

SECTION 27 52 23
HEALTHCARE COMMUNICATION AND MONITORING SYSTEM (NURSE CALL)

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Basic System Requirements
- B. Stations
- C. Master Stations/Consoles
- D. Annunciators, Lights, and Indicators
- E. Call Cords/Pillow Speakers
- F. Cabling
- G. Integration
- H. Reporting
- I. Sequence of Operation

1.2 RELATED SECTIONS

- A. Section 26 05 33 - Conduit
- B. Section 26 05 13 - Wire and Cable

1.3 REFERENCES

- A. UL 1069 - Hospital Signaling and Nurse Call Equipment
- B. EIA - Electronics Institute of America Standards
- C. NFPA 70 - National Electrical Code

1.4 DEFINITIONS

- A. ADT: Admission Discharge Transfer System
- B. HL7: Health Level 7 integration protocol
- C. IP: Internet Protocol
- D. VoIP: Voice over Internet Protocol
- E. GUI: Graphical User Interface

1.5 SYSTEM DESCRIPTION

- A. This specification section describes the furnishing, installation, commissioning, and programming of a complete, turnkey extension of an existing healthcare communication and monitoring system.
- B. Performance Statement: This specification section and the accompanying design documents are performance based, describing the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment constraints described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming, and miscellaneous equipment required for a complete and operational system.
- C. Basic System Description: The healthcare communication and monitoring system shall be a networked-based, supervised audio/visual system for healthcare communications. The system shall comply with all pertinent codes, regulations and laws of the relevant hospital Authority Having Jurisdiction.

1.6 QUALITY ASSURANCE

- A. Manufacturer: The nurse call system shall be a single-source manufacturer such that the single manufacturer distributes, supports, warranties, and services all major components. The manufacturer shall have a minimum of five (5) years documented experience.
- B. Installer: The installing dealer must be a factory-authorized service and support company specializing in the selected manufacturer's product, with demonstrated prior experience with the selected manufacturer's system installation and programming.
- C. Servicing Contractor: The manufacturer of the system must have local service representatives within 100 miles of the project site.

1.7 BID REQUIREMENTS

- A. At the time of bid, the manufacturer shall submit complete rough-in requirements including:
 - 1. The exact back box requirements for every component on the project.
 - 2. Interconnection wiring requirements.
 - 3. Conduit and sleeve requirements.
- B. These requirements shall clearly state those items provided by the installing Contractor and those items expected to be provided by others.
- C. Any rough-in or installation item required for the successful installation and operation of the system, that is not identified as "provided by others" AT THE TIME OF BID, shall be provided by the Contractor at no additional cost to the project.

1.8 SUBMITTALS

- A. Submit product data under provisions of Section 27 05 00.
- B. Product Data Submittal: Provide manufacturer's technical product specification sheet for each individual component type. Submitted data shall show the following:
 - 1. Compliance with each requirement of these documents.
 - 2. All component options and accessories specific to this project.
 - 3. Electrical power consumption rating and voltage.
 - 4. Heat generation for all power consuming devices.
 - 5. Wiring requirements.
- C. System Drawings: Project-specific system CAD drawings shall be provided as follows:
 - 1. Provide a system block diagram noting system components and interconnection between components. The interconnection of components shall clearly indicate all wiring required in the system. When multiple pieces of equipment are required in the exact same configuration (i.e., multiple patient stations), the diagram may show one device and refer to the others as "typical" of the device shown.
 - 2. Identify power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.
 - 3. Station Installation Details: Dimensioned and to scale.

- D. Submit detailed description of Owner training to be conducted at project end, including suggested training times.
- E. Provide a narrative scope of work for all system integrations to be performed. Scope of work shall clearly identify work to be provided by others.
- F. Quality Assurance:
 - 1. Provide materials documenting experience requirements of the manufacturer and Installing Contractor.
 - 2. Provide system checkout test procedure to be performed at acceptance.

1.9 PROJECT RECORD DOCUMENTS

- A. Submit documents under the provisions of Section 27 05 00.
- B. Provide final system block diagram showing any deviations from shop drawing submittal.
- C. Provide statement that system checkout test, as outlined in the shop drawing submittal, is complete and satisfactory.
- D. Warranty: Submit written warranty and complete all Owner registration forms.
- E. Complete all operation and maintenance manuals as described below

1.10 OPERATION AND MAINTENANCE DATA

- A. Submit data under provisions of Section 27 05 00.
- B. Product Certificates: Signed by manufacturer of nurse call equipment certifying that products comply with requirements.
- C. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.
- D. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.
- E. Field Tests Reports and Observations: Include record of final adjustments certified by Installer.
- F. Maintenance Data: Include the following in maintenance manuals:
 - 1. Operating instructions.
 - 2. Troubleshooting guide.
 - 3. Wiring terminal identification.
 - 4. Equipment parts list.

