

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

SECTION 27 51 16  
PUBLIC ADDRESS SYSTEMS

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Amplifier and control equipment
- B. Input equipment
- C. Raceways and communications cable
- D. List of equipment for gym PA system
- E. List of equipment for cafeteria PA system
- F. List of equipment for cafetorium PA system
- G. List of equipment for stadium PA system

1.2 SYSTEM DESCRIPTION

- A. Public address systems for voice and music with microphones and distribution of background music

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Indicate layout of equipment mounted in racks and cabinets, component interconnecting wiring and wiring diagrams of field wiring to speakers and remote input devices.
- C. Product Data: Provide for components and accessories.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Article REGULATORY REQUIREMENTS.
- E. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Manufacturer Field Reports: Submit under provisions of Section 01 40 00.
- H. Manufacturer Field Reports: Indicate that installation is complete and system performs according to specified requirements.

1.4 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01 77 00.
- B. Accurately record the actual locations of speakers, control equipment, and outlets for input/output connectors.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01 77 00.
- B. Operation Data: Include instructions for adjusting, operating, and extending the system.
- C. Maintenance Data: Include repair procedures, repair parts lists, service manuals, and schematics on each component in the system.

1.6 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in public address system with 5-years of experience.
- B. Supplier shall be an authorized distributor of amplifier/control equipment manufacturer.
- C. Installer shall be an authorized installer of amplifier/control equipment manufacturer with 5-years of experience and a service facility within 150 miles of Project.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.
- C. Conform to requirements of Federal Communications Commission.

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## 1.8 MAINTENANCE SERVICE

- A. Furnish service and maintenance of public address system for one year from Date of Substantial Completion.

## **PART 2 PRODUCTS**

### 2.1 AMPLIFICATION/CONTROL EQUIPMENT

- A. Manufacturers: Use current model.
  1. Dukane
  2. Crown Audio, Inc
  3. Electro-Voice
  4. JBL
  5. Mackie
  6. Shure
  7. Tascam
  8. Atlas Sound
  9. DBX
  10. Community
  11. Soundcraft
  12. Middle Atlantic
  13. Whirlwind
- B. Microphone Inputs
  1. Stadiums, and Courtyard System, provide two low impedance inputs with 600-microvolt sensitivity and noise level at least 55 dB below rated output.
  2. Cafeteria and Gymnasium System, provide four low impedance inputs with 600-microvolt sensitivity and noise level at least 55 dB below rated output.
- C. Auxiliary Inputs: Provide one high impedance input with 0.4-volt sensitivity and noise level at least 70 dB below rated output.
- D. System Frequency Response: 50 - 15,000 Hz. + 2dB.
- E. System Distortion: Less than 1.5%, 100 to 100,000 Hz. at rated power.
- F. System Output Power: - rms
  1. Courtyard Sound Systems – 100-Watts
  2. Cafeteria Sound System – 1200-Watts
  3. Cafetorium Sound System – 1200 Watts
  4. Gymnasium Sound System – 2400-Watts
  5. Stadium Sound System – 2400-Watts
- G. Volume Controls: Provide one for each input and one master volume.
- H. Bass Control: +8 dB to -12 dB at 50 Hz
- I. Treble Control: +8 dB to -12 at 10,000 Hz
- J. Program Selector: Provide program and mode selector switches.
- K. System Cabinet
  1. Media Center System – Vented surface mounted lockable media cabinet as used in typical classroom.
  2. Cafeteria, Cafetorium, and Gymnasium System -Vented, wall mounted lockable metal construction.
  3. Stadium System - Surface mounted thoroughly vented, lockable metal construction.
  4. Courtyard System - If installed on the exterior shall be rated weatherproof enclosure.

