

SECTION 16741

PAGING SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

A. Description Of System

1. The paging system shall meet the following requirements.
 - a. Telephone Page: Ability to page individual zone or areas and/or all areas or zones at the same time.
 - b. Microphone Page: Ability to page individual zones or areas and/or all areas or zones at the same time.
 - c. Extend an existing system.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Division 16 Section "Basic Electrical Materials and Methods".
- B. Division 16 Section "Electrical Identification".
- C. Division 16 Section "Wire and Cable (600 volts and less)".
- D. Division 16 Section "Wiring and Control Devices".

1.3 QUALITY CONTROL

A. Source Quality Control

1. Furnish equipment and materials listed in the current, latest issue having a date prior to issue date of Specifications, of Equipment Publications and Underwriters' Laboratories, Inc., bearing the UL Label and wherever standards have been established by NFPA, IEEE, ASTM, ANSI, ICEA and NEMA for equipment referenced to such standards in this document. Furnish equipment and materials conforming to the requirements of the National Electrical Code and the requirements of the Contract Documents.

B. Field Quality Control

1. Install equipment and material in compliance with the regulations of Local, State and Governmental laws governing electrical installations, the latest edition of the National Electrical Code and the requirements of the Contract Documents.

C. Quality Assurance

1. All tradesmen shall review the specifications herein with particular attention paid to the related sections. **CLOSE COORDINATION IS ESSENTIAL TO THIS PROJECT!**
2. Completely review all functions and layout of paging system unit components prior to permitting installation.
3. Bench test all components prior to installation.
4. Provide factory-trained personnel to conduct final site inspection, testing, start-up and programming.

1.4 EQUIPMENT SUPPLIER QUALIFICATIONS

- A. The supplier of the system shall maintain permanent service facilities in the area of the installation. The facilities shall include a permanent source of factory trained service technicians on 24 hour call experienced in servicing this type of equipment and shall provide warranty and routine maintenance service to afford the Owner maximum coverage. He shall also provide a central source of support to guarantee immediate answers to the Owner's problems resulting from malfunctioning and/or misunderstanding of the operation of the equipment.

1.5 EQUIPMENT INSTALLER QUALIFICATIONS

- A. The installation of the system shall be performed by fully qualified personnel having had experience on the installation of this type of system and able to certify that they have had no less than 5 years of continuous experience in this area and have made installations similar to this and of this size or larger.
- B. Contractor shall install the system under the supervision of the manufacturer and test the system in the presence of the Owner's Representative. Contractor shall submit all test reports to the Owner's Representative.

1.6 WIRING

- A. All wiring shall be in accordance with the manufacturers recommendation. All wiring must be installed in conduit or approved raceway. **Cables used in underground ducts shall be rated for use in flooded applications.** Wiring shall be run continuous from terminal to terminal without splices.
- B. All cabinets shall have surge suppressers provided for incoming power and speaker circuits.

1.7 SURGE PROTECTION

- A. All electronic equipment for all systems shall be equipped with surge protection.
- B. Provide lightning protection for all wiring entering or leaving building. Surge protection shall be installed in a junction box at floor level. Label box as "PAGING SYSTEM SURGE PROTECTION".

1.8 SUBMITTALS

- A. Unit Prices
 - 1. Submit unit prices for furnishing and installing each component specified in this Section. Each unit price includes all charges for General and Supplementary Conditions, incidental expenses, supervision, materials, labor, testing as required, applicable taxes, insurance, and overhead.