1.11 COORDINATION

- A. Coordinate wiring paths and maintenance access at locations listed below. Coordinate trim features and finishes at these locations to present a unified design appearance.

1. Patient head-wall units.
 2. Patient consoles.
 3. Patient beds with built-in nurse call features.
- B. Coordinate patient control units with items controlled that are not part of nurse call equipment.
1. TV: Channel selection and volume.
 2. Lighting at patient location.
 3. Connection and cabling to TV including jack, faceplate, terminations, conduit rough-in and pillow speaker.

1.12 WARRANTY

- A. Unless otherwise noted, provide warranty for one (1) year from Date of Substantial Completion for all materials and labor.
- B. The warranty shall include emergency service and repair on-site, with acknowledgment response time of four (4) hours from time of notification and on-site response within one (1) working day. The warranty shall include next day delivery of replacement parts required to make system operational.
- C. Refer to the individual product sections for further warranty requirements of individual system components.

1.13 EXTRA STOCK

- A. Provide extra stock under provisions of Section 27 05 00.
- B. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps for Corridor Dome Lights and Zone Lights: Furnish quantity equal to 20 percent of amount installed.
 2. Pillow Speakers: Furnish quantity equal to 10 percent of amount installed

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Rauland Responder IV Series

2.2 SYSTEM REQUIREMENTS

- A. Coordinate the features of materials and equipment to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Expansion Capability: Equipment ratings, housing volume, spare keys, switches, relays, Annunciator modules, terminals, and cable conductor quantities adequate to increase the number of master, staff, duty and call stations in the future by 25 percent above those indicated without adding internal or external components or main trunk cable conductors.

- C. Existing System Compatibility: Functionally and electrically compatible with existing system so components and wiring operate as an extension of the existing system and all functional performance of the existing system applies to the final system. Colors, tones, types, and durations of signal manifestation are common between new and existing systems.
- D. Resistance to Electrostatic Discharge: System, components, and cabling, and the selection, arrangement, and connection of materials and circuits, shall be protected against damage or diminished performance when subjected to electrostatic discharges of up to 25,000 V in an environment with a relative humidity of 20 percent or less.
- E. Equipment: Solid state, modular.

2.3 FUNCTIONAL PERFORMANCE

- A. Station Selection: Master station is capable of selectively communicating with other stations or groups of stations on its system by operating selector switches.
- B. Master Station Privacy: Capable of conversing with individual stations in complete privacy.
- C. Hands Free: Called station is capable of conversing hands free.
- D. Annunciation: At the master station, a tone announces an incoming call and an Annunciator light or liquid-crystal display identifies the calling station and indicates the priority of the call. Memory lamps or lighted displays identify stations selected for outgoing calls.
- E. System Reset at Master Station: A normal incoming call is canceled, associated lights and audible tones are extinguished, and the system is reset when the station switch is returned to the normal position after responding to a call.
- F. Patient Station Call: Lights the call-placed lamp at patient station, zone, and corridor dome lights. It sounds a tone and lights the call lights at staff/duty stations and actuates annunciation at the master station. When the calling station is selected at the master station, the patient can converse with the master station without moving and without raising or directing the voice. During voice communications, entertainment audio at the calling station is automatically muted.
- G. Pull-Cord Call Station and Emergency-Call Station Call: Lights call-placed lamp and corridor dome light, and flashes zone light. Master station tone pulses and Annunciator light for that room flashes. When master station acknowledges the call by operating a switch, the tone stops but lights continue to flash until the call is canceled at the point of origin.
- H. Staff/Duty Station Call: Lights the call-placed lamp at the station and actuates annunciation at the master station. When the called station is selected at the master station, the caller and the master station operator can converse.
- I. Handset Operation: Lifting handset on master station disconnects speaker microphone and transfers conversation to the handset.
- J. Station Privacy: No patient, staff, or duty station can be remotely monitored without the lighting of a warning lamp at the monitored station.

