

## SECTION 27 52 23 NURSE CALL SYSTEM

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. This document specifies the furnishing, installing, and testing of a complete and operating Audio – Visual Nurse Call here-in-after referred to as “the System”, and associated equipment to be installed in the VA Medical Center here-in-after referred to as “the Facility”. The System shall be capable of interfacing with the two-way radio paging system and/or the telephone system. The System shall be microprocessor based and include, but not be limited to: central terminal assemblies; nurse control master station; psychiatric, staff, staff/duty, duty, and emergency stations; dome lights; combiners, traps and filters; audio distribution amplifiers; uninterruptible power supplies (UPS); conduit, cable duct, and/or cable tray; and necessary passive devices such as, cable, wire, and connectors, cordsets and push-buttons.
- B. The System shall be delivered free of engineering, manufacturing, installation, and operating defects. It shall be engineered and installed for ease of operation, maintenance, and testing.
- C. The total System shall be designed and installed so that the installation, interfacing, integration, combining, and/or consolidation of equipment actually employed does not produce any undesirable visual or aural effects such as signal distortions, noise pulses, glitches, audio or video hum bars, transients, ghosting, etc.
- D. The System is defined as an Emergency Critical Care Communication System is defined as an Emergency Critical Care Life Support Communication System by the National Fire Protection Association (NFPA). Therefore, its installation and operation shall adhere to all appropriate National and/or Government Local Life Safety and/or Support Codes, whichever are the more stringent for this Facility. Additionally, the original equipment manufacturer's (OEM) recommendations and guidelines shall be followed. The OEM and Contractor shall ensure that all management, sales, engineering, and installation personnel have read and understand the requirements of this specification before the System is designed, engineered, delivered, and provided.
- E. The VA Project Manager (PM) and/or if delegated Resident Engineer (RE) are the approving authority for all contractual and operational changes to the System. The Contractor is cautioned to obtain in writing, approvals for System changes relating to the published contract specifications and drawings, from the PM and/or the RE before proceeding with any proposed change.
- F. Equipment Standards and Product Testing:
  1. All equipment and materials (other than specific nurse call or code one (blue) equipment items) used in providing the System shall be listed, labeled and certified by UL or a nationally recognized testing laboratory where such standards have been established for the utilized items. Such listing and labeling shall warrant that the equipment has been tested in accordance with, and conforms to the specified standards.
  2. The provided active and passive nurse call and code one (blue) equipment required by the system design and approved technical submittal must conform with each UL standard in effect for the

equipment, as of the date the technical submittal (or the date when the RE approved system equipment necessary to be replaced) was technically reviewed and approved by the VA. Where a UL standard is in existence for equipment to be used in completion of this contract, a test must be conducted to certify the equipment meet the published UL standard. This test must be conducted by UL that makes periodic inspections of the production of nurse call equipment. The Contractor's technical submittal shall include UL certification and/or documents supplied by the testing laboratory that indicate each piece of equipment to be furnished conforms to UL standards, where such standards exist:

1. Each item of equipment to be provided under this contract must bear the approved UL seal or the seal of the testing laboratory that warrants the equipment has been tested in accordance with, and conforms to the specified standards.
2. At a minimum, the entire system shall meet or exceed UL 1069 Standard and be listed so in UL's published literature. The Contractor shall provide a copy of the entire UL 1069 published listing as a part of the technical submittal.

G. System Performance: The total system shall meet the following performance standards:

Function	Characteristics
Audio Gain	10 decibel (dB) minimum, Sound Pressure Level (SPL)
Signal to Noise (S/N) Ratio	35 dB minimum

## 1.2 RELATED WORK

- A. Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Specification Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- C. Specification Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.
- D. Specification Section 27 10 00, STRUCTURED CABLING.
- E. Specification Section 26 27 26, WIRING DEVICES.
- F. Specification Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
- G. Specification Section 27 11 00, COMMUNICATIONS EQUIPMENT ROOM FITTINGS and Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- H. Specification Section 27 41 41, MASTER ANTENNA TV EQUIPMENT AND SYSTEMS - EXTENSION.
- I. Specification Section 27 15 00.71, RADIO ENTERTAINMENT HORIZONTAL CABLING - EXTENSION.

## 1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only. Except for a specific date given the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of the System's submittal is technically approved by the VA, shall be enforced.
- B. National Fire Protection Association (NFPA):

70	National Electrical Code (NEC)
77	RECOMMENDED PRACTICE ON STATIC ELECTRICITY
99	Standard for Health Care Facilities
101	Life Safety Code

C. Underwriters Laboratories, Inc. (UL):

65	Standard for Wired Cabinets
467	Standard for Grounding and Bonding Equipment
1069	Standard for Hospital Signaling and Nurse Call Equipment
1410	Standard for Television Receivers and Video Products
1778	Standard for Uninterruptable Power Supply

D. U.S. National Archives and Records Administration (NARA):

47 CFR 15	Radio Frequency Devices
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E. Electronic Industries/Telecommunications Industries Associations (EIA/TIA):

568	Commercial Building Telecommunications Wiring Standard
569	Commercial Building Telecommunications Pathways and Spaces Standard
606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
607	Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
RS-270	Tools, Crimping, Solderless Wiring Devices Recommended Procedures for User Certification

F. Joint Commission on Accreditation of Health Care Organization (JCAHCO): Comprehensive Accreditation Manual for Hospitals

G. National and/or Government Life Safety Codes(s): The more stringent of each listed code.

#### 1.4 QUALITY ASSURANCE

- A. The authorized representative of the System's OEM shall be responsible for the design, satisfactory total operation of the System, and its certification.

- B. The OEM shall meet the minimum requirements identified in paragraph 2.1.A. Additionally, the OEM shall have had experience with three or more installations of systems of comparable size and complexity as regards to coordinating, engineering, testing, certifying, supervising, training, and documentation. Each of these installations shall have been in successful operation for at least three years after final acceptance by the user. These installations shall be provided as a part of the submittal identified in paragraph 1.5.
- C. The System Contractor shall submit certified documentation that they have been an authorized distributor and service organization for the OEM for a minimum of three (3) years. The System Contractor shall be authorized by the OEM to certify and warranty the installed equipment. In addition, the OEM and System Contractor shall accept complete responsibility for the design, installation, certification, operation, and physical support for the System. This documentation, along with the System Contractor and OEM certifications must be provided in writing as part of the Contractor's Technical submittal.
- D. The Contractor's Communications Technicians assigned to the System shall be fully trained, qualified, and certified by the OEM on the engineering, installation, operation, and testing of the System. The Contractor shall provide formal written evidence of current OEM certification(s) for the installer(s) as a part of the submittal or to the RE before being allowed to commence work on the System.

