1999. Cabling shall have an impedance of 75 ohms, five (5) individual video cables, color-coded red, green, blue, white and yellow in overall jacket. Center conductors shall be #26 AWG tinned-copper. Shield shall be aluminum foil and tinned-copper braid with 93% shield coverage. Cabling shall have a nominal capacitance of 56 pF/m, maximum, and an attenuation of 5.9 dB/100 m at 10 MHz and 12.8 dB/100 m at 50 MHz. Manufacturer shall be Belden model 1167A, or West Penn model WP 54422.
- (4) Multi-conductor Camera Cables: Multi-conductor Camera Cables between cameras and control units shall be compatible with the cameras and control units. Control conductors shall meet or exceed the requirements specified herein for control cables.
- (5) Computer Breakout Cables: Computer Breakout Cables shall be as recommended by computer interface equipment manufacturer, and provided with every computer interface.

vi. Video Connectors and Terminations

- (1) Video and RGB-HV Connectors: Video and RGB-HV Connectors shall be true 75 ohm, BNC plugs, of a two or three piece construction with crimp rings and crimp or

solder center pins. Connectors shall be of brass, brass alloy, or stainless steel construction with tarnish-resistant finish which shall match video cables based on cable manufacturers recommendations. Manufacturer shall be Ampenol, Canare, Cambridge, Gilbert, or Kings.

- (2) Video and RGB-HV Receptacles: Video and RGB-HV Receptacles shall incorporate true 75 ohm, BNC recessed jacks of brass construction with tarnish-resistant finish. Connectors shall have a beryllium copper center contact and the front jack shall completely protect jack from physical damage. The rear jack shall accept BNC plug. Overall assembly shall incorporate an integral isolation bushing. Manufacturer shall be Canare model BCJ-IRU.
- (3) Video and RGB-HV Terminators: Video and RGB-HV Terminators shall be true 75 ohm, BNC plugs, and shall use a 75 ohm termination resistor, $\pm 1\%$. Manufacturer shall be Ampenol, Canare, Gilbert, or Kings.

vii. Voice-Data Cables

- (1) Telephone and Intercom Cables: Telephone and Intercom Cables shall be #22 AWG solid 3 twisted pair type.
- (2) Category 5e Cables: Category 5e Cables shall meet ANSI/TIA/EIA 568-B-2001, requirements for category 5e cable. Cabling shall support a highest test frequency of 350 MHz, a minimum power sum ACR of 9 dB at 155 MHz, a maximum attenuation of 21 dB at 100 MHz per 100 m, and a minimum power sum near end crosstalk of 36 dB at 100 MHz.
- (3) Category 6 Cables: Category 6 Cables shall meet ANSI/TIA/EIA 568-B-2001 requirements for category 6 cable. Cabling shall support a minimum power sum near end crosstalk of 36.3 dB at 250 MHz, a minimum power sum equal level far end crosstalk of 16.8 dB at 250 MHz, and a maximum delay skew of 25 ns.
- (4) Fiber Optic Cables: Fiber Optic Cables shall be multimode with minimum two strands per cable, and shall be plenum rated, and shall meet the requirements for FDDI certification, with a minimum band width of 200 MHz/km at 850 nm, a maximum attenuation at 850 nm and 1300 nm of 3.4 dB/km and 1.0 dB/km, a core diameter of $62.5 \text{ mm} \pm 3 \text{ mm}$, a cladding diameter of $125 \text{ mm} \pm 12 \text{ mm}$, a coating diameter of $250 \text{ mm} \pm 15 \text{ mm}$, a buffering diameter of $890 \text{ mm} \pm 50 \text{ mm}$, an operating temperature range from 0°C to 50°C, and a storage temperature range from -40°C to 65°C.

viii. Voice-Data Connectors and Terminations

- (1) RJ-45 Connectors: RJ-45 Connectors shall be (8) position non-keyed modular type, category 5e compliant. All connectors shall be terminated in compliance with TIA/EIA T568B. Connectors shall comply with FCC Part 68, R1998, be UL listed and CSA certified, have a plug insertion life of 750 insertions, a contact force of 99.2 g minimum using FCC-approved modular plug, a plug retention force of 133 N minimum between modular plug and jack.
- (2) Fiber optic Jacks and Connectors: Fiber optic Jacks and Connectors shall be duplex MT-RJ, LC, or opti-jack type. Fiber optic connectors to multimode fiber shall utilize a field installable no epoxy no polish method or an anaerobic adhesive method.

