

## SECTION 17100 - AUDIO-VISUAL COMMUNICATION SYSTEMS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION OF WORK

- A. This section pertains to the audio-visual communication system to be furnished and installed in the United States Federal Courthouse Jury Assembly Room. (B0018).
- B. It is the purpose of this specification to require the furnishing of highest quality materials, equipment, and workmanship. The work shall be in accordance with this specification and in conformity with the designs, layouts, and descriptions shown on the drawings.
- C. Any and all structural, mounting, or rigging details on the drawings are shown for concept only. It shall be the responsibility of the Systems Contractor to employ the services of a qualified Structural Engineer to be responsible for the design of the details to be employed. Shop drawings and calculations of all such details shall be submitted to the Owner for review.
- D. Except as noted on the drawings, the work shall include everything necessary or incidental to complete the installation EXCLUDING wire raceway (including conduit), raceway fittings, outlet boxes, pull boxes, terminal cabinets, 120 volt AC power circuits, low voltage control equipment, and insulated ground cables.
- E. The Systems Contractor shall cooperate with all other contractors engaged in this project and shall coordinate the installation of the audio-visual communication systems so that all work will proceed in a manner which is in the best interests of the Owner.

#### 1.2 ALTERNATES

- A. Proposals for this work shall include prices for the following Alternate(s). Quantities for a specified item of equipment shall be determined from the drawings and/or as noted herein. Items not specifically identified on the drawings as being part of an Alternate shall be considered to be part of the basic scope of work.
- B. ALTERNATE NO. 1 (Additive): ADD a video recorder and rack mount monitor, and digital signal processor input and output cards to the Jury Assembly Room as described in these specifications and shown on the construction drawings.
- C. ALTERNATE NO. 2 (Additive): ADD a new lectern in Jury Assembly Room to replace existing lectern as described in these specifications and shown on the construction drawings.

#### 1.3 EXISTING CONDITIONS

- A. This facility is an existing structure. It shall be the responsibility of each bidder to verify all conditions and dimensions which pertain to this work.
- B. The Systems Contractor shall verify the location, the operating conditions, and the conditions affecting the proposed work. Items to be verified by the Systems Contractor shall include, but not be limited to, reuse of existing equipment and access requirements to install all concealed components of the work. Bids submitted shall account for and include, but not be limited to, any and all work associated with providing concealed components (such as cable or conduits) and the complete restoration of all existing building components that are disturbed, modified, or dismantled in the process of installing the concealed components of the work.

- C. The Systems Contractor shall verify the condition of specific existing equipment and incorporate the items into the system as described in these specifications and shown on the drawings. These items are listed below:
1. Existing Shure 185 Gooseneck Microphone. Located at the Lectern.
  2. Existing Wireless Microphone Systems. Located in the equipment rack.
  3. Biamp Audia FLEX digital signal processor and any usable I/O cards. Located in the equipment rack.
  4. Existing JVC HR-XVC17 DVD/VHS Player. Located in front cabinet.
  5. One existing 42-inch Monitor.
  6. Existing QSC CX302V Power Amplifier. Located in the equipment rack.
  7. Existing 4-inch Loudspeakers. Located in the ceiling.
  8. Existing Lectern. (Delete if Alternate No. 2 is selected.)
  9. Any existing infrastructure, such as wall boxes, wall plates, power circuits, conduit, etc., is to be reused where appropriate.
  10. Any existing cabling, such as loudspeaker cable, audio cable in the equipment rack, video cable in the equipment rack, etc., is to be reused where appropriate.

#### 1.4 DEFINITION OF TERMS

- A. The term "Owner" shall refer to United States Federal Courts Missouri Western; Kansas City, MO; phone (816) 512-5000.
- B. The term "Acoustical Consultant" shall refer to Coffeen Fricke & Associates, Inc.; Consultants in Acoustics and Audio Visual Communications; 14827 W. 95<sup>th</sup> Street; Lenexa, KS 66215; phone (913) 888-9111; facsimile (913) 888-9193.
- C. The term "Systems Contractor" shall refer to the person, persons, or company who or which contracts for the performance of the audio-visual communication system work specified herein.

#### 1.5 CONTRACTOR QUALIFICATIONS

- A. The Systems Contractor must be a "Systems Contractor" who regularly engages in the furnishing and installation of commercial and industrial audio-visual communication systems.
- B. The Systems Contractor must maintain a suitably staffed and equipped service organization and must regularly offer maintenance services for systems of this type and size.
- C. At the request of the Owner, the Systems Contractor shall demonstrate to the satisfaction of the Owner and Acoustical Consultant that the Systems Contractor has
1. Adequate plant and equipment to pursue the work properly and expeditiously;
  2. Adequate staff and technical experience;

3. Suitable financial status to meet the obligations of the work.
- D. Any other contractor, who intends to bid on this work as the prime contractor and does not otherwise meet the requirements of the "Contractor Qualifications" paragraph(s) above, shall employ the services of a "Systems Contractor" who does meet the requirements noted above and who shall furnish the audio and video equipment; shop fabricate the equipment racks and subassemblies; make all audio, video and control connections to equipment and equipment racks; make all connections to microphone connection panels; and continuously supervise the installation and connections of all audio-visual communication system cable and equipment.
- E. A subcontractor so employed as the "Systems Contractor" must be acceptable to the Owner and the Acoustical Consultant and shall be identified on the Bid Proposal Form.

## 1.6 SUBMITTALS

- A. The Systems Contractor shall submit a minimum of four (4) suitably bound sets of the following Shop Drawings per the schedule listed below. Refer to the General and Special Conditions for additional set(s) which may be required.
  1. Prior to proceeding with the work
    - a. A complete list of ALL equipment and materials which are to be furnished. Accompanying the list shall be manufacturers' specification or cut sheets for all sound system equipment (e.g. microphones, audio program source equipment, power amplifiers, loudspeakers), audio-visual equipment (e.g. projectors, program source equipment, monitors, video processing equipment), AV control equipment (e.g. touchpanels, system controllers, interface/control cards), and any other MAJOR items of equipment.
    2. Prior to proceeding with respective portions of work
      - a. Art work, drawings, and listings indicating proposed nameplate nomenclature and arrangements for control panels, connection plates, floor boxes and nameplates prior to fabrication as described elsewhere in these specifications.
      - b. Details of proposed loudspeaker suspension including attachment methods, weights, and suspension locations approved by the Systems Contractor's Structural Engineer.
      - c. Details showing projector display mounting.
      - d. Front panel layouts for all equipment racks and AV lecterns, prior to installation, reflecting equipment and labels to be used.
      - e. Diagrams for AC power low voltage control switching, indicating distribution and sequencing of AC circuits for both on and off cycles.
      - f. Control system layout.
      - g. Details and descriptions of any other aspect of the audio-visual communication system which must differ from the drawings due to field conditions or due to the selected equipment to be furnished.
    3. As otherwise noted on the drawings and/or as noted herein.
  - B. Approved shop drawings and equipment instruction brochures, including schematic diagrams for all amplifiers and other electronic devices, shall be present at the job site during the period set aside for final system test and equalization.
  - C. Notebooks of operating instructions shall be prepared as described elsewhere in the specifications.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. It is the intention of these specifications to provide a complete and properly operating audio-visual communication system. The major items of equipment shall be furnished in the quantity indicated by the audio-visual communication system diagrams on the drawings or in the quantity as specified herein. (Refer to the Portable Equipment Quantity list at the end of the specifications.) However, any minor item of equipment or hardware that may not be specifically shown on the drawings or specified herein but required for proper audio-visual communication system operation or installation shall be furnished by the Systems Contractor.
- B. All equipment and material shall be new and shall be suitable for continuous operation.
- C. In any case, where a specific specification has not been included herein or shown on the drawings for any item that is required, the Systems Contractor shall furnish only the best quality equipment or material consistent with the quality of other specified equipment and material.
- D. Where the specifications list several manufacturers for a particular major item of equipment such as power amplifiers or loudspeakers, the Systems Contractor shall supply all of that item of equipment from one manufacturer.

