

SECTION 16770

AIRPORT PAGING ANNOUNCEMENT CONTROL SYSTEM

PART I - GENERAL

1.1 SUMMARY

- A. This section describes the requirements for the installation of Airport Paging Announcement Control System (PACS) equipment at ANC. ANC will provide programming and configuration of the PACS. The PACS is being installed in the South Terminal as part of the Concourse C Phase 2 Building Completion Project.
- B. Contact ANC for paging system requirements in the North Terminal.
- C. Only microphone stations in Concourse C will have access to all system functions (e.g., Flight Announcement System). Other areas of the South Terminal will have access to paging zones only throughout the South Terminal via telephone handsets. Microphone paging stations will be provided in the rest of the South Terminal as part of the Phase 3 South Terminal Renovation Project after completion of the Concourse C Phase 2 Building Completion Project.
- D. Note that microphone paging stations can be provided elsewhere in the South Terminal (other than Concourse C) prior to the Phase 3 project, however, this will require routing the microphone station cabling from the microphone station back to the PACS headend equipment located in the Main Telecom Room (MDF) in the basement of Concourse C. Contact ANC for additional information.
- E. Tenant shall coordinate PA System Input/Output Zones with ANC and receive approval from ANC.

1.2 SYSTEM DESCRIPTION

- A. The Paging Announcement Control System (PACS) is a multifunction system that utilizes microprocessors and appropriate digital processing to control the system's operation and controls.
- B. The microprocessor manages and controls all system functions and hardware including microphone page stations and associated queuing, telephone interfaces, external system interfaces, distribution of emergency announcements, local announcements, terminal announcements, background music, recorded announcements, pre-recorded and assembled messages, and visual display paging.
- C. The complete PACS is comprised of several subsystems, that form a complete system for airport announcement and message management.
 - 1. Networked Industrial Pentium Computer with Microsoft Windows® software-based graphic user interface (GUI) input setup screens for user configuration and control.
 - 2. Networked Computer based Paging Announcement Control System (PACS).
 - 3. Networked Industrial Pentium Computer(s) for Courtesy Announcement System workstations.
 - 4. Multi-bus Digital Recording and Playback system.
 - 5. Ambient Noise Analysis system.
 - 6. Equalization System.
 - 7. Automatic Test and Monitor system.

8. Microprocessor based Microphone Paging Stations.
9. Networked Visual Information System (VIS) (graphic display signs) to meet the requirements of the Americans with Disabilities Act (ADA).
10. Comprehensive Flight Announcement Software for announcement control and multi-lingual messages.
11. Comprehensive Courtesy Announcement System Software with synchronized recorded voice and visual text playback capability.
12. Redundant Power Supply systems.
13. Power Amplifier systems.

1.3 QUALITY ASSURANCE

- A. All PACS equipment shall be UL Listed.
- B. The basic system and related peripheral equipment for the Paging Announcement Control System is Innovative Electronic Designs, Inc., (IED) Model ACS500 and associated components.
- C. Common system components such as speakers, visual display screens and cabling shall match existing equipment provided in the Concourse C Phase 2 Building Completion Project.
- D. All materials and equipment shall be new and currently in production. The latest available model of each component shall be furnished, whether or not specifically specified.
- E. The installer shall have been regularly engaged in the installation of electronic audio systems for a minimum of five (5) years.
- F. While under warranty all work on the system shall be accomplished by the original equipment installer to preserve the system warranty. Contact ANC for information regarding status of the warranty.
- G. System components generating electromagnetic interference or radio frequency interference (EMI/RFI) shall be designed and constructed in accordance with IEEE 299 and CFR 47, Part 15.

1.4 SHOP DRAWINGS

- A. ANC will update and maintain Shop Drawings for the system. Provide all required information to ANC to allow shop drawings to be properly updated and maintained (loudspeaker types/locations, microphone types/locations, cabling types/routing, termination locations/designations, etc.).

1.5 RECORD DRAWINGS

- A. Keep up to date "As-built" record drawings at the job site detailing the layout of equipment and terminations, including a typed listing of cables/rooms served by each terminal block. Refer to Section 16010 for other Record Document requirements.
- B. At the completion of construction and testing and after acceptance of the completed Tenant-area system, record drawing information shall be submitted to ANC. ANC will update the master Record Drawings for the entire system.