- (3) Mounting hardware including rack ears or mounting kits, screws, etc.
- (4) Tie wraps, distribution rings, etc.
- (5) Power supplies.

21. WARRANTY OF PRODUCTS

- a. Contractor shall guarantee (warranty) each system in its entirety in writing against defects in material and workmanship for one (1)-year from date of written acceptance and to meet all performance requirements outlined herein. Warranties may not be pro-rated.
- b. During this time, the systems shall be kept in proper operating order at no additional labor, material, or transportation cost to the Government.
- c. During the warranty period, the Contractor shall respond with remedy to a trouble call within twenty-four (24) hours after receipt of such a call, and shall provide a 24-hour service phone number.
- d. Equivalent replacement equipment shall be temporarily provided when immediate on-site repairs cannot be made.
- e. At least two routine inspection and adjustment visits will be scheduled for the first year. Submit reports to the Government.

22. PROPOSED SUBSTITUTIONS

- a. Where specific equipment is described it is not the intention to discriminate against the products of other manufacturers, but rather to establish a standard of quality. The use of trade names on the drawings or finish schedule is to establish the file pattern to be used. It is not intended to exclude other manufacturers whose patterns, in the judgment of the Contracting Officer, are equivalent to those named. All proposed substitutions shall be submitted as alternates with complete data.
- b. The Government requires manufacturers' original specification tests. The Government and Government Representatives will evaluate and approve the substitutions.

PART 3- EXECUTION

23. PRE-INSTALLATION MEETING

- a. Prior to the start of the work, and at the Contractor's direction, meet at the project site to review methods and sequence of installation, special details and conditions, standard of workmanship, testing and quality control requirements, job organization and other pertinent topics related to the work. The meeting shall include the Contractor, Contractor's Project Superintendent, the Architect, the Audiovisual system Contractor, inspection and testing services (if any) and any other subcontractors whose work requires coordination with this work.
- b. A Conduit/Wiring Analysis shall be conducted at the Pre-Installation Meeting. The Contractor shall submit "as-built" drawings locating all existing conduit runs, junction boxes, and electrical

outlets. Show location and type of all special receptacle boxes and plates to be supplied and/r modified by the Contractor. Verify and inspect all necessary conduits and outlets. Provide with the submittals, a list of all conduits, boxes, and power changes necessary for installation of audio/visual systems in each courtroom.

24. GENERAL

- a. Installation shall include the delivery, unloading, setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of the system components, equipment alignment and adjustment, and all other work whether or not expressly required herein which is necessary to result in complete operational systems.
- b. The installation of all work must be in accordance with commonly accepted industry standards and practice. The installation vendor's Design Engineer shall exercise Engineering supervision over the entire installation and inspect the installation at least twice prior to Acceptance Testing. It is the responsibility of the Contractor to cooperate with other trades in order to achieve well-coordinated progress and satisfactory final results. The Contractor must watch for conflicts with work of other contractors on the job and execute moderate moves or changes as are necessary to accommodate other equipment or preserve symmetry and pleasing appearance.
- c. Wire all systems in accordance with Standard Broadcast Practices and the National Electrical Code, NFPA, SMPTE, NAB, UL, ETA, FCC, NTSC, Design and Installation (SAMS) and any other authority having jurisdiction. Where a conflict occurs, follow the most stringent requirements. Refer to schematic and block diagrams.
- d. If, in the opinion of the Contractor, an installation practice is desired or required, which is contrary to these specifications, a written request for modification shall be made to the Engineer. Modifications shall not commence without written approval from the Engineer.
- e. Provide necessary screws, anchors, clamps, tie wraps, distribution rings, miscellaneous grounding and support hardware necessary to facilitate the installation of the system.
- f. Furnish special installation equipment or tools necessary to properly complete the system, including but not limited to, tools for terminating, testing and splicing cables.
- g. All installation practices shall be in accordance with, but not limited to, these specifications.

25. PHYSICAL INSTALLATION

- a. All equipment shall be firmly secured in place unless requirements of portability dictate otherwise.
- b. Fastenings and supports shall be adequate to support their loads with a safety factor of at least three.
- c. All boxes, equipment, etc., shall be secured plumb and square.

- d. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
- e. Terminate all unused inputs to switches and mixers.
- f. Install equipment with all necessary precautions to prevent and guard against electromagnetic and electrostatic hum, to assure adequate ventilation, and to provide for safety and ease of use to the end user.
- g. All visible devices shall be a matte black finish.

