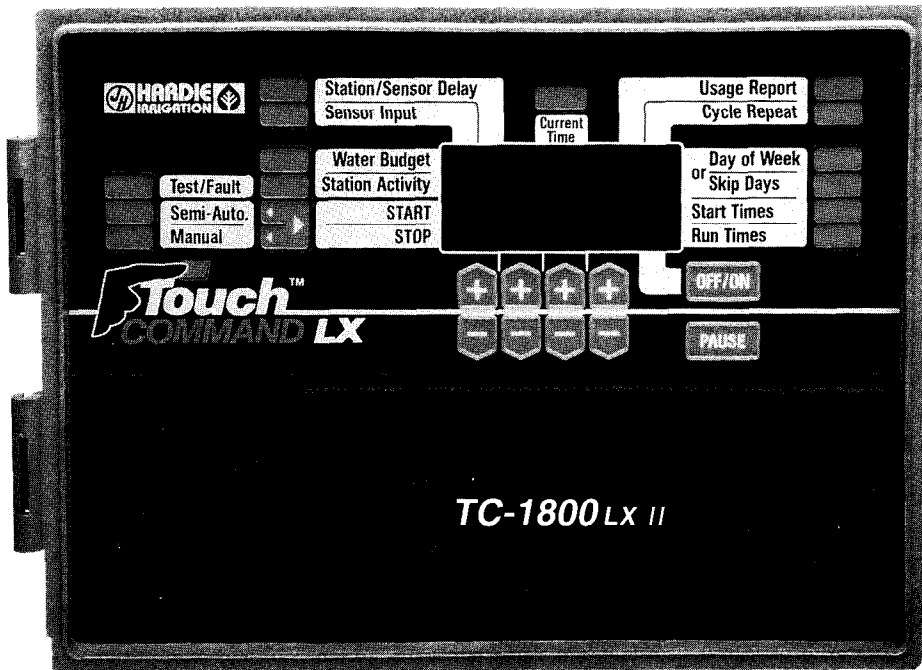# TOUCH COMMAND™ LX II
CONTROLLER

PROGRAMMING
AND INSTALLATION
GUIDE

INTRODUCTION

Touch Command LX II Model

Hardie Irrigation has expanded the limits of irrigation control with its Touch Command LX II irrigation controllers. These new controllers include non-volatile memory. In the event of a power failure, your programmed information will be held in memory for over 10 years.

By choosing a Touch Command controller for your irrigation system, you have selected a controller that is built for years of dependable performance and reliability.

Hardie is committed to developing state-of-the-art irrigation products, designed for the most advanced and environmentally sensitive irrigation systems for today and tomorrow.

Thank you for your business.
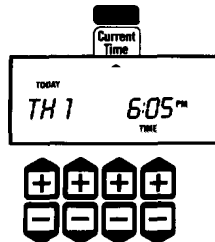
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BASIC PROGRAMMING INSTRUCTIONS

AUTOMATIC OPERATION

Before beginning the programming exercise and prior to any programming changes it is wise to erase all programmed information. This is done to ensure a reliable program.

To erase all programmed information
1. Press Off
2. Press Pause
3. Press all four plus (+) keys at the same time.

It is important that you thoroughly understand steps 1-4 before proceeding further. The first four steps refer to CURRENT TIME, RUN TIMES, START TIMES, DAY OF WEEK and SKIP DAYS. Changing the controller from one mode to another is indicated by a "beep" tone and the "indicator arrow" pointing to the mode of operation selected.

Step **1.** CURRENT TIME. To set the current time, push the CURRENT TIME key located directly above the digital display. A "beep" will indicate that the command has been received and an "indicator arrow" will show that the current time is being displayed. The first set of + and - keys below the display are for setting the day of the week. The second set of keys are for setting the week (when setting current time, set week to 1). The third keys are for setting the hour and the fourth set are for setting the minutes. A flashing colon separates the hour and minutes. Note that when there is no notation the time is AM. The PM hours carry a "PM" notation.

Step 2. RUN TIMES. Run times indicate how long each station will be ON in seconds, minutes or hours.

To set run times, press the RUN TIMES key. The 4 ± keys allow you to change the values in the display. (There are up to 24 stations depending on the Touch Command Controller model.) Run times may be set from 1 - 59 seconds, 1-59 minutes, 1.0 to 9.9 hours or 10 to 15 hours. SEC, MIN and HOUR will be noted on the display.
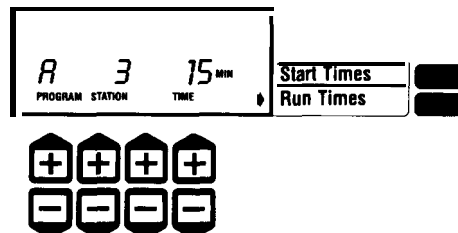
EXAMPLE: Station 3 *will run for* 15 minutes when Program A schedule has started.

EXAMPLE: Station 4 has been set to OFF by passing between 59 seconds and I minute.


```
A    4   OFF ▪▪
PROGRAM STATION  TIME    ◆
```
Start Times
Run Times

⊞ ⊞ ⊞ ⊞
⊟ ⊟ ⊟ ⊟
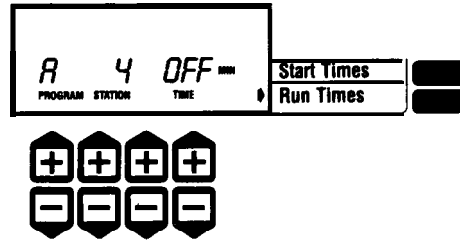
Note: If a station is not to be used, set the time to OFF. OFF appears between 59 seconds and 1 minute/59 minutes and 1 .O hour/and 15 hours and 1 second.

Step 3. START TIMES. These are the times you wish a program to start watering. By pressing the Start Times key, up to 8 start times may be assigned per program. Start times can be at any hour and minute desired.

PM hours are indicated by a "PM" notation. By passing midnight any start time can be set to OFF. OFF appears between 11:59P and 12:OOA.

EXAMPLE: Program A, Start Time #I *is* 9:45 a.m.

```
START
A    1   9:45  ◆
PROGRAM  TIME
```
Start Times
Run Times

⊞ ⊞ ⊞ ⊞
⊟ ⊟ ⊟ ⊟
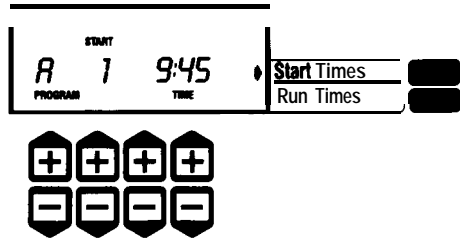
EXAMPLE: By passing midnight on the clock Program A Start Time #4 has been set to OFF.

```
START
A    4   OFF  ◆
PROGRAM  TIME
```
Start Times
Run Times

⊞ ⊞ ⊞ ⊞
⊟ ⊟ ⊟ ⊟
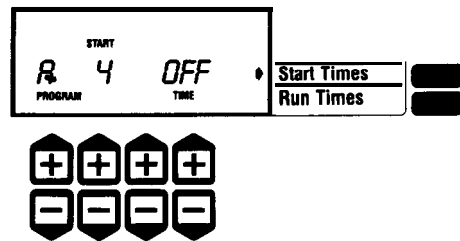
Step 4. WATERING DAYS are the days on which you want watering to occur. DAY OF WEEK allows programming on a 14 day schedule or SKIP DAYS up to once every 3 1 days. You cannot have both modes on the same program.

DAY OF WEEK. This allows you to water or not water on any of seven days for two consecutive weeks.

The controller operates on a 14 day schedule indicated by all 7 days of the week and Weeks 1 and 2. The program letter is indicated alphabetically to the left of the display. (The Touch Command has the same number of programs as stations.)

Next to the program letter is the day of the week indicated by SU to SA for Sunday through Saturday. Next is the week number, 1 or 2, and on the right-hand side of the display are the words ON or OF (OFF), depending on whether you want a program to be ON or OFF for that particular day.

or Day of Week / Skip Days

The keys indicate two separate modes. DAY OF WEEK or SKIP DAYS. Choose one of the two modes for Program A.

```
DAY
A    SU 1 ON
PROGRAM  WEEK
```
◆ or Day of Week / Skip Days
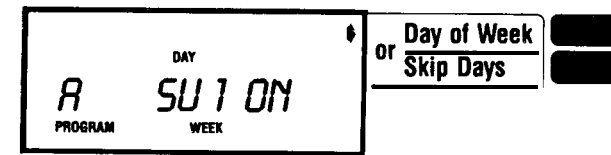
The DAY OF WEEK mode has been selected for *Program* A. *Program* A will be active on Sunday of Week 1.