1.6 PERFORMANCE REQUIREMENTS

- A. Paging Announcement Control System (PACS): The PACS includes microprocessor control for up to 120 microphone page stations and 120 zone outputs. All microphones are assignable

to any combination of the output zones. Assignments may be readily changeable by qualified authorized personnel.

- B. The basic system is expandable up to 600 microphone stations and 600 total zone outputs.
- C. The PACS processors and the microcomputer control stations are networked on standard 10/100 Mb/s Ethernet hardware to support common and remote control of all system features.
 - 1. Priority Levels: Announcement and messages shall be processed and dispatched based upon defined levels of priority. These priority levels are established as follows:

Priority Level	Message Type
1	Emergency Direct Announcement
2	Emergency Message
3	Local
	Multi Local Zone Group Announcement
	Multi Local Zone Group Message
	Local Zone Group Announcement
	Local Zone Group Message
4	Terminal
	Terminal Zone Group Announcement
	Terminal Zone Group Message
5	Background Music

- 2. Multiple emergency announcements may be made at one time if no zone conflicts for that class of announcement exists. Regardless of zone assignments, the emergency announcement immediately suspends all other announcements and messages. An emergency announcement or message shall interrupt and prevent any other use of the affected zones until completed or cancelled.
 - 3. A local or multi-local announcement shall not prevent a terminal announcement from playing, but it shall interrupt and override the terminal announcement in the zones that have been assigned to its use.
- D. Microphone Paging Stations: Microphone stations shall originate announcements into zone groups. ANC will make these group determinations. Coordinate with ANC to determine required paging zones for each paging station. Any microphone page station shall be capable

of being programmed into any zone group. Microphone stations shall be capable, when so programmed of making emergency zone group announcements, terminal zone group announcements, local zone group announcements, and multi local group announcements.

- E. Microphone stations so equipped and programmed, shall be capable of performing any or all of the control functions for pre recorded and assembled messages. These control functions shall include initiating a playback sequence, stopping a playback sequence, recording a message, monitoring a message, or playing back a message to its own multi local group, or to a terminal zone group instead of to the zone map assigned to that message. (Note some functions are limited to full function page stations only).
- F. The microphone stations shall include a microphone; either handheld or gooseneck mounted type. Each microphone station shall have buttons for zone group selection to activate that microphone station for announcements into preprogrammed zones. Green and Red LEDs shall indicate ready or busy respectively. Any 5 second pause after the green LED has illuminated shall terminate the announcement. Each station shall include its own microphone preamplifier, test oscillator, compressor, and balanced output line amplifier for driving long lines without appreciable high frequency loss. The PACS microprocessor, under software control shall continuously interrogate all of the following:
 - 1. Full Function Page Stations: Full function page stations shall have a (12) button keypad for data entry, a LCD digital display and ready/busy LEDs. Non-announcement functions shall include keypad disable/enable, self-test, and setup.
 - 2. Limited Function Page Stations: Limited function page stations shall have (4) zone group select buttons and ready/busy LEDs. Models with handheld microphones shall have the capabilities of using a push-to-talk button on the microphone as a fifth zone select button. Each button may be assigned to any zone group, message type, or prerecorded message function.
 - 3. Expansion Page stations: An expansion page station shall act as a slave to a full function or limited function page station. Up to (3) expansion page stations may be connected to a full function or limited function page station and shall follow the function of the mic switch assignment.
 - 4. Telephone Interfaces: The telephone interface shall include DTMF decoding for connection to the telephone system. Function shall be similar to the full function page stations with the exception that no LCD display is available nor functions that require LCD prompting.
 - 5. Operation: When a page station initiates an announcement, the system shall assign it to an open DRP channel. The ready (green) LED shall be illuminated on the page station and the announcement recorded. The ready LED shall begin to flash 5 seconds before the end of the record time. The announcement shall be played back if the microphone switch or announcement button is released prior to the end of the record time. If the microphone switch is pressed and held during a 5-second silence period, the announcement shall be cancelled when the green ready LED goes off. The announcement shall playback automatically, to the selected zones, in its assigned queue position.
 - 6. The busy LED (red) shall illuminate on the page station when all DRP channels are busy. The microphone station shall be able to select a desired zone group when all DRP channels are busy. The busy LED shall flash acknowledging acceptance of the station into the queue (first in, first out). When the station reaches the top of the queue, the station beeper shall sound and the ready LED shall illuminate signaling the station can proceed with its announcement recording.
- G. Permanent Digital/Record Playback System (PDRP): The PDRP system is capable of recording, storing and playback of permanent messages via the DRP system. The system

allows up to (8) messages to be played at one time. Message "takes" are stored in nonvolatile memory. Multilingual capabilities are available to allow a minimum of (8) different languages.