26. CABLE INSTALLATION

- a. All cables, regardless of length, shall be marked with wrap-around number or letter cable markers at both ends. There shall be no unmarked cables at any place in the system. All cable ends shall be clearly tagged with destination and function markings in accordance with the wiring diagram.
- b. Provide cable pass through holes as required. Provide grommets in all pass through holes. Coordinate placement of holes with Contracting Officer. Indicate placement on Shop Drawings. Review all locations with the Clerk of the Court before drilling.
- c. It is the intent for all audio, audiovisual, and control cables to be concealed. To this end, the Contractor shall provide materials and labor to drill holes through hard walls and provide surface mounted raceways inside and outside the courtroom. In the event that it is demonstrated to be impossible to drill the required holes, the Contractor shall provide wooden moldings (stained to match the courtroom finish) configured to best blend in with the existing wooden panels and/or furniture.
- d. Contractor shall ensure that all audio, audiovisual, and control cables are neatly dressed with split loom tubing or equivalent for pleasing appearance and safety.
- e. All inter-rack cabling shall be neatly strapped, dressed, and adequately supported.
- f. Terminal blocks, boards, strips, or connectors, shall be furnished for all cables which interface with racks, cabinets, consoles, or equipment modules. No audio cables shall run directly to the audio patch panel jacks. Each audio patch panel shall be furnished with an audio terminal block, and all audio cables to and from the audio patch panel shall terminate on this block.
- g. Provide quick disconnect connectors within the rack for equipment that is not provided with manufacturer installed connections. The connectors shall be of industry standard type, appropriate to the signal and voltages required by the equipment. Internal rack wiring shall not be wired directly to the equipment via screw or solder connections.
- h. All cables shall be grouped according to the signals being carried. In order to reduce signal

contamination, separate groups shall be formed for the following cables:

- i. Power cables,
- ii. Analog control cables,
- iii. Digital control cables,
- iv. Audio cables carrying signals less than -20 dBm,
- v. Audio cables carrying signals between -20 dBm and +20 dBm,
- vi. Audio cables carrying signals above +20 dBm,
- vii. RGB-HV cables,
- viii. S-Video cables,
- ix. Video cables, and
- x. Radio frequency (RF) cables.

NOTE - Under no circumstances should audio cables be allowed to run in the same raceway as video, computer or power cables.

- i. Racks shall have power on one side and low voltage on the other side. As a general practice, all power cables, control cables, and high level cables shall be run on the left side of an equipment rack as viewed from the rear. All other cables shall be run on the right side of an equipment rack, as viewed from the rear.
- j. Cables shall be routed at least 610 mm from any fluorescent ballast and at least 1 m from any electric motors or other high level source of electromagnetic interference.
- k. Unless otherwise called for in these specifications, the following cables, or their approved equals, shall be used in these systems:
 - i. Audio Canare L4E5AT
 - ii. Audio (70 Volt speakers) Belden 8461
 - iii. Audio (8 ohm speakers) Belden 8473
 - iv. Video (Baseband) Belden 8281
 - v. RE (Broadband) Belden 9291
 - vi. Control Belden 8489
- l. All cables shall be cut to the length dictated by the run. No splices shall be permitted in any pull boxes without prior permission of the Engineer. For equipment mounted in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.
- m. All cables in conduits must be insulated and shielded from each other and from the conduit the entire length and must not be spliced. Ground all the shields at the high-level termination end of the respective circuits only, unless otherwise specified herein. Heat shrink tubing shall be used to dress the ends of all wire and cabling including a separate tube for the drain or ground wire.
- n. Ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer. Observe the bending radius and pulling strength requirements of the cables during handling and

installation. Provide clutch or shear pin protection for cables during cable pulling to ensure cable pulling tension is not exceeded.

- o. Provide temporary protection of cables before termination. Cables shall not be left lying on the floor. Bundle and tie wrap to provide protection.

27. CONNECTOR ASSEMBLIES

- a. Provide engraved wall connector assembly plates for all audio, audiovisual, and control connections. All visible connector assemblies shall be constructed of bronze colored anodized aluminum, beveled and brushed 150 grit to reduce reflections. Thickness as required. Hidden (not easily seen) connector assemblies may be stainless steel or anodized aluminum.
- b. Unless otherwise detailed herein, the following types of panel receptacles shall be used on all connection boxes, panels, plates, and wireways:
 - i. Audio (microphone or line level) - XLR3F type.
 - ii. Video input and distribution - Canare BCJ-RU type.
 - iii. Remote Control Panels - 4 pin XLR.
 - iv. Infrared emitter - Canare BCJ-RU type (2 per emitter: specify different color from videoinput and distribution connectors to avoid confusion).
 - v. MATV outlet - F type 75 ohm connector
- c. RJ-45 Jacks shall be wired per the pair assignments indicated in ANSI/TIA/EIA 568-B-2001.
- d. Coordinate the placement of all audio and audiovisual devices and connector assemblies with the Contracting Officer. Indicate placement on Shop Drawings. Review all locations with the Clerk of the court prior to installation.