### 2.2 SUBSTITUTIONS

- A. Where a specific piece of equipment has been discontinued and/or replaced by a new model, submission of the new model or a suitable item as applicable may be required by the Acoustical Consultant for evaluation prior to acceptance.
- B. If substitute equipment is allowed by written consent, the Systems Contractor shall be completely responsible for the use of such equipment, including suitability with the equalization process to be employed. The Systems Contractor shall replace all such equipment with equipment listed by type number in the specifications if there is any evidence of equipment instability or unsuitability.
- C. Costs of any required evaluation and testing of substitute equipment shall be paid by the Systems Contractor.
- D. Any use of substitute equipment shall be at no extra cost to the Owner.
- E. Proposed substitute equipment shall be specifically noted in submittals as "substitution" with a footnote stating the reason for the substitution.
- F. Offerors proposing to furnish an "or equal" product must furnish all descriptive material necessary to demonstrate the acceptability of such product. The Acoustical Consultant shall be the sole determiner as to whether the proposed "or equal" product is suitable for use in work based upon review of the descriptive materials furnished.

### 2.3 SOUND SYSTEMS

- A. General
  - 1. As shown on the drawings and described in these specifications, the Sound System installation work will include the following components
    - a. Sound reinforcement in the Jury Assembly Room.

## B. Microphones

1. Type 1 Wireless Microphone System, with table top microphone, UHF, line level output on balanced XLR connector, compatible with remote mount antennas, with programmable logic button on microphone
  - a. Shure SLX Series units listed below; or
    - 1) One model SLX4 receiver.
    - 2) One model MX690 table top microphone, and six sets of alkaline batteries.
    - 3) Rack mount kits as needed for permanently mounted receivers.
  - b. Furnish and install manufacturer's remote antennas with coaxial cable as required for permanently mounted receivers.
  - c. Provide a different operating frequency for each wireless microphone transmitter/receiver pair, free from interference, in the UHF Band on an unused channel per FCC regulations. Assist the Owner in licensing these transmitter(s) as required.

## C. Microphone Accessories

1. Antenna Splitter, for wireless microphone system UHF antenna, same manufacturer as chosen wireless microphone systems
  - a. Shure UA844SWB.

## D. Audio Processing Equipment

1. AEC Input Cards, two microphone inputs with acoustic echo cancelling
  - a. Biamp Audia AEC-2HD; or
  - b. All microphone inputs on the existing Biamp Audia FLEX shall be equipped with acoustic echo cancelling.
2. Input Expansion Module, multiple balanced line level inputs, compatible with Biamp Audia FLEX
  - a. Biamp Audia EXPI.
3. Output Expansion Module, multiple balanced line level outputs, compatible with Biamp Audia FLEX
  - a. Biamp Audia EXPO.

## E. Loudspeakers

1. Ceiling Loudspeaker, two way design with nominal 6-inch woofer and separate tweeter and high power crossover, with integral metal back can, ceiling mounting hardware, and baffle, with low impedance rating, and minimum 89 dB sensitivity, minimum frequency response of 250-4k Hz +/- 3dB and 100-20k Hz +/- 6dB, with manufacturer's tile bridge or support rails where installed in T-bar ceilings. Loosely, but completely, fill each enclosure with lightweight glass fiber insulation. Factory paint all baffles to match adjacent ceiling and as approved by the Owner
  - a. JBL Control 26CT; or
  - b. Tannoy CVS6.
2. Only the latest versions of the loudspeakers in the above paragraphs shall be furnished. The manufacturer and Systems Contractor shall ascertain that each loudspeaker furnished does not "squawk" or "rattle" when energized with 1/3 octave bands of pink noise at a nominal input power of two watts.

#### F. Wireless Hearing Assistance Systems – Infrared

1. IR Transmitter, with mounting hardware as required, with appropriate interconnect cables for multiple panels
  - a. Sennheiser SI 30 with NT 20-1 power supply.
2. IR Emitter, with interconnect cable and mounting adapters as required
  - a. Sennheiser SZI 30 with NT 20-1 power supply.
3. Personal Receiver, stethoscopic style, audio output on 3.5mm phone jack, with volume control and rechargeable battery pack
  - a. Sennheiser RI 150.
4. Induction Neck Loop, with 3.5mm stereo plug
  - a. Sennheiser EZT 1101 (for use with RI 150).
5. Charging Base, with multiple charging stations for receivers, provide required power supply.
  - a. Sennheiser L 151-10 with NT 92 power supply.
6. Rechargeable Batteries, for personal receivers.
  - a. Sennheiser BA 151 (for use with RI 150).

#### 2.4 AUDIO-VISUAL SYSTEMS

##### A. General

1. As shown on the drawings and described in these specifications, the Audio-Visual System installation work will include the following components
  - a. Videoconferencing and Video Presentation Systems in the Jury Assembly Room.

##### B. Cameras

1. Video Camera, integral pan, tilt, and zoom control, native 1920x1080 resolution, with minimum 10x optical zoom, and a minimum +/-100 degree pan, with video and power extension over twisted pair cables, compatible with videoconference codec chosen below, with wall mount bracket, breakout cables, signal extenders, and power supply as required
  - a. Polycom EagleEye 1080 HD with Vaddio WALLView PRO or Sound Control Remote Cam2; or
  - b. Sony EVI-HD1 with Vaddio WALLVIEW PRO or Sound Control Remote Cam2; or
  - c. Vaddio WALLVIEW HD-18.

##### C. AV Program Source Equipment

1. HDTV Tuner, NTSC, ATSC, and clear QAM compatible, HDMI output, stereo audio output, bi-directional serial or IP control, Closed Captioning decoding, with rack mount hardware as required
  - a. Aurora Multimedia V-Tune Pro HD; or
  - b. Contemporary Research 232-ATSC+.

