

SECTION 27 53 13
GPS WIRELESS CLOCK SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. G.P.S. Receiver
- B. Primary Transmitter
- C. Satellite Transmitter
- D. Analog Clocks
- E. Digital Clocks

1.2 REGULATORY REQUIREMENTS

- A. System: Listed by UL, ETL, or FM
- B. Transmitter and receiver shall comply with Part 90 of FCC rules
- C. Transmitter frequency shall be governed by FCC Part 90.35
- D. Transmitter output power shall be governed by FCC Part 90.257 (b)
- E. Obtain operating license for the transmitter from the FCC
- F. Equipment operating at 450 MHz to 480 MHz and 900 MHz will not be installed.

1.3 SYSTEM DESCRIPTIONS

- A. The GPS wireless clock system shall continually synchronize clocks throughout the facility, and shall be capable of clock readouts in multiple time zones where desired.
- B. The system shall synchronize all clocks to each other.
 - 1. The system shall utilize GPS technology to provide atomic time.
 - 2. The system shall not require hard wiring.
 - 3. Clocks shall automatically adjust for Daylight Savings Time.
- C. The Analog Clocks shall be synchronized to within 10-20 milliseconds 4-6 times per day, and the system shall have an internal oscillator that maintains plus or minus one second per day between synchronizations, so that clock accuracy shall not exceed plus or minus 0.2 seconds.
- D. The system shall include an internal clock reference so that failure of the GPS signal shall not cause the clocks to fail in indicating time.
- E. The system shall incorporate a "fail-safe" design so that failure of any component shall not cause failure of the system.
 - 1. Upon restoration of power or repair of failed component, the system shall resume normal operation without the need to reset the system or any component thereof.
- F. Clock locations shall be as indicated, and clocks shall be fully portable, capable of relocation at any time.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Indicate cable routing and connections.
- C. Submit product data for each item of equipment.
- D. Submit manufacturer's installation instructions.
- E. Submit location of all transmitters and receivers.

1.5 WARRANTIES

- A. Provide manufacturer's 4-year warranty extension, for a total of 5-year manufacturer's warranty (transmitter and clocks).

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Sections 01 77 00 and 01 78 23.
- B. Operation Data: Include instructions for routine operation of master and remote stations.

- C. Maintenance Data: Include instructions for repair trouble-shooting (with replacement parts list), preventive maintenance, and cleaning of all equipment supplied.
- D. Include manufacturer representative's letter stating that the system is fully tested and operational.
- E. Provide one set of factory service and installation manuals, which shall include schematics on each component in the system.

1.7 EXTRA MATERIALS

- A. Provide six extra clocks to the owner.
- B. Provide twenty (20) extra manufacturer's batteries for the clocks to the owner.

1.8 DEFINITIONS

- A. GPS - Global Positioning System, a worldwide system that employs 24 satellites in an integrated network to determine geographic location anywhere in the world, and which employs and transmits atomic time, the most accurate and reliable time.

1.9 QUALITY ASSURANCE

- A. Manufacturer shall be a company specializing in manufacturing commercial time systems with a minimum of five continuous years of documented experience.
- B. Installer shall be a company with documented experience in the installation of commercial time systems.

1.10 SEQUENCE OF OPERATION

- A. Transmitter Operation
 - 1. When power is first applied to the transmitter, it checks for and displays the software version.
 - 2. It then checks the position of the switches and stores their position in memory.
 - 3. The transmitter looks for the GPS time signal.
 - 4. Once the transmitter has received the GPS time, it sets its internal clock to that time.
 - 5. The transmitter then starts to transmit its internal time once every second.
 - 6. The transmitter updates its internal clock every time it receives valid time data from the GPS.
- B. After initial setup, the clock will shut off the receiver.
 - 1. Four to six times each day, the microprocessor will activate the receiver and starting with the stored channel, it will again look for a valid time signal.
 - 2. If necessary, the clocks will resynchronize to the correct time.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Primex Wireless Clocks
- B. Rauland-Borg.
- C. Sapling
- D. Substitutions: Under provisions of Section 01 60 00

