



SPECIFICATIONS  
GPS Wireless Clock System

Section 16730



## TIME SYSTEM

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes: Division 1 applies to this section. Provide GPS wireless clock system, complete.
- B. Related Work Specified Elsewhere:
  - 1. 120 volt grounded electrical outlet at transmitter location.

#### 1.02 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.

#### 1.03 SYSTEM DESCRIPTION

- A. 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. The system shall utilize GPS technology to provide atomic time. The system shall not require hard wiring. Clocks shall automatically adjust for Daylight Savings Time.
- C. Analog Clocks shall be synchronized to within 10 milliseconds 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. 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 being relocated at any time.

#### 1.04 REGULATORY REQUIREMENTS

- A. Equipment and components furnished shall be of manufacturers latest model.
- B. Transmitter and receiver shall comply with Part 90 of FCC rules,as follows:
  - 1. This device may not cause harmful interference, and
  - 2. this device must accept interference received, including interference that may cause undesired operation.
  - 3. Transmitter frequency shall be governed by FCC Part 90.35.
  - 4. Transmitter output power shall be governed by FCC Part 90.257 (b).
- C. System shall be installed in compliance with local and state authorities having jurisdiction.

#### 1.05 SUBMITTALS

- A. Product Data: Submit complete catalog data for each component, describing physical characteristics and method of installation. Submit brochure showing available colors and finishes of clocks.

*Note to Specifier: In accordance with FCC regulations, an application for license must be filed prior to use of the equipment. Normally, the manufacturer will have completed the filing and obtaining the license. If not, the Owner will be required to file the application with the FCC prior to use. Furnishing the license, or a copy of the application, will confirm that FCC approval has been obtained.*

- B. Operating License: Submit evidence of application for operating license prior to installing equipment. Furnish the license, or if the license has not been received, a copy of the application for the license, to the Owner prior to operating the equipment. When license is received, deliver original license to Owner.
- C. Samples: Submit one clock for approval. Approved sample shall be tagged and shall be installed in the work at location directed.
- D. Manufacturer's Instructions: Submit complete installation, set-up and maintenance instructions.

#### 1.06 SUBSTITUTIONS:

- A. Proposed substitutions, to be considered, shall be manufactured of equivalent materials that meet or exceed specified requirements of this Section.
- B. Proposed substitutions shall be identified not less than 10 days prior to bid date.
- C. Other systems requiring wiring and/or conduit between master and clocks, or which require connection of clocks to external electrical power supply will not be acceptable.

## 1.07 QUALITY ASSURANCE

- A. Permits: Obtain operating license for the transmitter from the FCC.
- B. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing commercial time systems with a minimum of 10 continuous years of documented experience.
  - 2. Installer: Company with documented experience in the installation of commercial time systems.

## 1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver all components to the site in the manufacturer's original packaging. Packaging shall contain manufacturer's name and address, product identification number, and other related information.
- B. Store equipment in finished building, unopened containers until ready for installation.

## 1.09 PROJECT SITE CONDITIONS

- A. Clocks shall not be installed until painting and other finish work in each room is complete.
- B. Coordinate installation of GPS receiver for access to the roof or exterior side wall so that the bracket and related fasteners are watertight.

## 1.10 SYSTEM STARTUP

- A. 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.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURER:

- A. GPS wireless clock system shall be manufactured by Primex Wireless, Inc., N3211 County Road H, Lake Geneva WI 53147 (800) 537-0464 FAX (262) 248-0061 [www.primexwireless.com](http://www.primexwireless.com).

## 2.02 SEQUENCE OF OPERATION

- A. Transmitter Operation: When power is first applied to the transmitter, it checks for and displays the software version, then it checks the position of the switches and stores their position in memory. The transmitter then looks for the GPS time signal. Once the transmitter has received the GPS time, it sets its internal clock to that time. The transmitter then starts to transmit its internal time once every second. The transmitter updates its internal clock every time it receives valid time data from the GPS.
- B. Analog Clock Operation:
  - 1. When the batteries are inserted into the clock: A) Press the red button when the red second hand is at the 12:00 position. At this time the microprocessor will lock in the location of the second hand. B) After the red second hand has passed over the minute hand (first second hash mark after minute hand), press and release the red button. At this time the microprocessor will lock in the location of the minute hand. The microprocessor then assumes the location of the hour hand.
  - 2. After the red button has been pressed twice, the micro processor will start searching the channels. It will start at channel No. 1 and proceed one by one until it either decodes a valid signal or reaches channel No. 16. If no signal is detected the receiver will be shut off and will try again later. If a signal is received, the micro processor will store the channel number, set the clock to the receive the time. For the next minute the clock will beep every time that it receives a valid time signal. If the clock is in a good signal area it will beep once a second. If the clock beeps every few seconds, the clock is in a marginal signal area. Analog clocks can operate in marginal signal areas, but battery life will be about 25 percent shorter.
  - 3. After initial set, the clock will shut off the receiver. On a pre-scheduled basis, the microprocessor will turn the receiver back on and starting with the stored channel, it will again look for a valid time signal. However, the beeper will not operate.
  - 4. If the clock has not decoded a valid time signal for seven days, then it will go back to a double-step mode. Non-signal reception can be caused by low battery voltage. If this occurs, replace the batteries.