#### D. Video Processing

1. Video Down Converter, DVI video input compatible with resolutions up to 1920x1200, composite video output in NTSC format, front panel controls, with rackmount kit and power supply
  - a. TVOne C2-2100A; or
  - b. Approved equal.
2. Video Encoder, composite video input, streaming video-over-IP output, compatible with Wireless Touchpanel chosen, with power supply as needed
  - a. Crestron CEN-NVS100.
3. Videoconference Codec, high definition, 1920x1080 resolution at 30 frames per second, configurable display, bi-directional serial control, two high definition camera inputs, dual high definition monitor outputs, recording output, high definition video output, stereo audio inputs and outputs, with rack mounting hardware
  - a. Polycom HDX9004.

#### E. Distribution and Switching Equipment

1. Type 1 Video Switcher, video inputs and outputs as shown on the drawings, audio inputs and outputs as shown on the drawings, HDCP compliant, constant EDID communication and storage, front panel controls and IP configurable using A/V control system, with rack mount hardware as needed
  - a. Crestron DM-MD8x8 with necessary I/O cards.
2. Type 1 Video Transmitter, wall plate style, supports 1080p resolution over 100 feet, HDMI and VGA input, stereo audio input, HDCP compliant, DigitalMedia output, fits standard 2-gang wall box, compatible with Types 1 and 2 Video Switchers
  - a. Crestron DM-TX-200-2G.
3. Type 2 Video Transmitter, supports 1080p resolution over 100 feet, HDMI and VGA input, stereo audio input, DigitalMedia output, HDCP compliant, compatible with Types 1 and 2 Video Switchers
  - a. Crestron DM-TX-200.
4. Type 3 Video Transmitter, supports 1080p resolution over 100 feet, HDMI, DVI, VGA, component, and composite video input, stereo audio input, HDCP compliant, DigitalMedia output, local monitor output, compatible with Types 1 and 2 Video Switchers
  - a. Crestron DM-TX-300N.
5. Video Receiver, supports 1080p resolution over 100 feet, DigitalMedia input, HDMI output, serial control output, HDCP compliant, compatible with Types 1 and 2 Video Switchers
  - a. Crestron DM-RMC-100-1.
6. HDMI Equalizer, HDMI input and output, small form factor, supports 1920x1080 @60 Hz resolution over 50 feet, with power supply
  - a. Extron HDMI 101; or
  - b. Kramer PT-101HDMI.

7. DVI Equalizer, DVI input and output, small form factor, supports 1920x1080 @60 Hz resolution over 50 feet, with power supply
  - a. Extron DVI 101; or
  - b. Kramer PT-101HDCP.

#### F. Video Projectors and Monitors

1. Video Projector, LCD, minimum 6000 ANSI lumens, WXGA (1280x800) native resolution, including manufacturers warranty with no limit on daily use, motorized horizontal and vertical lens shift, DVI-D or HDMI input, HDCP compliant, bi-directional serial control, with field replaceable lamps, and lens as required for mounting location shown on drawings
  - a. Christie LW650.
2. Rack Mount Monitor, dual screen, nominal 8-inch diagonal screens, composite video input and loop through output for each screen, front panel controls, rack mount
  - a. Marshall V-R82DP-2C.

#### G. Video Recorders

1. Video Recorder, rack mount, 250 GB hard drive, high speed DVD recorder, composite video input and output, bi-directional serial control
  - a. JVC SR-DVM700.

#### H. Video Accessories

1. Monitor Wall Mount, compatible with Type 1 Monitors chosen above, compatible with existing monitors in the Jury Assembly Room to be reused, full swing and nominal 10 degree tilt capability, with integral locking mechanism and mounting accessories as required
  - a. Chief PWR Series; or
  - b. Peerless SA761PU; or
  - c. Premier Mounts AM300.
2. Video Projector Mount, compatible with projectors chosen above, with screw actuated adjustment of pitch, yaw, and roll, and custom adapter plate
  - a. Peerless PRG-EXA series; or
  - b. Premier Mounts PBL-UM series.
3. Type 1 Motorized Projection Screen, tab tensioned, surface or ceiling mounted, motor in roller construction, controllable electric operation, with factory installed low voltage control interface and low voltage wall switch, 16:9 screen ratio, nominal 161-inch diagonal screen, black border on all sides, and extra black drop as required to place bottom of image 48 inches above finished floor.
  - a. Da-Lite Tensioned Cosmopolitan Electrol with DaMat screen surface; or
  - b. Draper Premier with M1300 screen surface.
  - c. Coordinate finish or veneer selection with Owner.

4. Type 2 Motorized Projection Screen, tab tensioned, surface or ceiling mounted, motor in roller construction, controllable electric operation, with factory installed low voltage control interface and low voltage wall switch, 16:9 screen ratio, nominal 119-inch diagonal screen, black border on all sides, and extra black drop as required to place bottom of image 48 inches above finished floor.
  - a. Da-Lite Tensioned Cosmopolitan Electrol with DaMat screen surface; or
  - b. Draper Premier with M1300 screen surface.
  - c. Coordinate finish or veneer selection with Owner.

## 2.5 AV CONTROL SYSTEMS

### A. General

1. As shown on the drawings and described in these specifications, the AV Control System installation work will include the following components
  - a. Control over the Audio-Visual System in the Jury Assembly Room.

### B. Control Interface Equipment

1. Wireless Touchpanel, hand held form-factor, nominal 8-inch screen, Wi-Fi operation, with wall mount docking station and hardware to mount in an equipment rack, with table top docking station, video over IP streaming capability, compatible with Control System chosen
  - a. Crestron TPMC-8X with TPMC-8X-DSW and TPMC-8X-DS docking stations.
2. Wireless Transmitter, 802.11g operation, minimum three years manufacturer's warranty, Ethernet connectivity, with power supply, compatible with Wireless Touchpanel chosen
  - a. Crestron CEN-WAP-ABG-POE-PWE.
  - b. Mount in equipment rack using panel hardware such as Middle Atlantic HBL1-722243 or equivalent.
3. Ethernet Switch, multiple Ethernet ports, web manageable, with power supply, with rack mount hardware as needed
  - a. Cisco Catalyst 2960 Series; or
  - b. HP Procurve Series.

### C. System Controllers

1. Control System, bi-directional serial control port, and multiple relays for control of AV equipment, with Ethernet connectivity, compatible with AV control system equipment, with rack mount hardware as needed
  - a. Crestron CP2E.

### D. Custom Programming

1. The Systems Contractor shall provide system programming incorporating all the below functions with input from the Owner and the Acoustical Consultant. The Acoustical Consultant will provide initial user interface touch panel screen and remote control unit layouts to the Systems Contractor for use in the system programming. The Systems Contractor shall furnish to the Owner a copy of the final system configuration files (including all source codes), the latest version of system programming software, and any required computer connection cables, for the Owner's use.