## 1.5 SUBMITTALS

- A. Provide submittals in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. The RE shall retain one copy for review and approval.
  - 1. If the submittal is approved the RE shall retain one copy for Official Records and return three (3) copies to the Contractor.
  - 2. If the submittal is disapproved, three (3) copies will be returned to the Contractor with written explanation attached indicating the areas the submittal deviated from the System specifications. The RE shall retain one copy for Official Records.
- B. Documents: The submittal shall be separated into sections for each sub-system and shall contain the following:
  - 1. Title page to include:
    - a. Facility name
    - a. VA Project Name
    - c. Contractor's name, address, and telephone (including FAX) numbers
    - d. Date of Submittal
    - e. VA Project Number
  - 2. A list containing a minimum of three locations of installations of similar size and complexity as identified herein. These locations shall contain the following:
    - a. Facility location and name
    - b. Owner's or User's name, address, and telephone (including FAX) numbers
    - c. Date of Project Start and Date of Final Acceptance by Owner
    - d. System Project Number

- e. Brief (three paragraphs minimum) description of each system's function, operation and installation
3. Narrative Description of the system as it is expected to be installed.
  4. A list of the equipment to be furnished. The quantity, make and model number of each item is required. Select the required equipment items quantities that will satisfy the needs of the System and edit between the // - //. Delete equipment items that are not required, add additional items required, and renumber section as per system design. List format shall be as follows:

The following are the minimum equipment required by the System:

QUANTITY	UNIT
//As required//	Central Terminal Equipment and Cabinet
//As required//	Power Amplifiers
//As required//	Nurse Control Master Station
//As required//	Staff Station
//As required//	Duty Station
//As required//	Single Patient Station
//As required//	Corridor Dome Lights
//As required//	Intersectional Dome Lights
//As required//	Remote Annunciator Panel
//As required//	Wires and Cables
//As required//	General Station Connectors
//As required//	Emergency Station
//As required//	Push-buttons
1 ea.	Installation Kit
//As identified//	Separate List of each Equipment Spare(s)

5. Central terminal cabinet layout drawing, as it is expected to be installed.
  6. Equipment technical literature detailing the electrical and technical characteristics of each item of equipment to be furnished.
  7. Engineering drawings of the System, with information to determine compliance with contract drawings and specifications.
  8. List of test equipment per paragraph 1.5.C.
  9. Letter certifying that the Contractor understands the requirements of the SAMPLES paragraph 1.5.D.
  10. Letter certifying that the Contractor understands the requirements of Section 3.2 concerning tests.
- C. Test Equipment List:
1. The Contractor is responsible for furnishing all test equipment required to test the System in accordance with the parameters specified. Unless otherwise stated, the test equipment shall not be

- considered part of the System. The Contractor shall furnish test equipment of accuracy better than the parameters to be tested.
2. The test equipment furnished by the Contractor shall have a calibration tag of an acceptable calibration service dated not more than 12 months prior to the test. As part of the submittal, a test equipment list shall be furnished that includes the make and model number of the following type of equipment as a minimum:
    - a. Spectrum Analyzer
    - b. Signal Level Meter
    - c. Volt-Ohm Meter
    - d. Sound Pressure Level (SPL) Meter
    - e. Sound Pressure Level (SPL) Calibrator
    - f. Random Noise Generator
    - g. Audio Amplifier with External Speaker
    - h. Pillow Speaker Test Set (Pillow Speaker with appropriate load and cross connections in lieu of the set is acceptable)
- D. Samples: A sample of each of the following items shall be furnished to the RE for approval prior to installation.
1. 610 mm (2 foot) section of each cable to be used with connectors installed and OEM cable sweep compliance and/or certification tags as specified in paragraph 2.3.F.
  2. Back boxes for the nurse call patient stations, dome lights, staff stations, duty stations, annunciator panels, and junction boxes.
  3. Cover plates used for patient stations, staff stations duty stations, annunciator panels, emergency stations.
  4. UPS equipment (if required by system design).
- E. Certifications
1. Submit written certification from the OEM indicating that the proposed supervisor of the installation and the proposed provider of the contract maintenance are authorized representatives of the OEM. Include the individual's exact name and address and OEM credentials in the certification.
  2. Submit written certification from the OEM that the wiring and connection diagrams meet National and/or Government Life Safety Guidelines, NFPA, NEC, UL 1066, this specification, and JCAHCO requirements and the instructions, requirements, recommendations, and guidance set forth by the OEM for the proper performance of the System as described herein. The VA will not approve any submittal without this certification.
  3. Preacceptance Certification: This certification shall be made in accordance with the test procedure paragraph 3.2.B.
- F. Equipment Manuals: Ten (10) working days prior to the scheduled acceptance test, the Contractor shall deliver four (4) complete sets of commercial operation and maintenance manuals for each item of

equipment furnished as part of the System to the RE. The manuals shall detail the theory of operation and shall include narrative descriptions, pictorial illustrations, block and schematic diagrams, and parts list.

G. Record Wiring Diagrams:

1. Ten (10) working days prior to the acceptance test, the Contractor shall deliver four (4) complete sets of the record wiring diagrams of the System to the RE. The diagrams shall show all inputs and outputs of electronic and passive equipment correctly identified according to the markers installed on the interconnecting cables, equipment and room/area locations.
2. The record wiring diagrams shall be in hard copy and two compact disk (CD) copies properly formatted to match the Facility's current operating version of Computer Aided Drafting (AutoCAD) system. The RE shall verify and inform the Contractor of the current version of AutoCAD being used by the Facility.

H. Ten (10) days prior to the start of the intermediate test, provide a typewritten detailed description of the System testing plan that meets this specification's performance standards as indicated in paragraph 2.1.C including illustrations and utilizes the test equipment specified in paragraph 1.5.C. The test plan will need to be evaluated and approved by the RE before intermediate testing begins.

I. Provide two (2) copies of an OEM developed training video tape presentation (reference paragraph 3.3.B) for evaluation and approval by the RE.

J. Provide a typewritten document that details the complete record program in memory for all associated station assignments. PART 2 - PRODUCTS

## **2.1 EQUIPMENT AND MATERIALS**

A. System Requirements:

1. The System shall receive the specified system signals and shall process and distribute them to the designated outlet, control and/or remote locations shown on the drawings. The System shall be designed to minimize cross talk, background processor noise and other signal interference.
2. The central control equipment shall be provided in the central equipment terminal cabinet ensuring that test port(s) is provided for access to each system function without the need to disconnect distribution cables or equipment.
3. The System shall be capable of interfacing with the two way radio system and networking more than one nurse call control units. These functions and connections must be specifically approved, in writing, by the RE during the specification, and technical submittal approval processes.
4. The System shall be capable of interfacing with the telephone system and networking more than one nurse call control unit. These functions and connections must be specifically approved in writing by the RE during the technical submittal approval process.
5. The Contractor is responsible for interfacing the RED, refer to Specification Section 27 15 00.71, RADIO ENTERTAINMENT HORIZONTAL CABLING-EXTENSION and MATV (refer to Specification Section 27 41 41, MASTER ANTENNA TV EQUIPMENT AND SYSTEMS-

- EXTENSION) and public address (PA - refer to Specification Section 27 51 16, PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS) system.
8. Each floor or ward distribution system shall be a "buss" design where each room's nurse call equipment is fed from centrally located lateral trunk line cables. Each signal closet mounted terminal cabinet shall be capable of connection to vertical trunk line riser cables in the associated signal closet and as shown on the drawings and recommended by the OEM.
  9. Each floor or ward distribution system shall be installed in conduit.
  10. The Contractor shall provide verification in writing that the type wire/cable being furnished and installed is recommended and approved by the OEM and will provide a total system free of defects.
  11. Central Terminal Cabinet Location: The cabinet shall be provided, protected, and located at the most central distribution system signal closet location to insure optimum origination, reception and control of all system signals. Each cabinet shall be provided with a internal active 120 Volts Alternating Current (VAC) quad receptacles connected by conduit to the Facility's Critical Branch Emergency Power Distribution Panel as shown on plans or if not shown on plans consult with RE regarding a suitable circuit location, prior to bidding. Each cabinet shall be installed to allow working clearances per NEC Article 110, paragraph 110.26 and as recommended by the equipment manufacturer. Each cabinet shall be provided, as required to meet the single audio and data channel requirements, and system performance standards.
  12. Central Terminal Cabinet and Master Control Station Selection:
    - a. The cabinet(s) shall be provided and protected in signal closets as shown on the drawings.
    - b. The master control station(s) shall be provided and protected in the nurses stations as shown on the drawings.

