

SECTION 16721

INTERCOMMUNICATION SYSTEM
05/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (1999) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 50 (1996; Rev thru Oct 1997) Enclosures for Electrical Equipment

1.2 SYSTEM DESCRIPTION

The system shall be solid state, modular in design, and shall be of the [wired] [and] [wireless] type with [all master stations] [a single master with remote stations] [master and remote stations intermixed] as indicated. [Stations shall have capacity for later expansion to [[_____] master] [and] [[_____] remote] stations [with [_____] handset] without sacrificing any equipment or feature of performance.] [When both wired and wireless circuitry are used, such interface shall not present a reduction of function or quality.]

1.2.1 Sound Reproduction

The intercommunication system shall reproduce a signal at all receiving stations from a 40 dB minimum input signal referenced to a microphone sound pressure level (SPL) over the frequency range of [300] [_____] to [3300] [_____] Hz. The received signal shall have a dynamic range of 30 dB, adjustable at the receiving station. Unless otherwise specified SPL shall be 20 micro Paschal. The root-mean-square (rms) extraneous noise (e.g. hum) level introduced by the intercommunication system shall be at least [30] [_____] dB below the nominal signal level. Distortion, including envelope delay, intermodulation, cross talk, and other nonlinear sources, shall not exceed 5 percent.

1.2.2 System Operation and Service Features

1.2.2.1 Control and Power Requirements

The system shall have a power switch and an associated pilot light for ON and OFF operations. A volume control at each station shall be used to regulate listening volume. System shall operate on 110-125 Vac, single phase, 60 Hz.

1.2.2.2 Call-In Indication

Master stations shall have a "call-in" switch to provide an audible and/or visual indication of incoming calls from remote stations. Individual visual indication shall identify calling station and status, and remain actuated until a call is answered by a master station.

1.2.2.3 Identification Plates

In addition to the manufacturer's standard identification plates, engraved laminated phenolic identification plates shall be provided for each component connection and terminal. Identification labels shall be 3-layer black on white on black, engraved to show white letters on a black background. Any warning or caution labels shall be 3-layered red on white on red, engraved to show white letters on red background. Control switches and knobs shall be clearly marked with their function and status. Identification strips for station selector switches shall be located to clearly identify remote and master stations and shall be protected by transparent plastic inserts.

1.2.2.4 Speaker/Handset Stations

At speaker/handset stations, lifting the handset shall automatically cut out the loudspeaker in the station and all conversation shall be carried through the handset.

1.2.2.5 Privacy Switch

A privacy switch shall be provided at each remote station. When in the ON position, the switch shall prevent any transmission of sound from the remote station. When in the OFF position, without further switch manipulation, the station shall respond to incoming calls upon voice activation from anywhere within a 6 m 20 foot radius of station.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Spare Parts; [____].

After approval of detail drawings and not later than [____] months prior to the date of beneficial occupancy, the Contractor shall furnish spare parts data for each different item of equipment and component in the system. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

SD-04 Drawings

Intercommunication System; [____].

Detail drawings shall consist of illustrations, schedules, performance charts, instructions, brochures, diagrams, catalog cuts, manufacturer's data, materials and equipment lists, and operational and general maintenance instructions. Detail drawings shall be submitted for the

overall system and for each major component. Drawings shall illustrate how each item of equipment has been coordinated and will function properly in the system. Detail drawings shall include an overall system schematic indicating relationship of intercommunication units on one diagram and showing power source, system controls, impedance matches, plus number, size, and maximum lengths of interconnecting wires and indicate clearances required for maintenance and operation.

SD-09 Reports

Test Plan and Procedures; [_____].

Test plan and procedures for the acceptance test shall explain in detail step-by-step actions and expected results to demonstrate compliance with the requirements specified. The procedures shall also explain methods for simulating the necessary conditions of operation to demonstrate system performance.

Acceptance Tests; [_____].