Press the fourth set of ± keys to set the desired days ON or OFF.

NOTE: Both weeks, 1 and 2 (all 14 days) must be programmed ON or OFF.
NOTE: Each ± key has a function in this mode.

```
DAY
A    MO 1 ON
PROGRAM  WEEK
```
◆ or Day of Week / Skip Days
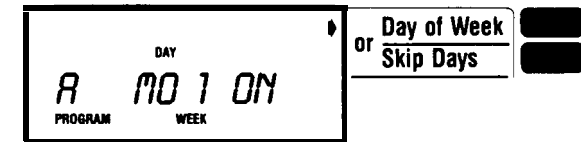
EXAMPLE: Program A will be active *on* Monday of Week 1.

⊞ ⊞ ⊞ ⊞
⊟ ⊟ ⊟ ⊟

```
DAY
A    MO 2 OFF
PROGRAM  WEEK
```
◆ or Day of Week / Skip Days
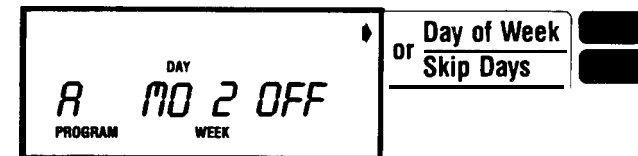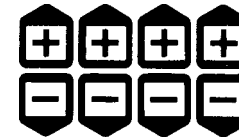
EXAMPLE: Program A will not he active on Monday of Week 2.

CHANGING TO SKIP DAYS OR DAY OF WEEK

If SKIP DAYS has been chosen for a program, the program letter and the word SKIP will appear on the display when selecting DAY OF WEEK. To

go back to DAY OF WEEK, the days in SKIP DAYS should be set back to ZERO (00) for that program. When selecting SKIP DAYS the DAY OF WEEK schedule for that program is not lost.

Skip Day. Watering will be scheduled from once every day, up to once every 31 days.

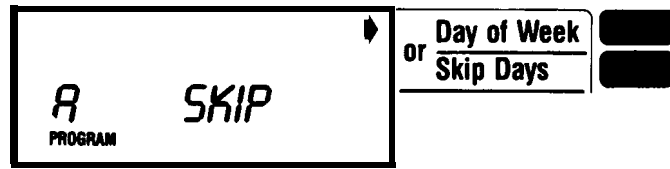In the SKIP DAYS mode you set a number of days (from 1 to 31) to establish the watering interval. 1 means that program will occur every day, 31 means that program will occur every 31 days (One day ON and 30 days OFF). The display will show you the number of days left before watering occurs again. "00" above the "LEFT" means that today is the watering day, a 3 would mean that the program will stay OFF for 3 more days including today and then will be operational.

EXAMPLE: Program A is in the SKIP DAYS mode. To return to the DAY OF WEEK mode, press the SKIP DAYS key, then clear the days to all ZEROS (00). Now you can return to the DAY OF WEEK mode.

EXAMPLE: You have pressed the SKIP DAYS key. Program A is in the SKIP DAYS mode and it will water every fourth day. There are 3 days left before it waters again.
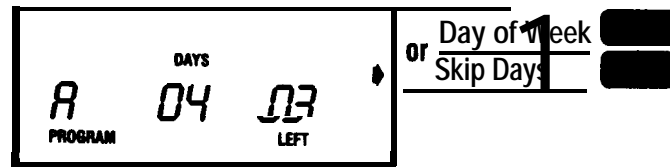
EXAMPLE: Press the fourth + keys to set the number of days left before watering occurs.
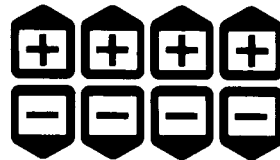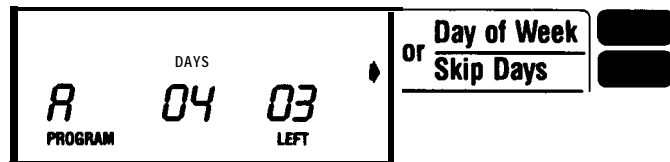
ENTERING COMPLETED PROGRAM

Your controller is now programmed. Repeat these steps for other programs as desired. By pressing current time your controller will show the time of day.

WATER BUDGET. Using this feature you may increase or decrease your Run Times of any program in increments of 10% without modifying the Run Times settings.

Press the WATER BUDGET key and select a program. The WATER BUDGET figure will come up in the display. By pressing the ± keys you can increase or decrease that percentage figure in increments of 10%, going from 10% to 250%. Th'is means that all of the Run Times within that program will be affected by the percentage increase or decrease you have selected. Below 10% and above 250% the WATER BUDGET setting goes to OFF which prevents that program from operating.
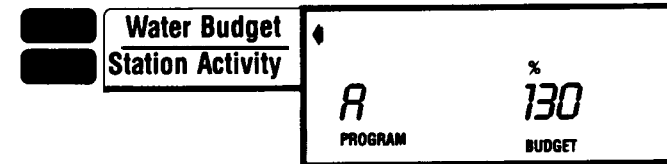
EXAMPLE: All the Run Times assigned to Program A have been budgeted to have their current Run Times increased by 30%) or 130% of their original value.
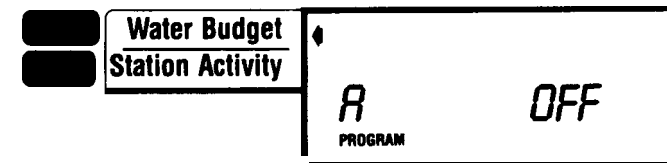
EXAMPLE: Program A has been disabled. The second set of ± keys does not operate in the WATER BUDGET mode.

The WATER BUDGET only increases or decreases the Run Times for those stations assigned to that program.

NOTE: The minimum value of a Run Time that has been modified by BUDGET is:

1 sec if Run Time was in seconds;

1 min if Run Time was in minutes;

0.1 hour if Run Time was in hours.

NOTE: If "AB" appears between the program letter and the budget value, refer to the "AUTO-BUDGET" section of this manual.
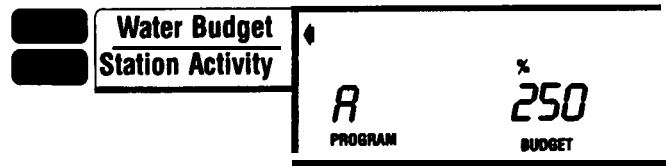
EXAMPLE: Program A has a Water Budget *of* 250%.

WATER BUDGET FOR AUTOMATIC OPERATION

If your budget is increased beyond 150%, the cycle is split into two parts. First a complete cycle of 100% of the Run Time assigned to that program is started. At the end of the first cycle a second cycle will start immediately. This second cycle will water the remaining percentage. (For example, if you are watering for 10 minutes at 250% then the first cycle will run for 10 minutes of 100% and the second cycle will run for 15 minutes or 150%. This is a total of 25 minutes or 250% of 10 minutes.)

WATER BUDGET FOR SEMI-AUTOMATIC OPERATION

NOTE: When a program is turned on semi-automatically, the budget will not be split into two parts. There will be only one cycle even if the budget is beyond 150%.

In the Semi-Automatic mode, you will see the program, station and run time on the display. If you want to know the percentage value applied to that program press the WATER BUDGET key.

Water Budget Default: 100% on all programs.

Station Activity. Tells you which stations are currently ON (running) or OFF, which programs are assigned to them, and the time still remaining on any particular station.