- K. Patient Station Cord Set: When a patient station cord-set plug is removed from the jack in the station faceplate, a patient station call is initiated as described above. When the master station call button for the station is pressed, the tone stops but lights continue to flash until the call is canceled at the point of origin or the plug is reinserted or replaced with a dummy plug.
- L. Patient Console: Controls entertainment volume and channel selection. Speaker is used for both nurse communication and entertainment sound. Entertainment sound is automatically muted when station is communicating with master station. Nurse button on the unit initiates a patient station call.
- M. Noise: System is free from pops, clicks, hisses, hums, and other noise at all speakers and handsets during operation, including standby.
- N. Selective Paging: Master station is capable of initiating a message to selected groups of stations or speakers simultaneously by using station group switches.
- O. Staff Reminder: Master station can initiate a staff reminder that a patient requires direct staff response by operating a reminder control while in contact with the patient station. This will light a distinctive-color lamp in the corridor dome light at the patient's room and in the appropriate zone lights. Reminder calls are canceled by operating a staff reminder cancel switch in the patient's room.

2.4 EQUIPMENT DESCRIPTIONS

- A. Master Station: Speaker-microphone unit with operating controls
 1. Indicator lamps with legends or by liquid-crystal displays designate identification and priority of calling stations and called stations.
 2. Station Selection Controls: Switches select stations for two-way voice communications.
 3. Signal Tones: Announce incoming calls.
 4. Volume Control: Regulates incoming-call volume.
 5. Speaker-Microphone Sensitivity: At least 40 dB (EIA pressure rating).
 6. Privacy Handset with Hook Switch: Attached to each station, unless otherwise indicated.
 7. Staff Reminder Control: Initiates flashing of corresponding corridor dome lights for patients requiring service. Permits scanning equipment to indicate which patients are currently in reminder status.
 8. Call Priority Selection: Controls associated with patient station selection switches determine the priority indication displayed when a call is initiated at a patient station.
- B. Single-Patient Station: Speaker microphone with 2-inch dynamic cone, a polarized receptacle to match the cord-set plug, monitor lamp, reset button, and call-placed lamp; assembled under a single faceplate.

- C. Dual-Patient Station: Speaker microphone with 2-inch dynamic cone, two polarized receptacles to match cord-set plugs, monitor lamp, and reset button; assembled under a single faceplate.
 - 1. Single call-placed lamp serves both beds.
- D. Staff/Duty Station: Audible call-tone signal device, speaker microphone with 2-inch dynamic cone, monitor lamp, reset switch, routine-call lamp, emergency-call lamp, and call push button; assembled under a single faceplate.

2.5 MISCELLANEOUS EQUIPMENT COMPONENT DESCRIPTIONS

- A. Staff Assist Call Station: Momentary green push button, labeled "STAFF", with cancel push button and call-placed lamp, mounted in a single faceplate.
- B. Nurse Emergency Call Station: Momentary red push button labeled "PUSH FOR HELP", with cancel push button and call-placed lamp; mounted in a single faceplate.
- C. Code Blue Call Station: Momentary blue push button labeled "CODE BLUE", with cancel push button and call-placed lamp; mounted in a single faceplate.
- D. Patient Assist Pull-Cord Call Station: Lever-locking type pull-down switch, labeled "Pull Down to Call Help", with cancel push button and call-placed lamp, mounted in a single faceplate.
- E. Patient Assist Shower Pull-Cord Call Station: Water-resistant lever-locking type pull down switch, labeled "Pull Down to Call Help", with cancel push button and call-placed lamp, mounted in a single faceplate.
- F. Patient Console: Equipped with plug and 96-inch long white cord.
 - 1. Ethylene oxide, sterilizable.
 - 2. Lighting Control Switch: Arranged for independent on-off control of patient lighting.
 - 3. Integral Speaker: 2 inch diameter, with 0.35-oz. magnet, rated 0.2 W.
 - 4. Controls: Speaker volume, TV control, and nurse call.
 - 5. Housing: High-impact plastic.
 - 6. Palladium switch contacts in high-impact housing with cord-set strain relief.
 - 7. Attachment: Stainless-steel bed clamp with permanently attached strap.
 - 8. Quantity: 12 units for every 10 patient beds.
- G. Call-Button Plug: Designed to plug into patient station cord-set receptacle. Button switches call circuit. Furnish 2 plugs for every 10 patient beds.
- H. Dummy Plugs: Designed to plug into patient station cord-set receptacle when call-button plug or patient cord set is not used. Furnish 3 plugs for every 10 patient beds.
- I. Indicator Lamps: Light-emitting-diode type.