2. Jury Assembly Room
  - a. Control of video sources displayed on the projectors, monitor, and touchpanel.
  - b. Channel control of TV tuner.
  - c. Power and video mute control of projectors and monitor.
  - d. Volume and mixing control of playback audio into the room via Digital Signal Processor.
  - e. Ability to change equalization of existing wireless microphones.
  - f. Ability to individually control audio and video playback in side room when partition is in place.
  - g. Control of power sequencing system.
  - h. Play, stop, pause, record, and menu functions for the Video Recorder (Alternate only).
  - i. Control of videoconferencing codec to match standard remote control functions.
  - j. Pan, tilt, zoom, and preset recall of Video Cameras.

## 2.6 CABLE AND CONNECTORS

### A. General

1. As shown on the drawings and described in these specifications, the Cable and Connector installation will include the following components
  - a. AV racks and associated equipment specific to the Jury Assembly Room.

### B. Audio Cable

1. Type 1 Microphone and line level audio circuits where installed within conduit and equipment rack, #22 AWG, one twisted pair of stranded conductors, aluminum foil and polyester tape shield
  - a. Belden 8451, 9451; or
  - b. Covid CSP 1200 22; or
  - c. Extron STP22; or
  - d. Gepco IR222AL; or
  - e. Liberty 22-1P-EZ; or
  - f. West Penn 77291, 452.
2. Type 2 Microphone and line level audio circuits where installed within conduit and equipment rack, #22 AWG, two individually shielded twisted pairs of stranded conductors, separate drain wire, aluminum foil and polyester tape shield
  - a. Belden 9451D; or
  - b. Covid CSP 1400 22; or
  - c. Extron STP22-2; or
  - d. Liberty 22-2P-SHEX; or
  - e. West Penn D430.
3. Type 1 Line level audio circuits where installed exposed in spaces which are used as return air plenums, #22 AWG, one twisted pair of stranded conductors, plenum rated, aluminum foil and polyester tape shield
  - a. Belden 9451P, 82761; or
  - b. Covid CSP 3200 22; or
  - c. Extron STP22P; or
  - d. Gepco IP222AL; or
  - e. Liberty 22-1P-CMP-EZ; or
  - f. West Penn D25291.

4. Type 2 Line level audio circuits where installed exposed in spaces which are used as return air plenums, #22 AWG, two individually shielded twisted pairs of stranded conductors, separate drain wire, plenum rated, aluminum foil and polyester tape shield
  - a. Belden 9451DP; or
  - b. Covid CSP 3400 22; or
  - c. Extron STP22-2P; or
  - d. Liberty 22-2P-CMP-EZ; or
  - e. West Penn D25430.
  
5. Loudspeaker circuits where installed in conduit, equipment rack, or exposed interior benign environment (except return air plenums), #18 AWG, two stranded conductors, unshielded
  - a. Belden 9740; or
  - b. Covid CVA 0200 18; or
  - c. Extron SPK18; or
  - d. Gepco IR182BA7; or
  - e. Liberty 18-2C-GRY; or
  - f. West Penn 224.
  
6. Loudspeaker circuits, where installed exposed above ceilings in spaces which are used as return air plenums, #18 AWG, two stranded conductors, unshielded, plenum rated
  - a. Belden 89740; or
  - b. Covid CVA 3200 18; or
  - c. Extron SPK18P; or
  - d. Gepco IP182BA7; or
  - e. West Penn 25224.

C. Audio Cable Assemblies

1. Stereo Audio Cable, factory made, 3.5mm stereo audio plug on each end, molded connectors
  - a. Extron A MINI; or
  - b. Liberty E-3.5SM-M; or
  - c. Equal

D. Video Cable

1. Composite Video Cable for use in conduit and equipment racks, coaxial, #25 AWG center conductor, 75 ohm, copper braid shield, with a separate foil shield
  - a. Belden 1865A; or
  - b. Gepco VDM250; or
  - c. Liberty 25-CMR; or
  - d. West Penn HD825.

2. RGB Component Cable for use in conduit and equipment racks where RGB Component runs under 75 feet are indicated, #25 AWG nominal, three high resolution mini 75 ohm coaxial multipairs in a common jacket, with each individual coax color coded with solid individually colored insulators, copper braid shield, with a separate foil shield
  - a. Belden 1277R; or
  - b. Covid CHD 0300 25; or
  - c. Gepco RGB250; or
  - d. West Penn WP8253.
  
3. RGBHV Cable for use in conduit and equipment racks where RGBHV Cable runs under 75 feet are indicated, #26 AWG, five high resolution mini 75 ohm coaxial multipairs in a common jacket, with each individual coax color coded with solid individually colored insulators, copper braid shield, with a separate foil shield.
  - a. Belden 1279R; or
  - b. Covid CVD 0500; or
  - c. Extron Electronics MHR-5; or
  - d. Gepco RGBSC250; or
  - e. Liberty RGB5C-MINI; or
  - f. West Penn WP8255.
  
4. Digitalmedia D Cable, four shielded twisted pairs, for use with digital video transmission, installed in conduit and equipment rack locations
  - a. Crestron DM-CBL-D-NP.
  
5. Digitalmedia D Cable, four shielded twisted pairs, for use with digital video transmission, installed in plenum locations
  - a. Crestron DM-CBL-D-P.
  
6. DigitalMedia video cable for use in conduit and equipment racks, four unshielded twisted pairs, four shielded twisted pairs, one unshielded pair for power, and one shielded control pair in a common jacket
  - a. Crestron DM-CBL-NP.
  
7. DigitalMedia video cable where installed exposed above ceilings in spaces which are used as return air plenums, four unshielded twisted pairs, four shielded twisted pairs, one unshielded pair for power, and one shielded control pair in a common jacket
  - a. Crestron DM-CBL-P.
  
- E. Video Cable Assemblies
  1. DVI-D Video Cable, for use in lecterns and equipment racks, factory-made, male to male DVI-D molded connectors
    - a. Covid DVI DIGLL; or
    - b. Extron DVID SL Pro; or
    - c. Liberty Wire EDVID-SL; or
    - d. Pacific Cable DVISL.
  
  2. RGBHV Video Cable, for use in lecterns and equipment racks, factory-made, male to male 15-pin HD molded connectors.
    - a. Covid MC-VGA; or
    - b. Extron MVGA M-M; or
    - c. Liberty Wire E-MVGAM-M.