Upon completion and testing of the installed system, test reports shall be submitted in booklet form showing all field tests performed to adjust each component and to prove compliance with the specified performance criteria. Each test report shall include the final position of controls and operating mode of the system. The manufacturer, model number, and serial number of test equipment used in each test shall also be included.

SD-19 Operation and Maintenance Manuals

Intercommunication System; [_____].

[Six] [_____] complete copies of operation manuals outlining the step-by-step procedures required for system start-up, operation and shutdown. The manuals shall include equipment layout and schematics of simplified wiring and control diagrams of the system as installed. Instructions shall include the manufacturer's name, model number, and a brief description of equipment and components, and their basic operating features.

[Six] [_____] complete copies of maintenance manuals listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides.

1.4 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

1.5 VERIFICATION OF DIMENSIONS

The Contractor shall become familiar with the details of the work and working conditions, shall verify dimensions in the field, and shall advise the Contracting Officer of any discrepancies before performing the work.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Standard Products

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. Items of equipment shall essentially duplicate equipment that have been in satisfactory use at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

2.1.2 Identical Items

Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components.

2.1.3 Nameplates

Each major component of equipment shall have the manufacturer's name, model number, and serial number on a plate screwed to the equipment.

2.2 TYPE 1 SYSTEM

Direct connected keyed intercommunication system shall accommodate [_____] stations in any combination of master stations and remote stations. Master and remote stations shall be provided in the quantities indicated. Each master station shall selectively communicate with any other master station and any remote station by actuation of an appropriate selector switch. [Each master station shall be designed to be capable of initiating a message to all other master stations and all remote stations simultaneously or in groups of not less than 10 stations per group.]

2.2.1 Master Station

[Desk] [Surface wall] [Recessed wall] [Rack]-mounted master stations shall as a minimum conform to the following specifications:

Capacity: Accommodate [_____] stations

Speaker Sensitivity: Minimum of 40 dB

2.2.2 Intercommunication Amplifier

The system intercommunication amplifier shall as a minimum conform to the following specifications:

Output Power: 2 watts rms or greater

Total Harmonic Distortion: Less than 5 percent at rated output power with a load equivalent to one station connected to output terminals

Signal-To-Noise Ratio: 60 dB or greater at rated output

Frequency Response: Plus or minus 2 dB from 200 Hz to
10,000 Hz

2.2.3 Remote Station

[Desk] [Surface wall] [Recessed wall] [Rack]-mounted remote station shall have [stainless steel] [anodized aluminum] faceplate with tamper proof mounting screws and [galvanized steel] [aluminum] backbox [with "station call-in" capabilities]. The remote station shall provide a speaker with a minimum sensitivity of 40 dB for speakers less than 200 mm 8 inches in diameter and 45 dB for speakers 200 mm 8 inches or greater. The remote station shall have a call announcement monitor lamp [and recurring momentary tone].

2.2.4 All-Call Amplifier

All-call amplifier shall as a minimum conform to the following specifications:

Output Power:	Minimum of 0.5 watt rms for each station
Total Harmonic Distortion:	Less than 5 percent at rated output power with a load equivalent to the quantity of stations connected to it in all-call mode of operation
Signal-To-Noise Ratio:	60 dB or greater at rated output
Frequency Response:	Plus or minus 2 dB from 200 Hz to 10,000 Hz

2.3 TYPE 2 SYSTEM

Single conversation path, central control intercommunication system shall include [an annunciator panel,] a master station, automatic switching equipment, remote stations and all amplifiers, control equipment and ancillary devices required to provide features specified. The master station shall selectively communicate with any remote station by actuating the [two] [three] digit number assigned to that remote station. [The master station shall be designed to communicate with all remote stations simultaneously or in groups of not less than 10 stations by actuating an assigned "all-call" number.] Only the selected remote station shall listen or talk to the master station. A nonselected remote station shall not be able to hear or interfere with any portion of conversation between a master station and the selected remote station. Hanging up the master station handset shall reset the system for next call. The quantity and location of remote stations shall be as indicated on the drawings.