28. GROUNDING PROCEDURES

- a. The Contractor shall ensure that all power circuits are on the same electrical phase and that all ground cables are only connected to one point at the power breaker panel.
- b. In order to minimize problems resulting from improper grounding and to achieve maximum signal-to-noise ratios, the following grounding procedures shall be adhered to:
 - i. System Grounds: A single primary "system ground" shall be established for the systems in each particular area. All grounding conductors in that area shall connect to this primary system ground. The system ground shall be provided in the audio equipment rack for the area, and shall consist of a copper bar of sufficient size to accommodate all secondary ground conductors.
 - ii. A copper conductor, installed in a raceway by this contractor, having a maximum of 0.1Ohms total resistance, shall connect the primary system ground bar to the nearest metallic electrical conduit of at least 5cm in diameter. The Contractor shall be responsible for determining if the metallic conduit is properly electrically bonded to the building ground system.

- iii. Secondary system grounding conductors shall be provided from all racks, audio consoles, and ungrounded audio equipment in each area to the primary system grounding point for the area. Each of these grounding conductors shall have a maximum of 0.1 Ohms total resistance.
- iv. Under no conditions shall the AC neutral conductor, either in the power panel or in a receptacle outlet, be used for a system ground.
- v. Audio Cable Shields: All audio cable shields shall be grounded at one point only. There are no exceptions. For inter and intra-rack wiring this requires that the shield be connected at one end only. For ungrounded portable equipment, such as microphones, the shield shall be connected at both ends but grounded at only one end.
- vi. General: Because of the great number of possible variations in grounding systems, it shall be the responsibility of the Contractor to follow good engineering practice, as outlined above, and to deviate from these practices only when necessary to minimize crosstalk and to maximize signal-to-noise ratios in the audio, video, and control systems. The Contractor shall submit a written request to the Government and the Government's Representatives, with justification and technical support materials, for approval of alternate grounding methods and practices.

29. POWER DISTRIBUTION IN EQUIPMENT RACKS

- a. General: Provide Surge Suppressors with Remote Turn-On at the top of each rack and wire into control system. Provide Power Conditioners which shall plug into the Surge Suppressors and distribute power to groups of equipment. All rack mounted equipment will have conditioned power.

30. SPARE PARTS

- a. Provide replacement fuses, lamps, batteries and connectors in sufficient quantities to last one (1) year.

31. QUALITY CONTROL

- a. Provide and maintain an effective Quality Control program and perform sufficient inspections, surveys and tests of all items of work, including those of other trades, to ensure compliance with the contract documents. Furnish appropriate facilities, accurately calibrated instruments and testing devices required to perform the quality control operations and with sufficient work forces to cover the construction operations within the actual construction sequences. Coordinate this work with the quality control requirements of other technical Sections of the Specifications and with requirements of the Contractor and governing authorities having jurisdiction.

32. SYSTEM PERFORMANCE TESTS AND ADJUSTMENTS

- a. Test Plan
 - i. The Contractor shall develop a comprehensive test plan for testing all systems elements in accordance with the outlines contained herein. The testing shall include manufacturing

quality assurance, subassembly, pre-installation system testing and post-installation system testing.

- ii. The test plan shall be submitted to the Contracting Officer and the Engineer for approval in accordance with an agreed upon schedule.
 - iii. The test plan shall identify each individual tests to be performed and the test equipment and methods to be used.
 - iv. Reference shall be made to all applicable standards for test methods, equipment, and reporting values, or to best industry practices when test requirements are not addressed by specific standards.
- b. Cabling Tests:
- i. Upon completion of the installation of each area, the contractor shall test all elements of the system. This testing shall include as a minimum:
 - (1) Continuity of all circuits.
 - (2) Operation of all circuits.
 - (3) Phase checking of all circuits.
 - (4) Operation of all equipment in all modes
 - ii. During and/or after installation, as appropriate, the Contractor shall test all cabling for continuity, phase, shielding, and unreasonable signal loss. The testing shall be conducted according to the submitted and approved test plan.
- c. Audio System Performance Tests:
- i. General:
 - (1) Interior finishes and furnishings shall be in place for these tests.
 - (2) Documentation of performance tests shall be maintained for reference during the system acceptance tests.
 - (3) Tests and adjustments shall be performed in the sequence specified herein.
 - (4) Provide buffer amplifiers or fixed attenuation pads to meet the signal levels specified herein.
 - (5) Tests may include subjective viewing and listening at various positions under various operating conditions, using live or recorded material.
 - ii. Impedance:
 - (1) Measure absolute impedance value of each loudspeaker line at 250, 500, 1000, 2000 and 4000 Hz without the amplifier connected but with all speakers connected. Record the impedance levels versus frequency for each loudspeaker line.
 - (2) Impedance must not be below the rated load impedance of respective amplifier and may be any value equal to or above that.
 - (3) Check the resistance of the lines for loudspeaker, line level, and microphone

