

SECTION 275116 - PUBLIC ADDRESS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a tested and fully functioning intercom system in the building, including but not limited to:
 - 1. Intercom Head End system / Admin Intercom Master Station and Media Player
 - 2. Ceiling and Wall-Mounted Speakers with talk-back functionality initiated by existing wall-mounted call buttons (Intercom Call-In Switches).
 - 3. Amplifier/Switching Device – a minimum of one located in each Telecom Room, to power classroom ceiling speakers.
 - 4. Paging horn if applicable.

- B. Coordinate with Owner regarding the following:
 - 1. Speaker Zones
 - 2. Class / Bell schedule
 - 3. Training of the interface of the Public Address System and how to load and change content on the Media Player.

1.2 DEFINITIONS

- A. Channels: Separate parallel signal paths, from sources to loudspeakers or loudspeaker zones, with separate amplification and switching that permit selection between paths for speaker alternative program signals.

- B. VU: Volume unit.

- C. Zone: Separate group of loudspeakers and associated supply wiring that may be arranged for selective switching between different channels.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of public address systems and ancillary equipment of types, ratings, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

- B. Installer's Qualifications: Firms with at least 3 years of successful installation experience with projects utilizing public address systems and equipment similar to that required for this project.

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- C. All work shall be performed and completed in a thorough and workmanlike manner and in accordance with the manufacturer's instructions.
- D. All items of equipment including wire and cable shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.
- E. Except where specifically noted otherwise, all equipment supplied shall be the standard product of a single manufacturer of known reputation and experience in the industry. The supplying contractor shall have attended the manufacturer's installation and service school. A certificate of this training shall be provided with the contractor's submittal.
- F. Listing and labeling: Provide products specified in this section that are listed and labeled.
 - 1. The Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100

1.4 REGULATORY REQUIREMENTS

- A. Provide products listed and classified by Underwriter's Laboratories, Inc as suitable for the purpose indicated.
- B. Follow all applicable local codes, references, and standards per the listings in this specification and per the Authority Having Jurisdiction.
- C. The communications system shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as D.S.& G. and be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, including N.E.C. Section 800-51 (i), under direction of a qualified and factory approved distributor, to the approval of the owner.
- D. Comply with UL 50
- E. Comply with NFPA 70

1.5 SUBMITTALS

- A. The following submittals are due at the "pre-construction" phase submission:
 - 1. Shop Drawings:
 - a. Submit for review scaled layout drawings showing the routing of all cabling, locations of public address devices, console, rack arrangements and splices (where

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- allowed/required by contract documents), pair/strand counts, cable types, cable jacket listing information, fire-stop locations (with quantity and NRTL system number identified) and cable designations at each splice and termination point.
- b. Unless otherwise required by these specifications, it is permissible to show different cabling systems (voice, data, CATV, A/V) on the same shop drawing.
 - c. Shop drawings shall show the layout of the AV equipment racks with each block/panel.
2. Provide calculations for sizing backup battery
 3. Provide a typed list indicating part name, manufacturer, part number, and color (if applicable) for products specifically identified herein by the exact and complete part number (no wild-card characters).
 4. Submit manufacturer's' cut sheets or catalog cut sheets of each of the cables specified not specifically identified by its exact part number:
 - a. Cut sheets shall include the following information at a minimum:
 - 1) Manufacturers name and logo
 - 2) Cable outside diameter
 - 3) Number of conductors/strands in each cable and binder group
 - 4) Gauge or strand thickness
 - 5) Minimum transmission performance rating
 - 6) Cable jacket material and rating
 - 7) Maximum pulling tension
 - 8) Jacket/Sheath color
 - 9) Individual conductor or strand insulation colors
 - 10) Minimum bend radius
 - a) During installation and post installation.
 - b) As well as any additional information required by individual sections of this Division
 - n.
 5. Required warranty information as indicated herein and elsewhere in this Division
 6. Manufacturers Testing
 - a. Submit as required by in the specification sections.
- B. The following submittals are due at the "Project Completion" phase submission:
1. As-built Drawings:
 - a. Submit scaled layout drawings showing the routing of all cabling, locations of speakers, head end equipment, public address devices and splices (where allowed/required by contract documents), pair/strand counts, cable types, cable jacket listing information, fire-stop locations (with quantity and NRTL system number identified) and cable designations at each splice and termination point.
 - b. Unless otherwise required by these specifications, it is permissible to show different cabling systems (voice, data, CATV, A/V) on the same As-built drawing.
 - c. As-built drawings shall show the layout of the AV equipment racks with each block/pan

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- el.
- 2. Installation wiring diagrams and instruction manuals
- 3. Warranty Certificate
- 4. Submit a certificate of completion of installation and service training from the system manufacturer.