1. Operation: Two types of permanent messages are provided; standard and assembled.
 - a. Standard messages include:
 - 1) Emergency evacuation announcements and instructions.
 - 2) Public service announcements (no parking, no smoking, etc.)
 - 3) Regulatory announcements such as do not leave bags unattended, etc.
 - 4) Other institutional messages.
 - b. Standard messages are assignable to any zone or zones and may be initiated by any assigned paging station or scheduled for play by the quartz controlled system clock. Each message may be up to 16 takes long.
 - c. Assembled messages allow message "takes" or phrases to be "assembled" in real time to create a complete message. Assembled messages allow dynamic information provided by the user or a database to be included within the message to provide for specific information or instructions. These may include:
 - 1) Flight boarding announcements.
 - 2) Flight arrival and bag claim announcements.
 - 3) Gate change announcements.
 - 4) Delayed flight or cancelled flight announcements.
- H. Ambient Noise Analysis System (ANAS): The ANAS system adjusts signal levels in response to either ambient noise levels or computer commands. Three (3) modes of operation are possible:
 1. Automatic: Changes attenuation levels in response to noise levels reported by remote sensors.
 2. Controlled: Changes attenuation levels based on remote sensors of an automatic channel.
 3. Fixed Attenuation: Fixed attenuation as set by the computer and user.
- I. Automatic Test and Monitor: The automatic test and monitor system (ATMS) provides for self-diagnostics that operate in real time under software control. This self-testing includes testing of logic, audio operation, power supplies, power amplifiers, wiring, loudspeakers and network communications.
- J. Visual Information System (VIS): The Visual Information System (VIS) interface with the Paging Announcement Control System(s) provides automatic visual messages in text form on display devices simultaneously with audible prerecorded/assembled messages generated by the PACS.
- K. Courtesy announcement workstations are provided in several locations in the C Concourse to allow creation, dispatch, and logging of courtesy paging announcements.
- L. Power Amplifiers: The power amplifiers are of a modular design using slide in amplifier cards installed in a mainframe. ANC will provide additional amplifiers if required.
- M. 1/3 Octave equalization is provided for all zones. ANC will provide additional equalizers if required.

- N. Paging Announcement Control System Software: The PACS is software controlled using Microsoft Windows® based programming. The software can support:
1. Digital Recording and Playback of announcements for queuing and distribution
 2. Full operational control of the Automatic Test and Monitor System (ATMS)
 3. Full operational control of the Ambient Noise Analysis System (ANAS)
 4. Support for Flight Announcement System Software
 5. A Multilevel password control system is provided that establishes a password account for each individual. A person of a given level can only assign access and passwords to a person of an access level equal to or lower than his own. Each feature of the system is individually assignable/limited to each individual. The password system keeps a program log of the last 500 log-ins to the system. This log includes the individual, date, time, and type of actions taken.
- O. Flight Announcement System Software: FAS software operates in conjunction with the PACS Software. It is designed to assemble and dispatch all normal announcements related to flight arrivals, departures, boarding and baggage information from prerecorded message segments.
1. The system user shall only be required to select a message and key in variable information as prompted via the microphone paging station keypad. The software has the ability to assemble and play the messages in up to (8) languages.
 2. A database has been provided to store dynamic airline information including Cities, Flight Numbers, Airlines Names, Days of Operation, Languages, Boarding Row Groups, Airline Slogans, Frequent Flyer Programs, Mileage, etc. The database shall be updateable by airline personnel using secure passwords to reach only their airline specific information. ANC will provide additional information upon timely request.
 3. The system has the ability to input new flight information in advance and establish an effective date for implementation.
- P. Courtesy Announcement System Software: CAS software provides for management of messages and courtesy paging. The software provides the ability to:
1. Create templates for various message types.
 2. Record message requests into a database
 3. Create visual messages and play them through the Visual Information System in synchronization with the audio message.
 4. Retrieve message requests from the database at any Courtesy Announcement Workstation and delete them after they are fulfilled.
 5. Maintain a log of person's name, receiving operator, dispatching operator, date, number of plays and time of plays.

