

SECTION 275105 – AUDIO SYSTEMS FOR CONSULAR SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes audio communications systems for consular services, including intercommunications systems for consular teller window stations, and paging system for general consular waiting area and associated waiting area outside of building.
- B. Related Sections:
 - 1. Division 26 Section on raceways and boxes for conduit installed outside of building.
 - 2. Section 270526 “Grounding and Bonding for Communications Systems.”
 - 3. Section 275124 “General-Use Teller Window Intercommunications Systems” for teller window intercommunications at locations not associated with Consular Waiting Area. Those intercoms are not related to the work of this Section.
 - 4. Section 275405 “Consular Queue Management System Infrastructure and Displays” for interfacing queue management system.
 - 5. Other Division 26 and Division 27 sections for conduits, wire ways, connection boxes, pull boxes, junction boxes, electrical breaker panels required to power audiovisual systems, and outlet boxes permanently installed in walls, floors, and ceilings.

1.2 REFERENCE STANDARDS

- A. See Section 270508 “Common Work Results for Telecommunications” for commonly applicable telecommunications reference standards.
 - 1. Each Division 27 Section may include citations to these references identified Section 270508.
 - 2. In addition, each Division 27 Section may include citations to other reference standards not listed in Section 270508.
- B. American National Standards Institute/ Audiovisual and Integrated Experience Association (ANSI/AVIXA (formerly INFOCOMM)):
 - 1. ANSI/AVIXA 1M: Audio Coverage Uniformity Standard in Enclosed Listener Areas.
 - 2. ANSI/AVIXA 2M: Standard Guide for Audiovisual Systems Design and Coordination Processes.

1.3 FUNCTIONAL DESCRIPTION OF SYSTEM

- A. General:

1. The intent is to provide a fully operational system with voice amplification to facilitate communication by both teller and applicant at each Consular Teller Window without requiring each to raise their voices, and to provide a clear audio experience of paging system for applicants in interior and exterior general consular waiting areas.

B. Audio Systems:

1. Audio Digital signal processor (DSP): Provides echo cancellation and audio processing for full duplex teller window communications, as well as in consular office and public area paging system.
2. Audio speaker for teller side: Provide wall-mounted speaker.
3. Audio speaker for applicant side: Provide ceiling mounted speaker.
4. Teller Microphone: Provide gooseneck tabletop microphone. Provide base with mute button for microphone.
5. Applicant boundary zone microphone: Provide wall mounted on public side with mounting to single gang wall plate. Place microphone to provide direct coverage of teller window glass surface to ensure adequate discrimination between applicant voice and waiting area noise.
6. Provide two discrete channels of amplification for audio speakers at each teller window.
7. Waiting Area Loudspeakers: Place loudspeakers to serve paging zones in consular waiting area and in associated outdoor waiting area. Speaker indoor coverage shall conform to ANSI/AVIXA 1M, "Audio Coverage Uniformity Standard in Enclosed Listener Areas."
8. Connections and Configurations:
 - a. Provide connections and configuration to facilitate connection of user-furnished headset by teller at AV control panel. These connections shall be wired in standard fashion to facilitate use of commercial off-the-shelf (COTS) headphones with microphone boom.
 - b. To facilitate paging announcements from queuing system processor, provide audio interface with consular queuing system; see Section 275405 "Consular Queue Management System Infrastructure and Displays."

C. Remote Control Systems:

1. Provide integrated control system for control teller and public areas.
 - a. Provide controls on teller-side countertop at each teller window location.
 - b. AV Control Panel: Provide paging and muting control, with limited volume, for teller via AV control panel. Include headset jack to permit connection of headset by teller.
 - c. Control functions shall include the following:
 - 1) Display number of window being controlled.
 - 2) Provide "To Applicant" volume control. This controls volume and muting of teller's speech being heard by applicant. Provide indicator that displays relative position of volume.
 - 3) Provide "From Applicant" volume control. This controls volume and muting of applicant's speech being heard by teller. Provide indicator that displays relative position of volume.