2.2 GENERAL REQUIREMENTS

- A. General: The clock system shall include a transmitter, a roof mounted GPS receiver (if required system manufacturer), indicating clocks, and all accessories for complete operation.
- B. GPS Receiver: GPS roof mounted, with 15-foot cable attached. Provide 50' GPS cable extension.
 - 1. The GPS Receiver shall be a complete GPS receiver including antenna in a waterproof case, 3-7/8 inches by 4-3/16 inches by 2 inches, designed for roof or outdoor mounting.
 - 2. Provide mounting bracket for attachment to roof.
- C. Transmitters: Primex 5-watt Wireless **Model 72XR572MHZ XR05EM**, (and/or additional 1 watt Model 14144 Satellite Transmitters, consisting of wireless transmitter with GPS receiver, a built-in

surge suppressor. Unit shall obtain current NIST-time from satellite. The clock system shall transmit time to all clocks in the system. The Contractor shall provide mounting shelf.

1. Transmission: Frequency Range: 72.100 to 72.400 MHz or other Frequency Ranges as approved by Palm Beach School District, Transmission Range: one mile, open field. Radio technology: narrowband FM. Channel bandwidth: 20 kHz maximum. Transition mode: one-way communication, Data rate: 2-KBps. Operating range: 0 degrees C. to 70 degrees C.
 2. Transmitter: Transmitter output power: +26 to +30 dBm. Frequency deviation: +/- 4-kHz. Transmitter power requirements: 120 VAC 60 Hz. Internal power requirements: 5-VDC. Carrier frequency stability: +/- 20-ppm.
 3. Transmitter shall have 16 selectable channels to assure interference-free reception.
 4. Transmitter shall have the following switches: Time zone adjustment switches for all time zones in the world, including all US time zones: Eastern, Central, Mountain, Pacific, Alaska, and Hawaii. Daylight Saving Time bypass switch. 2-hour or 24-hour display.
 5. Transmitter housing shall be black metal case.
 6. Transmitter housing shall incorporate a display which shall include the following: Time readout, AM and PM indicator if 12-hour time display is set, Day and date readout, Indicator for daylight savings or standard time, LED which shall flash red in event of reception problem, GPS reception indicator.
- D. Antenna shall be commercial type, mounted minimum 46-inches above roof level.
- E. Power supply: Primex Wireless **Model 14003** (included) Input: 120 volt AC 50/60 Hz, 0.4 amps, Output: 9 volt DC, 1.5 amps.
- F. Cable Connection Sealant: Radio Shack Coaxial Cable Connector Sealant 278-1645, or approved electrical grade silicone sealant.
- G. The Wireless Receiver Switches (as may be required): Switches shall receive time packets from the Master Transmitter and relay the synchronized time to the Satellite Transmitter connected to it. The unit shall include the following:
1. Antenna mounted on top of the switch housing, minimum 11-1/2 inches long.
 2. Power Supply: Input 120 VAC 50/60 Hz, 0.4 amps Output: 9 volt DC, 1.5 amps.
 3. RS 232 data cable, minimum 5 feet long.
 4. Daylight Savings Time bypass switch.
- H. Satellite Transmitters (as may be required) Primex Wireless **Model 14401**: Satellite Transmitters shall receive the signal from the Wireless Receiver Switches and transmit the signal to the devices in its vicinity, which are out of the range from the Master Transmitter. The unit shall include the following:
1. Antenna mounted on top of the housing, minimum 46 inches long.
 2. Power Supply: Input: 120 VAC, 50/60 Hz, 0.4 amp Output: 9 volt DC, 1.5 amps
 3. 6 foot cord
 4. Surge Suppressor/Battery Backup
 5. Mounting Shelf
 6. Approximately one Watt transmission
 7. 72 MHz frequency
- I. Traditional analog clocks: Each classroom shall be provided with Primex Wireless analog clocks, 12-1/2 inch diameter, Primex Model **14155**, or The Media Center, and Cafeteria shall be provided with a 16-inch diameter clock, Primex Wireless Model **14157**. Analog clocks shall be wall mounted using the manufacturer's supplied hardware. Clocks shall have polycarbonate frame and polycarbonate lens. Face shall be white. Hour and minute hands shall be black. Analog clocks shall be provided with red sweep second hand.