PART 2 - PRODUCTS

2.1 PAGING ANNOUNCEMENT CONTROL SYSTEM

- A. The PACS is a modular mainframe system with plug in circuit cards to allow custom configurations. ANC will provide circuit cards as required to meet the functional requirements of the system. Tenant shall clearly communicate requirements in a timely manner to allow ANC time for procurement and installation.
- B. Modular, slide in power supplies provide load sharing and full redundancy.

- C. An industrial microcomputer provides for the user interface and monitor/test reporting. It is a rack mount unit with rack mounted SVGA monitor, keyboard, mouse, and locking keyboard drawer. It includes network and interface cards as necessary to interface to and control the system(s). The computer includes networking software to allow any computer to log-in and control any ACS in multiple computer/ACS installations.
- D. Video/Keyboard/Mouse Switcher: A 6x1 master CPU switcher allows rack mounted monitor, keyboard and mouse to interface with all system CPUs.
- E. Network Interfaces: Network interfaces network the ACS(s), microcomputer(s), sign server(s), advertising computer, flight announcement computer and courtesy announcement work stations. Networking is IEEE Standard 802.3 10/100 Mb/s Ethernet, via the building Category 5e UTP copper cable system.

2.2 PAGING STATIONS

- A. Limited Function Page Stations: Limited function page stations shall have (4) zone group select buttons and ready/busy LEDs. Mounting configurations shall be; horizontal or vertical orientation, flush or surface mount, desktop, or locking door enclosure. Microphone options shall be handheld or gooseneck.
 - 1. Acceptable Products:
 - a. IED Series 500 Microphone Page Stations.
 - b. Model and quantity as required.
- B. Full Function Page Stations: Full function page stations shall have a (12) button keypad for data entry, a LCD digital display and ready/busy LEDs. Mounting configurations shall be; horizontal or vertical orientation, flush or surface mount, desktop, rack mount (with or without powered speaker), or locking door enclosure.
 - 1. Microphone options shall be handheld or gooseneck.
 - 2. Acceptable Products:
 - a. IED Series 508 Microphone Page Stations.
 - b. Model and quantity as required.
- C. Expansion Page Stations: An expansion page station shall act as slave to a full function or limited function page station.
 - 1. Acceptable Products:
 - a. IED 500FME Microphone Page Stations.
 - b. Model and quantity as required.
- D. Page Station Enclosures: Wall mounted microphone page stations shall be installed in flush mounted, locking door enclosures.
- E. Individual Password Access: Full function paging stations shall be capable of being programmed with individual password access accounts, for use by multiple users at varying levels of access (e.g., User 1 – local paging only, User 2 – local and all-call, etc.)
- F. Telephone Interfaces: The telephone interface shall include DTMF decoding for connection to the telephone system.
 - 1. Acceptable Products:
 - a. IED 508T-1 (1 Channel) or 508T-2 (2 Channel).

- b. Model and quantity as required.

2.3 PERMANENT DIGITAL RECORD AND PLAYBACK

- A. Provides permanent message capability.

2.4 AUTOMATIC TEST AND MONITOR SYSTEM

- A. The (ATMS) provides for self-diagnostics that operate in real time under software control. This self-testing includes testing of logic, audio operation, power supplies, power amplifiers, loudspeaker wiring and loudspeakers.

2.5 AMBIENT NOISE ANALYSIS SYSTEM

- A. The ANAS system consists of a modular mainframe that accepts a power supply, CPU card and up to (11) channel input cards. Tenant shall provide remote ambient sensors and cabling back to Remote Terminal Cabinets in Equipment Rooms. ANC will determine sensor requirements and required mounting configurations.
- B. Remote Sensors shall be one of the followings as determined by ANC:
 - 1. IED 540S-2 Sensor on 2 Gang Plate.
 - 2. IED 540S-8 Sensor in 8 inch Speaker Basket.