- J. Station Faceplates: Type 302 stainless steel, 0.0375-inch (0.95-mm) minimum, on brushed finish. Machine-engraved labeling identifies indicator lamps and controls.
- K. Corridor Dome Lights and Zone Lights: Four lamp signal lights.
 - 1. Lamps: Front replaceable without tools, low voltage with rated life of 7500 hours. Barriers are such that only one color is displayed at a time.
 - 2. Lenses: Heat-resistant, shatterproof, translucent polymer that will not deform, discolor, or craze when exposed to hospital cleaning agents.
 - 3. Color Filters: Three per unit, amber, red, and blue. White compartment should not need a filter.
- L. Cable: Features include the following, unless otherwise indicated:
 - 1. Conductors: Jacketed single and multitwisted pair, untinned solid copper. Sizes as recommended by equipment manufacturer, but not smaller than No. 22 AWG.
 - 2. Insulation: Thermoplastic, not less than 1/32 inch thick.
 - 3. Shielding: For speaker-microphone leads and elsewhere if recommended by the manufacturer; No. 34 AWG tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage not less than 60 percent.
 - 4. Cable for Use in Plenums: Listed and labeled for plenum installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wiring Method: Install wiring in conduit except within consoles, desks, and casework; and except in accessible ceiling spaces and in gypsum board partitions, where cable wiring method may be used. Use UL-listed plenum cable in environmental air spaces including plenum ceilings. Conceal wiring except in unfinished spaces.
- B. Wiring within Enclosures: Provide adequate length of conductors. Bundle, lace, and train conductors to terminal points with no excess. Provide and use lacing bars in cabinets.
- C. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and powerwiring runs. Run in separate raceways or, if exposed or in same enclosure, provide 12-inch (300-mm) minimum separation between conductors to speaker microphones and adjacent parallel power and telephone wiring. Provide separation as recommended by equipment manufacturer for other conductors. As a general rule, nurse call wiring is not to be run in cable trays, unless tray is dedicated for nurse call wiring.
- D. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes, terminal cabinets, and equipment enclosures. Install terminal cabinets where there are splices, taps, or terminations for eight or more conductors.
- E. Impedance and Level Matching: Carefully match input and output impedances and signal levels at signal interfaces. Provide matching networks if required.

3.2 EXISTING SYSTEMS

- A. Examine existing systems for proper operation, compatibility with new equipment, and deficiencies. If discrepancies or impairments to successful connection and operation of interconnected equipment are found, report them and do not proceed with installation until directed. Schedule existing systems' examination so there is reasonable time to resolve problems without delaying construction.

3.3 GROUNDING

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other signal impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding except at connection to main building ground bus.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and testing and adjusting of system.
- B. Test Procedure: Comply with the following:
 - 1. Schedule tests a minimum of seven days in advance of performance of tests.
 - 2. Report: Submit a written record of test results.
 - 3. Operational Test: Perform an operational system test to verify compliance of system with these Specifications. Perform tests that include originating station to-station and all-call messages and pages at each nurse call station. Verify proper routing, volume levels, and freedom from noise and distortion. Test each available message path from each station on the system.
 - 4. Frequency Response Test: Determine frequency response of two transmission paths by transmitting and recording audio tones. Minimum acceptable performance within 3 dB from 150 to 2500 Hz.
 - 5. Signal-to-Noise Ratio Test: Measure the ratio of signal to noise of the complete system at normal gain settings, using the following procedure:
 - a. Disconnect a speaker microphone and replace it in the circuit with a signal generator using a 1000-Hz signal. Measure the ratio of signal to noise and repeat the test for four speaker microphones.
 - b. The minimum acceptable ratio is 35 dB.
 - 6. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 150, 200, 400, 1000, and 2500 Hz into each nurse call equipment amplifier, and measure the distortion in the amplifier output. The maximum acceptable distortion at any frequency is 5 percent total harmonics.
- C. Retesting: Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets these Specifications and complies with applicable standards. Report results in writing.
- D. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel and caregiver staff.
 - 1. Provide training under provisions of Section 27 05 00.
 - 2. Schedule training with Owner with at least seven days advance notice.
 - 3. Train Owner's maintenance personnel on procedures and schedules related to starting and stopping, troubleshooting, servicing, and preventive maintenance. Provide a minimum of eight hours training.
 - 4. Train Owner's caregiver personnel on proper use of the equipment. Coordinate periods of training with Architect/Engineer to ensure nursing shifts receive the required training. Conduct training outside normal working hours as required to coordinate with shift schedules. Include instructions utilizing audio and visual graphics and hands-on operation of the equipment in typical zones selected by Architect/Engineer. Provide handout material describing equipment features and functions to those attending. Provide a minimum of three, three-hour sessions for a minimum of four groups of trainees.
 - 5. Training Aids: Use approved maintenance manual material as instructional aids. Refer to 27 05 00. Provide copies of this material for use in the instruction.

END OF SECTION