3. RGBHV Video Cable with Audio, for use in lecterns and equipment racks, factory-made, male to male 15-pin HD molded connectors, with integral 3.5mm stereo audio plugs.
  - a. Covid MC-VGAA; or
  - b. Extron MVGA-A M-M; or
  - c. Liberty Wire E-MVGAMAM-M.
4. HDMI Video Cable, for use in lecterns and equipment racks, factory-made, male to male HDMI molded connectors
  - a. Belkin AV22300b; or
  - b. Covid HDMI NN DVI DIGLL; or
  - c. Extron HDMI M-M Pro; or
  - d. Liberty Wire E-HDM-M; or
  - e. Pacific Cable HDMI; or
  - f. West Penn CN-HDMIUL.
5. HDMI to DVI-D Video Cable, for use in lecterns and equipment racks, factory-made, HDMI male to DVI-D male molded connectors
  - a. Extron HDMI M-DVID M Pro; or
  - b. Liberty Wire E-HDM-DVI; or
  - c. Pacific Cable HDMIDVI.
6. DisplayPort adapter, factory-made, DisplayPort male to HDMI female molded connectors
  - a. Extron DP-HDMIF; or
  - b. Pacific Cable DPHDMIF. or
  - c. Equal.
7. Type 1 Digital Video Adapter, factory-made, DVI-D male to HDMI female respectively, molded connectors
  - a. Extron HDMIF-DVIDM; or
  - b. Pacific Cable HDMIFDVIM; or
  - c. Equal.
8. Type 2 Digital Video Adapter, factory-made, DVI-D female to HDMI male respectively, molded connectors
  - a. Extron HDMIM-DVIDF; or
  - b. Pacific Cable HDMIMDVIF; or
  - c. Equal.

F. Control Cable

1. Control Circuits, #20 AWG, stranded, unshielded, vinyl jacketed with number of conductors as required. Each control cable shall have at least two spare conductors
  - a. Belden 9455; or
  - b. Columbia C6357; or
  - c. West Penn 264.

2. Control System Cable, unshielded twisted pair, shielded twisted pair, compatible with control system equipment chosen
  - a. Belden 1502P; or
  - b. Covid COM 1400; or
  - c. Crestron Crestnet-NP; or
  - d. Extron CTL; or
  - e. Gepco 18/22CRT; or
  - f. Liberty AXLINK; or
  - g. West Penn 77350.
3. Category 6 UTP Cable, unshielded twisted pair, for use with data circuits installed in conduit and equipment rack locations
  - a. Belden MediaTwist 1872A; or
  - b. Berk-Tek LANmark 2000 CAT6 or LANmark 1000 CAT6; or
  - c. CommScope 6ECMR.
  - d. Factory-made and certified Category 6 cable shall be used for all UTP patch cables installed at patch bays and within equipment racks. No field fabricated patch cables shall be used.
4. Category 6 UTP Plenum Cable, unshielded twisted pair, for use with circuits installed in spaces which are used as return air plenums
  - a. Belden MediaTwist 1874A; or
  - b. Berk-Tek LANmark 2000 Series CAT6 or LANmark 1000 Series CAT6; or
  - c. CommScope 6ECMP; or
  - d. Factory-made and certified Category 6 cable shall be used for all UTP patch cables installed at patch bays and within equipment racks. No field fabricated patch cables shall be used.

#### G. Audio Connectors

1. Microphone and line level receptacles and cable connectors, panel mounting receptacles shall be square in shape, except as noted
  - a. ADC Products Pro-Line; or
  - b. Neutrik NC series, with metal release mechanism; or
  - c. Switchcraft Q-G.
2. 3.5mm Stereo Plugs, solder type, tip, ring, sleeve, metal shell
  - a. Extron 3.5mm Mini Stereo-HQ; or
  - b. Neutrik NYS231; or
  - c. Switchcraft 35HDNN.
3. RCA Audio Connectors, solder type, metal shell
  - a. Extron 3502; or
  - b. Neutrik NYS352; or
  - c. Switchcraft 3502A.

#### H. Video Connectors

1. DigitalMedia connectors, shielded RJ45, field terminable, metal shell, compatible with DigitalMedia cable above
  - a. Crestron DM-CONN; or
  - b. Equal.

#### I. Network Connectors

1. RJ45 Jacks, panel mount, pass through RJ45 jacks, field terminable, with latch lock, square in shape, compatible with RJ45 Connector Shell below
  - a. Neutrik NE8FDP.
2. RJ45 Connector Shell, compatible with preassembled RJ45 plugs, field assembled, metal shell, compatible with RJ45 Jacks above
  - a. Neutrik NE8MC.

J. Multipin Connectors

1. Multipin Connector, compatible with audio, video, data, and control cables, secure latching system, with length of connector cables to allow ten feet of travel between lectern and floorbox connection
  - a. Wireworks AV2000.
  - b. The Systems Contractor is responsible for providing Digitalmedia D Cable to Wireworks for the Multipin Connector as needed.
  - c. Order two CAT6 Ethernet cables to be bundled with the Multipin Connector as shown on the drawings. Cables must have sufficient length to comfortably reach a laptop on the lectern surface and a desktop computer mounted in the lectern. RJ45 connector must be compatible with Ethernet Connector Shell for wall box connection.

2.7 EQUIPMENT RACKS, CABINETS, AND ACCESSORIES

A. General

1. As shown on the drawings and described in these specifications, the Equipment Rack, Cabinet, and Accessory installation will include the following components
  - a. Floor standing equipment rack and accessories for the Jury Assembly Room.
  - b. Presentation Lectern for the Jury Assembly Room (Alternate only).

B. Equipment Racks and Cabinets

1. Lectern, portable, laminate wood finish, flat top work surface with backwall, with lockable storage compartment, top and bottom vents, fixed 19" equipment rails, separate side space for computer tower, recessed open monitor location for 15-inch table top monitor (owner provided), rear and floor access, pull out keyboard shelf, casters with brakes, with four (4) power outlets and cable grommets in top work surface
  - a. HSA Rolltops USAVID Series; or
  - b. Marshall Furniture Prairie, Radius, or Classic Style, with options as required;
  - c. Supply appropriate hardware to mount computer CPU as needed.
  - d. Provide the following cables through grommets in work surface: 3.5mm stereo audio cable, HDMI cable, RGBHV video cable, and Ethernet cable (bundled with Multipin Connector). Each cable must have sufficient length to comfortably connect to a laptop on the work surface.
  - e. Coordinate with Owner to determine exact color and any other aesthetic aspects of the Lectern.
2. Equipment Rack, floor standing, metal enclosure, with removable sides, cable management system, locking vented rear door, locking perforated front door, and caster base.
  - a. Middle Atlantic WRK Series with CBS-WRK; or
  - b. Raxxess GAR Series with GAR-CB.

