



**ALEX-TRONIX**  
A DIVISION OF GNA INDUSTRIES, INC.

**SMART CLOCK™**  
**BATTERY POWERED**  
**TEMPERATURE BUDGETING**  
**CONTROLLER MANUAL**

**Patent Pending**

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**M A N U A L**

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## INTRODUCTION

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The Smart Clock is a non-solar battery powered irrigation controller with the following features:

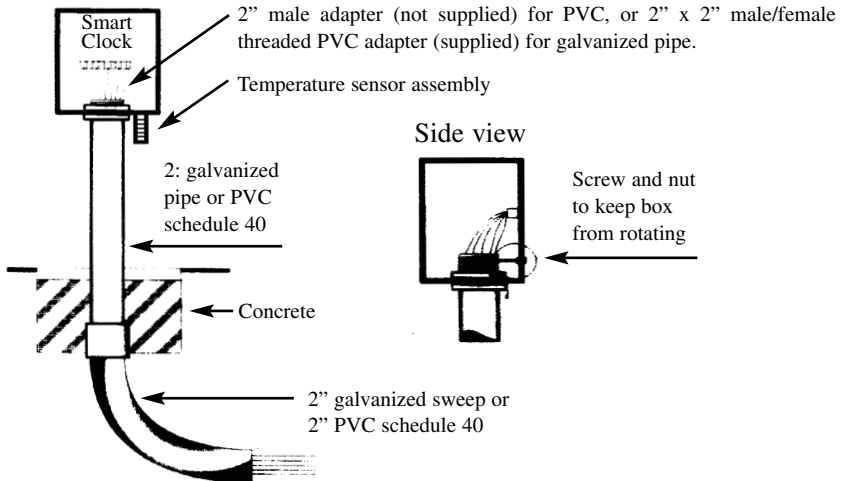
- a. Six Stations plus master valve or pump output
- b. Four programs, four starts per day per program
- c. Up to 23 hours 59 minutes station time in minute increments
- d. Up to 2000 feet valve operating distance with 14 gauge UF wire
- e. Years of battery life (Two years guaranteed)
- f. Temperature budgeting adjusts irrigation daily based on ambient temperature, location, and time of the year.
- g. Minimum irrigation temperature setting for water conservation or to minimize risk of road and sidewalk icing conditions
- h. “SET IT, DON’T SWEAT IT”<sup>®</sup> simple programming
- i. Rain switch input
- j. Rain delay up to 99 days
- k. Stations test function
- l. Retrofits easily to competitors pedestals, or can be wall mounted
- m. System compatible to most currently existing valves
- n. Powder coated steel enclosure standard, stainless steel optional
- o. Two year battery and controller warranty

## INSTALLATION

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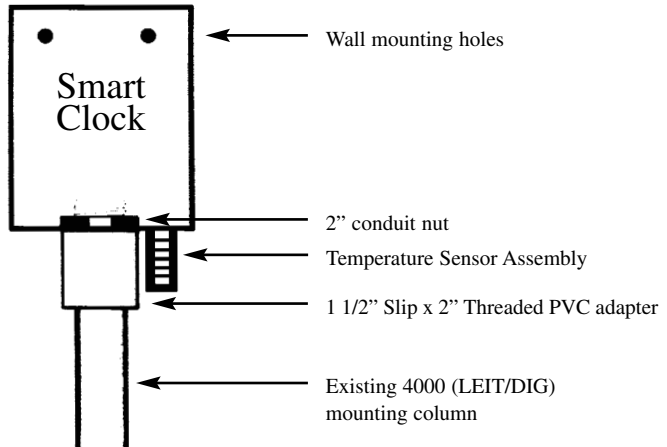
The Smart Clock can be installed in any convenient location since no external power or light of any form is required. It is however recommended that it not be placed directly in front of sprinklers. For ease of installation, remove front panel from box by unplugging it and loosening or removing two screws holding panel on left hinge. Use the following guide for new installations:

