

SECTION 16730 CLOCK AND PROGRAM SYSTEMS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of electronic clock and program system work is indicated by drawings and schedules.
- B. Applications of clock and program systems, capable of providing automatic and accurate supervisory control of time recording equipment and coded programs include the following:
 - 1. Administrative offices.
 - 2. Schools.
- C. Work of this section includes electrical wires/cables, raceways, boxes and fittings, as specified in Division-16 Basic Electrical Materials and Methods sections, and used for enclosing clock control and power wiring/cabbling.
- D. Refer to applicable Division-16 Basic Electrical Materials and Methods sections for electrical raceways, boxes and fittings required in connection with clock and program systems; not work of this section.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of clock and program systems, components and accessories, of types, characteristics and performance required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience with projects utilizing clock and program system work similar to that required for this project.
- C. NEC Compliance: Comply with applicable NEC requirements including, but not limited to, Article 725, entitled, "Class 1, Class 2, and Class 3 Remote-Control, Signals, and Power-Limited Circuits".
- D. NEMA Compliance: Comply with NEMA Stds No.'s 250, ICS 1, and 6 pertaining to enclosures and controls for clock and program systems.
- E. UL Compliance: Comply with applicable requirements of UL Std 863, pertaining to time indicating and recording appliances. Provide clock and program system components which are UL-listed and labeled.
- F. ETL Compliance: Provide clock and program systems and components which are ETL-listed and labeled.
- G. FCC Compliance: Comply with Subpart J of Part 15, FCC Rules pertaining to computing devices including Class A types of systems. Provide equipment which complies with technical standards for both radiated and power line conducted interference.
- H. Comply with Part 68, Federal Communication Commission Rules, pertaining to labeling of telephone equipment, including data sets and modems, indicating FCC registration and numbering.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's data on clock and program systems.
- B. Shop Drawings: Submit layout drawings of clock and program systems, indicating accurately scaled components and their spatial relationship to associated equipment, and connection diagrams of signal cabling and electrical power feeders.
- C. Wiring Diagrams: Submit power, signal and control wiring diagrams for clock and program systems. Clearly differentiate between portions of wiring that are manufacturer-installed and portions that are field-installed.
- D. Agreement to Maintain: Prior to time of final acceptance, the Installer shall submit 4 copies of an agreement for continued service and maintenance of clock and program systems, for Owner's possible acceptance. Offer terms and conditions for furnishing parts and providing continued testing and servicing, including replacement of materials and equipment, for one-year period with option for renewal of Agreement by Owner.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver clock and program components and accessories properly wrapped and packaged in factory-fabricated containers to protect units against breakage and damage.
- B. Handle clock and program components carefully to prevent internal component damage, impact, breakage, denting, and scoring the enclosure finishes. Do not install damaged clock and program components; replace and return damaged units to equipment manufacturer.
- C. Store clock and program components in clean dry space. Protect units from dirt, fumes, water, construction debris and traffic.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering clock and program systems which may be incorporated in the work include, but are not limited to, the following:
- B. Manufacturer: Subject to compliance with requirements, provide clock and program systems of one of the following (for each type of system):
 - 1. Simplex 6400
 - 2. All other manufacturers require written authorization from LPS Property Management Services.

2.2 CLOCK AND PROGRAM SYSTEMS:

- A. General: Except as otherwise indicated, provide clock and program systems and ancillary equipment; of types, sizes, ratings and performances as indicated, which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation. In addition, provide system with the following functional and operational features:
- B. Provide and establish a single time standard for and throughout entire project, synchronizing all clocks and program devices.

- C. Provide master time control unit to operate without power and to automatically reset entire system upon resumption of power.
- D. Provide pushbutton for standard-daylight time device to automatically reset clock and program system for time changes.
- E. Operate all subsidiary time indicating clocks by individual synchronous motors. Test all such time indicating clocks automatically once each hour and twice daily for 12-hour control for synchronization with master time center.
- F. Restore indicating clocks, which are not synchronized time-wise with master time control units automatically to correct time by stopping hands of such units that are fast for period of time equivalent to fast error, and by accelerating rate of travel of hands of such units as may be slow.
- G. Integrate and control electronic equipment via carrier signal equipment to afford independent operation of control equipment, with each remote unit capable of operating with its own source of power.
- H. Provide automatic program unit, with program circuits as indicated, including reading bars for setting and changing of program schedules. Select units with the following number of program circuits:
 - 1. Six.
 - 2. Twelve.
 - 3. Eighteen.
- I. Provide program circuits for the following special functions:
 - 1. Automatic temperature control.
 - 2. Protective lighting control.
 - 3. Parking area lighting control.
 - 4. Door and class-changing bell system control.