3. All standard sized rack panels used to mount controls or connectors shall have formed edges. Rack panel mounting screws shall be as short as practical for equipment to be mounted.
4. Quiet cooling exhaust fan with rigid screen guard, mount fan to rack with rubber grommets or other vibration isolation mounts, install one fan in the top of each rack
  - a. ebm-Papst 4800X; or
  - b. Hoffman A4AXFNGQ; or
  - c. IMC Magnetics WS2107FL-2; or
  - d. Lowell LFW-KIT; or
  - e. Middle Atlantic QFAN; or
  - f. Winstead model 10725.
5. Any rack front panel details shown on the drawings are for concept only. Shop drawings are required indicating the exact equipment to be furnished. The exact size (larger or taller racks) and quantity of equipment racks is to be determined by the Systems Contractor based upon the exact equipment to be furnished. Verify all audio equipment room dimensions and conditions.
6. Include a 1RU panel at the top of each equipment rack engraved with the logo and contact information of the Acoustical Consultant and the Systems Contractor.
7. Except as noted on the drawings, allow a 3½-inch blank panel space at the top of each rack below the engraved panel, minimum 7-inch vent panel space at the bottom of each rack, and ventilation space (vent panels) between all equipment. Allow a minimum 3½-inch vent panel above and below line amplifier cardfiles. Allow a minimum 5¼ -inch vent panel above and below all power amplifiers. Except as noted on the drawings or for mounting switches or LED indicators, blank panels shall not be used between equipment.
8. The following guidelines concerning equipment rack layouts shall be followed. Submit shop drawings illustrating proposed equipment rack layouts, indicating equipment labels
  - a. Equipment that requires operator interface (e.g. audio-visual communication system AC power pushbuttons, audio-visual communication system mode select switches, computer monitor and keyboard, audio mixers, program source and/or audio-visual equipment) shall be installed at heights that permit ease of operation and viewing.
9. Equipment Rack Storage Drawer, 3RU, steel, with key lock, black to match equipment racks.
  - a. BGW SRD-3 with keylock; or
  - b. Lowell L18-195-L; or
  - c. Middle Atlantic D3 with keylock; or
  - d. Raxxess SDR-3 with keylock.
  - e. Furnish three sets of drawer keys to be turned over to the Owner.
  - f. Install one drawer in each equipment rack and lectern as layout permits.

#### C. Hardware and Accessories

1. Type 1 Barrier Strip, for termination of audio circuits in equipment rack.
  - a. TRW-CINCH 140 series; or
  - b. Approved equal.
2. Type 2 Barrier Strip, high density, for termination of loudspeaker circuit in junction box.
  - a. Phoenix Contact High Density UK series; or
  - b. Approved equal.

3. Spade Tongue Terminal, brazed seam, un-insulated type only.

## 2.8 AC POWER

### A. Equipment

1. AC Power Sequencer, rack mount, with single momentary switch to begin sequencing, with remote sequencing of remote power modules
    - a. Atlas Sound SACR-191, with SACS series power modules; or
    - b. Lowell SCS-8R, with RPC series power modules; or
    - c. Middle Atlantic USC-6R, with RLM series power modules.
    - d. Provide one AC Power Sequencer and necessary number of remote power modules for each system to provide adequate power to all equipment.
  2. Furnish multireceptacle AC power strip for each AC circuit and furnish small clip on reflector type portable work light with 60 watt bulb in each equipment rack. Each power strip shall have at least two spare receptacles. Each group of one or more equipment racks and each lectern shall have at least two unswitched AC power receptacles.
- B. Connect power amplifiers to 120V 20A AC power circuits so that maximum rated input power can be delivered to each power amplifier without exceeding the power handling capacity of any AC power circuit.
- C. Except for tape machines, video monitors, phono turntables, compact disc players, and other user operated equipment, all equipment AC power switches that are accessible from the front of the equipment racks (and not covered by acrylic plastic covers), shall be wired out of their circuits so that the AC power to each unit cannot be turned off.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Installation and connection of audio-visual communication system equipment, materials, cable and cable fittings shall be performed only by experienced audio-visual communication system installers. Each installer shall have access to a complete copy of the specifications at the job site.
- B. All materials and equipment are to be installed in accordance with all applicable standards of the National Electrical Code, the Electrical Code of the governing local municipality, all other applicable local codes, and all safety codes and ordinances.

### 3.2 INSTALLATION

- A. Cable within equipment racks shall be separated and routed in groups according to function: microphone circuits, intercom circuits, line level audio circuits, loudspeaker circuits, control circuits, and 120 volt AC power circuits. Cable shall be neatly arranged, but tight bundling which makes modifications difficult shall be avoided. Plastic or Velcro cable ties shall be used for grouping of circuits.

- B. Cable in conduit or other raceway shall be separated according to function: microphone circuits and intercom circuits, line level audio circuits, loudspeaker circuits, control circuits, and 120 volt AC power circuits. Control circuits may be installed in line level audio conduit where separate control conduit is not indicated on the drawings. Control circuits for loudspeaker volume control priority override relays may be installed with loudspeaker circuits. Intercom circuits may be installed in line level audio conduit where microphone level conduit is not installed.
- C. At all connection points for all types of cable, pressure sensitive label strips of the appropriate letters and numbers shall be wrapped around each cable near its termination. These cable numbers and/or letters, and all transformer and preadjustment potentiometer identifiers, shall be given to the Acoustical Consultant for inclusion on the record audio diagrams.
- D. Unless otherwise noted, all audio circuits shall be two wire with shield, with the red or white wire used for the "high" side of the line and connected to pin 2 of microphone connectors or to the "tip" of patch panel and other phone jacks. The black wire shall be used for the "low" side of the line and shall connect to pin 3 of microphone connectors or to the "ring" of phone jacks. The shield (drain) wire shall connect to pin 1 of microphone connectors or to the sleeve of phone jacks.
- E. All audio circuits (red or white and black conductors) shall be ungrounded except as provided by single ended amplifier inputs and where grounding of unbalanced circuits is directed during system tests. Shields for line level audio circuits shall be grounded to rack sheet metal at each cable termination. Where line level audio circuits connect to audio transformers, shields shall connect to transformer electrostatic shields and case grounds. At each cable termination shield or shield drain, wire length shall be approximately equal to the length of the insulated conductors. Shield drain wires shall be sheathed in green PVC sleeving. Circuit shields shall not otherwise connect to each other nor ground to electrical conduit at wall boxes, etc. Microphone circuit shields shall be grounded only at mixer inputs.
- F. Equipment rack sheet metal ground shall only be via the insulated ground cable(s) noted on the drawings. Racks shall not otherwise connect to building steel or electrical conduit which is grounded to the building electrical system. Adjacent equipment racks shall be connected by an insulated #6 AWG ground cable which is bonded to each equipment rack.
- G. Care shall be exercised in wiring so as not to damage cables and equipment. Circuits shall not be spliced except as approved on shop drawings.
- H. Where conduit connects between equipment rack locations, or between sound console and equipment racks, at least two spare circuits of each type in the conduit (microphone level, line level, or control) shall be installed in each conduit used. All spare circuit conductors shall be connected to chassis ground at the downstream (e.g. power amplifier) end of the cable.
- I. Where resistors are indicated to terminate an audio circuit, install each resistor at the end of the line at the input to the following transformer or amplifier. High impedance circuits shall not extend more than 20 feet.
- J. All wire joints and connections in the audio system shall be made with rosin core solder and a small soldering iron; or with approved mechanical connectors. Soldering shall be neat and shall not exhibit "cold" solder joints. Connections to screw type terminals shall be made with mechanically connected, uninsulated, spade type lugs selected for the particular wire size in use.