B. General:

1. All equipment to be supplied under this specification shall be new and the current model of a standard product of the OEM of the existing nurse call system currently on this campus. An OEM of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied and which:
  - a. Maintains a stock of replacement parts for the item submitted.
  - b. Maintains engineering drawings, specifications, and operating manuals for the items submitted.
  - c. Has published and distributed descriptive literature and equipment specifications on the items of equipment submitted at least 30 days prior to the Invitation for Bid.
2. Specifications of equipment as set forth in this document are minimum requirements, unless otherwise stated, and shall not be construed as limiting the overall quality, quantity or performance characteristics of items furnished in the System. When the Contractor furnishes an item of equipment for which there is a specification contained herein, that item of equipment shall meet or exceed the specification for that item of equipment.



3. The Contractor shall provide written verification, to the RE that the type of wire/cable being provided is recommended and approved by the OEM. Cabling shall meet the interconnecting wiring requirements of UL 1069; and the requirements of NFPA 70 (NEC). The Contractor is responsible for providing the proper size and type of cable duct and/or conduit and wiring even though the actual installation may be by another subcontractor.
4. The Nurse Call Contractor is responsible for interfacing the RED and MATV, Two-Way Radio Paging, Telephone, and \_\_\_\_\_ systems with the nurse call system. The Contractor shall continually employ interfacing methods that are approved by the OEM and VA. At a minimum, an acceptable interfacing method, requires not only a physical and mechanical connection but, a matching of signal, voltage and processing levels, with regard to signal quality and impedance. The interface point must adhere to all standards described herein for the full separation of Critical Care and Life Safety systems. The audio interface must be accomplished utilizing solid state switching. It is not acceptable to utilize the MATV/cable system for distribution and control of RED and nurse call system signals and equipment.
5. The TV multi-pin jack shall be the interface point for connection of the nurse call cabling from the bedside station. The multi-pin jack and MATV outlet with cover plate shall be furnished and installed by the MATV Contractor. The Nurse Call Contractor shall provide and interface the nurse call pillow speaker TV remote control functions to the MATV multi-pin jack.
6. Active electronic component equipment shall consist of solid state components and be rated for continuous duty service in the areas where provided.
7. All passive distribution equipment and cables shall meet or exceed -80 dB radiation shielding specifications.
8. All signaling and communication circuits shall be solid state except for audio switching relays.
9. The System shall utilize microprocessor components for all signaling and programming circuits and functions. Program memory shall be non-volatile or protected from erasure from power outages for a minimum of five minutes.
10. The System shall provide the continuous polling (not to be substituted for electrical supervision) of each station sequentially to determine change of status and to assist in trouble shooting faults.
11. All voltages, except for the primary power to the power supply circuits, shall not exceed 30 VAC Root Mean Squared (RMS) or 41.2 V direct current (DC).
12. Color code all distribution wiring to conform to the Nurse Call Industry standard, EIA/TIA, and this document, whichever is the more stringent. At a minimum, all equipment, cable duct and/or conduit, enclosures, wiring, terminals, and cables shall be clearly and permanently labeled according to and using the provided record drawings, to facilitate installation and maintenance. Reference Specification Section 27 10 00, STRUCTURED CABLING and Section 27 11 00, COMMUNICATIONS EQUIPMENT ROOM FITTINGS and Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.

13. Connect the System's primary input AC power to the Facility's Critical Branch of the Emergency AC Power Distribution System as shown on plans or if not shown on plans consult with RE regarding a suitable circuit location, prior to bidding.
  14. Provide a UPS for the System to operate and function normally (as if there was no AC power failure) in the event of an AC power failure for a minimum of 15 minutes.
  15. All equipment shall function and operate normally from the furnished power source, and also, during input power fluctuations or loss of power for a minimum of 15 minutes.
  16. Plug-in connectors shall be provided to connect all stations, except emergency stations and corridor lights. Emergency stations and corridor lights shall utilize barrier terminal screw type connectors, at a minimum. Crimp type connectors installed with a ratchet type installation tool are an acceptable alternate as long as the cable dress, pairs, shielding, grounding, and connections and labeling are provided the same as the barrier terminal strip connectors. Tape of any type, wire nuts or solder type connections are unacceptable and will not be approved.
  17. All equipment face plates utilized in the System shall be stainless steel, anodized aluminum or UL approved cycolac plastic that matches the equipment item it is installed. All faceplates shall be constructed of the same material throughout the facility.
  18. All equipment trim plates utilized in the System shall be stainless steel, anodized aluminum or UL approved cycolac plastic that matches the equipment item and the areas where provided. Trim plates are not authorized to bear the UL label for the station unless specifically approved by UL. All trim plates shall be constructed of the same material throughout the facility.
  19. Noise filters and surge protectors shall be provided for each equipment control cabinet, nurse call master station, local, and remote locations to ensure protection from input primary AC power surges and noise glitches are not induced into low voltage data circuits.
  20. Passive and electronic components and cabling shall be provided under the OEM's recommendations and guidance, to prevent damage to any system equipment from electrostatic discharges of a minimum of 25,000 Volts, at a relative humidity of a maximum of 20 percent (%) or less. The Contractor shall detail in the technical submittal the method and equipment to be utilized to protect the system components from a minimum 25,000 Volt electrostatic discharge.
- C. Master Station Nurse Call Equipment shall include, but not be limited to, the following:
1. Provide one station, including cathode ray tube (CRT), computer processing unit (CPU), keyboard, mouse, and UPS when used, where shown on the drawings. Provide two complete spare stations that at a minimum include CRTs, CPUs, keyboards, mouse, and UPS's when used.
  2. One telephone type handset shall be provided per station. Provide two spare handsets.
  3. Provide one current (as of the technical acceptance date of the System by the VA) operational copy of system software (VA to retain right of ownership and to be provided future software upgrades at a negotiated cost). Provide one complete spare software copy including published and unpublished upgraded.

## D. Dome Lights:

1. Corridor dome lights shall be provided as shown on the drawings and identified in the equipment list.  
Provide one spare dome light for each 40 locations, and portion thereof.
2. Room dome lights shall be provided as shown on the drawings and identified in the equipment list.  
Provide one spare dome light for each 40 locations, and portion thereof.

## E. Local and Remote Annunciator Panel Equipment shall be provided in the locations shown on the drawings and identified in the equipment list. Provide one spare panel.

## F. Equipment Functional Characteristics:

FUNCTIONS	CHARACTERISTICS
Input Voltage	105 to 130 VAC
Power Line Frequency	60 Hertz (Hz), $\pm 2.0$ Hz
Operating Temperature	0 to 50 degrees ( $^{\circ}$ ) Centigrade (C)
Humidity	80 %, minimum rating

**2.2 CENTRAL TERMINAL ASSEMBLIES**

## A. Equipment Cabinet:

1. The provided equipment cabinet shall be lockable, fabricated of heavy gauge steel with baked on paint finish. The color shall conform to the area in which it is installed and approved by the RE. It shall be wall mounted with knockout holes for cable entrance and conduit connection, contain ventilation ports and quiet fan with non-disposable air filter for equipment cooling. Two keys shall be provided to the RE for each lock when the VA accepts the System.
2. AC Power Surge Protector Strip(s):
  - a. The strip may be provided, in lieu of the required internal cabinet mounted quad AC outlet(s), with an outlet for each item of equipment and a minimum of four spare AC power outlets. Each strip shall be mounted inside and at the rear of each equipment cabinet. The strip shall be self-contained in a metal enclosure with a maximum of 1.8 m (6 feet) connecting wire with three-prong plug. It is acceptable to connect it to one of the service outlets for the AC power line filter. Extension or "pig tail" non-protected cords from the system cabinet or rack to a system wall outlet is not authorized and shall not be allowed and if discovered shall be grounds to declare the entire system unacceptable and terminate all acceptance testing.
  - b. Technical Characteristics:

Power Capacity	20 Ampere (AMP), 120 VAC continuous duty
Wire Gauge	Three conductor, #12 American Wire Gauge (AWG) solid copper