- 4) Provide audio processor to limit range of these controls, and prevent feedback and excessive loudness.
- 5) Provide "Paging Waiting Room" button. When this button is pushed, teller's microphone shall be routed to audio processor frame that assigns microphone to paging output.
- 6) Provide "Mute All" button on AV control panel. When this button is pushed, both inbound and outbound signals shall be muted.
- 7) Provide "Mute" button on teller microphones. When this button is pushed, only outbound audio is muted. When button is pushed again, microphone shall become operational again. Include visible indicator on teller microphone of mute status.
- 8) Number of programmed paging zones shall be as determined by Project Director/COR as indicated or based upon input from OBO/PDCS/DE/EE, and labeling nomenclature shall be provided for zones.

D. Network:

1. Device control and cobra-net networks shall be distributed separately from building network.
2. Use of intra-building optical fiber is indicated on Drawings, or if not, shall be coordinated with Project Director/COR based upon input from Post Information Management Officer (IMO).
3. Consular AV Installer shall coordinate associated IP addresses with Project Director/COR based upon input from Post IMO.
4. Provide Cobra Net network to link each audio processor frames to facilitate paging functions and interconnectivity.
5. Provide network switched to support Cobra Net device connections.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. General:

1. Provide equipment, components, software, accessories, and miscellaneous items necessary to achieve fully functioning audio systems for consular teller intercoms and consular paging.
2. System design shall conform to ANSI/AVIXA 2M, "Standard Guide for Audiovisual Systems Design and Coordination."

B. Audio Performance Characteristics:

1. Frequency Response: 30Hz – 18 KHz, within ± 3.0 db
2. Signal to Noise Ratio: 55dB minimum
3. Total Harmonic Distortion: 1 percent maximum from 30Hz-15Hz (THD)

C. Audio Intelligibility:

1. Consular intercom and paging systems shall achieve minimum performance for Speech Transmission Index (STI) exceeding the level of "Fair" quality (i.e., the STI level meets or exceeds 0.60 STI) identified in International Standard IEC 60286-16 (2003-05), "Objective Rating of Speech Intelligibility by Speech Transmission Index),"
 2. White noise or spoken word source within Consular Waiting Room shall be set to 65 dBA at 1M to simulate conversation level within Consular Waiting Room.
 3. Noise source shall be positioned to emulate waiting applicants.
- D. Paging Zone Amplifier Load: Provide 70V amplification for paging zones. Total of loudspeaker load presented to amplifier shall not exceed 80 percent of amplifier's wattage capacity.
- E. Audio Video Bridging (AVB):
1. Transport: Conform to IEEE 802.1.
 2. Transport in development products expected Q1-2012.

**<RETAIN PARAGRAPH BELOW FOR PROJECTS REQUIRING SEISMIC
DESIGN BASED UPON OBO-ICS IBC AND ASCE/SEI 7>**

- F. **[Seismic Performance: Equipment frames shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.**
1. **The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified.]**

1.5 SUBMITTALS

- A. Product Data: Manufacturer's product information and data sheets for all equipment items. Products and options selected in data sheets shall be clearly identified. Data sheets without identification of selections may be rejected.
- B. Coordinate timing and content of submittals with those for Section 275405 "Consular Queue Management System Infrastructure and Displays" for output of paging and input for queueing system.
- C. Shop Drawings: Signed and sealed by a qualified professional engineer. Complete system shop drawings depicting the following information:
1. All point-to-point wiring single-line diagrams, equipment interconnections, component values and showing complete letter and number identification of all wire and cable as well as jacks, terminals and connectors.
 2. All panels, plates, and designation strips, including details relating to terminology, engraving, finish, and color.
 3. Complete sets of remote touch panels and pushbutton panel layouts, and brief functional description of programming.
 4. All equipment modifications.
 5. Cabling run sheets and field wiring details.

6. Wire specifications and assignment by use.
 7. Elevation drawings of each equipment rack.
 8. Complete and detailed schematic drawing including all items of equipment, and mounting heights.
- D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of items involved:
1. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