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- L. Cafeteria, Cafetorium, and Media Center PA console shall be connected to audio inputs from DVD player, auxiliary input source, and computer.
    - 1. PA system in cafeteria, cafetorium, and media center will provide audio amplification of the ceiling projector system from both the projector control station and projector satellite control station.
  - M. PA console shall have mute circuit connected to the campus intercom system to mute the PA speakers when campus intercom speakers are activated.
  - N. New or upgraded PA systems, except for stadiums, shall have a rack power off circuit, controlled by the fire alarm system. The PA system shall power off when the fire alarm is in emergency mode. The PA system rack power circuit shall require a manual reset, after the fire alarm is reset, accessible from the PA rack. Provide one sequenced power control system to power off the PA system in the event of a fire alarm, Middle Atlantic PDS-620R or approved equal. Provide any other component(s) necessary for satisfactory operation of the system.
  - O. DBX Zone Control configured with speaker protection (limits) and feedback suppression.
  - P. PA console shall have one line out with RCA female labeled "ALD" for Assisted Listening Device from a mono summing output.
  - Q. PA console shall have one input cable connected to system terminating with 1/8" TRS (3.5 mm stereo) male with 3 ft. of coiled slack secured with hood and loop Velcro cable fastener at front of rack labeled "Auxiliary" or "Aux".
- 2.2 PA SYSTEM EQUIPMENT LIST FOR CAFETERIA (Typical High School)
- A. This list contains main components of a PA system for a cafeteria.
    - 1. One Atlas WMA35-23 Wall Cabinet or approved equal.
    - 2. One locking door installed in rack, 2RU (two rack unit) size.
    - 3. Four JBL PRX 415 wall mounted speakers or approved equal.
    - 4. Two Crown XTI 2002 Power Amplifiers or approved equal.
      - a. Integrate the amplifier with the projector system and physically locate in the media cabinet at the projector control station.
    - 5. One Tascam CD-200SB CD/MP3 player, rack mounted or approved equal.
    - 6. One Digital Zone Processor System, 12 total inputs to include:
      - a. One DBX ZonePRO 1261m rack mounted or approved equal.
      - b. One DBX ZC3 wall mounted or approved equal.
      - c. Seven DBX ZC1 wall mounted or approved equal.
    - 7. One 12 input mixer installed upright, integrated into Zone Processor System: Soundcraft EFX 12 or approved equal.
    - 8. Two Shure SLX4 wireless microphone receivers rack mounted or approved equal.
    - 9. Two Shure SLX2/58 handheld transmitter or approved equal.
    - 10. Two Shure SLX1 body pack transmitter or approved equal.
    - 11. Two Shure WH30TQG headset microphone or approved equal.
    - 12. One Atlas ACRL-291 power strip or approved equal.
    - 13. Two Shure SM58S handheld microphones or approved equal.
    - 14. Two Atlas MS-10C microphone stands or approved equal.
    - 15. One DVD player shelf mounted inside rack.
    - 16. Provide any other component(s) necessary for the satisfactory operation of the system.
  - B. Contractor shall provide all components for a complete system.
  - C. If any major part is missing from this list, the bidder shall inform affected parties prior to bid.
  - D. Installed system shall provide minimum of 10 decibels above the ambient noise at full occupancy.

### 2.3 PA SYSTEM EQUIPMENT LIST FOR CAFETORIUM (Typical Elementary and Middle School)

- A. This list contains main components of a PA system for a cafetorium.
1. One Atlas WMA35-23 Wall Cabinet or approved equal.
  2. One locking drawer installed in rack, 2 RU (rack unit) size.
  3. Four JBL PRX 415 Wall Mounted Speakers (Main) or approved equal
  4. Two JBL JRX 212 Wall Mounted Speakers (Monitor) or approved equal.
  5. Two Crown XTI 2002 Power Amplifier (Main) rack mounted or approved equal.
    - a. Integrate the amplifier with the projector system and physically locate in the media cabinet at the projector control station.
  6. One Crown XTI 1002 Power Amplifier (Monitor) rack mounted or approved equal.
    - a. Integrate the amplifier with the projector system and physically locate in the media cabinet at the projector control station.
  7. One Tascam CD-200SB, rack mounted or approved equal.
  8. One Digital Zone Processor System, 12 total inputs to include.
    - a. One DBX ZonePRO 1261m rack mounted or approved equal.
    - b. One DBX ZC3 wall mounted or approved equal.
    - c. Seven DBX ZC1 wall mounted or approved equal.
  9. One 16 input mixer on sliding rack shelf, integrated into Zone Processor System: Soundcraft FX16ii or approved equal.
  10. Two Shure SLX4 Wireless microphone receivers rack mounted or approved equal.
  11. Two Shure SLX2/58 Handheld transmitter or approved equal.
  12. Two Shure SLX1 Bodypack transmitter or approved equal.
  13. Two Shure WH30TQG Headset microphone or approved equal.
  14. One Atlas ACRL-291 Power Strip rack mounted or approved equal.
  15. Two Shure SM58S Handheld Microphones or approved equal.
  16. Three Shure MX202BP/C Hanging ceiling microphones or approved equal.
  17. Two Atlas MS-10C Microphone Stands or approved equal.
  18. One DVD shelf mounted inside rack
  19. Provide any other component(s) necessary for the satisfactory operation of the system.
- B. Contractor shall provide all components for a complete system.
- C. If any major part is missing from this list, the bidder shall inform affected parties prior to bid.
- D. Installed system shall provide minimum of 10 decibels above the ambient noise at full occupancy.