NOTE: To review activity of other stations, press the ± keys below the station number.
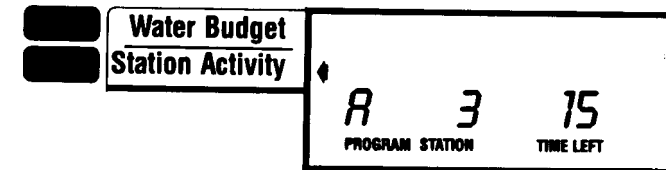
EXAMPLE: The cycle scheduled on Program A *is* running and at this time station #3 *is on. There are 15* minutes of Run *Time* remaining on Station #3.
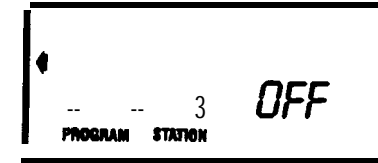
EXAMPLES: 1. This particular station is OFF.
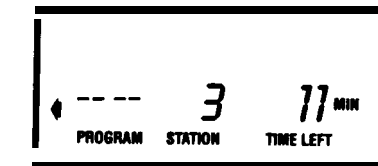
2. This particular *station is on* MANUAL. (The Program is not shown on the display *in* the manual mode.)
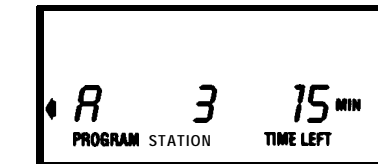
3. This particular station *is on* SEMI-AUTOMATIC or AUTOMATIC.

If by pressing the ± keys under STATION, the station number does not change, it is because that station is running on more than one program at that particular time, so the controller will show all the programs that have that station on at that time.

EXAMPLE: Station 3 is running manually and on two separate programs at this time. Therefore by pressing the *station keys,* the station number will not change.

Press the Program keys to determine the *run times left for Station* 3 on each of the two *programs* assigned to that *station.*
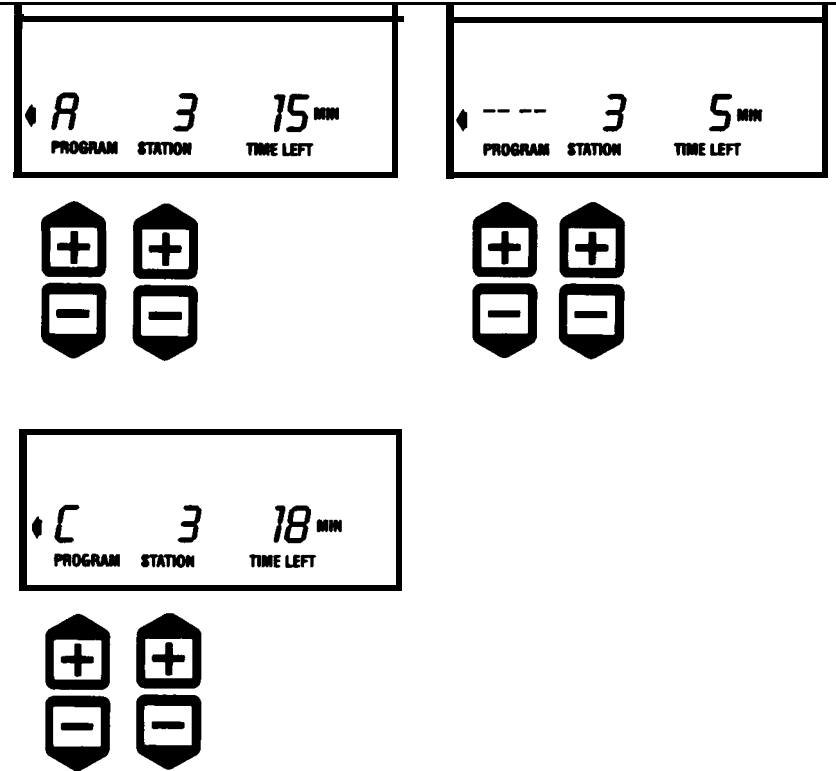
OFF/ON. (Rain Switch).

The purpose of OFF is to shut off the controller when it is raining without cancelling the programs. By pushing the OFF/ON key the first time (to OFF) all stations that are currently ON will be turned OFF. "OFF" will show on the display.

By pressing the second set of plus (+) or minus (-) keys, it is possible to set the controller to be OFF for a certain number of days (up to 3 1) and then resume normal operations.

Once the day count is ZERO, all normal functions are restored. When any other function is selected, review how many days are left by pressing OFF/ON twice. To review any other function, press the appropriate key. Do not press OFF/ON as this will only reset the controller to ON.

The OFF setting overrides any Automatic, Semi-Automatic or Manual operation.

Pressing the OFF/ON key a second time (from anywhere) restores normal controller operation.
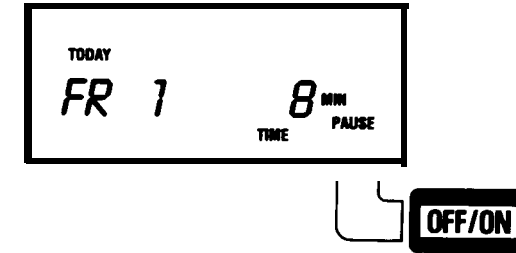

PAUSE.

By pressing the PAUSE key the following occurs.:

1. The "PAUSE" indicator will flash on the display.
2. All stations currently on will be turned off while the programs continue to run.

Normal operation is resumed by pressing the PAUSE key again. If the PAUSE key is not pressed a second time, all stations will resume their normal operation at midnight and the PAUSE indicator will be cancelled.

PAUSE can be pressed at any time.

SEMI-AUTOMATIC   OPERATION

The purpose of this operation is to run one or more programs at any time, regardless of watering days or start times.

Press the SEMI-AUTO key to activate. If a program has been disabled (by setting its budget value to OFF) the display will show that program to be "OFF."

Select the program you want to run semi-automatically.

Select the station (of this program) you want to start first. The time shown to the right is that station's run time.

Press the START key to start the cycle. The time will count down to zero. The controller will return to automatic mode once this program is completed. If you wish to stop the program, press the STOP key.

To advance, press the second + key while the program is ON and the current station will turn OFF and the next programmed station will turn ON.

NOTE: Semi-Automatic does not work if the controller is set to "OFF," and a program cannot be started if it is already ON.

NOTE: A flashing arrow pointing to START means that the program is Off and it can be turned on.

A flashing arrow pointing to STOP means that the program is ON and it can be turned OFF.

NOTE: If the Water Budget is other than 100%, the % indicator and the adjusted run time will be shown. In Semi-Automatic mode, the cycle is not split into two cycles for budget values above 150%.

Semi-Automatic mode will run one cycle only even if cycle repeat is set to more than 1.

EXAMPLE: Program A is OFF. It can be started beginning with Station #4 by pressing "START. "
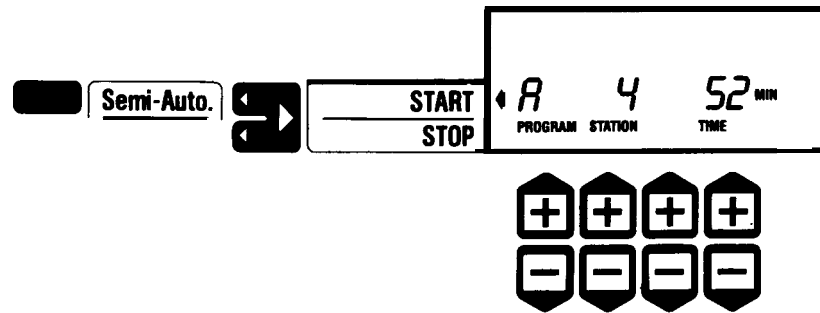
EXAMPLE: Program A *is ON,* watering Station #4. It can be stopped by pressing "STOP. "
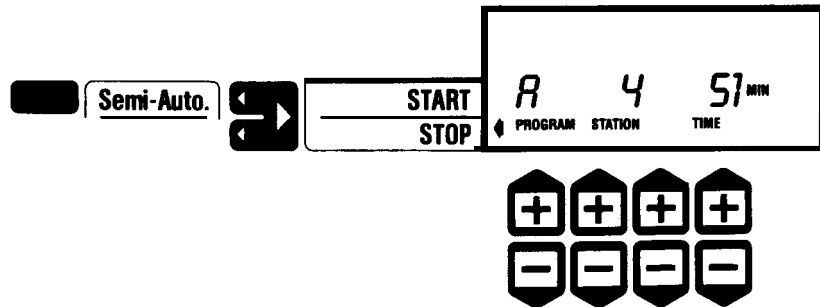
MANUAL OPERATION

The purpose of this operation is to start any individual station at any time.