**<RETAIN PARAGRAPH BELOW FOR PROJECTS REQUIRING
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- E. **[Manufacturer Seismic Qualification Certification: Submit certification that central control cabinets, accessories, and components will withstand seismic forces applicable to the Project. Include the following:**
1. **Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.**
 2. **Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.**
 3. **Detailed description of equipment anchorage devices on which certification is based and their installation requirements.]**
- F. Qualification Data for Consular AV Installer:
1. Identify three similar projects of the same or greater magnitude and scope within last five years. Include statement that Consular AV Installer was actively involved in those projects. Provide current contact names and telephone numbers, as well as job description.
 2. Identify project team for Consular AV Installer, including resumes demonstrating history with similar projects of similar or greater magnitude and scope.
 3. Certificates: Factory-training certificates for Installers that correspond to work for this project.
 4. Factory-trained and certified engineer for DSP Software and control product for product lines included in this project, including for training and service. Submit certificates and credentials.
- G. Field quality-control test reports.
- H. Closeout Submittals: At completion of installation, provide the following information:
1. Equipment inventory listing manufacturer, model number and serial number for all equipment items furnished.
 2. Record drawings for each system installation, showing all equipment items, interconnection of equipment and all cable label designations.

3. Teller-Side User Guide: In addition to laminated guides identified in Article on IDENTIFICATION AND INSTRUCTIONS, provide editable version to facilitate updates to guides.
4. Functional Block Drawing: Identify all input and output circuit cable and terminal block numbers as well as all jack field circuit I.D. designations. Drawing shall be in readable logical format that is understandable to both technical and non-technical staff.
 - a. Provide separate copy of this drawing; place under clear acrylic sheet, and mount on inner surface of AV equipment rack door.

I. Operation and Maintenance Data: For intercommunication system to include in emergency, operation, and maintenance manuals. Provide hardcopy manual and electronic version.

1. The Operation section shall describe all typical procedures necessary to activate each system to provide for functional requirements as listed in this section.
2. The Maintenance section shall provide recommended maintenance schedule with reference to applicable pages in manufacturer's maintenance manuals. Where manufacturer provides inadequate information, Consular AV Installer shall provide information necessary for proper maintenance.
3. Submit replacement parts lists in support of all items of equipment, either stock manufactured item or custom built.
4. Submit data on same electronic storage as with programming code and software for system.

1.5 OWNERSHIP OF PROPRIETARY MATERIAL

- A. Government retains all rights to software and passwords used for this project.
- B. Government will sign copy of manufacturer's standard software and firmware licensing agreement as condition of this contract. Such license shall grant use of all programs and application software to Government as defined by manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of Trade Secrets contained within such software.
- C. Licensing agreement shall not preclude use of software by individuals under contract to Government for commissioning, servicing, or altering system in future. Use of software by individuals under contract to Government will be restricted to use on Government's computers, and only for purpose of commissioning, servicing, or altering installed system.
- D. All project developed software, files and documentation shall become property of Government.

1.6 QUALITY ASSURANCE

- A. Consular AV Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project, and are Certified Technology Specialists (CTS and CTS-D), with minimum 10 years industry experience.
- B. Qualification for Engineers for DSP Software and Control Products: Manufacturer-certified and factory-trained for product line training, software programming, and service.

- C. Independent Testing Agency Qualifications: Testing agency that is member company of InterNational Electrical Testing Association (NETA), and that is acceptable to Project Director/COR based upon input from OBO/PDCS/DE/EE.
 - 1. Testing Agency's Field Supervisor: Person currently certified by NETA or National Institute for Certification in Engineering Technologies (NICET) to supervise on-site testing specified in this Section.
- D. Comply with the OBO Electrical Code; see Section 270508 "Common Work Results for Telecommunications."
- E. Comply with National Fire Alarm and Signaling Code (NFPA 72).

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in fully enclosed vehicles after specified environmental conditions have been permanently established in spaces where equipment is to be placed.
- B. Store equipment in spaces with environments controlled within manufacturers' ambient temperature and humidity tolerances for non-operating equipment.

1.8 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted speaker microphones with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 MAINTENANCE SERVICE

- A. During project warranty period, Consular AV Installer shall supply staff, authorized and trained for equipment installed, to service equipment as described below.
 - 1. Telephone Assistance: Consular AV Installer shall respond via telephone within one business day of notification. This first contact will be to outline nature of problem or functional anomaly. Consular AV Installer shall make available an individual knowledgeable with installed system that can address specific system issues described by system operators.
 - 2. On-Site Repair Assistance: Consular AV Installer shall be available to provide capable technicians for on-site service of systems equipment or control software. Technicians dispatched shall be familiar with installed system with complete knowledge of products used in systems configuration. Technicians dispatched shall have complete ability to address nature of system anomaly or performance difficulty described. Provide on-site response within one week. Service shall be available during normal business hours of the facility, Monday through Friday, 8:00 am until 5:30 pm.