2.3 MATERIALS AND EQUIPMENT:

- A. General: Provide electronic clock and program system products, of sizes, ratings and performances as indicated, complying with manufacturer's published product information on standard materials and components designed and constructed for applications indicated.
- B. Basic Wiring Materials: Provide required basic wiring materials which comply with Division-16 Basic Electrical Materials and Methods sections, "Raceways", "Wires and Cables", and "Electrical Boxes and Fittings" required in conjunction with clock and program systems.

2.4 MASTER TIME CENTER:

- A. General: Provide master time center for automatic supervision and hourly and 12 hour correction of indicating clocks.
- B. Provide plug-in, program control unit with ability to automatically make any signaling circuits active or inactive for any given minute of any given day of the week.
- C. Accomplish programming by means of prepared program bar.

- D. Cabinet: Provide steel cabinet with "lift-off", locking type front panel, and finished in manufacturer's standard color with stainless steel trim. Provide square, 7-inch clock dial with seconds indicated on front panel face.
- E. Provide back box for surface mounting.
- F. Provide back box and trim plate for semi-recessed installation.
- G. Provide manual pushbuttons on front for each program circuit.
- H. Time Function Machine: Provide plug-in, interchangeable assemblies, solid-state switching circuits and regulated accuracy of two seconds per month utilizing quartz crystal oscillator. Provide power in time-determining circuits by self-contained power supply consisting of a bank of lead calcium cells, permanently sealed with capacity to maintain accurate time for minimum of 24 hours during power failures. Use line voltage to maintain charge on lead calcium battery. Supervise single circuit of synchronously-wired indicating clocks by controlling carrier frequency pulse superimposed on AC circuits by electronic transmitter.
- I. Program Function Machine: Provide six electronic programmed signal circuits.
- J. Provide each circuit with adjustable signal duration of zero to 58 seconds, and with manual pushbutton and silencing switch. Provide prepared reading bars for setting, or changing program schedules for day, hour and minute. Provide drum to receive reading bars so that it signals minute and hour for which it is scheduled. Provide capability for each bar to signal one or more circuits on any or all days of week.
- K. Time Control Options:
 - 1. Direct connection circuits for indicating clocks.
 - 2. Circuits for impulse clocks.
 - 3. Daylight savings device with Spring and Fall seasons positions.
 - 4. Circuit for studio clock.
 - 5. Auxiliary program machines.
 - 6. Full Arabic clock dial.
 - 7. Coded program system.
 - 8. Special cabinet finish.

2.5 CARRIER CURRENT MOTOR GENERATOR PACKAGE:

- A. General: Provide equipment for developing and injecting signals into 60 Hz distribution system consisting of motor starter, generator control unit, output terminations for coupling capacitor units, variable air-core inductor, transformer, and fused disconnect switch.
- B. Cabinet: Provide steel cabinet with piano hinge door, or double doors each with two hinges, finished in manufacturer's standard color with stainless steel trim. Provide tumbler door lock.
- C. Equipment Package: Provide generator, motor starter, fuses and adjustable controls for tuning inductances and capacitances; in sizes and ratings as recommended by manufacturer to produce a single frequency with signal frequency power of:
 - 1. 200 watts.
 - 2. 2000 watts.
- D. Provide the following signal frequencies:

1. 3510 Hertz.
2. 4680 Hertz.
3. 6600 Hertz.

- E. Provide a signal from 2340 to 9500 Hertz as selected by manufacturer.
- F. Provide 3510/6000 Hertz dual frequencies.
- G. Provide a dual frequency combination from 2340 to 9500 Hz as selected by manufacturer.

2.6 SOLID-STATE TRANSMITTING PACKAGE:

- A. General: Provide transmitting equipment for developing and injecting signals into 60 Hz distribution system consisting of power supplies, oscillator, two-stage push-pull power amplifier, capacitors and fused disconnect switch.
- B. Cabinet: Provide steel cabinet with single door equipped with two hinges and a tumbler lock, finish in manufacturer's standard color with stainless steel trim.
- C. Transmitter Package: Provide solid-state package to produce four signal frequencies with signal frequency power of 250 watts. Provide the following frequencies:
 1. 3510, 4200, 5010, 6000 Hertz.
 2. 4680, 5250, 6300, 7300 Hertz.
 3. Maximum connected load 500 KVA, maximum line voltage 300.