receptacles with the receptacles opened and shorted. Document and repair any shorts or discontinuities found.

- iii. Polarity:
 - (1) Verify the polarity of each device in the shop to obtain true polarity throughout the system.
 - (2) Verify and document that polarity is kept throughout the system after wiring from inputs through output devices or receptacles.

- iv. Gain Structure:
 - (1) Turn off amplifiers and set equalizers and filter controls to flat response. Do not bypass any equalizers or filters.
 - (2) Adjust compressors and limiters to a 1:1 compression ratio and a +10 dBu limiting threshold. Do not bypass these processors.
 - (3) Insert pink noise into the mixer or mixing console and adjust levels to obtain a 0 dBu reading for the mixer or mixing console output. Distribute this output to all systems and subsystems.
 - (4) Adjust the output of line level electronics and signal processors to obtain a 0 dBu output at the output terminals. For equipment with input level controls, adjust the input controls so that input levels peak at -10 dB. For equipment not capable of providing 0 dBu output, adjust to achieve as close to 0 dBu as possible.
 - (5) Record input and output levels.
 - (6) Turn amplifier gain controls to minimum and turn on the power amplifiers. Adjust the gain controls to achieve a +4 dBu output level for low impedance amplifiers and a +18 dBu output level for high impedance or constant voltage amplifiers. Record power amplifier output levels.

- v. Hum and Noise Level:
 - (1) Without changing the gain, terminate microphone and line level inputs with proper shielded resistors of 150 and 600 ohms respectively.
 - (2) Measure and record overall hum and noise levels for each power amplifier output from each input and with all inputs simultaneously. Hum and noise shall be at least 50 dBA below rated power output levels with amplifier controls set for optimum signal-to-noise, using input from line level and microphone sources.

- vi. Electrical Distortion:
 - (1) Load amplifier outputs with appropriate resistors matching the nominal impedance of the output terminals in place of the actual loudspeaker loads.
 - (2) Adjust gain controls as for hum and noise level test.
 - (3) Apply 250 Hz, 500 Hz, 1 kHz, 2 kHz, and 4 kHz: sine wave signal from an oscillator with less than 0.01% Total Harmonic Distortion to one input, such that a level of 0 dBu is obtained on the mixer.
 - (4) Measure and record the electrical distortion at each power amplifier output. Distortion shall be less than 0.5%.

- vii. Parasitic Oscillation and Radio Frequency Pick-up:
 - (1) Set up system for each specified mode of operation.
 - (2) Using a 5 MHz bandwidth oscilloscope and loudspeaker monitoring.
 - (3) Ensure that the system is free from spurious oscillation and RF pick-up with the absence of any input signal and with a 160 Hz signal at a 0 dBu level on the mixer or mixing console.
 - (4) Repeat this test for each mode of operation of the lighting dimmers (incandescent, neon, and fluorescent).

- viii. Background Noise:
 - (1) Using a calibrated ANSI S 1.4-1983 (1997) Type 1 or IEC 6065 1-01-1994, precision sound level meter, determine the average ambient noise level in the room. Record the level derived. The average background noise shall be 60 dBA or below during performance of the following tests. If noise level exceeds this criterion, promptly notify the Government before proceeding further.

- ix. Buzzes and Rattles:
 - (1) Apply a 1 kHz sine wave signal such that a 0 dBu level is obtained on the mixer or mixing console.
 - (2) Sweep loudspeaker systems from 50 Hz to 5 kHz to 6dB below full amplifier power. Listen for buzzes, rattles, vibrations or resonance. Locate and correct problems.
 - (3) If the cause is outside the system, promptly notify the Government, indicating the cause and recommended corrections.