2.3.1 Master Station

[Desk-top] [Rack-mounted] type master station equipped with a handset with a switch for private conversations [with permanently coiled cord, approximately 1.5 m 5 feet long extended] shall be provided. The master

station shall have molded shock-resistant plastic [handset and] housing. The housing shall be mounted on a steel base plate with a station selector with ten-digit, silent operating [dial] [touch key] mechanism.

2.3.2 Remote Station

[Desk-top] [Surface wall] [Recessed wall] [Rack-mounted] remote stations with [stainless steel] [anodized aluminum] face plates with tamperproof mounting screws and [galvanized steel] [aluminum] backbox shall be provided. [A call-in switch mounted on a faceplate to provide selective call-in to master station shall be provided as an integral part of the remote station.] The remote stations shall provide a speaker with a minimum sensitivity of 40 dB for speakers less than 200 mm 8 inches in diameter and at least 45 dB for speakers 200 mm 8 inches or greater. The remote shall have a call announcement monitor lamp [and recurring momentary tone].

2.3.3 Amplifier

2.3.3.1 Intercommunication Amplifier

Intercommunication amplifiers shall as a minimum conform to the following specifications:

Output Power:	2 watts rms or greater
Total Harmonic Distortion:	Less than 5 percent at rated output power with a load equivalent to one station connected to output terminals
Signal-to-Noise Ratio:	60 dB or greater at rated output
Frequency Response:	Plus or minus 2 dB from 200 Hz to 10,000 Hz

2.3.3.2 All-Call Amplifier

All-call amplifiers shall as a minimum conform to the following specifications:

Output Power:	Minimum of 0.5 watt rms for each station
Total Harmonic Distortion:	Less than 5 percent at rated output power with a load equivalent to quantity of stations connected to it in all-call mode of operation
Signal-to-Noise Ratio:	60 dB or greater at rated output
Frequency Response:	Plus or minus 2 dB from 50 Hz to 10,000 Hz

2.3.4 Horn-Type Loudspeakers

Horn-type loudspeakers shall be provided with line transformers and mounting brackets and shall as a minimum conform to the following

specifications:

Frequency Response: Plus or minus 3 dB from 250 Hz to 10,000 Hz

Power Rating: 25 [_____] watts

Horizontal Dispersion
Angle: [57] [90] [115] [_____]

Vertical Dispersion
Angle: [57] [90] [115] [_____]

Axial Sensitivity: Minimum of [60] [_____] dB

Line Transformers
Power Rating: At least 4 watts

2.4 TYPE 3 SYSTEM

A multiple conversation path central control intercommunication system shall be provided. The system shall be capable of communicating with other master stations and remote stations selectively or in any combination thereof. Each master station shall selectively communicate with any other master station or any remote station by actuating number assigned to called station. [Each master station shall also be designed to initiate a message to all other master stations and all remote stations simultaneously or in groups of not less than 10 stations.] Station quantities shall be as indicated on drawings.

2.4.1 Master Station

[Desk-top] [Surface wall] [Recessed wall] [Rack-mounted] master stations with ten-digit [dial] [touch key] station selector mechanism. The master station shall have a speaker-microphone with at least 40 dB sensitivity. The master station shall also have a push-button type reset button to cancel calls and reset system for next call.

2.4.2 Remote Station

[Desk-top] [Surface wall] [Recessed wall] [Rack-mounted] remote stations with [stainless steel] [anodized aluminum] face plates with tamperproof mounting screws and [galvanized steel] [aluminum] backbox shall be provided. [A call-in switch mounted on a faceplate to provide selective call-in to master station shall be provided as an integral part of the remote station.] The remote stations shall provide speakers with a minimum sensitivity of 40 dB for speakers less than 200 mm 8 inches in diameter and at least 45 dB for speakers 200 mm 8 inches or greater.

2.4.3 Control Cabinet

Central control cabinet shall be of the size to house intercommunication amplifiers, system volume control, and other switching and control devices required to provide conversation channels, while also providing the required air circulation.

