

SECTION 27 52 23**NURSE CALL****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes expansion of existing system and includes system hardware and software that shall consist of a nurse/patient communications network comprised of nurse consoles, control stations, dome lights, entertainment cords, call cords, pull cord stations, emergency push button stations, and wiring. The system shall be capable of other compatible options such as bed side-rail interfaces, pocket page interfaces, computer interfaces, printer interfaces, and wireless/telephone network interfaces through either factory add on modules and/or equipment interfaces. All necessary equipment required to meet the intent of these specifications, whether or not enumerated within these specifications, shall be supplied and installed to provide a complete and operating nurse/patient communications network.
- B. This section requires that rough-in materials, were required for this section, be provided by this section. Rough-in materials include but are not limited to conduit, junction boxes, alternative raceway, and device enclosures. Cable for this section is to be provided by the installer for this section.

1.3 SUBMITTALS

- A. Any supplying contractor proposing a system or equipment which does not meet the basic functional specifications as stated herein must provide full statement of exceptions 10 days prior to the time of bid. This option shall be exercised at the discretion of the owner/specifying authority.
- B. Prior to commencement of work, the supplying contractor shall submit six (6) complete submittal sets which shall include the following:

1. Cabling Diagrams: Single-line block diagrams showing cabling interconnection of all components for this specific equipment. Include cable type for each interconnection.
2. Wiring Diagrams: Power, signal, and control wiring.
3. Station Installation Details: For built-in equipment; dimensioned and to scale.
4. Equipment Cabinet Drawings: Dimensioned and to scale.
- C. Coordination Drawings: Detail system components that fit, match, and line up with provisions made in equipment specified in other Sections or in separate contracts:
 1. Patient head-wall units or wall elevations.
 2. Nurse Call Master consoles.
- D. Manufacturer Certificates: Signed by manufacturers certifying that nurse call equipment complies with requirements.
- E. Field Tests Reports and Observations: Include record of final adjustments certified by Installer.
- F. Operation and Maintenance Data: For nurse call equipment to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 "Closeout Procedures " and "Operation and Maintenance Data," include the following:
 1. Operating instructions.
 2. Troubleshooting guide.
 3. Wiring diagrams and terminal identification.
 4. Equipment parts list.
 5. Product data for types and sizes of wires and cables used.
- G. Warranty Statement: Special warranty requirements as specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. The Installer shall be able to fully support the listed service and warranty requirements as specified herein.
- B. Manufacturer Qualifications: A firm experienced in manufacturing equipment similar to that indicated for this Project and that maintains technical support services capable of providing user with

training, parts, and emergency maintenance and repair with a 24-hour-maximum response time.

- C. Source Limitations: Obtain nurse call equipment components through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled according to UL 1069 as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 COORDINATION

- A. Coordinate patient control units with items controlled that are not part of nurse call equipment.
 - 1. TV: Channel selection and volume.
 - 2. Lights: Up light and down light at patient location.
- B. 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 installations.
 - 2. Patient consoles.
 - 3. Nurse station.

1.6 WARRANTY

- A. The installing contractor shall provide a warranty on the system which shall include all necessary labor and equipment to maintain the system(s) in full operation for a period of 3 years from the date of acceptance.
- B. Manufacturer shall provide, free of charge, product firmware/software upgrades throughout the warranty period for any product feature enhancements.

1.7 EXTRA MATERIALS

- A. 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 equal to 20 percent of amount installed. Corridor lights using LED's do not require spares.

2. Fuses: One for every 10 of each type and rating, but no fewer than 3 of each.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Rauland-Borg Corporation (to match existing).

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. System shall be microprocessor based, but independent of the facilities local area network, with a segmented platform configuration providing that system or equipment failures are locally mitigated without global system shutdowns or resets.
- B. Expansion Capability: Equipment ratings, housing volume, spare keys, switches, relays, annunciator modules, terminals, and cable conductor quantities adequate to increase the number of stations in the future by 20 percent above those indicated without adding internal or external components or main trunk cable conductors.
- C. 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.
- D. Equipment: Solid state, modular.
- E. Wall-Mounted Component Connection Method: Components connect to system wiring in back boxes with factory-wired plug connectors.

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 a visual indication is displayed on the console and identifies the calling station and indicates the priority of the call. LED/LCD lighted displays or touchscreens identify stations selected for outgoing calls.
- E. System Reset at Master Station: When 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: Activates 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: Activates call-placed lamp and corridor dome light, and flashes zone light. Master station tone pulses with visual display for that room flashes. When master station acknowledges the call, the tone stops but the display and lights continue to function until the call is canceled at the point of origin.
- H. Code Blue Station Call: Activates 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 tone stops but the display and lights continue to function until the call is canceled at the point of origin.
 - 1. Code Blue: Unique sound and light pattern, indicating the highest priority emergency.
- 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 Station/Pillow Speaker: 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" call button on the unit initiates a patient station call. TV control includes up and down channel control.
- M. Selective Paging: Master station is capable of initiating a message to selected groups of stations or speakers simultaneously by using station group switches.
- N. Auxiliary Alarm Inputs: Patient station accessory shall provide a minimum of 1 input connection, individually programmed and identified, for auxiliary equipment inputs for registration and annunciation displayed at the nurse call master.
- O. Call Priority Indication: Call priority switch near each patient station, or integral with the master station, controls the priority status of the call transmitted by individual stations. The switch selects one of the following status levels:
 - 1. Normal: No change to the normal call initiation and canceling sequence.
 - 2. Emergency: Call initiation produces signals and indications identical to those of emergency-call stations. Indicator lamps are extinguished and the system is reset only at the originating station.