2.7 PROGRAM SIGNALS:

- A. General: Provide electronic receivers and matching signaling equipment to receive carrier current pulse from 120 volt AC branch circuit.
- B. Receivers: Provide electronic receivers consisting of fixed-tuned transformer, cold-gas relay tube, and with load relay to function so when carrier pulse is transmitted corresponding to the fixed-tuned transformer, the tube is triggered energizing load relay. Correlate fixed-tuned frequency with generator, or transmitter frequencies.
- C. Back Boxes: Provide back boxes for all program equipment complete with knockouts, two-wire, grounded receptacle and hanger strap.
- D. Box Cover Plates: Provide plate and receiver equipped with relay and buzzer mounted on receiver chassis. Provide non-contact type, synchronous vibrating type buzzer. Mount chassis on outlet box cover with 3 inch diameter round opening protected by metal grille.
- E. Box Cover Plates: Provide plate and receiver to operate separately mounted audible signal such as bell or horn which is exposed to weather. Mount on inside wall and connect to outside signal.
- F. Box Cover Plates: Provide plate and receiver and outlet box designed to accommodate single and double projection horns, non-projection horns, chimes and bells.
- G. Bells: Provide beige colored, heavy-duty modular vibrating bells for mounting on electronic receiver plates. Provide sound output as follows:
 1. 4 inch bell - 90 dB.
 2. 6 inch bell - 95 dB.

3. 10 inch bell - 104 dB.
 4. Provide entire gong with a guard.
 5. For outdoor use, provide cast weatherproof outlet box and yard hood for gong.
- H. Chimes: Provide heavy-duty modular vibrating chimes with polished chrome tone bar and gray enamel housing for mounting on electronic receiver plates.
- I. Horns: Provide beige colored modular program horns for surface, semi-flush, or recessed mountings. Provide horns with minimum sound output of 104 dB at 100 feet.
- J. Provide single projection or double projection horns as indicated.
- K. Provide basic grille horn with sound power of 104 dB at 10 feet.
- L. For outdoor use, provide cast aluminum box with mounting lugs and gaskets.

2.8 INDICATING CLOCKS:

- A. Provide synchronous-motor driven indicating clocks of sizes and ratings as indicated, either surface or semi-recessed mounting, containing self-starting permanently lubricated and sealed motors, and setting knobs. Provide an electronic receiver with each clock.
- B. Provide semi-recessed 15 inch round clock, with red sweep second hand, black numbers or marker, cover glass and casing with black matte finish:
- C. Provide double face indicating clocks for wall or ceiling mounting.
- D. Options: Provide the following optional features as indicated by clock schedule:
1. Shatterproof crystal.
 2. Clock guards.
 3. Executive dial (no casing).
 4. Electroluminescent dial.
 5. Digital indicating clock.
 6. Reset interval timer with remote controller.
- E. Modular Panel: Provide modular panel containing indicating clock as previously specified, and with the following features:
1. Room lighting switches.
 2. Thermostats.
 3. Telephone.
 4. Speaker.
 5. Return call switch.
 6. Convenience outlet.
- F. Time-Tone Unit: Provide time-tone unit containing indicating clock as previously specified and acoustically treated and baffled speaker compartment, to receive standard 8 inch EIA speaker.

PART 3 EXECUTION

3.1 INSPECTION:

- A. Installer must examine areas and conditions under which clock and program system is to be installed, and notify Contractor in writing of conditions detrimental to proper completion of

work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF CLOCK AND PROGRAM SYSTEMS:

- A. Install clock and program systems including accessories as indicated, in accordance with equipment manufacturer's written instructions, in compliance with NEC and recognized industry practices, to ensure that system complies with requirements and serves intended purposes.
- B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of clock and program systems with other work.
- C. Install electrical identification in accordance with Division-16 Basic Electrical Materials and Methods section "Electrical Identification" for expeditious and efficient servicing of system.

3.3 GROUNDING:

- A. Provide equipment grounding connections, sufficiently tight to assure a permanent and effective ground, for clock and program system components as indicated.

3.4 ADJUSTING AND CLEANING:

- A. Inspect relays, clocks, and signals for malfunctioning and where necessary, adjust units for proper operation to fulfill project requirements.
- B. Final adjustment and programming shall be performed by specially trained personnel in direct employ of manufacturer of clock and program system equipment.

3.5 FIELD QUALITY CONTROL:

- A. Upon completion of installation of clock and program components, and after circuitry has been energized with rated power source, test clock and program systems to demonstrate capability and compliance to fulfill requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance, otherwise remove and replace with new units and proceed with retesting.

END OF SECTION 16730