1. Analog clocks shall be capable of automatically adjusting for Daylight Saving Time. An on-off switch located on the transmitter shall disable this function if desired
2. Time shall be automatically updated from the transmitter 6 times per day
3. Analog clocks shall remember the time during changing of batteries
4. Provide manufacturer's two (2) alkaline batteries per clock.
5. Analog clock receivers shall be as follow: Receiver power: two alkaline batteries and
Antenna type: internal.

2.3 ADDITIONAL REQUIREMENTS

- A. If transmitter stops transmitting valid time signals due to power failure, the clocks will continue to function as accurate quartz clocks until a valid time signal is decoded.
- B. Analog clock faces shall bear Owner's logo as indicated, where required.
- C. Provide 16-inch diameter analog clocks for media centers, cafeterias, and gymnasiums.
- D. Wire guards: Provide Model No. **14123**, 18 by 18 inch size, wire guards for clocks installed in gymnasiums.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that construction is complete in spaces to receive equipment and that rooms are clean and dry.
- B. Verify that 120-volt electrical outlet is located within 6-feet of location of transmitter and the outlet is operational and properly grounded.
- C. Verify and coordinate mounting height and exact locations of all clocks with architectural details, furniture layout, and elevations prior to installation.

3.2 INSTALLATION

- A. The local manufacturer's direct employee shall approve completed installation, and a written statement signed by such individual provided to the Owner certifying installation is working properly and installed in accordance with manufacturer's recommendations.
- B. System shall be installed in compliance with local and state authorities having jurisdiction.
- C. At completion of installation and prior to final acceptance, turn on the equipment; ensure that all equipment is operating properly, and that all clocks are functioning.

3.3 FIELD QUALITY CONTROL

- A. Perform the field inspection and testing under provisions of Section 01 40 00 and 01 45 00.
- B. Perform operational test on completed installation to verify proper operation.
- C. This device must accept interference received, including interference that may cause undesired.
- D. This equipment may not cause harmful interference.
- E. System shall be installed in compliance with local and state authorities having jurisdiction.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 01 60 00 and 01 75 00.
- B. Make final connections to units.
- C. Perform field inspection and testing.
- D. Demonstrate system operation.

3.5 ADJUSTING

- A. Adjust work under provisions of Section 01 75 00.
- B. After initial setup, the clock will shut off the receiver. Six times each day, the microprocessor will activate the receiver and starting with the stored channel, it will again look for a valid time signal. If necessary, the clocks will resynchronize to the correct time.

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- C. If the clock has not decoded a valid time signal a pre-determined number of days, it will go to a step mode. Non-signal reception can be caused by low battery voltage. If this occurs, replace the batteries.
- D. Provide manufacturer's lithium batteries in clock and follow set up procedures detailed in manufacturer's instructions.

3.6 DEMONSTRATION

- A. Provide systems demonstration and instructions under provisions of Section 01 75 00.
- B. Employ manufacturer's field representative to demonstrate system operation to Owner's personnel.
- C. Conduct walking tour of Project and describe function, operation, and maintenance of each component as well as proof testing of each component.
- D. Use submitted operation and maintenance manual as reference during demonstration and training.

3.7 DEMONSTRATION AND TRAINING

- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative.
 - 1. Provide competent, factory authorized personnel to instruct the operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems.
 - 2. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
 - 3. Provide minimum of two hours classroom instructions and training for school center. Schedule the training times with school principal.
 - 4. Provide minimum of two hours classroom instruction and training on programming and troubleshooting to the School District maintenance Department Electronic Technicians.

END OF SECTION