- K. Connections made with miniature screw actuated, pressure type terminal strips shall be made by stripping approximately ¼-inch of insulation from stranded conductor, inserting the untinned wire into the pressure terminal, and tightening the terminal screw using a small screwdriver which securely fits the screw head.
- L. All crimp type connectors, including insulated butt connectors for inline loudspeaker circuit connections, shall be crimped with a Thomas & Betts model WT111M tool. Spade tongue terminals shall be crimped with the notch on the barrel opposite the seam.
- M. Loudspeakers shall be installed so there are no obstructions to the loudspeaker coverage pattern. Loudspeakers shall be connected "in phase" and proper impedance matching shall be maintained between amplifiers and loudspeakers. As required for proper acoustic levels and proper aiming, retap selected loudspeaker transformers and reorientate selected loudspeakers or loudspeaker clusters as later directed by the Acoustical Consultant during final system tests and adjustments.
- N. Tie-wrap and secure all loudspeaker line matching transformer leads and loudspeaker cable away from loudspeakers to prevent "rattling" when loudspeakers are energized.
- O. All analog video circuits, except as indicated otherwise, shall be shielded, 75-ohm coaxial cable. Shields for video circuits shall be grounded only at the connected equipment and shall not ground at electrical conduit at wall boxes, etc.
- P. No field terminated digital video connectors will be permitted unless otherwise noted in these specifications or drawings (HDMI, DVI, DisplayPort).
- Q. No soldering of video connectors will be permitted.
- R. All non-locking video connectors (S-Video and HDMI) shall be secured to the installed equipment such that the connectors cannot be easily disturbed or disconnected.
- S. All HDMI and DVI cables shall not exceed 25 feet in length without the installation of an active HDMI or DVI Cable Equalizer.
- T. After the video system has received its preliminary testing by the Systems Contractor and is found to be operating properly, each video camera will be tested for proper tracking and each video monitor will be tested for sync stability, proper gray scale, convergence, and color temperature. Equalization of the video system will also involve setting video amplifiers so the video blanking level is at 1.0 volt peak-to-peak throughout the video system.

### 3.3 NAMEPLATES

- A. All control panels, and all controls, jacks, microphone receptacles, switches, etc. (except for controls, etc., on audio equipment which are properly identified by the manufacturer) shall be suitably identified by engraved panels, engraved plates, Metal-photo panels, or Metal-photo plates. Engraved panels or plates shall be filled with a suitable contrasting color as approved on shop drawings.
- B. Room numbers shown on drawings and indicated on control panel details, patch panels, etc., are architectural room numbers for identification only during the construction phase. Fabricated labels shall reflect the room numbers to be later assigned by the Owner and/or as designated by the Owner.

- C. All equalizers, audio delay devices, crossovers, power amplifiers, self-powered line and monitor amplifiers, and other electronic equipment shall be identified on front and rear panels by nameplates.
- D. Except as noted, all standard gang wall plates shall be Sierra stainless steel wall plates factory finished to match electrical device covers on the same surfaces, with all lettering engraved and filled directly on the wall plate. All floor box covers shall be engraved and filled directly on the cover.
- E. Except as noted, all other control mounting wall plates or microphone connection panels, 12 inches square or smaller, shall be bronze anodized brushed aluminum 1/8-inch thick with ground edges and pan head screws finished to match plate. Verify finish with Owner prior to fabrication.
- F. Except as noted, all other control mounting wall plates or microphone connection panels, larger than 12 inches square, shall be bronze anodized brushed aluminum 3/16-inch thick with beveled edges and countersunk screw holes with Phillips oval head screws finished to match plate. Verify finish with Owner prior to engraving.
- G. Verify all dimensions and spacing for panel-mounted components and engraving. Unless noted otherwise, engraved text shall be 3/16-inch high. Spacing between panel-mounted components shall be sufficient to enable front cable connections to be made easily.
- H. Connection panel layouts shall be according to function with all connections of one type located together. Labels shall be located above the corresponding connector or component. All connection plates and nameplates on the project shall be uniform in layout and nomenclature. All multipin connectors shall be placed at the bottom of connection plates.
- I. All nameplate nomenclature shall be reviewed by the Owner and Acoustical Consultant prior to panel or plate engraving; or Metal-photo processing. No wall plates shall carry the logo of the contractor's firm.
- J. All nameplates and labels shall reflect Alternates accepted or rejected.

#### 3.4 PAINTING

- A. Except where factory finishes are provided, paint all portable adapter boxes and microphone connection boxes two coats dark brown catalyzed epoxy paint, or polyurethane paint such as DuPont "IMRON"; or finish with a dark bronze anodized process.
- B. Paint all exposed hardware, loudspeakers, baffles, grille cloth, wall plates, and any other item furnished under this contract not specifically noted otherwise on the drawings, color and method as approved by the Owner.

#### 3.5 PRELIMINARY SYSTEM TESTS AND ADJUSTMENTS

- A. The Systems Contractor shall be responsible for preliminary field tests and adjustments of the completed audio-visual communication systems prior to the time reserved for system equalization. Circuits containing equalizers and resistors to be installed later may be strapped across to permit preliminary system testing. Such tests shall be made in conformance with the recommendations of the equipment manufacturer and Acoustical Consultant.
- B. Preliminary system tests and adjustments shall include but not be limited to the following

1. Testing of each loudspeaker to ascertain that none of the units "squawk" or "rattle" when energized with one-third octave bands of pink noise at a nominal input power of two watts.
  2. Functional tests of all individual audio, video, and control equipment.
  3. Phasing of all microphones, microphone cords, and microphone inputs.
  4. Functional tests of the installed system(s) as required to assure that the system(s) are ready for final tests and adjustments.
- C. The Systems Contractor shall be responsible for notifying the Acoustical Consultant of any unresolved malfunctions encountered during preliminary system tests and of any equipment not at the site prior to Acoustical Consultant's arrival at the site for system equalization.
- D. Most of the final tests and adjustments will be performed concurrently with system equalization. However, if problems are encountered, preliminary tests and adjustments shall continue until the system operates in a satisfactory manner.