2.4 EQUIPMENT DESCRIPTIONS

- A. Master Station: Speaker-microphone unit with operating controls.
 - 1. LED/LCD displays with "button" controls or touchscreen technology to designate location and priority of calling stations and called stations.
 - a. Pulse rate of incoming-call lights denotes priority of calls awaiting response.

2. Station Selection Controls: Touchscreen controls or console "button" controls select stations for two-way voice communications.
 3. Signal Tones: Announce incoming calls.
 4. Volume Control: Regulates incoming-call volume.
 5. Privacy Handset with Hook Switch: Of the type that does not require push-to-talk switch, attached to each station, unless otherwise indicated.
- B. Central Equipment Cabinet: Lockable metal. Houses amplifiers, tone generators, power supplies, controls, terminal strips, and other components.
1. Amplifier: With fidelity and overall gain necessary to achieve the sound transmission and reproduction characteristics specified, considering interoperability with the installed speakers/microphones and wiring.
 - a. Power Output: Not less than 3 W at a total harmonic distortion not exceeding 5 percent.
 - b. Hum and Noise: 60 dB below full output with normal input open.
 - c. Volume Control: Concealed within the amplifier unit to control the volume of sound reproduced at all stations.
 - d. Protection: Circuit to prevent damage to the amplifier in case shorted or open output.
 2. System Power Supply: For low-voltage operation of the call system.
 - a. Equipment Rating: Suitable for continuous operation between 32 and 120 deg F (0 and 49 deg C), from a primary line voltage between 105- to 125-V ac, 60 Hz.
 - b. Output: Regulated low voltages with protection against overloads. Line-to-load regulation shall not exceed 2-1/2 percent with ripple and noise remaining below the 10 mV, RMS level.
 - c. Overload Protection: Electronic fold-back circuit set to limit the volt-ampere output to less than 100 VA during overloaded or shorted output. Restore power output automatically on removal of overload without resetting

circuit breakers or replacing fuses.

3. Power-on indicator lamp.
4. Surge Protective Device: Comply with Division 26 Section "Transient Voltage Suppression" for auxiliary panel suppressors, with LED indicator lights for power and protection status.
5. Battery Backup Unit: Sealed nickel-cadmium, wet-cell battery supplies power through an automatic switch when normal power fails, for a period of not less than six minutes at rated output.
 - a. Automatic retransfer to normal power, after a 15-minute time delay.
 - b. Two-rate battery charger with an automatic trickle rate and a recharge rate.

C. Speaker/Microphones:

1. Type: Permanent-magnet, dynamic or ceramic, protected against dust and humidity.
2. Sound Reproduction: Sound level of 90 dB plus or minus 3 dB at a distance of 48 inches on the axis without overdriving or distorting any frequencies between 300 and 3000 Hz when installed in an enclosure or in the pillow speaker.
3. Power Handling Capacity: Not susceptible to damage from overdriving within the range of power available from the amplifier.
4. Impedance Matching: Coordinated and matched to the input and output circuits of the amplifier, both for single connection and for group monitoring, to provide the sound reproduction specified. Subsystems or components shall not be combined, which could cause unacceptable distortion such as feedback between pillow speakers and unmuted room speaker/microphone combinations. This protection shall extend throughout the entire range of operation (volume control) of all components.

D. Single-Patient Station: Each bedside control station shall be capable of the following functions:

1. At least 6 programmable call levels (including associated sub-stations).
2. Sound Reproduction: Sound level of 90 dB plus or minus 3 dB at a distance of 48 inches on the axis without overdriving or

distorting any frequencies between 300 and 3000 Hz when installed in an enclosure or in the pillow speaker.

3. Entertainment/pillow speaker intercom.
 4. Entertainment muting shall occur when nurse call audio is established.
 5. Support and supervise up to 5 sub-stations including pull-cord, push-button, code blue, staff register, and fire/auxiliary modules.
 6. Provide interface to local equipment alarm contacts (i.e. ventilator, IV drip, fire detector, etc.) to notify console of local alarm condition in patient room.
- E. Staff and Duty Stations: Audible call-tone signal device, speaker microphone with 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. Emergency-Call Station: Locking-type push button, labeled "Push to Call Help"; reset trigger to release push button and cancel call; and call-placed lamp; mounted in a single faceplate.
- B. Pull-Cord Call Station (Bath): Water-resistant construction. Includes the following, mounted under a single faceplate:
 1. Pull-Down Switch: Lever-locking type, labeled "Pull Down to Call Help."
 2. Reset trigger.
 3. Call-placed lamp.
- C. Patient Control Unit: Equipped with plug and 96-inch- (2400-mm-) long white cord.
 1. Ethylene oxide, sterilizable.
 2. Light-Control Switch: Arranged for independent on-off control of patient's up and down light.
 3. Integral Speaker: 2 inches (50 mm), with 0.35-oz. (9.9-g) magnet, rated 0.2 W.
 4. Controls: Speaker volume, TV control (up and down channel control), and nurse call.
 5. Housing: High-impact white plastic.