2.6 VISUAL INFORMATION SYSTEM

- A. The VIS consists of multicolor displays, RS485 router, a Pentium class computer called a sign server and a Pentium class computer called the advertising computer. Tenant shall provide multicolor displays and cabling back to ANC provided router in Equipment Room. ANC will determine display requirements and required mounting configurations.
- B. The displays shall support still or moving text, graphics and animated images that are in compliance with the Americans with Disabilities Act (ADA). Minimum Specifications shall be:
 - 1. Displays for indoor use shall have minimum viewing angle of 160 degrees
 - 2. Brightness: 450 cd/m² (amber green) and 550 cd/m² (red)
 - 3. Block Matrix shall be 160 pixels wide X 64 pixels high.
 - 4. Character height:

Single line	15.1"
Two lines	7.32"
Three lines	4.72"
Four lines	3.54"
Eight lines	1.65"
 - 5. Display Brightness: 4 levels.
 - 6. Acceptable products:
 - a. IED 500CVIS Display System, or approved equal
- C. Sign Server: The sign server is a networked Pentium class rack mounted computer.

- D. Advertising Computer: The Advertising computer is a networked Pentium class desktop computer

2.7 POWER AMPLIFIERS

- A. The power amplifiers are a modular design using slide in amplifier cards installed in a mainframe. ANC will provide additional amplifiers if required.

2.8 EQUALIZATION

- A. 1/3 Octave equalization is provided for all zones. ANC will provide additional equalizers if required.

2.9 UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. An UPS system provides power to all equipment controlled by CPUs.

2.10 REMOTE TERMINAL CABINETS

- A. Remote Terminal Cabinets are located in Equipment Rooms adjacent to Telecom Rooms (TRs/IDFs) in the C Concourse for termination of microphone, loud speaker and ambient analysis sensor circuits.
- B. Existing cabinets typically have spare terminal capacity. If new terminal cabinets are required they shall match existing cabinets.
- C. Terminal strips are mounted in vertical column(s) using machine thread screws.
- D. Provide screw mounted cable tie mounts between columns of terminal strips and along the perimeters of the cabinet interior for the neat dressing and securing of conductors.

2.11 TERMINAL BLOCKS

- A. If additional terminal space is required provide DIN rail mounted, compression clamp type terminal blocks to match existing in remote terminal cabinets and on terminal backboards for termination of PA system cabling.

2.12 CABLES

- A. Microphone and Line Level Cables in Conduit: 22 gauge, 1-pair, with 100% overall shield and tinned copper drain wire, Belden 8451, or approved equal. Provide cables with distinctly different colored outer jacket for microphone audio cables and power/control cables.
- B. Microphone and Line Level Cables in Rack: 22 gauge, 1-pair, with 100% overall shield and tinned copper drain wire, Belden 8451, or approved equal. Provide cables with distinctly different colored outer jacket for microphone audio cables and power/control cables.
- C. Loudspeaker Circuits: 14 gauge, 1 twisted-pair, copper conductors with 100% overall shielded and 16 gauge drain wire, Belden 8720, or approved equal.
- D. Ambient Analysis Sensor Circuits: 22 gauge, 1 twisted-pair, copper conductors with 100% overall shielded and 22 gauge drain wire, Belden 8761, or approved equal.

2.13 LOUDSPEAKER ASSEMBLIES

- A. Type A: Eight-inch diameter flush ceiling mounted coaxial Loudspeakers shall match existing.
- B. Type B: Eight-inch diameter pendant ceiling mounted coaxial Loudspeakers shall match existing.