3. Scheduled Service: Consular AV Installer shall provide two scheduled service visits to inspect, maintain, and adjust systems during project warranty period. First visit shall occur approximately six months after installation, and second visit near end of warranty period.
 - a. Adjustment: During first scheduled service visit provide on-site assistance in adjusting system to suit actual occupied conditions. Refer to Part 3 requirements for START-UP SERVICE in relation to initial adjustment prior to operation.

PART 2 - PRODUCTS

2.1 GENERAL

- A. System manufacturer shall furnish all equipment. In addition, manufacturer shall furnish all accessory components to this system that are not identified in the Summary Article in RELATED SECTIONS.

2.2 AUDIO EQUIPMENT

A. Audio dynamic sound processor (DSP):

1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Biamp
 - b. Pevey
 - c. Clear One

B. Consular Side Intercom Speakers:

1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Tannoy
 - b. JBL
 - c. Electro-Voice

C. Applicant Side Speakers:

1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products may be incorporated into the Work include, but are not limited to, the following:

- a. Tannoy
 - b. JBL
 - c. Electro-Voice
- D. Audio Amplifier: Provide two channels of amplifications for intercom speakers at each teller window. These amplifiers may be either part of DSP assembly, or may be product of separate manufacturer as follows:
 - 1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products may be incorporated into the Work include, but are not limited to, the following:
 - a. Biamp
- E. Gooseneck Microphone:
 - 1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products may be incorporated into the Work include, but are not limited to, the following:
 - a. Audiotechnica
 - b. Clock Audio
 - c. Shure
- F. Boundary Zone Intercom Microphone:
 - 1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crown
 - b. Harmon Audio
- G. Audio Connections:
 - 1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products that be incorporated into the Work include, but are not limited to, the following:
 - a. Brahler
 - b. DIS
- H. Paging Speakers:
 - 1. 70 V speaker with individual volume control on each speaker.

2.3 REMOTE CONTROL SYSTEMS

A. AV Function Control System:

1. Acceptable Manufacturers: Subject to compliance with functional description of system and other requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Creston
 - b. AMX

2.4 NETWORK COMPONENTS

A. Provide network connections: CobraNet or approved equal.

1. Provide network switches to support CobraNet device connections.

2.5 MISCELLANEOUS EQUIPMENT

A. Consular Audio Equipment Rack: Provide racks for rack-mounted consular audio equipment. Included rack-mounted shelves for equipment which is not rack-mounted. Provide associated wire management.

B. AC Power Conditioning for Equipment Rack:

1. Provide power devices based upon host country power standards.

C. AC Power Uninterruptible Power Supply (UPS): Provide for all audio signal processor and control system equipment. Size to operate paging and intercom for minimum of 10 minutes.

D. Cables: The following represents Basis of Design unless indicated otherwise on Drawings:

1. Type 1: West Penn D25921 Audio (Mic/Line shielded plenum).
2. Type 2: West Penn D25924 Audio (for 16- and 8-ohm speakers shielded plenum).
3. Type 3: West Penn D25923 Audio (70-V speakers shielded plenum).
4. Type 4: West Penn D254246 Category 6.
5. Type 5: West Penn D25291 RS-232 Distribution.
6. Type 6: Cresnet-P 6500185 Crestnet Distribution.

E. Connection Plate Receptacles: Unless otherwise detailed, provide the following types of panel receptacles on connection boxes, panels, plates, and wire ways:

1. Audio (microphone or line level): XLR3 type.
2. Loudspeakers (70 Volt or Low Impedance): Neutrik "Speakon" type.

2.6 SOFTWARE

- A. Provide all programming and configuration necessary to provide a complete and working system conforming to functional and performance requirements identified in this Section.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

- 1. Installation includes setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other work whether or not expressly required herein which is necessary to result in complete operational systems.
- 2. Installation shall be performed by installers authorized by Manufacturers.
- 3. Installation shall provide system which conforms to functional and performance requirements of this Section.