### 3.6 FINAL SYSTEM TESTS AND EQUALIZATION

- A. After the audio-visual communication system has received its preliminary testing, and is found to be operating properly, without hum, distortion, oscillations, radio frequency interference, etc., all circuits and connections have been examined, and all gain controls properly adjusted, then the acoustic response of the system shall be tailored by the adjustment of the active broadband and narrowband (as required) filters as indicated on the drawings.
- B. This process is termed system "tuning" or "equalization" and is accomplished after the completion of the system installation, but prior to any use of the audio-visual communication system. At this time, it is possible to measure the acoustic response of the system and to determine the feedback frequencies that actually exist. The broadband and narrowband filters are then tuned to these specific conditions.
- C. The final system tests will include evaluation of control system programming to determine if the system performs adequately and provides the desired functionality outlined above.
- D. The Systems Contractor shall furnish the services of a competent technician, one having knowledge of the system, to adjust the audio-visual communication system equipment and connections as requested by the Acoustical Consultant during the time reserved for system equalization. It is estimated that this technician should be available for approximately four (4) 10 hour days for this scope.
- E. These periods of time will be used for equalization and final system tests and adjustments. They will not, however, include the time that might have to be expended in the correction of system wiring errors, improper system performance due to noise, oscillations, etc. The Systems Contractor shall make his own assessment of the total time required for the technician referenced above.
- F. If, in the opinion of the Acoustical Consultant, the system does not appear to be functioning properly, the Systems Contractor may be required to perform tests on any individual item of equipment to determine its operational status. Any measurements deemed necessary shall be made for frequency response, distortion, etc.

- G. If after maximum effort by all concerned, it should prove impossible to complete the equalization within the stipulated period, the technician shall be made available for additional hours at no additional cost to the Owner if the Acoustical Consultant feels such assistance is necessary.
- H. The equalization service shall be provided for the Owner by Coffeen Fricke & Associates, Inc., the Acoustical Consultant. The cost of this service shall, as a convenience to the Owner, be included by the Systems Contractor as a portion of the total cost of the audio-visual communication system work. This commissioning fee shall be requested from the Acoustical Consultant prior to submitting any bid proposal. The Systems Contractor shall execute a letter of agreement concerning this service with the Acoustical Consultant prior to the review of shop drawings.

### 3.7 SYSTEM WARRANTY AND MAINTENANCE

- A. The Systems Contractor shall warrant the audio-visual communication system against defects in materials and workmanship, including any required parts and labor, during a one year warranty period from date of final acceptance or first beneficial use, whichever occurs first, of the completed audio-visual communication system at no cost to the Owner.
- B. The Systems Contractor shall make at least two visits to the job site to determine that all equipment is functioning satisfactorily, and to perform any maintenance services that may be required. The first of these visits shall occur approximately six months after the commencement of the warranty period, and the second visit shall occur approximately six months thereafter, but prior to the end of the warranty period.
- C. Maintenance services requiring additional visits shall also be performed at no charge. Maintenance services shall consist of, but not be limited to, operational tests and checks of all equipment.
- D. Any defective equipment discovered during any maintenance visit shall be repaired or replaced under the terms of the warranty. The Systems Contractor shall not be liable for equipment damaged by improper use, negligence, or accidental acts of nature.
- E. Warranty and maintenance services shall be restricted to normal working hours unless the Owner agrees to pay the difference in labor rates for overtime work.

### 3.8 OPERATING INSTRUCTIONS

- A. The Systems Contractor shall assemble notebooks, as described below, for the audio-visual communication system, and forward accurate field drawings of all wire numbers and control panel and patch panel engraving (for use in record drawing revisions) together with the notebooks to the Acoustical Consultant for review.
- B. The Acoustical Consultant will insert simplified operating instructions for the audio-visual communication system and audio one-line diagrams of record into the notebooks. The Acoustical Consultant will then forward the notebooks to the Owner through the Owner.
- C. Notebook Contents

The information described below shall be placed in standard 8½-inch by 11-inch, 3-ring stiff covered notebooks having a clear plastic label holder on the spine. Notebooks shall have one inch of extra capacity for the audio diagrams of record, to be added later. Label notebooks as follows

AUDIO-VISUAL COMMUNICATION SYSTEM  
OPERATING INSTRUCTIONS  
U.S. FEDERAL COURTS  
KANSAS CITY, MISSOURI

1. Notebook contents shall include a Table of Contents, section tabs with labels, system operating instructions, manufacturers' operating instructions, manufacturers' service manuals having schematic diagrams and parts lists, and any other information pertaining to the operation and routine maintenance of each major item of electronic equipment. Schematic diagrams which are not routinely available from a manufacturer will not be required. Where possible, manufacturers' original documents shall be furnished. Photocopied materials shall be equally legible as the originals.
2. Oversized drawings shall be neatly folded to approximately 8½-inch by 11-inch size and inserted individually into mylar sheet protectors, which shall be properly punched and inserted into the notebooks.

3.9 SYSTEM OPERATING ASSISTANCE

- A. After the audio-visual communication system has received its final testing and equalization and is fully operational, the Systems Contractor and Acoustical Consultant shall instruct designated representatives of the Owner in the proper methods of system operation.
- B. The Systems Contractor shall provide system operating assistance for the first two major uses of the completed audio-visual communication system. This assistance shall be provided at the times required by the Owner and there shall be no extra charge for work during this time prior to or after the normal working day.

PART 4 - EQUIPMENT SCHEDULES

4.1 SPARE EQUIPMENT (TO BE TURNED OVER TO THE OWNER)

- A. One (1) Fuse Kit, 125 VAC, including five of each type found on equipment furnished under this contract. Fuses shall be Bussman or equivalent brand. Provide an index in the Operating Instructions/Maintenance Manuals listing appropriate fuse type and size furnished for each item of equipment.

4.2 STANDBY EQUIPMENT

- A. The Systems Contractor shall have the following standby equipment on hand at the job site during the period set aside for system equalizing for the possible replacement of defective components. All unused standby equipment and any replaced equipment shall remain the property of the Systems Contractor
  1. One (1) of each type of loudspeaker used.
  2. Extra multipin connector contact pins.
  3. Microphone or line level audio cable for circuits in equipment racks.

#### 4.3 BASE BID PORTABLE EQUIPMENT QUANTITY

A. Quantities shown below are only for portable equipment not permanently mounted and/or not permanently connected to the audio-visual communication system. Refer to the drawings for other equipment quantities, or as noted, for additional requirements. Systems Contractor shall unbox, assemble, test, and store portable equipment where appropriate.

##### B. Microphones

1. Eight (8) Tabletop Wireless Microphones with batteries.

##### C. Hearing Assistance Receivers

1. Five (5) Personal Receivers with battery packs.
2. One (1) Charging Station.

##### D. Audio Cable Assemblies

1. One (1) Stereo Audio Cable, 6 feet long.

##### E. Video Cable Assemblies

1. Two (2) RGBHV Video Cables, 6 feet long.
2. Two (2) RGBHV Video Cables with Audio, 6 feet long.
3. Two (2) HDMI Video Cables, 6 feet long.
4. Two (2) Type 1 Digital Video Adapters.
5. Two (2) Display Port Adapters.

##### F. Control Interface Equipment

1. One (1) Wireless Touchpanel.

##### G. Miscellaneous

1. Two copies of a Notebook of Operating Instructions.
2. Three sets of Equipment Rack and Storage Drawer Keys.

END OF SECTION 17100