3. AC Power Line Surge Protector and Filter:

- a. Provide each cabinet containing active electronic equipment shall be with a AC surge protector and filter. The protector and filter shall be housed in one single enclosure. The protector and filter shall provide instantaneous regulation of the AC input voltage and isolate and filter any noise present on the AC input line. It shall be mounted inside the cabinet and the cabinet's AC power strip (two strips maximum) may be connected to it.
- b. Technical Characteristics:

Input Voltage Range	120 VAC $\pm$ 15%
Power Capacity	20 Amperes (AMP), 120 VAC
Voltage Output Regulation	$\pm$ 3.0%
Circuit Breaker	15 AMP, may be self contain
Noise Filtering	Greater than 45 dB
AC Outlets	Four duplex grounded types, minimum
Response Time	5 Nano Seconds (nS)
Surge Suppression	10,000 AMPS
Noise Suppression:	
Common	-40 dB
Differential	-45 dB

B. Central Terminal Equipment:

1. Each sub-system (ward) shall be provided with separate central terminal equipment that will service no more than two nursing units or wards. Components of the central equipment shall be mounted on panels or standard EIA rack dimensions.
2. The provided sub-systems shall be balanced so that when the system volume level is adjusted to maximum, no pulsating noise or data noise is audible, when communicating between the nurse control station and the most distant patient bedside station.
3. Each power amplifier unit shall be provided with separate power overload protection circuits and shall provide self-limiting audio compression without distortion. The amplifiers shall have a common volume control for regulation of intercom audio for all associated stations. The amplifiers shall be adjusted/balanced to provide normal system audio levels between the master station and all remote locations when system audio levels are adjusted to approximately mid-range. Provide one spare amplifier circuit board and/or module.
4. Each provided cabinet shall conform to the spaces designated for installation. The width, height and depth dimensions of the central equipment cabinet shall be included with the equipment submittals.

## 2.3 EQUIPMENT SPECIFICATIONS

- A. Staff Station: Each staff station shall be provided with:
  1. Two-way voice communication with the nurse control master station.
  2. A call origination device, cancel device, placed call annunciator, and an incoming call/privacy annunciator indicator.
  3. A connection from the on-call room to the nurse control master station.
  4. A location in the nearest nurse station to an ICU, CCU, Recovery, and/or Dialysis ward. Connect the staff station to the ICU, CCU, Recovery, or Dialysis nurse call system.
  5. Each staff station shall be mounted on a six-gang back box, minimum. A trim plate constructed of stainless steel or a material similar to the staff station shall be provided to cover the back box opening and frame the cover plate.
- B. Staff/Duty Station: Each staff/duty station shall be provided with:
  1. Two-way voice communications with the nurse control master station.
  2. A call placed annunciator and a device to generate audible signals.
  3. A call origination device, call placed annunciator, cancel device, and incoming call/privacy annunciator indicator.
  4. The capability to indicate all patient normal calls placed in the System with audible and visual signals.
  5. The capability to indicate all patient/emergency calls with audible and visual signals.
  6. Each staff/duty station shall be mounted on a six-gang back box, minimum. A trim plate constructed of stainless steel or a material similar to the staff/duty station shall be provided to cover the back box opening and frame the cover plate.
- C. Emergency Station:
  1. A pullcord emergency station shall be provided in each toilet stall and each shower/bath stall, one per shower head. Shower emergency stations shall be provided inside the shower stall at the shower headend. They shall be provided approximately 460 mm (18 inches) from the shower head itself and/or 1830 mm (72 inches) above finished floor (AFF). Each station inside shower and toilet areas shall be equipped with a rubber gasket between the face plate and wall or be rated by UL as waterproof.
  2. The gasket shall cover and water seal the entire back box opening and not extend beyond the sides of the associated face plate by 6.4 mm (1/4 inch) maximum. If the wall is tile or other uneven type material the gasket and associated face plate shall be provided to completely seal the opening and uneven material surface.
  3. Each emergency station shall be mounted on a double-gang back box, minimum. A trim plate constructed of stainless steel or a material similar to the emergency station shall be provided to cover the back box opening and frame the cover plate.
  4. Emergency stations shall be provided with:
    - a. A ten-pound test pull cord and pendant which shall be connected to a positive action on/off switch at the emergency station. The cord with pendant shall be 6 inches maximum length.

- b. A minimum of one pound pull to activate the switch.
  - c. A reset/cancel function on the face plate of the emergency station.
  - d. "EMERGENCY NURSE CALL" or similar approved wording stamped or permanently affixed on the face plate. The emergency wording letters shall be a minimum of 3.2 mm (1/8 inch) high.
  - e. A red lamp which shall flash at a rate of one second on and one second off upon initiation of a call from the emergency station. The lamp shall continue to flash until the station is reset.
- 5. A push-button emergency stations shall be provided in Exam and/or Treatment Rooms.
- D. Corridor Door Dome Lights:
  - 1. Provide light covers that are translucent and shall not deform, discolor or craze from heat or use of normal hospital cleaning agents.
  - 2. Corridor dome lights shall be provided for congregate bath/toilet areas and shall contain one red lamp.
  - 3. Each dome light shall be mounted on a dual-gang back box, minimum. A trim plate constructed of stainless steel or a material similar to the dome light shall be provided to cover the back box opening and frame the cover plate.
- E. Corridor Intersectional Dome Lights:
  - 1. Provide corridor intersectional lights that contain a minimum of two lamps to identify any placed call in the System. The visual signals for routine and emergency placed calls shall be distinctly different from each other.
  - 2. Provide the light at each intersecting point of corridors that display visual signals simultaneously at all corridor intersectional lights for calls placed in the System.
  - 3. Each light shall be mounted on a dual-gang back box, minimum. A trim plate constructed of stainless steel or a material similar to the light shall be provided to cover the back box opening and frame the cover plate.
- F. Nurse Control Master Station: Each nurse control station shall be provided:
  - 1. As an audiovisual type.
  - 2. As desk mounted: With 1.2 meters (4 feet) of interconnecting cable (from the central equipment to the master station) to allow for convenient placement of the nurse control station on the desktop.
  - 3. With the following features:
    - a. Microphone/speaker and telephone handset with a 910 mm (3 foot) coiled cord. The handset shall be able to conduct two-way voice communication between the nurse and the selected calling station. Lifting the handset shall mute the microphone/speaker.
    - b. Digital readout touch screen to visually announce the location of incoming calls placed in the System including room and bed number and priority of the call. Identify each calling station with an individual display, including separate displays for each patient sharing a dual bedside station. If a digital readout touch screen standard is not submitted or approved by the Facility during the project design phase, an alpha - numeric scheme shall be provided that identifies the: ward, room

and bed (i.e. Ward 2a, Room 201, Bed A (or 1) shall read 2A201A -or- 2A201-1. Equivalent readouts are acceptable as long as the Facility approves the readout).

- 1) It shall display a minimum of four incoming calls. Additional placed calls shall be stored in order of placement and priority.
- c. Nurse follower function. All calls placed in the System shall be visually or audibly announced at the selected bedside stations when selecting the nurse follower mode of operation and the bedside stations to be visited. It is acceptable for the nurse follower mode to be activated inside rooms containing bedside stations.
- d. Automatic answering function or selective answering device.
- e. Incoming call priority function. The visual or audible signals shall indicate if a routine or emergency (and/or code) call has been placed and shall continue until the call is canceled. The emergency calls shall be capable of being canceled only at the originating station. Provide for the programming to two levels of priority, minimum, for incoming calls from each associated bedside station.
- f. Reminder function. Shall temporarily store a placed call and generate visual signals in the corridor dome light associated with the calling bedside station by activating the reminder function/circuitry. The visual signals shall terminate and the stored call is eliminated from memory when the call is canceled at the originating station.
- g. The ability to generate visual and audible signals to indicate incoming calls from associated stations which:
  - 1) Shall silence or attenuate the audible signals through muting/attenuation circuits while the control station is being used to answer or place a call. The audible signals for incoming calls not answered shall be automatically reenergized when the nurse control station is returned to the standby mode.
  - 2) The visual signals for incoming calls shall remain displayed at all times until each call is answered or canceled at the calling station.
  - 3) The visual and audible signals for routine and emergency calls shall be distinctly different. The audible signals shall be generated at the same rate as the corresponding visual signals for each emergency calls. Audible signals for routine calls shall be generated at the same rate as the visual signals, or by repeating an audible signal every five to ten seconds until the call is answered or canceled.
  - 4) The visual display to indicate the location of a placed call shall appear on the control station within two seconds, maximum, after initiation of a call.
- h. Touch pad, or equal, to permit the nurse to selectively place calls to and conduct two-way voice communication with, all system bedside, staff and duty stations and associated nurse stations. The touch pad shall also provide for the programming of priority status and any other function capable of being programmed from the nurse control station.