Select the station and select the run time. Watering Times can be set in one digit increments from l-59 seconds, 1-59 minutes and l- to 15 hours. SEC, MIN or HOURS will be noted alongside the time.

Press START. The Run Time will decrease to zero as "TIME LEFT" shown on the display. Once the time reaches zero the station will turn off and the original time will be displayed. By pushing STOP the station will stop watering and the time displayed will be the one originally set for that station. Up to 8 stations are allowed to be turned on manually at any one time.

MANUAL OPERATION does not work if the controller is set to "OFF." It is possible to select Master Valve to be ON or OFF when a station is turned on manually. Just press the first set off keys to show "MV" if master valve needs to be on or "—" will be indicated if master valve does not need to be on for that particular station. Once a station has been turned on manually, changing between "—" and "MV" will not affect the current Master Valve setting until that station is first turned off and then on again.

EXAMPLE: Station #5 has been set to run *on* Manual and the watering time *is 10* minutes.

MANUAL DEFAULT: 10 min. on each station.

FAULT: If at any time a short circuit occurs while one or more stations are ON, the word FAULT will appear on the display and the controller will turn OFF all the stations that were on, setting them as faulty stations, and will go to the next station on each program.

To find the station with a problem or to check if the problem has been corrected, just turn on manually one station at a time. If after approximately a second the station is turned off automatically, it means that a short circuit condition is still present on that station. When all the stations can be turned on and off manually without the FAULT indicator appearing in the display, the system is functioning properly.
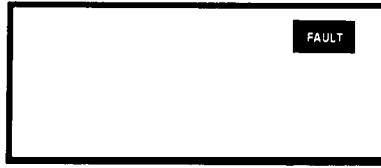
It is also possible that a faulty condition is detected because of an overload, that is, too many solenoids are on at a particular time. In this case, the FAULT indicator will be reset only if all the stations that were on while the overload occurred have been found to be good.

POWER FAILURE

In the event of a power failure the controller will function in three different ways.

1. If no battery is installed and the controller is set in ELECTRONIC mode, all programs are retained, but the time of day will default to 12:00 (p.m.). The display will indicate the time but there will be no arrow pointing to a function.

2. ELECTRO-MECHANICAL mode can be selected whether or not a 9V battery is used as backup. This mode allows the controller to function like an electro-mechanical controller-the clock stops during power failures, but resumes time when the power is turned back on. All functions are restored from the time the failure occurred. The only loss is on the current time clock by the length of time of the power failure.

   ELECTRO-MECHANICAL mode would be selected to avoid losing watering schedule because of a power failure.

3. ELECTRONIC mode can be selected when using a 9V battery as backup. The controller will keep the real time, but the eventual start times during the power failure will be lost. Upon the return of line power, the controller will resume all functions as from the time the power failure occurred.

   ELECTRONIC mode would be selected when desiring to keep the real time.

Selecting ELECTRO-MECHANICAL or ELECTRONIC mode: push the Face panel above the blue button of "Station/Sensor Delay" just below the

plastic frame. The display will show either ELTRONIC or MECHANIC: Push any ± key to toggle between modes, then press the CURRENT TIME key.

If because of an unusual power failure or excessive electrical interference from the power line the programmed information is altered, the controller will automatically reset itself

To compensate for Power Failure, place a 9V battery in the battery connection provided. You may use either an alkaline or NiCad battery, which will last up to 120 hours. The NiCad battery will be kept charged if the Alk/NiCad jumper to the right of the terminal strips has been set to NICAD.

CYCLE REPEAT. Allows a program to repeat its cycle from 1 to 99 times.

To activate press the CYCLE REPEAT key.

The first and fourth ± keys control the setting of the program letter and the number of cycles, respectively.

If a delay between stations is entered, the same delay will apply between the closing of the last station of the cycle and the opening of the first station of the next cycle.

NOTE: When in SEMI-AUTOMATIC mode there will be only one cycle regardless of how many cycles are set on cycle repeat.
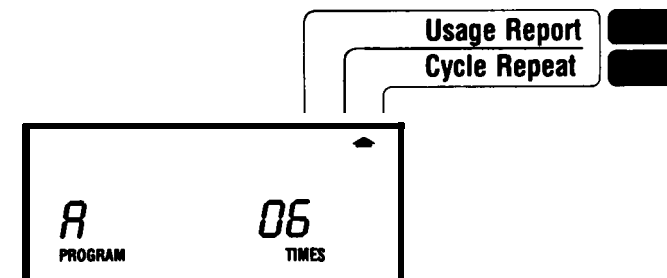
CYCLE REPEAT Default: 1 cycle on all programs.

USAGE REPORT. You can determine the amount of time any station has been watered during the current month (up to today's date), the last month or the month before last.

The first time you press the USAGE REPORT key, the current date must be set.

NOTE: When you press the USAGE REPORT key a flashing arrow will appear alongside START. Press the START key once you have checked for the correct date. Next the current month, a station number and the amount of time that station has been watering this month up to today's date will appear on the display.

By pressing the first set off keys you can go back one or two months to determine the accumulated amount of time any station has been watering last month, the month before last, or the current month up to today's date.

Accumulated watering time on any station will be displayed in seconds, minutes and hours up to a maximum of 744 hours.

EXAMPLE: You have pressed the USAGE REPORT key and set today's date on the display. The flashing arrow next to START tells you to now press the START key.

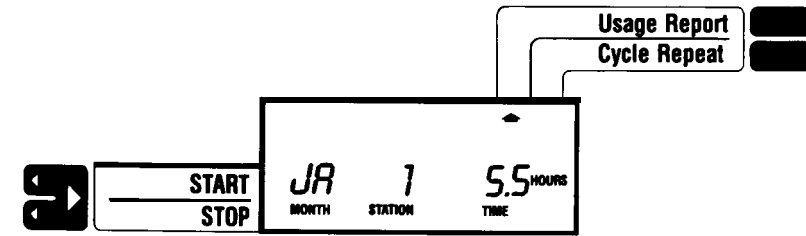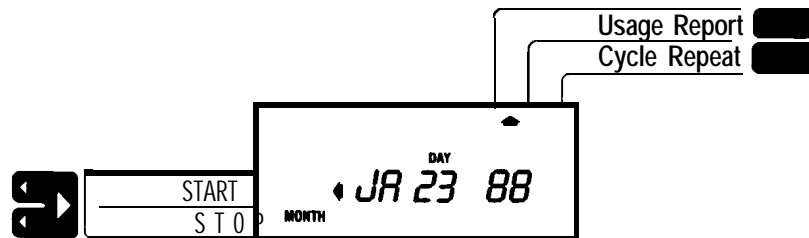SENSOR INPUT. This function allows you to choose which one of the four available sensor inputs will affect one or more programs. MASTER VALVE can be set ON or OFF for any program.

The terminal strip has 4 Sensor connections: Str. (Start), Stp. (Stop), Aux. (Auxiliary), A.B. (Automatic Budget). Any sensor with a normally open switch that closes with 24 VAC .Ol amps can be connected between the terminal S.C. (Sensor Common) and any of the 4 other sensor inputs. When the switch closes, the function associated with that sensor input is activated.

Once the Sensor Input key has been pressed, you can select any one of the four sensors plus Master Valve by pressing the second set off keys.

SENSOR START. (STR.) Select Sensor STR by pressing the second set off keys. Select the Programs you want to be started by pressing the first set off keys. This sensor input can be assigned to one or more programs. Press the fourth set off keys to set sensor STR to ON or OFF for that particular program. When a program has sensor STR set to ON, the closing of a switch between the terminals S.C. and STR will start that program cycle (or cycles if Cycle Repeat is larger than 1).

EXAMPLE: You have pressed the START key. The current month of January and Station #1 appear on the display. Station #I has been watering for 5.5 hours *this month up to* today's *date.* To determine the accumulated watering *time* for the last month or the month before last , press the first - key . To determine the watering time for all other *stations press the second set off keys.*
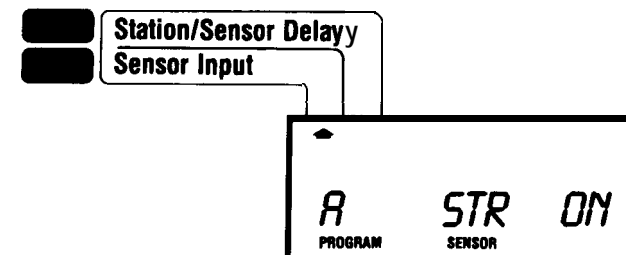
EXAMPLE: The *closing of a* switch between S.C. and STR *terminals will start* Program A cycle.