## NEW INSTALLATION:



1. Use either 2" threaded galvanized pipe, or 2" schedule 40 PVC pipe.
2. Dig hole with approx. dimension of: 12" x 12" x 10" deep.
3. Glue 2" PVC sweep to vertical PVC column. If galvanized pipe is used, thread on short piece of galvanized sweep to galvanized vertical column.
4. Run wires through column and bend ends over the top for about one foot.
5. Set column in hole and use dirt to set vertical. Pour concrete around base for permanency.
6. If PVC pipe is used, place a 2" male PVC adapter through bottom of box after Knockout has been punched out. Using a 2" conduit nut, tighten adapter to bottom of controller box.
7. Once concrete is set, pass wires through PVC adapter. Use PVC glue to affix adapter to top of PVC pipe. Rotate controller to desired orientation.
8. Make connections as described in "Terminal Wiring" instructions.
9. For galvanized column, use supplied male/female adapter. Tighten nut securely.
10. To keep box from rotating, use guide hole in back of box to drill through lip of PVC or galvanized pipe. Place screw and nut through this hole.
11. Mount temperature sensor assembly by passing wires through hole at bottom of box. Slide 3/4 inch nut over wires and tighten from inside box with pliers. Screw down two wires from temperature sensor securely to output terminals labeled T (Temp Sensor). There is no polarity to these wires.
12. Replace panel by screwing it into place with the two screws on the left hinge. Now plug in the output connector.
13. Press any button and screen until screen comes up. In STATUS screen, the current temperature should show on the top line. If it does not appear to be correct, check temperature wiring connection.

## ADAPTING TO DIG/ALTEC/SOLATROL 4000 SERIES MOUNTING COLUMN:

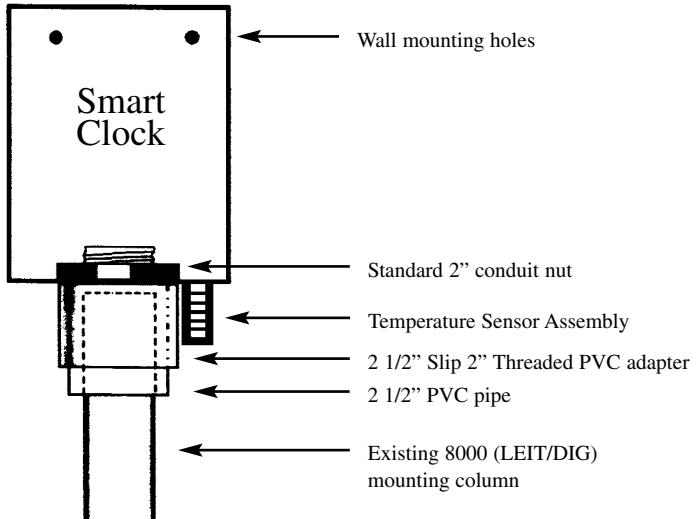


1. Mark and disconnect wiring before removing old controller.
2. Punch knockout hole on bottom of controller box.
3. Place 1 1/2" slip x 2" male PVC adapter through hole and tighten 2" conduit nut.
4. Apply "Liquid Nails" (or other appropriate adhesive) to top 2 inches of mounting pipe.
5. Slide PVC adapter over pipe and rotate back and forth to spread glue.
6. Align controller as desired.
7. Re-connect wiring.
8. To keep box from rotating, use guide hole in back of box to drill through lip of PVC or galvanized pipe. Place screw and nut through this hole. (See New Installation).
9. Mount temperature sensor assembly by passing wires through hole at bottom of box. Slide 3/4 inch nut over wires and tighten from inside box with pliers. Screw down two wires from temperature sensor securely to output terminals labeled T (Temp Sensor). There is no polarity to these wires.
10. Replace panel by screwing it into place with the two screws on the left hinge. Now plug in the output connector.
11. Press any button and screen until screen comes up. In STATUS screen, the current temperature should show on the top line. If it does not appear to be correct, check temperature wiring connection.

### WALL MOUNT:

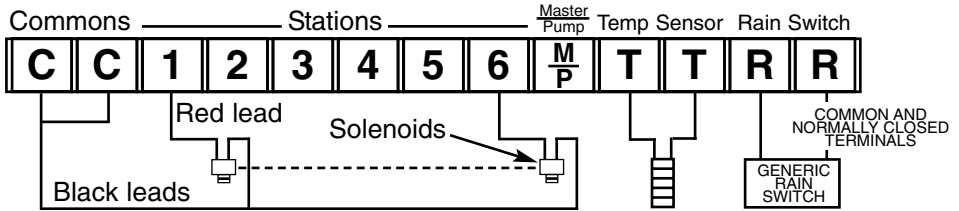
Controller may be mounted on a wall or post or in a "Strong Box" by using the two holes in the back of metal case.