## 2.03 EQUIPMENT

- A. General: The clock system shall include a transmitter, a roof or window mounted GPS receiver, indicating clocks, and all accessories for complete operation.
- B. Transmitter: Primex Wireless Model FM-72, consisting of wireless transmitter with GPS receiver. Unit shall obtain current atomic time from satellite. The clock system shall transmit time continuously to all clocks in the system.

1. Transmission:
  - a. Frequency Range: 72.100 to 72.400 MHz.
  - b. Transmission Range: one mile, open field.
  - c. Radio technology: narrowband FM
  - d. Number of channels: 16
  - e. Channel bandwidth: 20 kHz maximum
  - f. Transition mode: one-way communication
  - g. Data rate: 2 KBps
  - h. Operating range: 0 degrees C. to 70 degrees C.
2. Transmitter:
  - a. Transmitter output power: +26 to +30 dBm
  - b. Frequency deviation: +/- 4 kHz
  - c. Transmitter power requirements: 120 VAC 60 Hz
  - d. Internal power requirements: 5 VDC
  - e. Carrier frequency stability: +/- 20 ppm
3. Transmitter shall have 16 selectable channels to assure interference-free reception.
4. Transmitter shall have the following switches:
  - a. Time zone adjustment switches for all time zones in the world. Includes all US time zones: Eastern, Central, Mountain, Pacific, Alaska and Hawaii.
  - b. Daylight Saving Time bypass switch.
  - c. 12-hour or 24-hour display.
5. Transmitter housing shall be black metal case, 16-3/4 inches by 12 inches by 1-7/8 inches in size.
6. Antenna shall be 46 inches high, commercial type, mounted on top center of transmitter housing. Antenna gain shall be < 2.2 dB. Antenna polarization shall be vertical.

7. Transmitter housing shall incorporate a display which shall include the following:
  - a. Time readout
  - b. AM and PM indicator if 12-hour time display is set
  - c. Day and date readout
  - d. Indicator for daylight savings or standard time
  - e. LED which shall flash red in event of reception problem
  - f. GPS reception indicator
8. Transmitter shall contain an internal clock such that failure of reception from the GPS will not disable the operation of the clocks.

C. Power supply:

Model Number: 140003

Input: 120 volt AC 50/60 Hz, 0.4 amp.

Output: 9 volt DC, 1.5 amp.

*Note Specifier: Select appropriate cable length for distance between GPS unit and transmitter, from the following:*

D. GPS Receiver: Model Number Q11695, GPS roof mounted, with 15 foot cable attached (additional Primex Wireless extension cable available: 50, 100, 150, 200 foot).

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. Provide mounting bracket for attachment to roof structure.

E. Traditional analog clocks: Primex Wireless analog clocks, 12-1/2 inch diameter or 16 inch diameter as selected, color and finish as selected from manufacturer's standard colors and finishes. Analog clocks shall be wall mounted, and 12-1/2 inch diameter 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. 12-1/2 inch analog clocks shall be battery-operated, and shall have 5-year battery life.
2. 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.
3. Time shall be automatically updated from the transmitter 6 times per day.
4. Analog clocks shall remember the time during changing of batteries.
5. 12-1/2 inch analog clock lock: Tamper-proof/theft resistant hangers and slots in the backs of the analog clocks.
6. Provide 2 alkaline D-cell batteries with each 12-1/2 or 16-inch analog clock.

*Note Specifier: Select optional dial designs, case options and hands from manufacturer's brochure.*

7. Analog clock receivers shall be as follows:
  - a. Receiver sensitivity:  $>-110$  dBm
  - b. Receiver power: two alkaline D-cells
  - c. Antenna type: internal
  - d. Antenna gain:  $-7$  dBd
8. 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.

*Note to specifier: Analog clock faces can be made with Owner's logo as an option. If desired, leave in the following, and arrange for Owner to provide hard copy or digital copy of logo in format required by Primex Wireless. Contact Primex Wireless for details.*

9. Analog clock faces shall bear Owner's logo as indicated.

*Note to specifier: Where desired for protection of analog clocks, specify the following optional equipment:*

- F. Wire guards: Provide one for each analog clock as follows:
  1. Model No. 14131, 14 by 14 inch size, for nominal 12-1/2 inch diameter analog clocks.
  2. Model No. 14123, 18 by 18 inch size, for 16 inch diameter analog clocks.
- G. Cable Connection Sealant: Radio Shack Coaxial Cable Connector Sealant 278-1645, or approved electrical grade silicone sealant.