B. Shop Drawings And Product Data

1. Furnish submittals for items that are identified in this Section by a different type face and a bracketed code. Additional submittal requirements pertaining to this Section are specified herein under this Article. The type of submittals are defined as follows:
 - a. B - Bill of Materials: A detailed description of an assembly or components, including quantity.
 - b. C - Certificate: A notarized form or letter attesting to the quality of workmanship or product as measured by standards, codes or criteria specified in the Specifications.
 - c. D - Shop Drawings: Drawings, diagrams, schedules, illustrations or similar data specifically prepared for Work on this Project by the Contractor, subcontractor, distributor, or manufacturer to illustrate a product or a particular portion of the Work.
 - d. E - Extra Stock: Additional stock of specified material/products to be turned over to the Owner upon completion of project.
 - e. G - Guarantee: Written statement guaranteeing the product or a particular portion of the Work to be and remain free from defects in materials or workmanship for a definite period of time from date of acceptance of the Work.
 - f. L - Letter of Compliance: Written statement confirming that the product or a particular portion of the Work conforms to the requirements of the Contract Documents.
 - g. P - Product Data: Brochures, pictures, illustrations, diagrams, color charts or similar printed data of a manufactured product that is incorporated into the Work.
 - h. Q - Qualifications: Notarized statements attesting to the quality of workmanship, firm or individual as measured by standards, codes or criteria specified in the Specifications.
 - i. R - Record: Data substantiating the performance of a product, or a particular portion of the Work, and which does not require prior review and approval by the Owner's Representative, but is required for record purposes only. Performance data and other data may be required.
 - j. S - Samples: Physical examples of sufficient size to clearly illustrate functional characteristic of the product or assembly, or to show color, texture or pattern, as appropriate.
 - k. T - Test Report: Report, from a qualified testing agency, of actual tests conducted on products, assemblies or particular completed portions of the Work, measured against standards, codes or criteria specified in the Specifications. Each report shall state the values obtained for comparison with the stated standard, code or criteria specified in the Specifications.
1. List of Units provided, with unit identifications per Drawings, unit descriptions, ratings, types and catalog numbers are required for review purposes.
2. *Shop Drawings [D,P]*: Submit customized wiring diagrams, component product data and installation and operating instructions. Wiring diagrams shall show color coding of connections and mounting dimensions of equipment.
3. *Guarantee [G]*: The entire system and its operation shall be warranted for a period of 2 years from date of Owner's acceptance.
4. Submit shop drawings for approval and include complete data on each item. Coordinate the items, as they relate to the Work, prior to submittal. Shop drawings shall be approved at least 30 days prior to commencement of work and shall include:
 - a. System plans and riser diagrams: including sizing and routing of all conduits and wire, location of all equipment and devices, junction and pull boxes, and device address.

- b. Data catalog cuts or brochures on all equipment.
 - c. Installation hardware and requirements.
 - d. Wire and cable.
 - e. Complete wiring and connection diagrams of all equipment.
5. Furnish 1 electronic copy of Final, as Constructed, Shop Drawings and Product Data on CD ROM.

C. Maintenance Data And Operating Instructions

1. Furnish to the Owner 3 sets of instruction manuals and 1 set of manuals on electronic media (CD ROM) covering complete operating, service and repair instructions for the equipment furnished and complete illustrated parts breakdown with manufacturer's name, nomenclature and part number for each component part and assembly, include current unit prices for parts and supplies along with the location of the nearest source of supply and service.
2. During system commissioning and at such time acceptable performance of the system hardware and software has been established, the system supplier shall provide on-site operator instruction to the Owner's operating personnel. Operator instruction during normal working hours will be performed by competent representatives familiar with the system software, hardware and accessories.
3. At a time mutually agreed upon, the system supplier shall give 40 hours of instruction to the Owner's designated personnel on the maintenance and trouble shooting of all equipment within the system and describe its intended use with respect to the programmed functions specified. Maintenance and trouble shooting orientation of the system shall include the overall operational program. Equipment functions, commands, advisories and appropriate operator intervention required in responding to the system operation. An Owner's manual prepared for this project shall be used in addition to the instruction.
4. Additional instruction time as deemed necessary by the Owner shall be made available by the system supplier on a negotiated basis with the Owner.

D. *Guarantee [G]:*

1. The manufacturer shall warrant, in writing, all equipment and wiring to be free from all inherent mechanical and electrical defects in material and workmanship for a period of 2 years commencing at the time of system turnover to the Owner.
2. If the system fails to completely perform in accordance with the Contract Documents, the Contractor shall take all necessary action to repair or replace parts and wiring modification, at no additional cost to the Owner, to restore the system to perform in accordance with the Contract Documents.

E. Engineering Field Service

1. The Supplier shall furnish engineering field service as required.

F. Maintenance Contract

1. *Maintenance and Service Contract [G]:* shall be submitted with service rates covering all labor and materials necessary to maintain the system. The contract shall include a differentiation between and definitions of "emergency" and "non-emergency" service with applicable rates for each.

G. Spare Parts List

1. *Bill of Material [B]*: The supplier shall enclose a complete parts list of the equipment installed with vendor's names, address, telephone number, part numbers, prices and lead time.

1.9 THE CONTRACTOR SHALL SUPPLY THE FOLLOWING ITEMS:

- A. Complete system design and documentation. Equipment documentation to include manufacturer's specifications for all components.
- B. Field verify all Owner supplied information prior to submission of project proposal.
- C. Field installation of all equipment including conduit and wiring, ancillary devices and equipment enclosures, as required by the Owner.
- D. Supervision to coordinate and oversee the entire system installation and start-up, as required by the Owner.
- E. Service personnel available for 3 years after system acceptance.
- F. Training of plant personnel in operation and maintenance of the system, as required by the Owner.