## ADAPTING TO DIG/ALTEC/SOLATROL 8000 SERIES MOUNTING COLUMN:



1. Mark and disconnect wiring before removing old controller.
2. Use hacksaw to cut off top collar of mounting column.
3. Glue about a 3 inch section of a 2 1/2" schedule 40 piece of PVC pipe inside 2 1/2 to 2 inch PVC schedule 40 make adapter using PVC glue.
4. Place PVC adapter inside knocked out box hole and tighten nut.
5. Apply "Liquid Nails" to top 2 inches of 8000 column.
6. Slide PVC adapter over column and rotate back and forth to spread glue.
7. Align controller as desired.
8. Re-connect wiring.
9. To keep box from rotating, use guide hole in back to box to drill through lip of PVC or galvanized pipe. Place screw and nut through this hole. (See New Installation)
10. Mount temperature sensor assembly by passing wires through hole at bottom of box. Slide 3/4 inch nut over wires and tighten from inside box with pliers. Screw down two wires from temperature sensor securely to output terminals labeled T (Temp Sensor). There is no polarity to these wires.
11. Replace panel by screwing it into place with the two screws on the left hinge. Now plug in the output connector.
12. Press any button and screen until screen comes up. In STATUS screen, the current temperature should show on the top line. If it does not appear to be correct, check temperature wiring connection.

# SMART CLOCK OUTPUT TERMINAL WIRING \_\_\_\_\_



- C: These are the output common terminals which are attached to the black latching solenoid wires. Two terminals are provided for convenience.
- 1-6: These are the station outputs that each go to the red latching solenoid wires.
- M: This output can be connected to a master valve or to the optional P.I.K. (Pump Interface Kit) to operate a pump. In the Smart Clock, the sequence of operation is the master output comes on first, then the master.
- T: The temperature sensor leads are connected to these two terminals. No polarity observation is required.
- R: The common and normally closed rain switch terminals are connected to these terminals. **CAUTION; DO NOT CONNECT RAIN SWITCH TO COMMON TERMINAL.** To connect rain switch, remove red jumper wire and connect rain switch terminals in their place. The common and normally closed wires from the rain switch can be placed in either “R” position.

# CONTROLLER PROGRAMMING

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1. **STATUS:** Push any button until display is activated. If display has been off more than 15 minutes, STATUS screen is shown, otherwise, last active screen is displayed. In STATUS, current temperature and today's temperature budget percentage are displayed on top line. If output batteries are low, LO BAT is displayed instead on top line. The bottom line shows rain switch activation, rain delay condition, if temperature is below minimum setting, or if controller is off. If none of these four conditions exist, enabled programs and active stations are displayed. A letter followed by a number, such as B3, indicates that program B is enabled with station 3 on. An enabled program must have watering day(s), start time(s), and at least one assigned station with watering time.
2. **TEST/MANUAL:** To test valves, SELECT, ADJUST the time, and ENTER. Every station assigned to any program will come on sequentially for one cycle for programmed test time. For manual operation, SELECT and ADJUST the station time. SELECT again and ADJUST the station. Upon pressing ENTER, the master comes on first, then the station. Upon shutdown, the station goes off before the master. Only one station at a time can be operated manually. To terminate manual operation, press SELECT three times until the station number flashes. ADJUST the station number until OFF appears, then ENTER. TEST or MANUAL operation will terminate any ongoing automatic or semi-automatic cycle in progress. If an automatic start time occurs while in manual, test, or semi-automatic operation, the automatic start is skipped.
3. **SEMI-AUTO:** SELECT and ENTER a program (A, B, C, or D) and all timed stations assigned to that program will come on for one cycle. Only one semi-auto program can be activated at a time. Semi-auto shuts down active automatic cycles.

## CONTROLLER PROGRAMMING

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4. **ASSIGNING STATIONS:** For each program A, B, C, or D, SELECT to advance flashing cursor to selected station location. ADJUST (+) to assign each station and ADJUST (-) to remove it. ENTER to save program.
5. **START TIMES:** Each program has four start times. SELECT to desired position and ADJUST start times. To eliminate a starting time, ADJUST through midnight until a ----- is displayed and ENTER to save start times.
6. **WATERING DAYS:** Days of the week or up to 99 days interval are possible. Advance to watering days desired by pressing SELECT. Pressing (+) enters the day with an upper case letter, and (-) removes that day, making it lower case. For interval of days, SELECT until "I" (Interval of days) at end of line flashes and ENTER. Any program can be set for days of the week or interval of days. Selecting and entering D (days of the week) at end of the interval line returns screen to days of the week programming.
7. **STATION WATERING TIMES:** Stations can be programmed up to 23 hours and 59 minutes in minute increments. Two stations can be programmed per screen. After each screen is programmed for watering durations, ENTER to save program. If temperature budgeting is ON, pressing and holding ENTER while in STATION TIMES displays the temperature budgeted times.
8. **RAIN DELAY:** SELECT, ADJUST, and ENTER rain delay up to 99 days which counts down every midnight and irrigation resumes when it reaches 0.
9. **INFO/HELP:** This function displays customer service number, valve cycle count, controller software version, and recorded high temperature for previous day.