SENSOR STOP. (STP.) Select sensor STP by pressing the second set off keys. Select the programs you want. Set sensor STP to ON or OFF. When a program has sensor STP set to ON, the closing of a switch between S.C. and STP terminals will stop that program or will prevent it from turning on as long as the switch stays closed.
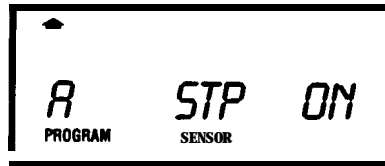
NOTE: The STP input overrides STR, AUX and AB inputs.

EXAMPLE: The closing of a switch between S.C. and STP terminals will stop Program A cycle if it was on or it will prevent Program A from starting as long as the switch is kept closed.


SENSOR AUXILIARY. (AUX.) Allows you to automatically turn off an individual station because of a faulty condition related to that station. For example, low water pressure due to a broken line or faulty valve. When a low pressure sensor connected to the Auxiliary Input closes its switch the controller turns OFF the current station and skips to the next station on the Program that has a run time different than zero.

To activate, advance sensor selection to AUX then select the program and set the sensor AUX to ON.

NOTE: A delay between stations and one for the AUX sensor input are recommended with this sensor in order to give the system time to restore its normal functions before turning on the next station in line.

(See section on STATION/SENSOR DELAY.)

EXAMPLE: The closing of a switch between S .C. and AUX terminals while Program A's cycle is on, causes the current station to be turned OFF and the next station with a time different than zero to be turned ON.
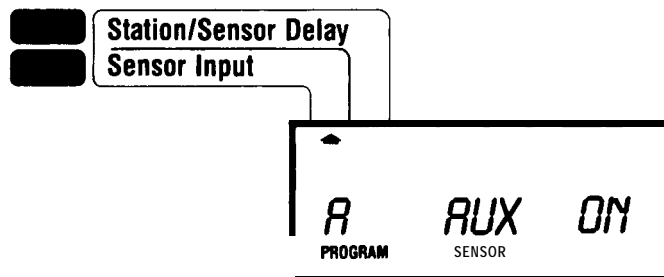
AUTO BUDGET. (AB) This is a way to automatically adjust the water budget for any program based upon what happens on station #I of Program A.
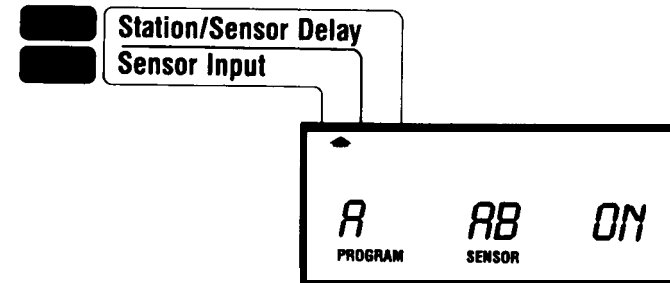
In order to use this feature sensor AB must be set to ON for Program A. When Program A has sensor AB set to ON and the sensor's switch between S.C. and AB terminals closes, Station #1 is turned OFF. The controller then calculates the ratio between how long station #I has been ON and how long Station #I was programmed to be ON then multiplies it by 100 to obtain the Auto Budget value. The AB or AUTO BUDGET value can be applied to the values of remaining stations of Program A (150% of the max AB value). This new budget value automatically calculated will be in effect until Program A's cycle is started again at which point a new AB value will be calculated. Also the current AB can be applied to any program that has AB sensor set to ON (providing the AB sensor is set to ON for Program A). The value of AUTO BUDGET can be viewed by selecting the WATER BUDGET function. All those programs having AB set to ON will show the letters AB on the display. Of course, the AB value cannot be changed since it is a value that can only be calculated by the controller.

The advantage of this feature is that a single sensor, a moisture sensor for example, placed where station #I waters can be used to control the complete watering cycle for Program A and for the remaining programs.

AUTO BUDGET EXAMPLE: You want to water six zones and experience tells you that the run times should be:

St. #	1	2	3	4	5	6
Run Time	20 min.	50 min.	10 min.	1.5 hr.	20min.	30 min.

Connect an adjustable moisture sensor, which closes its normally open switch when a preset moisture level is reached, to the S.C. and AB

terminals in the area watered by Station #1. Set the limit of the value shown on the moisture sensor after the preset 20 minutes of watering.

The next time the cycle runs again there will be 3 possible situations:

1. Everything is normal and the sensor senses its preset limit after 20 minutes of watering on STN #1, PR A.

2. There is more moisture than normal in the soil and the sensor closes before the preset Run Time of 20 minutes.

3. There is less moisture than normal in the soil and the sensor closes after the preset Run Time of 20 minutes.

The moment the AB sensor closes, Station #1, Program A, is turned OFF and the new AUTO BUDGET value is calculated:

1. The sensor closes after 20 min.
   20: Time between STN #1, PR A starts watering and AB input is closed to S.C.

$$AB = \frac{20}{20} \times 100 = 100\%$$

20: Programmed Run Time on STN #1, PR A.

The calculated AB value is then applied to station #2, 3, 4, 5 and 6:

St. #	1	2	3	4	5	6
Run Time	20 min.	50 min.	10 min.	1.5 hr.	20min.	30 min.

2) The sensor closes after 10 min.

$$AB = \frac{10}{20} \times 100 = \underline{50\%}$$

The calculated AB value is then applied to station #2,3,4, 5, and 6:

St. #	1	2	3	4	5	6
Run Time	10 min.	25 min.	5 min.	0.8 hr.	10min.	15 min.

3) The sensor closes after 26 min.

$$AB = \frac{26}{20} \times 100 = \underline{130\%}$$

The calculated AB value is then applied to station #2, 3,4, 5, and 6:

St. #	1	2	3	4	5	6
Run Time	26 min.	65 min.	13 min.	2.0 hr.	26min.	39 min.

When using a sensor that cannot be adjusted, STN #1 should be turned on manually, and the time from the moment station #1 starts watering to the moment the sensor closes should be the exact value programmed for STN #1, PR A, under normal conditions.

MASTER VALVE OUTPUT. This is a way to control whether Master Valve should be ON or OFF when a program's cycle is turned on. The Master Valve selection can be made by pressing the second ± keys once the Sensor Input function is selected. Just set MV to "ON" or "OF" (OFF) for each desired program.

EXAMPLE: You have pressed the second set off keys to *show* MV and set it ON for PR A.

SENSOR INPUT Default: All sensors are set to OFF for any program. Master Valve is ON for all programs.

STATION/SENSOR DELAY: STATION DELAY allows you to insert a delay between one station turning OFF and the next station turning ON in the same program and between two cycles when CYCLE REPEAT is set to repeat 2 or more times. SENSOR DELAY is the time the controller will wait when a sensor input is closed before it takes the appropriate action.

When you press the Station/Sensor Delay key you can set the delay for either Program or Sensor. The function which is not selected will appear as "—" on the display. The first set off keys controls the Program selection. The second set off keys controls the four Sensor Input selections. The delay is programmed by pressing the fourth set off keys. The delay can be from 1 to 59 seconds and 1 to 59 minutes for each Program or Sensor function. Between 59 seconds and 1 minute and 59 minutes and 1 second the delay can be set to 00.

NOTE: A tight connection between the sensor input and S.C. terminals is required during the sensor delay operation. A brief interruption will reset the delay to its original value.

STATION/SENSOR Default: All delays are set to 00 on all programs.

During the station delay, the Master Valve output is energized if it is set to ON for that program.

The delay is the same for all stations within a program, but each program may have a different delay.