- i. The ability to monitor a bedside station. The wiring and/or equipment used shall assure that, when a station is being monitored or called by the nurse control station, the call answered/monitor lamp station shall be lighted.
  - j. The capability of paging a minimum of 10 bedside stations simultaneously.
  - k. The ability to receive calls from a minimum of 10 associated stations simultaneously.
  - l. The ability for answering placed calls by either:
    - 1) Picking up the handset or by activating an answer next call function, which will automatically permit the nurse to communicate with the station that is next in sequence of placed calls by priority and time of placement, or
    - 2) By being able to selectively answer any placed call displayed in the order of priority and time of placement.
  - m. Accommodate a minimum of 10 percent expansion of additional patient, emergency, staff and duty stations within each master nurse control station as installed without any additions to the central equipment.
  - n. Nurse control master stations that require AC power and/or have video type (or CRT) display units associated with them, shall be connected to the same Emergency Critical Care Distribution System AC power panel that supplies AC power to its associated central terminal cabinet. A UPS shall be provided at the nurse station location to supply battery back up power to the station and CRT equipment if they are not powered from the central terminal equipment battery backup system.
- G. Psychiatric Stations
- 1. A push-button emergency station shall be provided in each toilet stall and each shower/bath facility in psychiatric nursing units. Shower emergency stations shall be installed inside the shower stall at the shower headend. They shall be installed approximately 460 mm (18 inches) from the showerhead itself and 1.8 meters (72 inches) above finished floor. Each station inside shower and toilet areas shall be equipped with a rubber gasket between the face plate and wall or be rated by UL as waterproof. The gasket shall cover and water seal the entire back box opening and not extend beyond the sides of the associated face plate by 6.35 mm (1/4 inch) maximum. If the wall is tile or other uneven type material the gasket and associated face plate shall be provided to completely seal the opening and uneven material surface.
  - 2. Fasten emergency station face plates to the back boxes with tamperproof screws.
  - 3. Provide security rooms in psychiatric nursing units with a hall station containing a key activated switch, four emergency push-button stations and a 100 mm (4 inch) flush mounted ceiling microphone/speaker. All equipment shall utilize tamperproof screws.
  - 4. Activating the switch shall energize each emergency station in the security room.
  - 5. Selection of the security room station at the nurse control station shall permit two-way voice communication within the room and nurse control station, through the ceiling microphone/speaker.



6. Pressing the push-button on any security room emergency station shall generate emergency visual signals in the corridor dome light and emergency audible and visual signals at the nurse control station.
7. Provide six keys for each psychiatric unit.

## **2.5 DISTRIBUTION SYSTEM**

Refer to Specification Sections 27 11 00, COMMUNICATIONS EQUIPMENT ROOM FITTINGS and 27 15 00, COMMUNICATIONS HORIZONTAL CABLING for additional VHA wire and cable standards and installation requirements. Each wire and cable used in the System shall be specifically OEM certified by tags on each reel and recommended and approved for installation in the Facility. The Contractor shall provide the RE a 610 mm (2 foot) sample of each wire and/or cable actually employed in the System and each certification tag for approval before continuing with the installation as described herein.

## **2.6 INSTALLATION KIT**

The kit shall be provided that at a minimum, includes all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap terminal or wiring block. Unfinished or unlabeled wire connections shall not be allowed. Turn over to the RE all unused and partially opened installation kit boxes, coaxial cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, physical installation hardware. This is an acceptable alternate to the individual spare equipment requirement as long as the minimum spare items are provided in this count. The following are the minimum required installation sub-kits:

### **A. System Grounding:**

1. The grounding kit shall include all cable and installation hardware required. All A/V nurse call equipment shall be connected to earth ground via internal building wiring, according to the NEC.
2. This includes, but is not limited to:
  - a. Coaxial Cable Shields
  - b. Control Cable Shields
  - c. Data Cable Shields
  - d. Equipment Racks
  - e. Equipment Cabinets
  - f. Conduits
  - g. Cable Duct
  - h. Cable Trays
  - i. Power Panels
  - j. Connector Panels

- B. Coaxial Cable (MATV Interconnections): The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, etc., required to accomplish a neat and secure installation.

- C. Wire and Cable: The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, wiring blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
- D. Conduit, Cable Duct, and Cable Tray: The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.
- E. Equipment Interface: The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface Systems and sub-systems according to the OEM requirements and this document.
- F. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to completely and correctly label each sub-system according to the OEM requirements, record drawings, and this document.
- G. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to completely and correctly provide the system documentation as required by this document and explained herein.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Product Delivery, Storage and Handling
  - 1. Delivery: Deliver materials to the job site in OEM's original unopened containers, clearly labeled with the OEM's name, equipment model and serial identification numbers, and UL logo. The RE may inventory the nurse call equipment at the time of delivery and reject items that do not conform to this requirement.
  - 2. Storage and Handling: Store and protect equipment in a manner that will preclude damage as directed by the RE.
- B. System Installation
  - 1. Do not install nurse call and fire alarm systems in the same conduit, raceway or cable trays.
  - 2. For VA Facilities, it is permissible to include non-powered RED and MATV cables with nurse call cables provided each signal is directly controlled by its system and each cable is 100% shielded and bundled as described herein.
  - 3. The Contractor shall provide suitable filters, traps and pads for minimizing interference and for balancing the amplifiers and distribution system(s). Items used for balancing and minimizing interference shall be able to pass audio, data and control signals in the speeds and frequency bands selected, in the directions specified, with low loss, and high isolation and with minimum delay of the system poling or subcarrier frequency(s).

4. Back up power supplies (e.g., batteries, UPS) shall be installed in the central equipment cabinet or in a separate metal cabinet equipped with a hinged door and lock. If a separate cabinet is installed, it shall be provided adjacent to the central equipment cabinet. Where the backup power supply is already self-contained in a housing, the unit can be mounted adjacent to the respective equipment cabinet. In all cases, backup power supplies must be permanently mounted. Each UPS and/or backup power supply shall be provided with full electrical supervision as described herein.
5. When prefabricated bedside units (PBPU) are used in the System, the Contractor shall contact the RE who in turn will contact the PBPU OEM to obtain proper authorizations and written certifications to attach system components to the PBPU in locations where standard PBPU access, port knockouts or routes have not been provided. Additionally, if the patient pillow speaker or cordset hanger does not have a standard place or mode of attachment to the PBPU, the Contractor shall obtain the aforementioned guidance from the PBPU OEM for attaching the hanger. Under no circumstance shall the Contractor modify, drill, punch, or proceed with installation of the System in PBPU's without the required approvals.
6. In those areas where special beds are to be used, such as Hill Rom, Striker, etc., and the communications connected to the PBPU or to the headwall, the PBPU, nurse call, and the bed OEMs shall be contacted by the RE to secure the proper authorizations and guidance for interfacing the bed's communications systems with the System.
7. All passive equipment shall be connected according to the OEM's specifications to insure correct termination, isolation, impedance match, and signal level balance at each speaker.
8. Install all equipment for each location specified herein and as identified on the drawings.
9. All trunk, distribution and interconnecting lines shall be terminated in a suitable manner to facilitate future expansion of the System by adding center terminal equipment only.
10. All vertical and horizontal lines shall be terminated so that subsequent expansion for additional audio channels shall require modifications of the System central terminal equipment only.
11. Terminating resistors shall be used to terminate all unused branches, outlets, unused equipment ports of the System and shall be devices designed for the purpose of terminating audio cables carrying audio signals in nurse call systems.