- x. Coverage:
 - (1) Using pink noise as an input, adjust loudspeakers and output levels to provide ± 2 dB coverage in the octave band centered at 4 kHz throughout the areas served by the system.
 - (2) Measure and record results.

- xi. Equalization:
 - (1) Equalize the sound systems in order to provide uniform seat-to-seat response, raise the threshold of feedback, suppress ring modes, and insure natural, pleasing sound in equal and adequate amplitude with maximum degree of intelligibility, and provide performance conforming to the requirements specified under "Acceptance Testing."
 - (2) Turn off systems except the speaker system under test.
 - (3) Using pink noise as an input and with system equalizers set to bypass operation, determine the average frequency response of the loudspeaker system in the room using a 1/3 octave real time analyzer.
 - (4) Record the frequency response derived.
 - (5) Locate the analyzer microphone approximately 1 m above the floor at a point which approximates the average frequency response, within ± 2 dB from 50 Hz to 16 kHz.
 - (6) Record the frequency response at this location.

- (7) Using pink noise as an input and with system equalizers set to normal operation, set low and high pass filters at 63 Hz and 16 kHz respectively.
 - (8) Adjust the 1/3 octave filter settings to obtain the following response curves, minimizing the variation (± 3 dB) between adjacent filter settings:
 - (a) Roll off-6 dB per octave below 125 Hz.
 - (b) Maintain ± 2 dB, 125 Hz to 4 kHz.
 - (c) Roll off-3 dB per octave from 4 kHz to 12 kHz.
 - (d) Roll off sharply above 12 kHz.
 - (e) With any system microphone open, make minor adjustments to maximize gain before feedback. No more than 3 filter settings shall be adjusted.
 - (f) Record the frequency response derived.
- xii. System Input and Output Levels:
- (1) Using pink noise source material and a calibrated ANSI S1.4-1983 (1997) Type 1 or IEC 60651-01-1994, precision sound level meter, perform the following:
 - (a) For microphone level inputs: locate a pink noise source at a distance of 300mm from the corresponding system microphone. Adjust the pink noise source to provide a level of 75 dBA at the microphone and set mixer levels to achieve a 0 dBu level at the mixer output.
 - (b) For line level inputs: use system program source equipment, with pink noise playback media, as a direct input to the mixer or mixing console and set mixer levels to achieve a 0 dBu level at the mixer output. Repeat for each system input individually where mixer inputs vary in input sensitivity. Settings for equivalent sensitivity inputs may be duplicated.
 - (c) With any input set as specified above, adjust audio distribution amplifiers to provide levels of -10 dBu at each output.
 - (2) Measure and record results.
- xiii. Feedback Stability:
- (1) With required output levels set, measure and record the available gain before feedback. Feedback stability margin shall be 6 dB, minimum.
- xiv. Intelligibility:
- (1) Using a TEF analyzer, measure the percent articulation loss of consonants (% ALcons) for at least 4 various locations in the room in the 2000 Hz octave band.
 - (2) % ALcons shall be less than 10 for each location.
 - (3) Record results.
- xv. Assistive Listening Systems:
- (1) Set gain so that normal speech or music does not over modulate the transmitter.
 - (2) Adjust emitter panels to provide even coverage throughout the courtroom.

33. SYSTEM CHECKOUT

- a. Before Acceptance Tests are scheduled, the Contractor shall perform his own system checkout.

He shall furnish all required test equipment and shall perform all work necessary to determine and/or modify performance of the system to meet the requirements of this specification. This work shall include the following:

- i. Submission of the "Test Plan".
- ii. Test all audiovisual and related systems for compliance with the "System Performance Tests and Adjustments".
- iii. Check all control functions, from all controlling devices to all controlled devices, for proper operation.
- iv. Adjust, balance, and align all equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for all level controls, and record these settings in the "System Operation and Maintenance Manual".
- v. Unless otherwise specified, use tamper-proof security covers on all controls affecting overall system level balance and signal-to-noise ratio, such as power amplifier input level control, and input-output level controls for equalizers, mixers, amplifiers, etc. Some controls may require re-adjustment as the result of "Acceptance Testing."
- vi. Maintain documentation of all performance tests for reference by the Engineer during the System Acceptance Tests.
 - (1) Upon completion of the tests and necessary adjustments, submit two (2) copies of a written report presenting test results, including numerical values of all measurements, for review by the Contracting Officer prior to demonstration and "System Acceptance" testing.
 - (2) With the above report, submit written certification that the installation conforms to specifications, is complete, and is ready for inspection and testing by the Contracting Officer and the Engineer.
- vii. Meet with the Contracting Officer and the Engineer and make system control changes as directed.