1.10 THE OWNER SHALL SUPPLY THE FOLLOWING ITEMS:

- A. Personnel to develop the system data file relative to schedules and equipment. This function shall be monitored/controlled under the direction of the Contractor's Representative.
- B. Equipment room preparation and rearrangement including all overhead lighting and mechanical and electrical service. The Contractor shall indicate in its proposal the environmental conditions and space requirements necessary for installation of the proposed system.

1.11 STANDARDS

- A. Standards
 1. All applicable regulations and laws shall apply to any installations. The standards indicated below are referenced as minimum requirements for installation and operation of the Paging System, unless otherwise noted, and not intended to be inclusive of all requirements. Requirements of appropriate authorities having jurisdiction shall supplement these specifications and indicated standards, and shall take precedence in case of conflict.
 2. All materials and equipment shall comply with the latest revision of the applicable standard(s) in every case where such a standard has been established for the particular type of material in question.
 - a. Federal Communication Commission (FCC)
 - b. National Electric Code (NEC)
 - c. National Building Officials Code Administrator (BOCA)
 - d. Underwriter's Laboratories (UL)
 - e. Institute of Electrical and Electronic Engineers (IEEE)

- f. American National Standards Institute (ANSI)
 - g. General Motors Electrical Standards for Building and Facilities
 - h. General Motors Basic Electrical Installation Standards EI-1 for Industrial Equipment
 - i. Uniform Building Code, by the International Congress of Building Officials (ICBO)
 - j. Industrial Risk Insurers (IRI)
 - k. Factory Mutual (FM)
 - l. Americans with Disabilities Act (ADA)
 - m. Occupational Safety and Health Act (OSHA)
 - n. International Building Code
 - o. State of New York Building Codes
3. Clarification of differences between standards, codes, Drawings, and/or Specifications will be made by the purchaser's representative.

B. Approval Drawings And Specifications

- 1. Approval Drawings and Specifications: The Contractor shall provide detailed installation Drawings indicating equipment and device locations with detailed routing locations for necessary conduit, cable and wiring. Installation Drawings shall include connection details for all wiring and cable terminations.
- 2. All Drawings and Specifications shall be developed through computer based media. Electronic Drawings shall be prepared in a format which can be used directly (without conversation) by General Motor's standard CAD software, "AutoCAD", for Windows, operating under MSDOS. Drawings, electronic file and layering requirements to be satisfied are described within the latest edition of the General Motors Facilities Graphics Standards Manual. Drawings and Specifications shall be maintained on CD ROM disk in a self extracting format.
- 3. The Contractor shall, upon completion of the work, furnish to the Owner, 2 complete sets of 'As Installed' Drawings in the 24 in. x 36 in. size. The Contractor shall also furnish the Owner with 1 complete set of the same Drawings on CD ROM disk as drawn with the latest version of AutoCAD 2000 brand software.
 - a. The following items shall be included in the Drawings and Specifications:
 - 1) Names, addresses and phone numbers of Manufacturer's Rep, Engineer and Manufacturer's Service Center.
 - 2) Detailed system operation.
 - 3) System block diagram.
 - 4) System riser diagram with E.O.L. resistors marked.
 - 5) Device, appliance, control unit and terminal panel mounting details.
 - 6) Device, appliance, control unit and terminal panel wiring details.
 - 7) Device, appliance, control unit and terminal panel location details.
 - 8) Complete Bill of Materials for the Project.
 - 9) Device list with address and instructions for addressing points.
 - 10) Complete set of battery calculations for system.
 - 11) All power requirements, descriptions and sequences.
 - 12) All wire and symbol legends.
 - 13) All manufacturer's notes and recommendations.
 - 14) Capacity of the system is installed and total system capability.

C. Coordination of Work

- 1. Installation of the new system shall be scheduled and performed in such manner as to prevent disruption or interference with the purchaser's business or other activities.

2. Installation of the new system shall be scheduled in such manner that the least amount of necessary disruption of Security monitoring is permitted at any given time. The purchaser's representative shall be notified, in advance, of any disruption in service in monitoring or occupant notification capabilities and the duration of such disruptions.

D. Testing and Acceptance

1. All system equipment and required functionality shall be tested after installation in the presence of the Owner and authority having jurisdiction.
2. The system installation shall meet all requirements of the Owner, required standards and approving authorities prior to acceptance.
3. All system components, devices and appliances shall be tested after installation to ensure that:
 - a. All required systems and devices are connected.
 - b. For final acceptance, the system must operate for thirty (30) consecutive days without malfunction of any kind, including any function not performed as a part of routine system administration.