### 2.4 PA SYSTEM EQUIPMENT LIST FOR GYMANISIUM

- A. This list contains main components of a PA system for a gym.
1. One Atlas WMA35-23 Wall Cabinet or approved equal.
  2. One locking drawer installed in rack, 2 RU (rack unit) size.
  3. Eight JBL PRX 415 M, 4 speakers mounted above center of court in two clusters facing bleachers or approved equal.
  4. Two Crown XTI 4002 Power Amplifiers rack mounted or approved equal.
  5. One Tascam CD-200SB, rack mounted or approved equal.
  6. One Digital Zone Processor System, 12 total inputs to include:
    - a. One DBX Zone PRO 1261m rack mounted or approved equal.
    - b. One DBX ZC3 wall mounted or approved equal.
    - c. Four DBX ZC1 wall mounted or approved equal.
  7. One 12 input mixer installed upright, integrated into Zone Processor System: Soundcraft EFX 12 or approved equal.

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8. Two Shure SLX4 Wireless microphone receivers rack mounted or approved equal.
9. Two Shure SLX2/58 Handheld transmitter or approved equal.
10. Two Shure SLX1 Body pack transmitter or approved equal.
11. Two Shure WH30TQG Headset microphone or approved equal.
12. One Atlas ACRL-291 Power Strip rack mounted or approved equal.
13. Two Shure SM58S Handheld Microphones or approved equal.
14. Two Atlas MS-10C Microphone Stands or approved equal.
15. Provide any other component necessary for the satisfactory operation of the system.

B. Contractor shall provide all components for a complete system.

C. If any major part is missing from this list, the bidder shall inform affected parties prior to bid.

D. Installed system shall provide minimum of 15 decibels above the ambient noise at full occupancy.

## 2.5 PA SYSTEM EQUIPMENT LIST FOR STADIUM

A. This list contains main components of a PA system for a stadium.

1. One Atlas Cabinet or approved equal.
2. One Community R2-52Z Speaker (aimed at visitor side) or approved equal.
3. Two Community R2-474Z Speakers (aimed at home side) or approved equal.
4. One Community R2-694Z Speaker (aimed at home side) or approved equal.
5. Two Crown XTI 2002 Power Amplifiers rack mounted or approved equal.
6. One Tascam CD-200SB, rack mounted or approved equal.
7. One Digital Zone Processor System, 12 total inputs to include
  - a. One DBX Zone PRO 1261m rack mounted or approved equal
  - b. One DBX ZC3 wall mounted or approved equal.
  - c. Seven DBX ZC1 wall mounted or approved equal.
8. One 12 input mixer installed upright, integrated into Zone Processor System: Soundcraft EFX 12 or approved equal.
9. Two Shure SLX4 Wireless microphone receivers rack mounted or approved equal.
10. Two Shure SLX2/58 Handheld transmitter or approved equal.
11. Two Shure SLX1 Body pack transmitter or approved equal.
12. Two Shure WH30TQG Headset microphone or approved equal.
13. One Atlas ACRL-291 Power Strip rack mounted or approved equal.
14. Two Shure SM58S Handheld Microphones or approved equal.
15. One Shure 450 Series II push to talk announcer microphone or approved equal.
16. Two Atlas MS-10C Microphone Stands or approved equal.
17. Provide any other component necessary for the satisfactory operation of the system.