34. SYSTEM ACCEPTANCE

- a. Upon approval of the Contractor's "System Checkout" report and at a time set by the Contracting Officer, demonstrate to the Contracting Officer and Engineer that the final system adjustments and tests meet the performance requirements.
- b. The Contractor shall provide all labor, materials, tools, and measurement equipment necessary for these demonstrations, tests, and adjustments. .
- c. The Contractor's representatives performing these tests must be thoroughly familiar with all details of the system. The test team must include the field supervisor and the Government in charge during the course of the installation work.
- d. The Contractor is responsible for all costs incurred to satisfy criteria requirements.
- e. System Acceptance Tests will not be performed until the Contractor's System Checkout has been completed. The System Acceptance Tests will be supervised by the Engineer and will consist of

the following:

- i. A physical inventory will be taken of all equipment on site.
- ii. The operation of all system equipment shall be demonstrated by the Contractor.
- iii. Both subjective and objective tests will be required to determine compliance with the specifications. The Contractor shall be responsible for providing test equipment for these tests.
- iv. Acceptance Tests may include speech intelligibility surveys and subjective evaluations by observers listening at various positions under various operating conditions, using speech, music, and live or recorded effects material. Acceptance tests shall include viewing of monitor images for sharpness, contrast, brightness, and color.
- v. Measurement of frequency response, distortion, noise, wave form, color vector, or other characteristics may be performed (or a demonstration test requested) by the Contracting Officer or Engineer on any item, or group of items, deemed necessary to determine conformity with criteria.
- vi. All final "as-built" drawings, run sheets, manuals, and other required documents, as detailed herein, shall be on hand. Two complete sets of these documents shall be delivered to the Contracting Officer at this time. (One complete set shall have been delivered to the Engineer prior to the scheduling of Acceptance Tests).
- vii. In the event further adjustment is required, or defective equipment must be repaired or replaced, tests may be suspended or continued at the option of the Engineer.
- viii. Performance Test Signal Paths - The signal paths for Performance Standards Tests shall be as follows:
 - (1) Audio:
 - (a) From all source inputs (for microphones, audio tape units, etc.) through all mixers, audio distribution amplifiers, switchers, etc., to all signal destinations.
 - (b) The delineation of the above signal paths shall not exempt the Contractor from the responsibility of checking all paths and outlets for appropriate compliance with the Performance Standards.
 - (c) During performance testing, all equipment shall be operated under standard conditions as recommended by the manufacturer.

35. OWNER TRAINING

- a. Scheduling of all training sessions must be approved by the Contracting Officer.
- b. In the event the Contractor does not have qualified instructors on staff for certain sophisticated equipment, a manufacturer's representative for such instruction will be provided by the Contractor

at no additional cost to the owner. All training shall take place after the Contracting Officer takes possession of the system, at a time convenient to the Contracting Officer.

c. Operational Training

- i. The Contractor shall provide on-the-job training by a suitably qualified instructor, to personnel designated by the Contracting Officer, to instruct them in the operation and maintenance of the systems. Operational training for designated personnel shall be provided on-site in the room where the system has been installed. This training shall be provided in two (2) sessions held on two (2) separate occasions and each session shall not exceed one (1) day in duration. In instances where multiple rooms are affected, the Contracting Officer may require additional sessions if the technology requirements are unique to the additional room(s).
- ii. The training shall provide for proper usage of the entire system. The contractor shall assume that designated personnel have no prior experience with the operation of the systems being installed. Training documentation shall include a one page laminated sheet with basic instructions as well as copies of the O&M Manuals referred to above.

d. Technical Training

- i. The Contractor shall provide Technical Training for a minimum two (2) of the courtroom personnel, designated by the Contracting Officer, who have received the above Operational Training. This additional training session shall cover the more technical aspects of all equipment used in the system. That session shall not exceed one (1) day in duration and scheduling must be approved by the Court. The goal is to provide sufficient training so that systems staff can perform advanced level troubleshooting.

Appendix A - Installation Schedule

The vendor shall provide an installation schedule substantially similar to the one provided here.