EXAMPLE: Program A is set to have a delay of 5 seconds between stations.
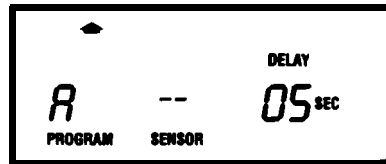
EXAMPLE: Sensor Input "Start" is set to have a delay of 5 seconds.
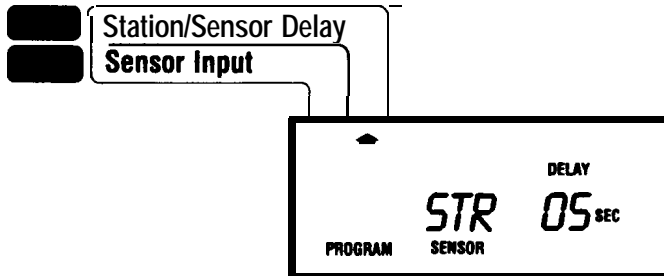
TEST/FAULT: This operation performs a short circuit test on all stations and an open circuit test on those stations with run times greater than 00 (OFF). It also displays a FAULT indicator and energizes the Alarm output for about 5 sec in the event a fault is detected. When you press the TEST/FAULT key the word TEST and a time will appear on the display with a flashing arrow pointing to START.

The moment you press START all the stations that were ON at that moment will be turned OFF, and the controller will run a test program. It will run one station at a time in sequence for the time that you have set. The test time is the same for all stations and can be set from 1 to 59 seconds and 1 to 59 minutes. The controller will check for an open circuit only those stations with a Run Time different than zero. During the test program the station currently ON will be shown on the numeric indicators on the display. At the end of the test program you can check to see if one or more stations have

been found shorted or open. By pressing the first, second, or third ± keys, you can go through the reports on shorted and open stations.

If there is no station that is shorted or open, the words SHORT OK or OPEN OK will appear in the display. If there is a station that is shorted or open you will see SHORT or OPEN and the number of the station that is shorted or open at the top of the display.

NOTE: The OPEN Station check will run automatically once a day during the day when all stations are off, after midnight.

EXAMPLE: You have pressed TEST/FAULT and the word TEST appears on the display. The time of the test can be set in minutes or seconds with the fourth set off keys. Press START to run the test.

EXAMPLE: It *shows that Station* #3 has a short circuit.

EXAMPLE: Once a day or each *time the test program is* run, the controller automatically runs an OPEN Station test. The test has found *an open* condition to exist on *Station #5.*

The FAULT indicator is set only the first time a short circuit is detected. It will be reset only when all stations are found to be good (no short circuit). When the FAULT indicator is set or an open circuit is detected, the output marked AL (alarm) will be energized for a few seconds. This output can be used to turn on any 24 VAC light or sound indicator or to trigger an automatic dialer to warn the user that a problem has occurred. I ɪ can also be used in conjunction with a relay to latch the indicator in the ON position. The FAULT light or buzzer can then be reset manually.

The following is a diagram of how to connect a relay to the AL output:

Terminal Strip
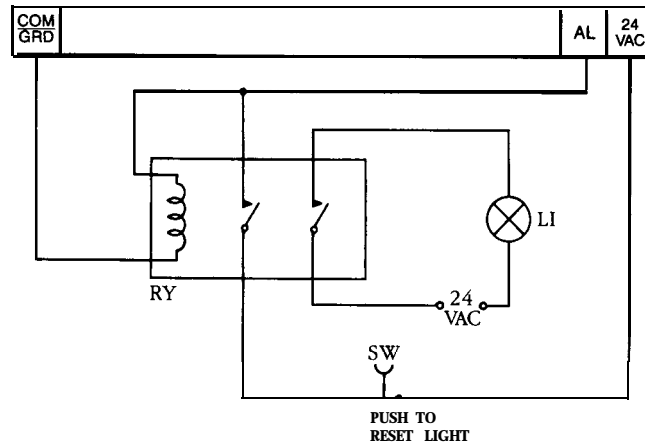
LI: is a 24 VAC light indicator
SW: is a normally closed momentary push button
RY: is a DPDT relay, coil voltage: 24 VAC, coil current: .2 AMP

Circuit Operation Light: A blinking LED light at the terminal strip location is provided to identify proper output operation. If the light is blinking at 1 sec. intervals, operation is normal. Any other condition indicates a failure and controller should be returned for repair.

Program Erase: To erase all programmed information:

1. Press Off.
2. Press Pause.
3. Press all four plus (+) keys at the same time until the time of day appears in the display.

Performing a program erase resets to zero all station and sensor delays, skip days, and usage information for all stations. This function sets to "OFF" all run times, start times, days of the week, sensor inputs, and the Test/Fault duration, resets CYCLE REPEAT to 1 and the manual run times to 10 minutes, and returns the water budgets for all programs to 100%.

Password: It is possible to prevent an unauthorized person from changing the information stored in a controller by entering a personal code, while still being able to review the programs.   If a code different from 0000 is entered,

the controller will ask for the right code the first time you want to change a program parameter. (For example Run Time or Start Time.) If the code is correct the controller will allow programming.

Entering a new personal code.

To enter a new personal code, just press all "-" keys at the same time. The word "PASSWORD" will appear on the display for about 2 seconds, and then four zeroes will be displayed. By pressing the ± keys, a new password number can be entered. Press the START key to enter the new value. The display will then be in time of day mode.

Accessing a controller protected by a personal code.

Once a new code has been entered, the first attempt to change any controller parameter will be prevented and such attempt will cause the controller to display the word "PASSWORD" for one or two seconds and then four zeroes. At this point the correct code must be entered by pressing the ± keys in line with each zero and, when ready, the START button must be pressed.

PASSWORD DEFAULT: The password is not enabled, the controller can be modified without restrictions.

To disable the password function, just push the four "-" keys at once and then press the START button after the four zeroes have appeared in the display.

All automatic, semi-automatic and manual functions are always allowed even if a personal code has been entered.

SPECIFICATIONS

Input = **120** VAC, 50/60 Hz, .5 amps. NOTE: 220 or 240 VAC, available, consult factory.

Output = 24 VAC, N.E.C. class 2.

Valve Output: 0.8 amp per station. 1.5 amps total.

Sensor Operation: Requires a normally open switch that can operate at 24 VAC, .01 amps.

Ambient operating temperature range: 32 F to 140 F

Battery backup: One 9 volt alkaline or NiCad (jumper selectable). Factory preset: Alkaline.

Electronic short circuit protection.

Warning: This controller does not have station program overlap protection, i.e. programs can be scheduled such that they run on top of each other and maintain up to 8 stations on at the same time. Caution should be used to consider the irrigation system's capabilities and capacities when programming, as not to cause over watering, runoff, pump or hydraulic damage, or any other troubling condition.
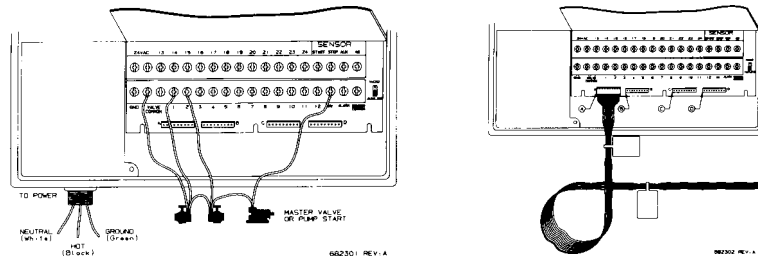
INSTALLATION INSTRUCTIONS

MOUNTING THE CONTROLLER
1. The Touch Command Controller can be mounted in one of two ways: (1) Wall Mount and (2) Pedestal Mount, using the optional pedestal and mounting kit.

WALL MOUNT
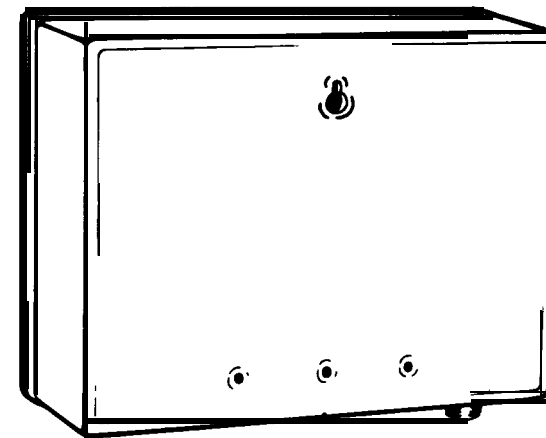
On the back of the controller is a "keyhole" shaped mounting slot as well as 3 mounting holes along the bottom edge. Access to the 3 mounting holes is from the front behind the terminal strip door. Note: The holes have thin "Knock-out" partitions to protect the controller internals from the elements should the holes not be utilized. This partition is easily knocked through using a "phillips head" screwdriver.