E. Training

1. The Contractor shall provide, at the Owner's facility, the training necessary for the Owner's personnel to perform installation, setup, data input, configuration, operation and maintenance of the system, components and devices. Adequate hands-on training shall be included for system operators. The Contractor shall provide an outline of proposed training for review by the Owner, prior to the commencement of actual training. The training shall be provided in 3 categories:
 - a. Installation and Maintenance: For system administrators and personnel responsible for installation and maintenance of system hardware, devices, appliances and circuits.
 - b. System Administration: For personnel responsible for total system administration, including software maintenance, setup, configuration and support.
 - c. Supervising Station Operator: For supervisors and personnel to be assigned daily operator responsibilities.
2. The Owner shall identify the numbers of personnel to be trained in each category.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturer

1. Dukane
2. Atlas/Soundolier
3. Bogen Sound
4. Owner approved equal.

B. Equipment

1. The Paging Sound System shall consist of the appropriate preamplifiers, power amplifiers, power supplies, and speakers to meet the requirements as shown on the Drawings and of this SPECIFICATION.

C. *Power Amplifier [D,P]:*

1. The amplifier shall employ silicon transistors exclusively and be capable of delivering required output at less than 3% distortion 40 to 10,000 Hz. The frequency response shall be 20 to 20,000 Hz +/- 2 dB. Noise level shall be at least 75 dB below rated output. Input shall be 100,000 ohms single ended. Rated output shall be obtained with 0.4 volt input. Balanced or single ended 70 volt output shall be available at a screw terminal strip. Output regulation shall be within 2 dB from no load to full load. The amplifier shall supply auxiliary voltage of 28 volts dc. An input level control shall be provided.
2. The unit shall operate on 105-125 volts, 50-60 Hz. The amplifier shall have protective circuits including a thermally operated relay and an automatically resetting electronic circuit to reduce dissipation under overload or short circuit conditions. Provide 1 extra amplifier for backup.
3. Bogen Model Black Max Series X450.

D. *Mixer-Preamplifier [D,P]:*

1. The Mixer-Preamplifier shall provide facilities for 8 inputs. The panel shall be completely solid-state with low distortion and noise operation. The microphone inputs shall be transformer coupled, and the unit shall be protected from R. F. interference.
2. The unit shall provide a single-ended audio output of 1 Vrms (nominal) and shall require a 120 VAC input. Controls shall include individual microphone level controls, auxiliary fader control, bass and treble controls, a master volume control, and a lighted power ON-OFF switch.
3. The mixer-preamplifier shall provide a telephone input to facilitate remote paging via the telephone system:
4. Caps shall be placed on all controls on the mixer except:
 - a. Volume control for each paging zone.
 - b. Microphone page
 - c. Telephone Page
 - d. See paging system Riser Diagram for paging zone designations.
5. Bogen Model CAM8PRO.

E. *Wall Mounted Equipment Rack [D,P]:*

1. The equipment rack [D,P] shall provide 17-1/2" of vertical front panel space for mounting standard 19" equipment panels horizontally.
2. The unit shall be constructed of 16 gauge steel with panel mounting rails of 16 gauge steel. All joining steel shall be welded and bonded to form a sturdy, solid assembly. Use of lighter gauge steel and bolted-type construction is not acceptable.
3. All panel mounting screws shall be concealed by vertical trim strips when the rack is completely assembled. The rack shall provide a hinged, removable, louvered, locking, back door. Also provide blank plates as required. **Size equipment racks to the size of sound equipment provided.** Provide each equipment rack with a U.L. listed multi-outlet strip with at least 6 AC outlets, an AC Power Panel, and cooling fans.
4. Dukane
5. Soundolier

F. *Speakers [D,P]:*

1. (High noise level areas) Each speaker shall have a power rating of 30 watts full range. The frequency range shall be 300 to 3,900 Hz.
2. The trumpet shall have a screwdriver adjustable switch which can be set externally to select 30, 15, 7.5, 3.7, 1.8 watts on a 70-volt line. Available impedances shall be 2500,