PART 2 - PRODUCTS AND MATERIALS

2.1 MANUFACTURERS

- A. CareHawk – CH 1000 System
- B. Bogen – Multicom 2000 System

2.2 HEAD END EQUIPMENT

- A. Main Cabinet
- B. Intercom Master Station
- C. Media Player - Integral or Auxiliary.

2.3 PERIPHERAL DEVICES

- A. Administration Phone / Microphone (2)
- B. Switching Modules
 - 1. Provide quantities as required to support all Classroom Speaker locations. ***Include minimum 25% spare ports in each Telecom Room for future expansion.***
- C. Speakers & Call Stations
 - 1. Indoor ceiling speakers and grilles (2' x 2' Lay-In Type shall have recessed volume control and rotary wattage adjustment), shall be:
 - A. Quam System 12/VC
 - B. Bogen Model CSD2X2VRU
 - C. Approved equal
 - 2. Indoor wall-mounted speakers shall be:
 - A. Quam System 2
 - B. Bogen Model WBS8T725
 - C. Approved equal

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3. Use existing single gang call stations (Call Buttons)
4. Wiring shall be done per manufacturer's recommendations and shall utilize plenum-rated Category 5e Speakers that shall be provided with two-way functionality unless in corridors or rooms with multiple speakers where a single speaker is being identified for the return signal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install and wire systems and equipment in accordance to the NFPA 70, other applicable codes, and per the local Authority Having Jurisdiction. Install and wire systems and equipment to comply with manufacturer's written instructions.
- B. Wiring Method: Install wiring in raceway in walls and in un-accessible ceiling spaces. In spaces above accessible ceilings, plenum cable may be installed in cable trays or using D-Rings where cable trays are not available. All cabling shall be kept a minimum of 12" from lighting ballasts and 4' from transformers and power equipment.
- C. Control Circuit Wiring: Install control circuits in accordance to NFPA 70 and as indicated per manufacturer's instructions. Provide number of conductors as recommended by system manufacturer to provide the control functions specified.
- D. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes, terminal cabinets, and equipment enclosures.
- E. Wiring Within Enclosures: Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.
- F. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- G. Provide physical isolation from each other for microphone, line level, speaker, and power wiring. Run in separate raceways or provide 12 inches of minimum separation where exposed or in same enclosure. Provide additional physical separation as recommended by equipment manufacturer.
- H. Conductor Requirement and Sizing: Size all conductors per manufacturer's recommendations.
- I. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.

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- J. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings as recommended by the Manufacturer.
- K. Grounding: Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common mode returns, noise pickup, cross-talk, and other impairments. Ground equipment per manufacturer's recommendations.
- L. Repairs: Wherever walls, ceilings, floors, or other building finishes are cut for installation - repair, restore, and refinish to the original appearance
- M. Cleaning: Prior to final acceptance, clean system components and protect from damage and deterioration.
- N. Firestopping: All holes, conduit penetrations, etc., shall be firestopped to meet applicable codes. Penetrations shall be made using conduit sleeves.
- O. All outside speakers shall be on a separate zone.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: If installing contractor is not already a factory-authorized service representative, engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field-Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Schedule tests with at least seven days' advance notice of test performance.
 - 2. After installing public address and after electrical circuitry has been energized, test for compliance with requirements.
 - 3. Cable Test: Contractor shall provide a thorough testing program for the cabling system. The testing should be done in accordance with EIA/TIA TSB-67, Level II performance. All cables shall be tested.
 - 4. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.
 - 5. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:

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- a. Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.
 - b. Repeat test for each separately controlled zone of loudspeakers. c. Minimum acceptance ratio is 50 dB.
 6. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.
 7. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.
- D. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.
- E. Public address systems will be considered defective if they do not pass all tests and inspections.
- F. Prepare test and inspection reports.
1. Include a record of cable testing, final speaker-line matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

3.3 STARTUP

SERVICE

A. Perform startup

service.

1. Verify that wiring installation complies with manufacturer's submittal and installation requirements.
2. Complete installation and startup checks according to manufacturer's written instructions.

3.4 ADJUSTING

A. On-Site Assistance: Engage a factory-authorized service representative to provide on-site

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assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.

- B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain the public address and mass notification systems and equipment in all operating modes and functions.
- B. Schedule training with owner with at least seven (7) days advanced notice.
- C. Provide a minimum of four (2) hours of training.

3.6 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: When requested within one (1) year of date of Substantial Completion, provide on-site assistance in adjusting sounds levels, adjusting controls, and investigating possible needs for any system revisions required to meet actual occupancy conditions. Provide up to one (1) visit to the site for this purpose.

3.7, WARRANTY:

- A. The contractor shall warrant parts and labor for the complete system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year.

END OF SECTION 275116