10. **MINIMUM IRRIGATION TEMPERATURE:** SELECT and ENTER ON, and temperature below which an irrigation cycle is not permitted is activated. Controller completes cycles already in progress.
11. **TEMPERATURE BUDGETING:** By selecting and entering BUDGET ON, the local latitude (from manual) and expected average summer high temperature can be programmed during installation. After summer irrigation schedule is entered, controller adjusts station watering times daily to accommodate daily temperature and seasonal changes. Temperature budgeting becomes effective the day after it is programmed. Press and hold ENTER in STATION TIMES to display temperature budgeted station times. Only auto and semi-auto station times are budgeted.
12. **CONTROLLER ON/OFF:** SELECT and ENTER CONTROLLER OFF to end irrigation. No valves can be operated in CONTROLLER OFF.
13. **TIME OF DAY:** The current time, day, and calendar are displayed. Controller has a 99 year calendar, but daylight saving time must be manually entered.
14. **RAIN SWITCH:** Controller comes with a red jumper across the rain switch "R" output terminals. To use a rain switch, remove jumper and connect rain switch common and normally closed contact wires to the "R" terminals. When the rain switch is activated, ongoing irrigation is terminated within seconds. After the rain switch dries out, irrigation starts are possible. Manual, test, and semi-automatic operation is available with rain switch activated.

## BATTERY REPLACEMENT

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The Smart Clock has two sets of batteries. Three AA size lithium batteries supply power for the electronics and the display. These are permanently mounted on the circuit board and should last for the life of the controller under normal conditions. They are not field changeable. If they need changing, it is probably not due to normal battery discharge but due to component failure which would require factory servicing. The second set of batteries supply power for the valves. These consist of three 9 volt jacketed lithium batteries. These are located inside the controller panel and are guaranteed for two years under normal conditions. LO BAT on the first line of the display indicates that these batteries need to be changed soon. Using the Alex-Tronix jacketed lithium batteries is strongly recommended, however three alkaline 9 volt batteries can be used with shorter battery life. If alkalines are used, change batteries once a year. To access these batteries, follow the following procedure.

**CAUTION: While handling panel, hold circuit board by their edges in order to not damage the electronics due to static discharge. Do not place board on metallic or other conductive surface. Do not expose circuit board to water or dirt.**

1. Unplug the front panel and remove it from the enclosure.
2. Using a Phillips screwdriver, remove the four screws holding the back plate and remove the back plate from the back of the circuit board.
3. Remove the single Phillips screw from the back of the circuit board holding the front panel. Remove the front panel from the circuit board.
4. Remove the three 9 volt batteries from their holders.
5. Replace with three new 9 volt lithium batteries. Be careful to not force batteries while plugging them in so as to not bend the battery terminal clips.

6. The LO BAT indication will not disappear until at least one output is activated. Before doing this, replace front panel to front of circuit board and replace screw holding front panel to circuit board. Replace the back plate and replace the four screws holding back plate to circuit board. To verify successful replacement of batteries, go to MANUAL function and operate any valve manually. Upon valve operation, relays should click inside the circuit board and the LO BAT indication should disappear.
7. Replace the front panel inside the metal case and plug in the output connector. Controller should be ready for operation.

## **ELECTRICAL INFORMATION** \_\_\_\_\_

Electronic current with operating display approximately 2 milliamps.

Idle current without display about 50 microamps.

Electronics battery: Three AA size 3.6 volt lithium batteries, 6,000 mah available capacity.

Valve batteries, three 9 volt jacketed lithium batteries in series (27 VDC), 1000 mah available capacity.

## WARRANTY

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Upon purchase, users of this product agree to the following terms, conditions and limitations of warranty and liability coverage:

Alex-Tronix warrants the Smart Clock to be free from original defects for two years from the date of original sale. The manufacturer shall replace, free of charge any part found defective under normal use and service within the guarantee period, provided the product is installed, used, and maintained in accordance with any applicable instructions or limitations issued by Alex-Tronix. Components supplied as replacement parts are warranted for 90 days from the date of shipment. The manufacturer assumes no liability for incidental or consequential damage sustained in the adoption or use of our engineering data, service, or products. Liability is therefore limited to the repair of the product manufactured by Alex-Tronix. No agent or representative of Alex-Tronix has the authority to waive or add to this agreement. Altered products, damage due to boxes left open or unlocked, or use of products in a manner not intended shall void this warranty. For warranty service, ship unit pre-paid to the address below. Controllers damaged in transit due to improper packaging are not covered by warranty.



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