B. Physical Installation:

- 1. Firmly secure equipment in place unless requirements of portability dictate otherwise.
- 2. Secure with fasteners adequate to support load from system with safety factor of at least three times total load.
- 3. Secure boxes, equipment, and similar components plumb and square.
- 4. Install equipment and cable in manner that facilitates operational efficiency and overall aesthetic factors.

C. Cable Installation:

- 1. Mark cables, regardless of length, with wrap-around number or letter cable markers at both ends. There shall be no unmarked cables at any place in the system. Marking codes used on cables shall correspond to codes shown on drawings or wire run sheets.
- 2. Neatly strap, dress, and adequately support inter-rack cabling.
- 3. Group cables according to signals being carried. To reduce signal contamination, form separate groups for the following cables:
 - a. Power cables.
 - b. Control, data cables, and Cat 6 UTP.
 - c. Audio cables carrying signals less than -20 dBm.
 - d. Audio cables carrying signals between -20 dBm and +20 dBm.
 - e. Audio cables carrying signals above +20 dBm.
- 4. Do not allow audio cables to run in same raceway as video, computer video or power cables.

5. As general practice, run power cables, control cables, and high level cables on left side of equipment rack as viewed from rear. Run other cables on right side of equipment rack, as viewed from rear.
6. Cut cables to length dictated by run. Splices in pull boxes are not permitted without prior permission of Project Director/COR. For equipment mounted in drawers or on slides, provide interconnecting cables with service loop of appropriate length.
7. Do not install cable with bend radius less than that recommended by cable manufacturer.
8. Install cable in 50 mm below-grade conduit from Consular equipment room to locations of paging devices in outdoor Consular waiting area. See Division 26 section on raceways and boxes for installation of conduit outside of building.

3.2 GROUNDING

- A. Procedures: To minimize problems resulting from improper grounding and to achieve maximum signal-to-noise ratios, adhere to the following:
 1. General: Because of great number of possible variations in grounding systems, it is the responsibility of Contractor to follow practices below, and to deviate from these practices only when necessary to minimize cross talk and to maximize signal-to-noise ratios in the audio, video, and control systems. See Section 270526 "Grounding and Bonding for Communications Systems" for general requirements.
 2. Install secondary system grounding conductors from all racks, audio consoles, and ungrounded audio equipment in each area to primary system grounding point for area
 3. Do not use AC neutral conductor, either in power panel or in receptacle outlet, be used for system ground; no exceptions are permitted.
 4. Audio Cable Shields: Ground audio cable shields at one point only; no exceptions are permitted. For inter and intra-rack wiring, shield be connected at one end only. For ungrounded portable equipment, such as microphones, connect shield at both ends but grounded at only one end.
 5. Speaker Cable Shields: Ground all speaker cable shields at rack enclosure and bond to technical ground.

3.3 SYSTEM PROGRAMMING

- A. Programming: Fully brief Project Director/COR on available programming options. Record Project Director/COR's decisions and set up initial system program. Prepare a written record of decisions, implementation methodology, and final results.

3.4 IDENTIFICATION AND INSTRUCTIONS

- A. Associated AV Equipment Room: Provide wall-mounted, full-size system diagrams to facilitate system setup and troubleshooting. Mount diagrams under clear plastic for protection.
- B. Teller-Side Window Station: Provide simplified user guide for tellers. Laminate each guide for durability.