**B. Conduit and Signal Ducts:**

1. Conduit:
  - a. The Contractor shall employ the latest installation practices and materials. The minimum conduit size shall be 25 mm (1 inch) in diameter for primary signal distribution and 19 mm (3/4 inch) for remote connections (i.e. dome lights, emergency station, TV control, RED control, etc.).
  - b. All cables shall be installed in separate conduit and/or signal ducts (exception from the separate conduit requirement to allow nurse call cables to be installed in partitioned cable tray with RED and MATV cables shall be granted in writing by the RE if requested.) The mixing of nurse call and fire alarm cables and/or systems is not authorized and will not be approved. (See caution

identified in paragraph 3-1b.3.e.). Conduit shall be provided in accordance with Specification Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS, at a minimum.

- c. Conduit fill shall not exceed 40 percent.
  - d. Cable runs shall be splice free between conduit junction and interface boxes and equipment locations.
2. Signal Duct, Cable Duct, or Cable Tray:
- a. The Contractor shall use existing signal duct, cable duct and/or cable tray, when identified and approved by the RE.
  - b. Approved signal and/or cable duct shall be a minimum size of 100 mm x 100 mm (4 inch x 4 inch) inside diameter with removable tops or sides, as appropriate. Protective sleeves, guides, or barriers are required on all sharp corners, openings, anchors, bolts, or screw ends, junction, interface and connection points.
  - c. Approved cable tray shall be fully covered, mechanically and physically partitioned for multiple electronic circuit use, and UL certified and labeled for use with telecommunication circuits and/or systems. The RE shall approve width and height dimensions.
  - d. Do not pull wire or cable through any box, fitting or enclosure where change of approved conduit, cable tray, signal, or cable duct alignment or direction occurs. Ensure the proper bend radius is maintained for each wire or cable as specified by it's OEM.
  - e. Employ temporary guides, sheaves, rollers, and other necessary items to protect the wire or cable from excess tension or damaging bending during installation. Abrasion to wire or cable jackets is not acceptable and will not be allowed. Replace all cables whose jackets has been abraded the discovery of any abraded and/or damaged cables during the proof of performance test shall be grounds for declaring the entire system unacceptable and the termination of the proof of performance test. Completely cover edges of wire or cable passing through holes in chassis, cabinets or racks, enclosures, pull or junction boxes, conduit, etc., with plastic or nylon grommetting.
  - f. All cable junctions and taps shall be accessible. Do not install junction blocks, multi distribution connections or other distribution equipment (active or passive) items inside signal ducts. Use a 150 mm x 150 mm x 100 mm (6 inch x 6 inch x 4 inch) minimum covered junction box attached to the signal duct fixed side for distribution system passive equipment installation. Ensure all equipment and connection assembly junctions are accessible.

C. Distribution System Signal Wires and Cables

- 1. Wires and cables shall be provided in the same manner and use like construction practices as Fire Protective and other Emergency Systems that are identified and outlined in NFPA 101, Life Safety Code, Chapters 7, 12, and/or 13, NFPA 70, National Electrical Code, Chapter 7, Special Conditions. The wires and cables shall be able to withstand adverse environmental conditions location without

deterioration. Wires and cables shall enter each equipment enclosure, console, cabinet, or rack in such a manner that all doors or access panels can be opened and closed without removal or disruption of the cables.

2. Routing and Interconnection:

- a. Wires or cables routed between consoles, cabinets, racks, and other equipment shall be installed in an approved conduit, signal duct, cable duct, or cable tray that is secured to building structure.
- b. Wires and cables shall be insulated to prevent contact with signal or current carrying conductors and be 100% shielded. Wires or cables used in assembling consoles, panels, equipment cabinets and racks shall be formed into harnesses that are bundled and tied. Harnessed wires or cables shall be combed straight, formed and dressed in either a vertical or horizontal relationship to equipment, controls, components or terminations.
- c. Harnesses with intertwined members are not acceptable. Each wire or cable that breaks out from a harness for connection or termination shall have been tied off at that harness or bundle point, and provided with a neatly formed service loop.
- d. Wires and cables shall be grouped according to service (i.e.: AC, grounds, signal, DC, control, etc.). DC, control and signal cables may be included with any group. Wires and cables shall be neatly formed and shall not change position in the group throughout the conduit run. Wires and cables in approved signal duct, conduit, cable ducts, or cable trays shall be neatly formed, bundled and tied off in 600 mm to 900 mm (24 to 36 inch) lengths and shall not change position in the group throughout the run. Concealed splices are not allowed.
- e. Separate, organize, bundle, and route wires or cables to restrict channel crosstalk or feedback oscillation inside any enclosure. Looking at any enclosure from the rear (wall mounted enclosures, junction, pull or interface boxes from the front), locate AC power, DC, and speaker wires or cables on the left; coaxial, control, microphone, and line level audio and data wires or cables, on the right. This installation shall be accomplished with ties and/or fasteners that will not damage or distort the wires or cables. Limit spacing between tied off points to a maximum of 150 mm (6 inches).
- f. Distribution cables shall be installed and fastened without causing sharp bends or rubbing of the cables against sharp edges. Cables shall be fastened with hardware that will not damage or distort them.
- g. Cables shall be labeled with permanent markers at the terminals of the electronic and passive equipment and at each junction point in the System. The lettering on the cables shall correspond with the lettering on the record diagrams.
- h. Completely test all of the cables after installation and replace any defective cables.
- i. Provide system input and output polarity as recommended by the OEM. Insure each color coded wire or cable is connected and terminated to maintain system polarity to be at least the same

quality of professional audio systems. Reflect all color codes, wire and cable terminations on the System's record drawings as required herein.

D. Outlet Boxes, Back Boxes, and Face Plates

1. Outlet Boxes: Signal, power, interface, connection, distribution, and junction boxes shall be provided as required by the system design, on-site inspection, and review of the contract drawings.
2. Back Boxes: Back boxes shall be provided as directed by the OEM as required by the approved system design, on-site inspection, and review of the contract drawings.
3. Face Plates (or Cover Plates): Face plates shall be of a standard type, stainless steel, anodized aluminum or UL approved cyclac plastic construction and provided by the Contractor for each identified system location. Connectors and jacks appearing on the face plate shall be clearly and permanently marked.

E. Connectors: Circuits, transmission lines and signal extensions shall have continuity, correct connection, and polarity. Polarity shall be maintained between all points in the System.

1. Wires:

- a. Wire ends shall be neatly formed and where insulation has been cut, heat shrink tubing shall be employed to secure the insulation on each wire. Tape of any type is not acceptable and will not be approved.
  - b. Audio spade lugs shall be installed on each wire (including spare or unused) end and connect to screw terminals of appropriate size barrier strips. AC barrier strips shall be provided with a protective cover to prevent accidental contact with wires carrying live AC current. Wiring blocks are approved for signal, not AC wires. Wire Nut or "Scotch Lock" connectors are not acceptable for signal wire installation.
2. Cables: Each connector shall be designed for the specific size cable being used and installed with the OEM's approved installation tool. Typical system cable connectors include; but, are not limited to: Audio spade lug, wiring block, wirewrap, etc.