When attaching to wall studs, use a #10 screw leaving about l/4" of the head exposed to slip into the "keyhole" slot. To then secure and stabilize the controller, drive additional screws through the bottom mounting holes into the stud or cross bracing.

When attaching the controller to hollow walls, masonry or cinder blocks, use appropriate toggle bolts, masonry shields or compression drive bolts.

For added weatherproofing, a silicon bead can be run around between the controller case and the wall after mounting.

- PEDESTAL-MOUNT
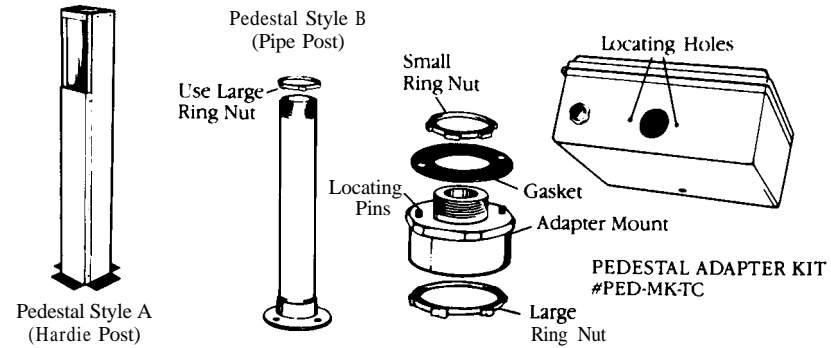
Note: The Touch Command Controller mounting hole pattern is compatible with the Rain Bird Ped - (RC - 7A) and PD-7D pedestals and mounting kits.

To mount to Style "A" (Hardie Pedestal #PED-TC):

Note: **2** bolts, Washers and Nuts can be used in place of the Adapter Mount and Small Ring Nut. Just knock out the indexing holes in the case.

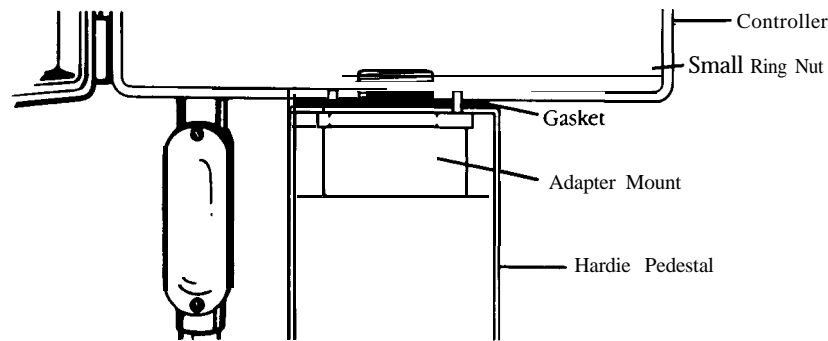1. Take off pedestal cover plate, open controller terminal strip door.
2. Insert "Adapter Mount" up through hole in pedestal. Make sure locating pins align with locating holes.
3. Lay black rubber "Gasket" over the locating pins and threaded portion of "Adapter Mount" that extends through the top of the pedestal.
4. Place the controller on top of the pedestal aligning the locating holes with the locating pins extending through the top of the pedestal.
5. Using the "Small Ring Nut," thread it with the "teeth" down over the "Adapter Mount" threads which should now extend up into the controller.

Using a wrench, screw the nut down tight to secure the controller to the pedestal.

To mount to Style "B" (2" Pipe Post):
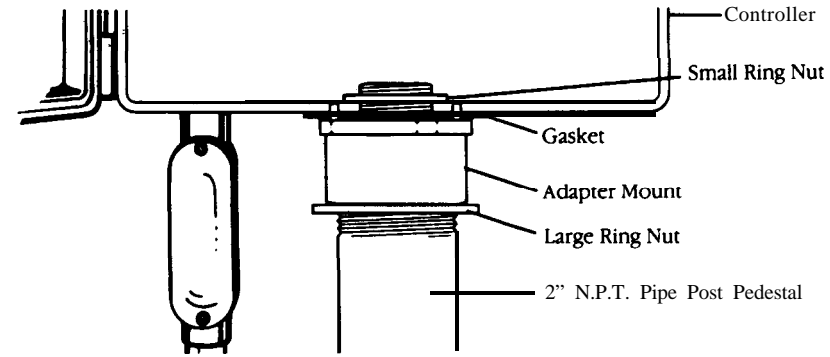
1. Thread the "Large Ring Nut" all the way onto the 2" Pipe Post (Schedule 80 or galvanized) with the "teeth" on the ring facing up.
2. Screw the "Adapter Mount" onto the Pipe Post.
3. Once the "Adapter Mount" has been screwed all the way down onto the pipe, position the "Adapter Mount" by backing it out until the locating pins on the mount are positioned in the same plain desired for the controller.
4. Screw the "Large Ring Nut" up on the pipe pedestal until it locks against the bottom of the "Adapter Mount." Tighten it with a wrench.
5. Lay the black rubber "Gasket" over the locating pins on top of the "Adapter Mount."
6. Open the terminal strip door and place the controller on top of the "Adapter Mount" making sure to align the locating pins with the locating holes in the bottom of the controller.
7. Thread the "Small Ring Nut" with the "teeth" down onto the threaded portion of the "Adapter Mount" that extends into the controller. Using a wrench, screw the nut down tight to secure the controller to the pedestal.

CONNECTING THE POWER LEADS

- ALWAYS TURN OFF POWER TO CONTROLLER WHILE CONNECTING STATION WIRES TO CONTROLLER.
- ALWAYS MAKE SURE YOUR CONTROLLER IS PROPERLY GROUNDED.

The Touch Command Controller has 3 colored 18 gauge power leads extending from the internally mounted transformer down through the conduit hole and fitting.

The leads should be connected to a 120 Volt AC power source only according to color as follows:

White Lead = Neutral
Green Lead = Ground
Black Lead = "Hot"

NOTE: The wire gauge used to connect the power to the controller must be of sufficient size to compensate for voltage drop due to electrical resistance in wiring run lengths.

NOTE: Connection methods used should be according to approved National Electrical Code requirements using either wire nuts or solder as required.

A conduit adapter is also provided for proper installation. The controller is protected against power surges, EM1 (Electro Magnetic Interference) and RFI (Radio Frequency Interference) coming from the power line, some installations may require additional protection.

A good Power Surge Protector (commercially available), including EMI and RFI suppression, can be installed in line with the controller input. In the remote case of apparent malfunction (display showing unusual values) just remove the battery, disconnect the power for about 15 seconds and connect the power back. The controller has been reset with the default program. Connect a good battery and reprogram the controller.

For better protection against power surges induced by lightening on the field wiring, the GROUND terminal marked GRD should be properly connected to a ground rod or the equivalent.

The Touch Command comes standard with an electrical conduit fitting. Most local building and electrical codes require that approved electrical conduit be used when running power to any exterior wall or pedestal mounted controller requiring a 120 Volt AC power supply.

CONNECTING THE BATTERY

Using a 9 Volt battery (supplied by the user), connect it to the battery terminal. A molded battery holder compartment is located in the bottom right hand corner of the case. If no battery is used, reconnect the battery terminal to the inside of the terminal strip door.

In the case of a power outage, the battery will provide back-up power to

advance the clock. Note: The battery does not contain enough power to operate the valves. A typical alkaline battery contains enough power for 120 hours of power loss. We suggest you change the battery about every 2 years, depending on the number of power outages.

NOTE: The Touch Command Controller comes equipped with circuitry enabling the use of either a standard 9 Volt alkaline or rechargeable NiCad battery. A rechargeable NiCad battery should be used in areas that experience frequent or prolonged power outages. A small, three-post header located next to the terminal strip valve connections selects either circuitry. It has 2 positions, "NICAD" for NiCad setting and "ALKALINE" for Alkaline setting. Place the jumper over the two posts corresponding to the appropriate setting.

WARNING: If a NiCad battery is to be used, in order for the battery to recharge, the jumper must be in the "NICAD" position located at the top of the switch. If an alkaline battery is used, the jumper must be in the "Alkaline" setting. Use of an alkaline battery in the "Nicad" setting could result in the battery leaking or even exploding due to overcharging.

We suggest that you first charge a NiCad battery before installing it in the controller.