3.5 FIELD QUALITY CONTROL

- A. Contractor System Checkout: Before Acceptance Tests are scheduled, Consular AV Installer shall perform their own system checkout as quality control procedure. They shall furnish all required test equipment, and perform all steps necessary to determine performance of system to conform to requirements of this Section. This work shall include the following:
1. Checkout procedures shall be consistent with test standards identified under requirements for "System Acceptance Tests" below.
 2. Test all audio and related systems for comply with System Performance Requirements.
 3. Check all control functions, from controlling devices to controlled devices, for proper operation.
 4. Perform preliminary adjusting, balancing, and alignment of system equipment for optimum quality and for conformance with manufacturer's published specifications. Establish and mark normal settings for all level controls, and record these settings in "Operation and Maintenance Data" submittal.
 5. Maintain documentation on-site of all performance tests for reference by Project Director/COR and representative of independent testing agency during System Acceptance Tests.
- B. Systems Acceptance Tests:
1. Contractor shall engage independent testing agency to perform tests identified below. System Acceptance Tests shall not be performed until Contractor's System Checkout has been completed. Project Director/COR or their representative may monitor System Acceptance Tests. These tests will consist of the following:
 - a. Testing Standards: International Standard IEC 60268-16, as identified in Article on SYSTEM PERFORMANCE REQUIREMENTS.
 - b. Testing Equipment: Contractor is responsible for supplying test equipment required to perform tests.
 - c. Two complete hardcopy sets of record drawings, run sheets, manuals, and other required pre-testing construction submittals shall be on on-site, delivered to Project Director/COR prior to scheduling of Acceptance Tests.
 - d. Physical inventory of installed equipment and components shall first be performed of all equipment on site to confirm sufficient presence of items necessary to obtain acceptable test results.
 - e. Consular AV Installer shall demonstrate operation of all system equipment.
 - f. Subjective and objective tests shall be performed to determine compliance with requirements of this Section. Confirm that sampling of 25 percent of teller windows and paging zones achieve required minimum STI.
 - g. If further adjustment is required to conform to project requirements, or if equipment is defective and requires repair or replacement, tests may be suspended or continued at discretion of Project Director/COR. Acceptance testing shall then be continued once Consular AV Installer has identified readiness of system. Costs associated with suspension of testing, including additional costs for testing representatives of Project Director/COR, are responsibility of Contractor.

2. Performance of test audio signal paths for Performance Standards Tests will include, as an example but not limited to, the following:
 - a. Audio:
 - 1) Communication of each teller window station. Test of levels shall include echo cancellation check.
 - 2) Paging capabilities from each teller window station.
 - 3) Monitoring station capabilities.
 - 4) Testing shall be from all source inputs (e.g., microphones, audio tape units) through all (e.g., mixers, ADA's, switchers) to all signal destinations.
 - 5) Test all switches, sound levels, and overall intelligibility.
 - 6) Delineation of above signal paths does not exempt Contractor from responsibility of checking all paths and outlets for appropriate compliance with Performance Standards during prior Contractor System Checkout.
 - 7) During Acceptance Testing, all equipment shall be operated under standard conditions recommended by manufacturer.
 - b. Control:
 - 1) Audio volume, include inbound and outbound levels.
 - 2) Mute inbound and mute outbound operations
 - 3) Paging selections.
 - c. Miscellaneous:
 - 1) Cable identification markings.
 - 2) Cable routing integrity and neatness.
 - 3) Location of speakers, microphones, and controls.

3.6 CLEANING

- A. Upon completion of installation, clean equipment in accordance with manufacturer's instructions.

3.7 STARTUP SERVICE

- A. Engage factory-authorized service representative to perform startup service and initial system programming.
- B. Adjust sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.
- C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
- D. Complete installation and startup checks according to manufacturer's written instructions.

3.8 PROTECTION

- A. During installation, and up to date of occupancy, protect finished and unfinished work against damage and loss. In event of such damage or loss, replace or repair such work at no cost to Government.

3.9 DEMONSTRATION

- A. Provide on-the-job training by instructor who is fully knowledgeable in design and operation of systems to individuals identified by Project Director/COR. Provide qualified instructors or manufacturer's representative for such instruction. All training shall take place after audio systems are operational, and after Government-Furnished Government-Installed (GFGI) components and software for Consular Queue Management System is operational; see Section 275405 "Consular Queue Management System Infrastructure and Displays."

1. System User Training:

a. Training Sessions:

- 1) On-site class training of 1-hour duration per session, with each session training tellers serving 10 windows. Number of class sessions shall be one for each 10 teller windows.
- 2) On-site hands-on training sessions of same individuals that participated in class sessions, but on window-by-window basis. Sessions shall be ½-hour duration for each window, with two individuals being trained in each session.

b. Training Content:

- 1) Operation of teller window control panel, volume level, and paging area selection(s).
- 2) Microphone use and techniques for best intelligibility.

2. Technical Support Personnel Training; 8-hour session for 4-6 individuals. Session shall include the following topics:

- a. Operation of teller window control panel (conceptual design, configuration and normal use parameters).
- b. Microphone use and techniques for best signal to noise ratio.
- c. General Care and system maintenance.

END OF SECTION 275105