- 1300, 666, 333, 167, 89 and 45 ohms. The sound pressure level shall be 125dB on axis the dispersion 85°.
3. The trumpet shall be 21" wide, 8" (20 cm) high, 16" deep and finished in beige, baked enamel. External connections shall be to screw terminals. The terminals housing and transparent cover shall function together as a cable strain relief. The trumpet shall be provided with a 3 adjustable mounting bracket. The assembly weight shall not exceed 15 pounds.
 4. Atlas Sound Model No. DR-42 with PD-30T Tapped @ 15 Watts or match existing.
- G. *Flush Ceiling Mounted Loudspeakers [D,P]:*
1. Flush mounted loudspeaker shall be an 8 inch permanent magnet cone type having a viscous-damped cone and a ceramic (Index 5) magnet weighing at least 6 oz. It shall have a frequency range of at least 50 to 12,000 cycles, a 25 watt program power-handling capability, and an axial sensitivity of at least 95 dB at 4 ft. with a 1-watt input. Voice coil shall be 3/4 inch diameter with an 8-ohm impedance.
 2. The speaker shall be equipped with a [70] volt line matching transformer. The transformer shall provide 1/2, 1, 2 and 4-watt power taps.
 3. The speaker shall be tapped at 2 watts initially. All units shall be adjusted in the field for sound levels required in each area under actual operating conditions.
 4. Bogen Model No. S86T725 PG8WBRVR.
- H. *Telephone Paging Interface Card [D,P]:*
1. The paging system shall be equipped with the Bogen Model TAMB PABX Station Access Card. The TAMB shall be a ring-activated card with a ring sensitivity of 20Hz to 60Hz at 65 to 120 volts. It shall interface the paging system with a PABX or a CENTREX station line. The access card shall plug into a prewired, designated slot in the system, and shall require no further connections.
 2. The card shall have an adjustable size timer that starts when the card is activated and deactivates the card when it finishes its adjustable duration. The seize timer shall have a range of approximately 5 to 50 seconds. The card shall have an IN USE LED on the card bracket that lights while the card is activated.
 3. The card shall generate 3 selectable tones: An annunciator tone that indicates when the system has connected a paging telephone to system speakers for an announcement (sounds at the telephone earpiece and at all connected speakers), an access tone that sounds at the telephone earpiece (used only with zone paging to indicate that the system has been accessed and the zone number can be dialed), and an end-of-message tone that sounds at the telephone earpiece when the seize timer finishes to warn the pager that the paging system will disconnect. The card shall provide an ON/OFF switch for each tone and shall have 1 additional control for setting the volume of all 3.
- I. *Wiring [D,P]:*
1. All wiring shall be in accordance with the manufacturer's recommendation. All wiring must be installed in conduit or approved raceway.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

1. Install all equipment at locations indicated on the Drawings, and secure to ceilings, ceiling supports, walls, floors or structural members as required.
2. Provide wire and cable conforming to general use wire specified in Division 16 Section "Wire and Cable (600 volts and less)", except where special wire or cable is indicated on the Drawings or specified in this Section.
3. Install all wiring in conduit.
4. Wiring shall be run for all lengths less than 1000 feet without splices. Where wire runs are of lengths greater than 1000 feet, cable pulling tension calculations shall be submitted to the Owner prior to installation. All splices shall be made in terminal boxes mounted at floor level.
5. Speakers shall be zoned as shown on the drawings.
6. Speaker wiring shall be labeled as per circuit number at each termination point.

B. Cable Installation

1. All cabling in racks, cabinets and junction boxes shall be neatly strapped, dressed and adequately supported. Cable installation shall conform to good engineering practices and to the standards of the most current National Electrical Code.
2. Cables shall be terminated with the proper connector required for the associated operation of the equipment to which it is connected. Screw terminal blocks shall be furnished for all cables which interface with racks, cabinets, consoles or equipment modules. Wire shall be interfaced with screw terminal blocks with an installation tool specifically recommended by the manufacturer of the lug. Evidence of the installation of cable and wires without the appropriate connectors, shall be sufficient cause for rejection of the work and reinstallation of the cables or wires.
3. Where cables or wires require soldering, the soldering shall be done using rosin core solder and controlled temperature soldering equipment. Evidence of solder joints not made with rosin core solder or with non-temperature controlled tools shall be sufficient cause for rejection of the work and resoldering of all connections.
4. Every cable or wire shall be labeled or coded at each end. Each terminal of each field terminal strip shall be permanently labeled or coded to show the zone, instrument of item served.

C. Testing

1. All systems shall be tested [T] in the field under actual operating conditions to assure proper operation. **Speaker volumes shall be adjusted to maintain proper output for the area of use.** All final tests shall be witnessed by the Owner's Representative Submit 3 copies of test procedures to the Owner.

END OF SECTION

Revision History	
Date	Rev. No.
D	0
E	0
F	0
02-19-09	0

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