F. AC Power: AC power wiring shall be run separately from signal cable.

G. Grounding:

1. General: The Contractor shall ground all Contractor installed equipment to eliminate all shock hazard and to minimize, to the maximum extent possible, all ground loops, common mode returns, noise pickup, crosstalk, etc. The total ground resistance shall be 0.1 Ohm or less:
  - a. Under no conditions shall the AC neutral, either in a power panel or in a receptacle outlet, be used for system control, subcarrier or audio reference ground.
  - b. The use of conduit, signal duct, or cable trays as system or electrical ground is not acceptable and will not be permitted. These items may be used only for the dissipation of internally generated static charges [not to be confused with externally generated lightning] that may be applied or generated outside the mechanical and/or physical confines of the System to earth ground. The

discovery of improper system grounding shall be grounds to declare the System unacceptable and the termination of all system acceptance testing.

3. Cabinet Buss: A common ground buss of at least #10 AWG solid copper wire shall extend throughout each equipment cabinet and be connected to the system ground. Provide a separate isolated ground connection from each equipment cabinet ground buss to the system ground. Do not tie equipment ground busses together.
4. Equipment: Equipment shall be bonded to the cabinet ground bus with copper braid equivalent to at least #12 AWG. Self grounding equipment enclosures, racks or cabinets, that provides OEM certified functional ground connections through physical contact with installed equipment, are acceptable alternates.
5. Cable Shields: Cable shields shall be bonded to the cabinet ground buss with #12 AWG minimum stranded copper wire at only one end of the cable run. Cable shields shall be insulated from each other, face plates, equipment racks, consoles, enclosures or cabinets; except, at the system common ground point. Coaxial and audio cables, shall have one ground connection at the source; in all cases, cable shield ground connections shall be kept to a minimum.

#### H. Equipment Assembly:

1. Cabinets:
  - a. Each enclosure shall be: floor or wall mounted with standard knockout holes for conduit connection or cable entrance; provide for ventilation of the equipment; have front and rear locking doors (except wall mounted cabinets that require only a front locking door); power outlet strip(s) and bulkhead connector panel(s).
  - b. Each cabinet shall be equipped with a quiet fan and nondisposable air filter.
  - c. Enclosures shall be installed plumb and square. Each shall be permanently attached to the building structure and held firmly in place as approved by the RE.
  - d. Signal equipment, patch or bulkhead connector panels (i.e.: audio, data, control, etc.) shall be connected so that output for from each source, device or system component shall enter the panel at the top row of jacks, beginning left to right as viewed from the front, which will be called "input". Each connection to a load, device or system component shall exit the panel at the bottom row of jacks, beginning left to right as viewed from the front, which will be called "output".

#### I. Labeling: Abbreviations may be used as long as they are symbol(s) or acronyms designated for the System or equipment by accepted industry standards and each abbreviation is used on the appropriate system and sub-system "record" drawing.

1. Cable and Wires (Hereinafter referred to as "Cable"): The Contractor shall install labels on all cables at each side of all connections. The labeling shall be permanent, with contrasting identification alpha or numeric, identifying each cable according to the System "as record" drawings. Labels shall be installed adjacent to each mechanical connector, pull box or break in the cable run.

2. **Equipment:** The Main Nurse Call Control Panel, amplifying, control, switching, and routing equipment inputs and outputs shall be permanently labeled with contrasting plastic laminate or bakelite material. System equipment shall be permanently labeled on the face of the unit corresponding to its source. Remote control equipment shall be labeled according to the unit or system being controlled. Equipment labels shall be permanently affixed to the equipment with metal screws, permanent mounting devices or cement.
3. **AC Power:** The AC Power Panel Directory shall identify which equipment console, cabinet or enclosure that it serves. Each equipment console, cabinet or enclosure shall be labeled to identify which AC power panel provides power to it. These labels shall be permanently affixed to the equipment with metal screws, permanent mounting devices or cement.
4. **Conduit, Cable Duct, and/or Cable Tray:** The Contractor shall label all conduit, duct, and tray, including utilized GFE, with permanent marking devices or spray painted stenciling a minimum every 3 meters (10 feet) identifying it as the System. Also, each enclosure shall be labeled according to this standard.

### **3.2 PROOF OF PERFORMANCE TESTS**

#### **A. Intermediate Testing:**

1. After completion of the installation of a central control cabinet and equipment, nurse control master station, local and remote enunciation stations, the first ward (maximum of two wards), and prior to any further work, this portion of the System must be pretested, inspected, and certified. Each item of installed equipment shall be checked to ensure appropriate UL certification labels are affixed, NFPA, Life Safety, and JCAHCO guidelines are followed, and proper installation practices are followed. The intermediate test shall include a full operational test.
2. The inspection and test will be conducted by a factory-certified representative and witnessed by a Government Representative. The results of the inspection will be officially recorded by the Government Representative and maintained on file by the RE, until completion of the entire project. The results will be compared to the Acceptance Test results. An identical inspection may be conducted between the 65 - 80% point of the system construction phase, at the direction of the RE.

#### **B. Pretesting:**

1. Upon completing installation of the System, the Contractor shall align, balance, and completely pretest the entire system under full operating conditions.
2. **Pretesting Procedure:**
  - a. During the System pretest the Contractor shall verify (utilizing approved spectrum analyzer and test equipment) that the System is fully operational and meets all the System performance requirements of this standard.
  - b. The Contractor shall pretest and verify that all system functions and specification requirements are met and operational, no unwanted aural effects, such as signal distortion, noise pulses, glitches,



audio hum, poling noise, etc. are present. At a minimum, each of the following locations shall be fully pretested:

- 1) Central Control Cabinets
  - 2) Nurse Control Stations
  - 3) Patient Stations
  - 4) Staff Stations
  - 5) Local and Remote Enunciation Panels (code one [blue] only)
  - 6) All Networked locations
  - 7) System interface locations (i.e. two way radio, PA, etc.)
  - 8) System trouble reporting
  - 9) System supervision
  - 10) UPS operation
3. The Contractor shall provide four (4) copies of the recorded system pretest measurements and the written certification that the System is ready for the formal acceptance test shall be submitted to the RE.

C. Acceptance Test:

1. After the System has been pretested and the Contractor has submitted the pretest results and certification to the RE, then the Contractor shall schedule an acceptance test date and give the RE 30 days written notice prior to the date the acceptance test is expected to begin. The System shall be tested in the presence of a Government Representative and an OEM certified representative. The System shall be tested utilizing the approved test equipment to certify proof of performance and Life Safety compliance. The test shall verify that the total System meets all the requirements of this specification. The notification of the acceptance test shall include the expected length (in time) of the test.
2. The acceptance test shall be performed on a "go-no-go" basis. Only those operator adjustments required to show proof of performance shall be allowed. The test shall demonstrate and verify that the installed System does comply with all requirements of this specification under operating conditions. The System shall be rated as either acceptable or unacceptable at the conclusion of the test. Failure of any part of the System that precludes completion of system testing, and which cannot be repaired in four (4) hours, shall be cause for terminating the acceptance test of the System. Repeated failures that result in a cumulative time of eight (8) hours to effect repairs, shall cause the entire System to be declared unacceptable. Retesting of the entire System shall be rescheduled at the convenience of the Government.

D. Acceptance Test Procedure:

1. Physical and Mechanical Inspection:
  - a. The Government Representative will tour all major areas where the System is and all sub-systems are completely and properly installed to insure they are operationally ready for proof of performance testing. A system inventory including available spare parts will be taken at this time.

Each item of installed equipment shall be checked to ensure appropriate UL certification labels are affixed.

- b. The System diagrams, record drawings, equipment manuals, Auto CAD Disks, intermediate, and pretest results shall be formally inventoried and reviewed.
- c. Failure of the System to meet the installation requirements of this specification shall be grounds for terminating all testing.