B. Contractor shall provide all components for a complete system.

C. If any major part is missing from this list, the bidder shall inform affected parties prior to bid.

D. Installed system shall provide minimum of 15 decibels above the ambient noise at full occupancy.

## 2.6 ACCESSORIES

A. Microphones, stands and cabling

1. Quantity (4) for each system Whirlwind MK425 25' microphone cables with XLR connectors for the microphone and input jacks or approved equal.
2. Quantity (2) for each system Whirlwind MK450 50' microphone cables with XLR connectors for the microphones and input jacks or approved equal.

B. Speakers and Stadium Driver/Horns

1. As recommended by the amplifier manufacturer for the particular application required.

2. The maximum power rating shall not be less than the peak power available from the amplifier.
- C. Microphone Cord
  1. 20-AWG stranded copper conductor, 600-volt insulation, rated 60°C, two conductor shielded cable with rubber jacket.
- D. Input Cable
  1. 22-AWG copper conductors, 300-volt insulation, rated 60°C, paired conductors twisted together, shielded, and covered with a PVC jacket.
- E. Speaker Wire and Cable
  1. Media Center System - 20 AWG copper conductors, 300-volt insulation, rated 60°C, paired conductors twisted together, shielded, and covered with a PVC jacket.
  2. Stadium, Cafeteria and Gymnasium System - 12 AWG copper conductor, 600-volt insulation, rated 60°C.
- F. Provide raceway for all sound system conductors under the provisions of Section 26 05 33.
- G. Microphone input connectors: 3-pin male cannon connectors.
- H. Microphone outlets in the Gymnasium shall not be floor mounted.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- A. Install equipment in accordance with manufacturer's instructions.
- B. Splice cable only in accessible terminal block units.
- C. Make cable shields continuous at splices and connect speaker circuit shield to equipment ground only at amplifier.
- D. Install input circuits in separate cable and raceways from output circuits.
- E. Leave 12" excess cable at each termination at microphone, volume pad, speaker, and other system outlet.
- F. Leave 6' excess cable at each termination at system cabinet.
- G. Provide protection for exposed cables where subject to damage.
- H. Use armored cable for outside speaker circuits.
- I. Use suitable cable fittings and connectors.
- J. Connect reproducers to amplifier with matching transformers.
- K. Install system cabinets in locations shown; arrange to provide adequate ventilation and access.
- L. Install amplifiers per manufacturer specification with appropriate spacing and ventilation above and below.
- M. Speaker lines in Gyms, Auditoriums, and Cafeterias shall be paralleled at the Amplifier and NOT at the speakers.
- N. Speaker lines on Football Fields, Softball Fields, and Stadiums shall be paralleled at the bottom of the pole in waterproof junction boxes and NOT on the top of the pole at the speakers.
- O. Provide surge protection devices on all stadium public address system cables that enter or leave the press box.
  1. Provide surge protection device on 120-volt power circuit serving the stadium public address consol.

#### **3.2 INTERFACE WITH OTHER PRODUCTS**

- A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights specified and indicated on Drawings.

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3.3 MANUFACTURER'S FIELD SERVICES

- A. Provide manufacturer's field services under provisions of Section 01 40 00.
- B. Include making final wiring connections, inspection, adjusting of completed installation and systems demonstration.
- C. Certify that installation is complete and performs according to specified requirements.

3.4 FIELD QUALITY CONTROL

- A. Measure and record sound power levels at designated locations.

3.5 ADJUSTING

- A. Adjust transformer taps for appropriate sound level.
- B. Adjust devices and wall plates to be flush and level.

3.6 DEMONSTRATION

- A. Demonstrate system to designated Owner personnel under provision of Section 01 77 00.
- B. Conduct walking tour of Project; briefly describe function, operation, and maintenance of each component.
- C. Provide detailed operation and maintenance instruction and training.
- D. Provide local training for Owner personnel.
- E. Use submitted operation and maintenance manual as reference during demonstration and training.

3.7 DEMONSTRATION AND TRAINING

- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative.
  - 1. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems.
  - 2. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
  - 3. Refer to Section 01 91 00, Commissioning, for further contractor training requirements.
- B. Provide demonstration and training for all types of panelboards installed in this project.
- C. Invite the SDPBC Intercom Shop Foreman to participate in the demonstration/acceptance of the public address system.
  - 1. Forward a copy of sign-in sheet of the participants to the SDPBC Project Coordinator.

END OF SECTION