CONNECTING THE VALVES

It is recommended to turn the controller OFF when wiring the solenoids leads to the controller's terminals by pressing the OFF/ON switch once. This will prevent accidentally causing a short circuit.

Route one lead wire from each valve through the large hole at the bottom center of the controller case. Insert each lead under the appropriate screw on the terminal strip. The "common" wire from each valve should be attached to a single "common" wire. Route this common wire through the large hole and connect it to the terminal strip screw labeled "COM".

PVC PIPE
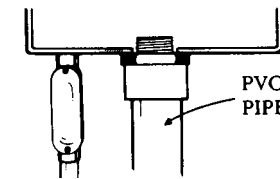
If wire size and the room available in a box is a problem, it is suggested that you add 4 feet of 18 gauge wire (minimum) to led from the box to field connection wires.

NOTE: This controller is designed for use with 24VAC, 6 VA solenoid-operated valves. A maximum of three valves per station may be used and no more than 6 valves (or solenoids) should be on at any one time. This includes the master valve if one is being used. Current requirements should not exceed .25 Amp for each solenoid.

For pedestal mounted controllers route the wires according to that pedestal's particular design. For wall mounted controllers, 1 1/4" (metal or PVC) pipe and a male threaded fitting may be used as a wire conduit.

USING A WIRE HARNESS:

The TC-0009 kit is an optional wire harness for 8 and 12 stations, standard on all 18 and 24 stations, that simplifies the connections between valves and controller. The controller is provided with up to four 9 pin headers below the terminal strip named A,B,C, and D from left to right.

INSTRUCTION:
1. The first step is to determine which of the 4 wire harnesses are needed by using the table below.

CONTROLLER MODEL	WIRE HARNESS
8 STATION LX 11	A C D
I! STATION LX II	A C D
18 STATION LX II	A B C D
24 STATION LX II	A B C D

2. The second step is to apply the appropriate labels onto the tags provided for each wire harness for identification

3. The wire harness is now ready to be wired to the valves and connected to the corresponding white header below the termina! strip on the controller.

CONNECTING A MASTER VALVE OR PUMP

To use a master valve which operates throughout the watering run times, simply connect one solenoid lead wire to the terminal strip screw labeled "MV", and the remaining lead to the terminal strip screw labeled "COM". NOTE: The master valve must be equipped with a 24VAC, 5VA solenoid.

If a pump is to be used, simply connect a relay lead to the same terminal used for the master valve connection. The pump relay should have a nominal coil voltage of 24VAC at .25A maximum.

682303 REV:A
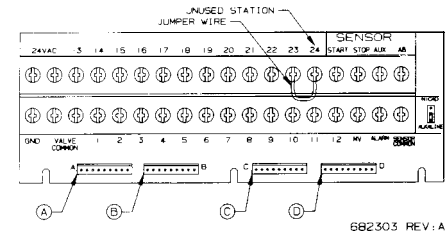
TROUBLESHOOTING

Problem	Possible Cause	Correction
Va!ves don't operate	Controller "OFF" mode.	Set mode switch to ON position.
	Solenoid defective.	Test & replace if necessary.
	Loose wire connection.	Secure wire connections. Check for continuity.
	Proper day setting in "OFF".	Check current day in display. Set to correct day and check to see if it is programmed "ON"
Valves open at unscheduled times	Current time of day out of synchronization	Check and reset current time.
.	Start times need checking.	Check and reset current time.
	Improper water budget.	Check budget setting and reset it to 100% if necessary Erase program & reprogram.
Display is blank.	No power at source.	Check current or circuit breaker.
	No power to controller	Check wiring and connections.
Display not reading after a power outage or after being plugged in.	Back-up battery is weak or no battery is being used.	Disconnect power and correctly remove battery for 1 minute. Restore power, replace battery and reprogram.
Waters on a day when not scheduled.	Day of Week or Skip Day schedule improperly programmed.	Reprogram, referring to Control Descriptions and instructions for correct procedure. Erase program & reprogram.
Current time of day is wrong time.	Power outage occurred with no batteries or dead batteries used in the controller.	Reset current time of day. Check and replace batteries.

GLOSSARY OF TERMS

AUTO BUDGET: This is a way to automatically adjust the water budget for any program based on what happens on station #1 of Program A. With this feature a single sensor, such as a moisture sensor, can be used to control the complete watering cycle for Program A and for the remaining programs (see page 17).

CYCLE REPEAT: Allows you to set a program to repeat its cycle from 1 to 99 times (see page 14).

DAY OF WEEK: The day of the week on which watering will occur based on a 14-day schedule (See page 2).

DEFAULT: A preset factory value has been entered for Run Times, Start Times, Day of Week, Skip Days, Manual Operation, Cycle Repeat, Sensor Input, Station/Sensor Delay and Auto Budget.

FAULT: If at any time a short circuit occurs while one or more stations are ON, the word FAULT will appear on the display and the controller will go to the next station on each program (see page 11 for instructions on checking for a short circuit). FAULT will also appear briefly after an open has been detected during an open circuit test.

MANUAL: Allows you to start any individual station at any time (see page 11).

MASTER VALVE OUTPUT: A way to control whether the Master Valve is to be ON or OFF when a program's cycle is turned on (see page 19).

OFF/ON : The purpose of the OFF/ON function is to shut off the controller, for instance, when it is raining. (See page 8).

PASSWORD: A secret four digit code that prevents an unauthorized person from changing program information stored in the controller (see page 22).

PAUSE: Allows all stations currently on to be turned off while the programs continue to run (see page 9).

POWER FAILURE: In the event of a power failure, the controller will function in one of three ways. 1) In Electronic mode with no battery connected, real time is reset to 12:00 p.m. when power is restored. 2) In Electra-Mechanical mode the real time is not advanced during a power failure. 3) In Electronic mode with a 9V battery connected, the controller keeps the real time but start times during the power failure will not occur. In all modes of operation, program information is retained during a power failure, including password (see page 12).

PROGRAM:	A combination of values that determines the times of day when watering will start, the time periods watering will run and the days on which watering will occur. Each program can control more than one station. There are the same number of programs as stations.
RUN TIME:	The length of time assigned to a station that watering will occur in hours, minutes or seconds (see page 1).
SKIP DAYS:	The number of days indicating the frequency of watering in terms of alternate days up to 3 1. e.g.: To water every 3rd day (See page 3).
SEMI-AUTOMATIC:	Allows you to start, manually, one program at a time regardless of watering days or start times (see page 9).
SENSOR AUXILIARY:	Allows you to automatically turn off an individual station and rotate to the next station in the program. An example of this would be because of a faulty condition such as low water pressure due to a broken line or faulty valve when signaled by the proper sensor (see page 16).
SENSOR INPUT:	Allows you to activate or deactivate the four sensor inputs available for each program. The four inputs are SENSOR START, SENSOR STOP, SENSOR AUXILIARY and AUTOMATIC BUDGET (see page 15).
SENSOR START:	This sensor starts a program or programs when its condition is met (see page 15).
SENSOR STOP:	This sensor stops a program or programs when its condition is met (see page 16).
SENSORS:	When a sensor detects some condition, a switch will activate the function associated with that particular condition. Possible "sensed" conditions might be a soil moisture condition, a station fault condition or water budgeting.
START TIME:	The exact time at which watering will begin based on a 24-hour day. 8 start times per program are available (see page 2).
STATION:	A valve output that will be turned ON or OFF depending on the program values assigned to it.
STATION ACTIVITY:	Tells you which stations are currently ON (running) or OFF, which programs are assigned to them, and the time still remaining on any particular station (see page 6).
STATION/SENSOR DELAY:	Allows you to insert a delay between one station turning OFF and the next station turning ON in the same program and between two cycles when CYCLE REPEAT is set to repeat two or more times. The advantage of Station Sensor Delay is to compensate for lowering in water pressure when one valve is turned off and another valve is immediately turned on (see page 19).
TEST/FAULT:	This operation performs an open circuit test on those stations with Run Times greater than 00 and a short circuit test on all stations (see page 20).
USAGE REPORT:	Allows you to determine the amount of time any station has watered during the current month (up to today's date), the previous month and the month before last (see page 14).
WATER BUDGET:	A percentage that will increase or decrease the Run Time of any program in increments of 10%. Range O-250% (see page 6).

James Hardie Irrigation