Pre-Award Schedule

RFP to AV Contractors - August 8, 2005

Scheduled AV Contractor site visits - August 23, 2005

Proposals due - September 8, 2005

Bid Review & Revision - September 12 - 16, 2005

Bid Award - September 23, 2005

Post Award Schedule

Contractor Submittal process - Complete by October 2, 2005

Submittal review - Complete by October 7, 2005

Contractor Procurement:

Begin October 10, 2005

Complete by November 18, 2005

Cabling installation:

Begin November 3, 2005

Complete by December 2, 2005

Equipment installation:

Begin November 10, 2005

Complete by December 2, 2005

Training Plan submittal - Complete by November 21, 2005

Training plan review - Complete by November 23, 2005

System installation deadline, **December 2, 2005**

Punch list resolution - December 5-7, 2005

Training - December 7-8, 2005

System Acceptance Review - December 9, 2005

Appendix B - Bid Spreadsheet

The vendor shall provide a bid spreadsheet substantially similar to the one provided here.

ITEM	Make/Model	Substitution Make/Model	Qty	Unit Price	Total Price
Courtroom Audio System					
equipment racks, floor standing	Middle Atlantic/SRS-16		1		
floor poke-thru device	Wiremold/Walker/AV3		6		
power conditioners	Furman / PL-PLUS		1		
handheld microphones	Shure / SM58		1		
podium microphones, 18" with shock mount	Shure / MS418S		1		
podium microphones, 18" with desk mount	Shure / MX418D		3		
podium microphones, 12" with desk mount	Shure / MX412D		6		
conference microphones	Shure / MX393/0		1		
headset microphones	Sennheiser / HMD 25		1		
headphone set	AKG K141M		1		
floor stands	Atlas Sound/ MS-20		1		
custom interpreter's breakout box	custom by contractor		1		
CD player	Denon / DN-C360		1		
automatic microphone mixers	Lectrosonics / AM-84		1		
automatic microphone mixers	Lectrosonics / AM-16		1		
programmable equalizers/feedback suppressors	Sabine / GRQ-3102s		1		
power amplifiers, six channels	Crown / CP-660		1		
wall mounted speakers	JBL/ Control 5		3		
desktop monitor speakers	Tannoy / SAT 1		2		
custom judges desktop speakers	custom by contractor		1		
infrared emitters	Sennheiser / SZI 1015		2		
infrared receivers	Sennheiser / HDI 302		4		
telephone hybrids	Lectrosonics / TH3a		1		
audio distribution amplifiers	Extron / SADA 6 MX		2		
	Equipment Subtotal				
miscellaneous equipment & wiring					

audio system labor					
	Total Courtroom Audio System				
Courtroom Audio Recording System					
digital 4-track court recorder	FTR/FTR Gold		1		
digital 4-track mixer	FTR/DMX-8 Audio Mixer		1		
	Equipment Subtotal				
miscellaneous equipment & wiring					
audio recording system labor					
	Total Audio Recording System				
Courtroom Video Presentation System					
system rack video switch	Extron		1		
lectern video switch	Extron/ MLS 304SA		1		
document camera	ELMO/HV-5100XG		1		
VCR/DVD unit	Toshiba/SD-V593		1		
Video Displays	Sony/SDM-S53		7		
	Equipment Subtotal				
miscellaneous equipment & wiring					
video presentation system labor					
	Total Audio Recording System				
Courtroom Control System					
integrated controllers	AMX / Accent 3		1		
tilt touch screens	AMX / AXT-MCP		2		
control system power supplies	AMX / PS2.8		1		
	Control System Subtotal				
miscellaneous equipment & wiring					
control system programming					
control system labor					
	Total Audio Control System				

Equipment and Labor Grand Total					
Optional Maintenance	Year 1			warranty	
	Year 2				
	Year 3				
	Year 4				

Appendix C - Request for Information

1. Contractor:		5. Contract Number:	
2. Address:		6. Task Order:	
3. Telephone:		7. Court POC: John Domurad	
4. Facsimilie:		8. AOPM:	
9. Project Name: James T. Foley Courthouse, Courtroom #1 Audio Project			10. RFI #
11. Project Location: 445 Broadway, Albany, NY	12. Date of Request:		13. Date Response Required (5 bus. days min)
14. Description of RFI:			
15. As-built sketches enclosed:		16. Specification Paragraph Reference:	17. Drawing Reference:
18. Contractor's Recommendation:			
19. Cost Impact:		20. Schedule Impact:	
21. Subcontractors Affected:			
22. Subcontractors Coordinated with:			
23. Submitted by:			
24. Response			
25. Respondent:		26. Date of Response:	

Appendix D - Statement of Compliance

The firm fixed price proposed here-in includes all materials, labor, transportation, engineering, travel and costs required to provide and complete an operation system as outlined in the scope of work statement and conforming to the design concept and intent as described in the Specifications.

Name

Title

Date

Company