6. Attachment: Stainless-steel bed clamp with permanently attached Mylar strap.
7. Quantity: 12 units for every 10 patient beds.
- D. Call-Button Cord Set: Plug and 72-inch white cord; equipped with momentary-action, call-button switch.
 1. Ethylene oxide, sterilizable.
 2. Washable cord.
 3. Palladium switch contacts in high-impact white housing with cord-set strain relief.
 4. Attachment: Stainless-steel bed clamp with permanently attached Mylar strap.
 5. Quantity: 3 cord sets for every 10 patient beds.
- E. Indicator Lamps: Light-emitting-diode type with 20-year rated life, unless otherwise indicated.
- F. Station Faceplates: High-impact plastic, color by architect. Molded or machine-engraved labeling identifies indicator lamps and controls.
- G. Corridor Dome Lights and Zone Lights: Four-lamp signal lights (minimum).
 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. Filters: Two per unit, amber and red.
- H. Cable: Features include the following, unless otherwise indicated:
 1. Conductors: Jacketed single and multiple twisted-pair, copper cables. Sizes and types as recommended by equipment manufacturer. All cable shall be plenum rated.
- I. Grounding Components: As specified in Division 26 Section 26 05 26, "Grounding."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wiring Method: Install wiring in raceway except within consoles, desks, and counters; and except in accessible ceiling spaces, where

cable wiring method may be used. Use UL-listed plenum cable in environmental air spaces including plenum ceilings. Conceal cable and raceway wiring except in unfinished spaces.

- B. Install cables without damaging conductors, shield, or jacket.
- C. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.
- D. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
 - 1. Pull cables simultaneously if more than one is being installed in same raceway.
 - 2. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.
 - 3. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage media or raceway.
- E. Install exposed raceways and cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings designed and installed so as not to damage cables. Secure cable at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, or fittings.
- F. 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.
- G. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power-wiring runs. Run in separate raceways or, if exposed or in same enclosure, provide 12-inch minimum separation between conductors to speaker microphones and adjacent parallel power and telephone wiring. Provide separation as recommended by equipment manufacturer for other conductors.
- H. 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.
- I. Impedance and Level Matching: Carefully match input and output impedances and signal levels at signal interfaces. Provide matching

networks if required.

- J. Identification of Conductors and Cables: Retain color-coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams. Label stations, controls, and indications using approved consistent nomenclature.
 - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Prepare cable administration drawings to show building floor plans with cable administration point labeling. Identify labeling convention and show labels for terminal hardware and positions, cables, stations and devices and equipment grounding conductors.
 - 3. K.Configure system to direct call devices to the assigned master station as indicated in the drawings. Duty stations shall reflect all calls in the system regardless of which master station the devices are assigned to or as noted.

3.2 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.
- C. Grounding Provisions: Comply with requirements in Division 26 Section 26 05 26, "Grounding."

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- 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, and demonstrate proper operations, adjustment, and sensitivity of each station. 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. Meet the following criteria:
 - a. Speaker Output: 90 dB plus or minus 3 dB, 300 to 3000 Hz.
 - b. Gain from patient's bedside station to nurse station, with distortion less than 65 dB (plus or minus 3 dB, 300 to 3000 Hz).
 - c. Signal-to-Noise Ratio: Hum and noise level at least 45 dB below full output.
4. Test Procedure:
 - a. Frequency Response: Determine frequency response of two transmission paths by transmitting and recording audio tones.
 - b. Signal-to-Noise Ratio: Measure the ratio of signal to noise of the complete system at normal gain settings, using the following procedure: 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.
 - c. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 300, 400, 1000, and 3000 Hz into each nurse call equipment amplifier, and measure the distortion in the amplifier output.
- 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.

3.4 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sound levels and controls to suit actual occupied conditions. Provide up to three visits to Project during other-than-normal operating hours for this purpose.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel and caregiver staff to adjust, operate, and maintain nurse call equipment. Refer to Division 1 Section "Closeout Procedures" and "Demonstration and Training."

3.6 TRAINING

- A. Both manufacturer/factory supported and local installer training shall be provided to all nursing staff. Floor nurses/staff shall receive training appropriate to their needs, and likewise, unit secretaries (or any person whose specific responsibilities include answering patient calls and dispatching staff) shall receive operational training appropriate to their needs and charge nurses (or any person whose specific responsibilities include scheduling staff to patient assignments) shall receive operational training appropriate to their needs.
- B. The training shall be comprehensive enough to allow the local in-house technical staff the ability to maintain and service the system themselves, including the making of internal programming alterations and to the extent of programming their own "canned" text messages. Include in the contract any factory training sessions required, trips, expenses, etc. at local or factory locations to provide this level of training.

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