2.4.4 Amplifier

2.4.4.1 Intercommunication Amplifier

Intercommunication amplifiers shall as a minimum conform to the following specifications:

Output Power:	Minimum of 2 watts rms
Total Harmonic Distortion:	Less than 5 percent at rated output power with a load equivalent to one station connected to output terminals
Signal-to-Noise Ratio:	60 dB or greater at rated output
Frequency Response:	Plus or minus 2 dB from 50 Hz to 10,000 Hz

2.4.4.2 All-Call Amplifier

All-call amplifiers shall as a minimum conform to the following specifications:

Output Power:	Minimum of 0.5 watts rms per station
Total Harmonic Distortion:	Less than 5 percent at rated output power with a load equivalent to [_____] stations connected to output terminal
Signal-to-Noise Ratio:	60 dB or greater at rated output
Frequency Response:	Plus or minus 2 dB from 50 Hz to 10,000 Hz

2.4.5 Horn-Type Loudspeakers

Horn-type loudspeakers shall be provided complete with line transformer and mounting brackets and shall as a minimum conform to the following specifications:

Frequency Response:	Plus or minus 3 dB from 250 Hz to 10,000 Hz
Power Rating:	25 [_____] watts
Horizontal Dispersion Angle:	[57] [90] [115] [_____] degrees
Vertical Dispersion Angle:	[57] [90] [115] [_____] degrees
Axial Sensitivity:	[57] [60] dB
Line Transformers Power Rating:	At least 4 watts

2.5 SPEAKER ENCLOSURES

Speaker enclosures shall be compatible with the speakers specified and comply with UL 50.

2.6 TERMINALS

Terminals shall be [solderless, tool-crimped pressure] [or] [_____] type.

2.7 COMMUNICATIONS WIRING

Type of signal and control circuit wire and number of conductors shall be provided as recommended by the intercommunication system manufacturer, and as necessary to provide a complete and operable system. Where required, cable shall be UL classified low smoke and low flame for use in air plenums in accordance with NFPA 70.

2.8 SURGE PROTECTION

Major components of the system such as Master Stations, Amplifiers, and Remote Stations, shall have a device, either internal or external, which shall provide protection against voltage spikes and current surges.

PART 3 EXECUTION

3.1 INSTALLATION

All system components and appurtenances shall be installed in accordance with the manufacturer's instructions and as specified and shown. Units to be mounted outside or subject to inclement conditions shall be weatherproof or be mounted in weatherproof enclosures.

3.1.1 Signal and Control Circuits Wiring

Signal and control circuits shall be installed in accordance with NFPA 70 and as indicated.

3.1.2 Conduit, Cable Tray and Tubing Systems

Wiring shall be installed in rigid conduit, intermediate metal conduits, cable trays, or electric metallic tubing as specified in Section 16415 ELECTRICAL WORK, INTERIOR.

3.2 GROUNDING

The connection of interfacing components shall be accomplished through the use of transformers and the tying of interconnecting lines to a unit ground bus at one end only. The ground and distribution ground buses shall be solid copper wire with insulating covering.

3.3 ACCEPTANCE TESTS

After installation has been completed, the Contractor shall conduct an acceptance test, using the approved test plan, to demonstrate that the equipment operates in accordance with specification requirements. The Contractor shall notify the Contracting Officer [_____] days prior to the performance of tests. In no case shall notice be given until after the Contractor has received written approval of the test plans. The acceptance tests shall include originating and receiving messages at specified

stations, at proper volume levels, without cross-talk or noise from other links or nondesignated units.

3.4 TRAINING

The Contractor shall conduct a training course for [_____] members of the operating and maintenance staff as designated by the Contracting Officer. The training course will be given at the installation during normal working hours for a total of [_____] hours and shall start after the system is functionally complete but prior to final acceptance tests. The field instructions shall cover all of the items contained in the approved operating and maintenance instructions, as well as the demonstration of routine maintenance operations. The Contracting Officer shall be notified at least 14 days prior to the start of the training course.

-- End of Section --