- C. Type D: Flange mounted double reentrant loudspeakers with compression driver mounted in framed speaker recess with flush round stainless steel or brushed aluminum grille to match column cladding finish material shall match existing.
- D. Type E: Eight-inch diameter surface wall mounted coaxial Loudspeakers shall match existing.
- E. Type F: Flush ceiling mounted outdoor double re-entrant type Loudspeakers shall match existing.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Provide all microphone stations, telephone interfaces, loudspeakers, ambient analysis sensors, station/speaker/sensor cabling and cabling terminations at Remote Terminal Cabinets in Equipment Rooms. ANC will provide all central system equipment and programming. Provide all Visual Information Displays and cabling back to Equipment Rooms. ANC will provide all routers, central system equipment and programming.
- B. All equipment shall be firmly held in place. This shall include loudspeakers, enclosures, cables, etc. Fastenings and supports shall be adequate to support their loads with a safety factor of at least three. Connectors shall be clearly, logically and permanently marked. Wires and cables shall be identified at every termination and connection point with permanent type markers in accordance with existing standards. Equipment shall be shock isolated for seismic conditions according to codes and regulations.
- C. Recessed ceiling mounted loudspeakers shall be securely attached to the building structure or the T-bar ceiling structure and shall not depend on the ceiling tiles for support. Provide tile bridges, hanger bars, etc., as required to support fixtures. In addition, in suspended T-bar ceiling areas provide a minimum of one dedicated support wire to each speaker backbox for seismic support independent of ceiling
- D. All PA system wiring shall be in conduit.
- E. Provide cables (circuits) as required by the application. Cables shall be routed via PA system Remote Terminal Equipment cabinets in Equipment Rooms in the C Concourse.
- F. ANC will provide simplified step by step paging station operating instructions on placard or laminated instruction sheet.
- G. Take such precautions as are necessary to prevent and guard against electromagnetic and electrostatic hum and to install the equipment so that it may be safely operated.
- H. Care shall be exercised in wiring, so as to avoid damage to the cables and to the equipment. All joints and connections shall be made with rosin-core solder, or with approved mechanical connectors. All wiring shall be executed in strict adherence to standard broadcast practices.
- I. The installation of all work shall be neat. Boxes, equipment, etc. shall be plumb and square.
- J. Freedom From Buzzes, Rattles and Objectionable Distortion: ANC will apply a slow sine-wave sweep from 50 to 10,000 Hz at a level of 6 dB below rated power amplifier output voltage. Listen carefully for buzzes, rattles, and objectionable distortion (each major loudspeaker system shall be tested individually). Correct any causes of these defects, unless the cause is clearly outside the sound amplification system equipment and installation, in which case the cause shall be brought to the attention of ANC.

3.2 TESTS AND ADJUSTMENTS

- A. ANC will perform final Testing and adjustment of the completed paging system as follows:

1. Provide personnel to assist in testing.
 2. Provide written notification to ANC when installed equipment is ready to test. Provide minimum of 10 days notice of desired time for tests.
 3. ANC will test the audio system for proper operation and adjustment in accordance with existing system and Manufacturer's requirements. As a minimum, the tests will include:
 - a. Proper operation of system interfaces.
 - b. Measured impedance of loudspeaker circuits.
 - c. Measured hum and noise levels of the system for each microphone and line-level input channel.
 - d. Measured electrical distortion of the system for each line-level input channel.
 - e. Measured sound pressure level of each loudspeaker, on-axis at 5'-0" AFF using pink noise.
 - f. Measured sound pressure level uniformity of coverage for each zone or area.
 - g. Polarity check of loudspeaker circuits.
 - h. Ensure that all systems are free of spurious oscillation and radio frequency pickup when system is quiescent (absence of audio input signal) and when system is driven to full output at 100 Hz.
 - i. Adjust, align and balance all equipment in accordance with manufacturer's specifications.
- B. Schedule and coordinate all system tests and initial level adjustments when the installation is complete and the area is unoccupied. Final wall, floor and ceiling finishes shall be in place and the Contractor's tools and equipment shall be for the most part removed from the area.
- C. Demonstrate operation of each major component and of the complete installation, using all microphone positions and all other inputs, under all operating conditions required by ANC.
- D. Listening tests shall include subjective tests by observers at various positions, listening under various operating conditions.
- E. To meet the minimum performance requirements the Tenant shall be responsible for:
1. Use of equipment in the manner specified, each component's conformance with its manufacturer's published specifications, and other requirements as stated herein.
 2. If these tests show that the equipment is in any way defective or at variance with the requirements of these specifications, the Tenant shall make any changes necessary at his expense. The Tenant shall also pay the expenses of any subsequent testing required to demonstrate compliance with these requirements.
 3. If the need for further adjustments becomes evident during the demonstration and testing, the work shall be continued until the installation operates properly to the satisfaction of ANC.

END OF SECTION