## 2. Operational Test:

- a. After the Physical and Mechanical Inspection, the central terminating and nurse call master control equipment shall be checked to verify that it meets all performance requirements outlined herein. A spectrum analyzer and sound level meter may be utilized to accomplish this requirement.
- b. Following the central equipment test, a pillow speaker (or on board speaker) shall be connected to the central terminating and nurse call master control equipment's output tap to ensure there are no signal distortions such as intermodulation, data noise, popping sounds, erratic system functions, on any function.
- c. The distribution system shall be checked at each interface, junction, and distribution point, first, middle, and last intersectional, room, and bed dome light in each leg to verify that the nurse call distribution system meets all system performance standards.
- d. Each MATV outlet that is controlled by a nurse call pillow speaker shall be functionally tested at the same time utilizing the Contractor's approved hospital grade TV receiver and TV remote control cable.
- e. The RED system and volume stepper switches shall be checked to insure proper operation of the pillow speaker, the volume stepper and the RED system.
- f. Additionally, each installed emergency, patient, staff, duty, panic station, intersectional, room, and bed dome light, power supply, code one, and remote annunciator panels shall be checked insuring they meet the requirements of this specification.
- g. Once these tests have been completed, each installed sub-system function shall be tested as a unified, functioning and fully operating system. The typical functions are: nurse follower, three levels of emergency signaling (i.e. flashing red emergency, flashing white patient emergency, flashing white or combination lights for staff emergency, separate flashing code blue), minimum of ten minutes of UPS operation, memory saving, minimum of ten station audio paging, canceling emergency calls at each originating station only, and storage and prioritizing of calls.
- h. Individual Item Test: The Government Representative will select individual items of equipment for detailed proof of performance testing until 100% of the System has been tested and found to meet the contents of this specification. Each item shall meet or exceed the minimum requirements of this document.

## 3. Test Conclusion:

- a. At the conclusion of the Acceptance Test, using the generated punch list (or discrepancy list) the VA and the Contractor shall jointly agree to the results of the test, and reschedule testing on deficiencies and shortages with the RE. Any retesting to comply with these specifications will be done at the Contractor's expense.
- b. If the System is declared unacceptable without conditions, all rescheduled testing expenses will be born by the Contractor.

### **3.3 TRAINING**

- A. Furnish the services of a factory-trained engineer or technician for four eight-hour periods to instruct the Facility's maintenance personnel. Instruction shall include corrective and preventive maintenance of the nurse call equipment. Training shall be accomplished before the VA can accept the System. Additionally, training will be scheduled at the convenience of the Facility's, Chief Engineering Service.
- B. Furnish the services of a representative of the nurse call and code one OEM, familiar with the functions and operation of the equipment, for two eight-hour periods to train nursing personnel. Instructions shall be provided for staff personnel in each ward where new nurse call and code one (blue) equipment is provided under this contract. When multiple wards are involved, classes will be grouped. Periods of training shall be coordinated with the Chief of Nursing Service for the Facility to ensure all nursing shifts receive the required training. Each session shall include instructions utilizing a factory prepared and RE approved vertical - horizontal system (VHS) format video tape presentation and "hands-on" operation of the nurse call //and code one (blue)// equipment on a hospital ward. The tape presentation shall be sufficient in detail to stand-alone as a training aid for initial utilization and familiarization of the System. Additionally, the Contractor shall provide two (2) copies of the video presentation to the Chief of Nursing Service.

### **3.4 GUARANTEE PERIOD OF SERVICE**

- A. Contractor's Responsibility:
  - 1. The Contractor shall guarantee that all provided material and equipment will be free from defects, workmanship and will remain so for a period of one year from date of final acceptance of the System by the VA. The Contractor shall provide OEM's equipment warranty documents, to the RE (or Facility Contracting Officer if the Facility has taken possession of the building), that certifies each item of equipment installed conforms to OEM published specifications.
  - 2. The Contractor's maintenance personnel shall have the ability to contact the Contractor and OEM for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time. This contact capability shall be provided by the Contractor and OEM at no additional cost to the VA.
  - 3. All Contractor maintenance and supervisor personnel shall be fully qualified by the OEM and must provide two (2) copies of current and qualified OEM training certificates and OEM certification upon request.
  - 4. Additionally, the Contractor shall accomplish the following minimum requirements during the one year guaranty period.

B. Response Time During the One Year Guaranty Period:

1. The RE or Facility Contracting Officer is the Contractor's reporting and contact official for nurse call system trouble calls, during the guaranty period.
2. A standard work week is considered 8:00 A.M. to 5:00 P.M., Monday through Friday exclusive of Federal Holidays.
3. The Contractor shall respond and correct on-site trouble calls, during the standard work week to:
  - a. A routine trouble call within one working day of its report. A routine trouble is considered a trouble which causes a pillow speaker or cordset, master nurse control station, patient station, emergency station, or dome light to be inoperable.
  - b. An emergency trouble call within four hours of its report. An emergency trouble is considered a trouble which causes a sub-system (ward), distribution point, terminal cabinet, or code one system to be inoperable at anytime.
4. If a nurse call component failure cannot be corrected within four hours (exclusive of the standard work time limits), the Contractor shall be responsible for providing alternate nurse call equipment. The alternate equipment/system shall be operational within a maximum of four hours after the four hour trouble shooting time and restore the effected location operation to meet the System performance standards. If any sub-system or major system trouble cannot be corrected within one working day, the Contractor shall furnish and install compatible substitute equipment returning the System or sub-system to full operational capability, as described herein, until repairs are complete.

C. Required On-Site Visits During the One Year Guaranty Period

1. The Contractor shall visit, on-site, for a minimum of eight hours, once every 12 weeks, during the guaranty period, to perform system preventive maintenance, equipment cleaning, and operational adjustments to maintain the System according the descriptions identified in this document.
2. The Contractor shall arrange all Facility visits with the RE or Facility Contracting Officer prior to performing the required maintenance visits.
3. Preventive maintenance shall be performed by the Contractor in accordance with the OEM's recommended practice and service intervals during non-busy time agreed to by the RE or Facility Contracting Officer and Contractor.
4. The preventive maintenance schedule, functions and reports shall be provided to and approved by the RE or Facility Contracting Officer.
5. The Contractor shall provide the RE or Facility Contracting Officer a type written report itemizing each deficiency found and the corrective action performed during each required visit or official reported trouble call. The Contractor shall provide the RE with sample copies of these reports for review and approval at the beginning of the Acceptance Test. The following reports are the minimum required:
  - a. The Contractor shall provide a monthly summary all equipment and sub-systems serviced during this guarantee period to RE or Facility Contracting Officer by the fifth working day after the end

of each month. The report shall clearly and concisely describe the services rendered, parts replaced and repairs performed. The report shall prescribe anticipated future needs of the equipment and systems for preventive and predictive maintenance.

- b. The Contractor shall maintain a separate log entry for each item of equipment and each sub-system of the System. The log shall list dates and times of all scheduled, routine, and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency steps taken to rectify the situation and specific recommendations to avoid such conditions in the future.
- 6. The RE or Facility Contracting Officer shall convey to the Facility Engineering Officer, two (2) copies of actual reports for evaluation.
  - a. The RE or Facility Contracting Officer shall ensure a copy of these reports is entered into the System's official acquisition documents.
  - b. The Facility Chief Engineer shall ensure a copy of these reports is entered into the System's official technical record documents.
- D. Work Not Included: Maintenance and repair service shall not include the performance of any work due to improper use; accidents; other vendor, contractor, or owner tampering or negligence, for which the Contractor is not directly responsible and does not control. The Contractor shall immediately notify the RE or Facility Contracting Officer in writing upon the discovery of these incidents. The RE or Facility Contracting Officer will investigate all reported incidents and render findings concerning any Contractor's responsibility.

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