## PART 3 - EXECUTION

### 3.01 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 that outlet is operational and properly grounded.

### 3.02 INSTALLATION

*Note to specifier: The GPS unit can be mounted on the roof, on a pole, or at a window. In each case, the GPS unit must have a clear view of the sky. If the GPS unit is mounted on the roof, it must be located on a suitable bracket, well above the level of standing or incidental water. If the GPS unit is mounted at a window, it must be located away from low-E glass.*

- A. GPS Unit: Install on roof in location indicated, in clear view of the sky. Install unit in location free from standing water, and above accumulations of leaves or debris. Seal cable connection to GPS with cable connection sealant. Any added cable lengths must be protected from outside elements.

*Note to specifier: The GPS unit can be mounted on the roof, on a pole, or at a window. In each case, the GPS unit must have a clear view of the sky. If the GPS unit is mounted on the roof, it must be located on a suitable bracket, well above the level of standing or incidental water. If the GPS unit is mounted at a window, it must be located away from low-E glass.*

*Note to specifier; Where desired for mounting transmitter, specify the following equipment: One Model Number 14005, 18 inches long, by 3 inches wide by 15 inches deep.*

B. Transmitter:

1. Locate transmitter where indicated, a minimum of 2 to 3 feet above the floor, away from large metal objects such as filing cabinets, lockers or metal framed walls. The preferred transmitter location for best transmission coverage is centrally located on the top floor of the building.
2. Attach receiver to transmitter using cable.
3. Connect antenna to transmitter, using care not to strip threads.
4. Connect power supply to the transmitter.
5. Set the channel number on the display to correspond to the FCC license.
6. Plug power supply into electrical outlet.

C. Analog clocks: Perform the following operations with each clock:

1. Install D-cell batteries.
2. Set clock to correct time in accordance with manufacturer's instructions.
3. Observe analog clock until valid signals are received and analog clock adjusts itself to correct time.
4. Install the analog clock on the wall in the indicated location, plumb, level and tight against wall. If using 12-1/5 inch clock, attach using clock-lock hanging method and suitable fasteners as approved by clock manufacturer.

*Note to specifier: Delete the following if wire guards are not required.*

D. Wire guards: Secure to wall, using approved theft-resistant fasteners.

3.03 ADJUSTING

- A. Prior to final acceptance, inspect each clock, adjust as required, and replace parts which are found defective.

3.04 CLEANING

- A. Prior to final acceptance, clean exposed surfaces of clocks, using cleaning methods recommended by clock manufacturer. Remove temporary labels from clock faces. Do not remove labels from backs of clocks.

3.05 DEMONSTRATION

- A. Provide training to Owner's representative on setting and adjusting clocks, replacing batteries and routine maintenance.

3.06 PROTECTION

- A. Protect finished installation until final acceptance of the project.

END OF SECTION

Addendum No. 1 to the Specifications for GPS wireless clock system Section 13810

*Note to specifier: When the coverage from the master transmitter and GPS receiver is insufficient to reach all destinations, expanded coverage may be obtained economically by the use of one or more wireless satellite transmitters and receiver switches. In such case, add the following to paragraph 2.03 of the specification.*

H. Additional Equipment

1. Wireless receiver switches: 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:
  - a. Antenna mounted on top of the switch housing, 11-1/2 inches long
  - b. Power Supply:  
Input: 120 VAC 50/60 Hz, 0.4amp  
Output: 9 volt DC, 1.5 amps
  - c. RS 232 data cable, 5 feet long
  - d. Daylight Saving Time bypass switch
  - e. Dimensions: 4-1/4 inches long, 5-3/4" wide, 1-1/4 inches deep
  - f. Weight: 12 ounces
  - g. Operating range: 32 degrees F to 158 degrees F (0-70 degrees C)
2. Satellite transmitters: 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 range from the master transmitter. The unit shall include the following:
  - a. Antenna mounted on top of the housing, 46 inches long
  - b. Power Supply:  
Input: 120 VAC, 50/60 Hz, 0.4 amp  
Output: 9 volt DC, 1.5 amps.
  - c. 6 foot cord

- d. Approximately one Watt transmission
- e. 72 MHz frequency
- f. 16 selectable channels
- g. Time zone adjustment switch
- h. LCD display showing time, date and signal verification
- i. Housing: black metal casing:
- j. Dimensions: 16 inches wide by 12 inches deep by 1-7/8 inches high
- k. Weight: 7-3/4 pounds
- l. Operating range: 32 degrees F to 158 degrees F (0-70 degrees C)

*Note to specifier: Add the installation of the additional equipment in paragraph 3.02 as follows:*

- E. Receiver switches: Locate as required to provide complete coverage of the area designated for each switch. Install the receiver switch in the location or locations indicated, and secure to supports using fasteners suitable for the surface to which it is attached.
  - 1. Align the antenna vertically.
  - 2. Set receiver switch to the same channel number of the transmitter it will be receiving its signal from.
- F. Satellite transmitter: Install within 5 feet of the receiver switch and connect using the supplied cable.
  - 1. Set the satellite transmitter to the channel as indicated on the approved submittal and FCC license.
  - 2. Set switch B for time zone offset from UTC.
  - 3. Set switch #3 to down position.

*Note to specifier: If you require Daylight Saving Time bypass, remove access cover on receiver switch and change dip switch #5 to the 'ON' position.*





The right time. All the time.

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