



TouchNet™

Central Control System
for OSMAC®

User's Guide

- ◆ Installation
- ◆ Programming
- ◆ Operation
- ◆ Service

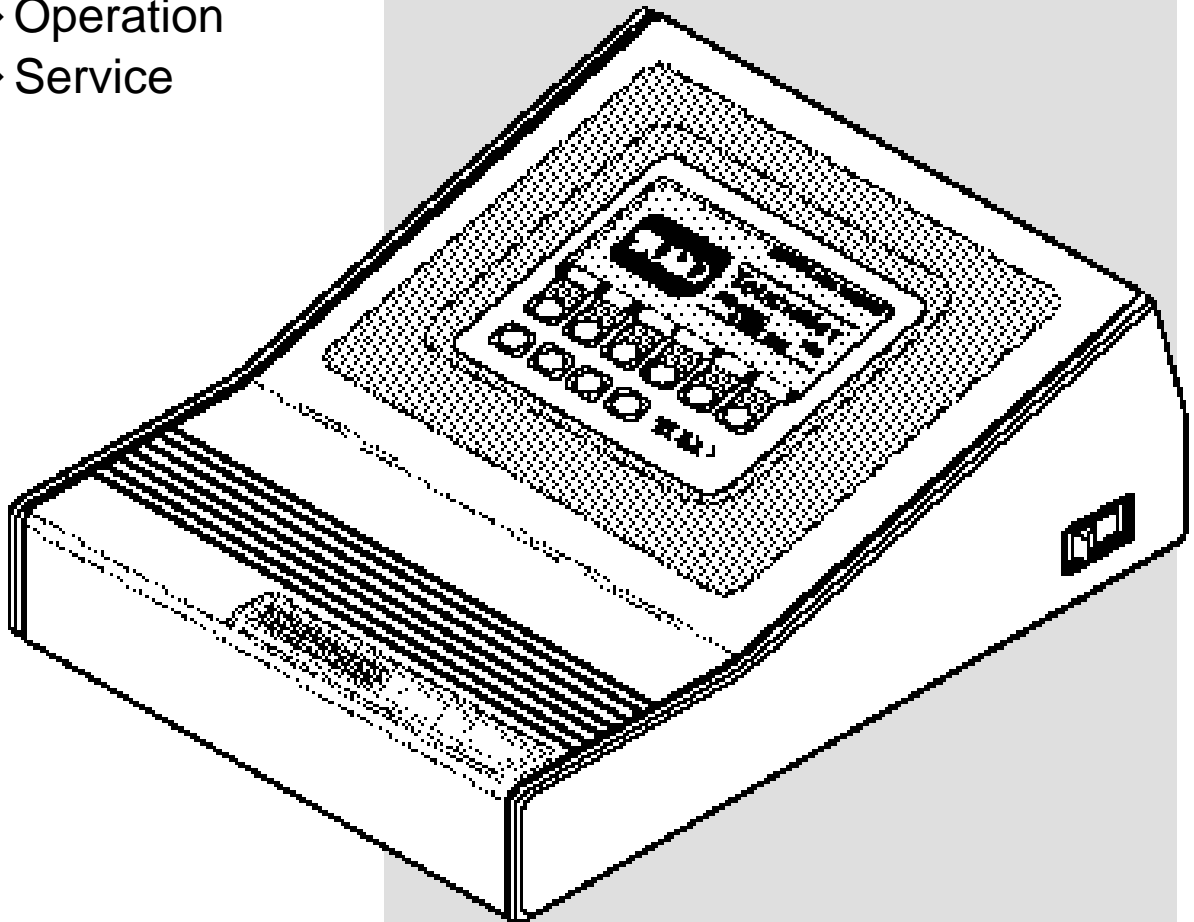
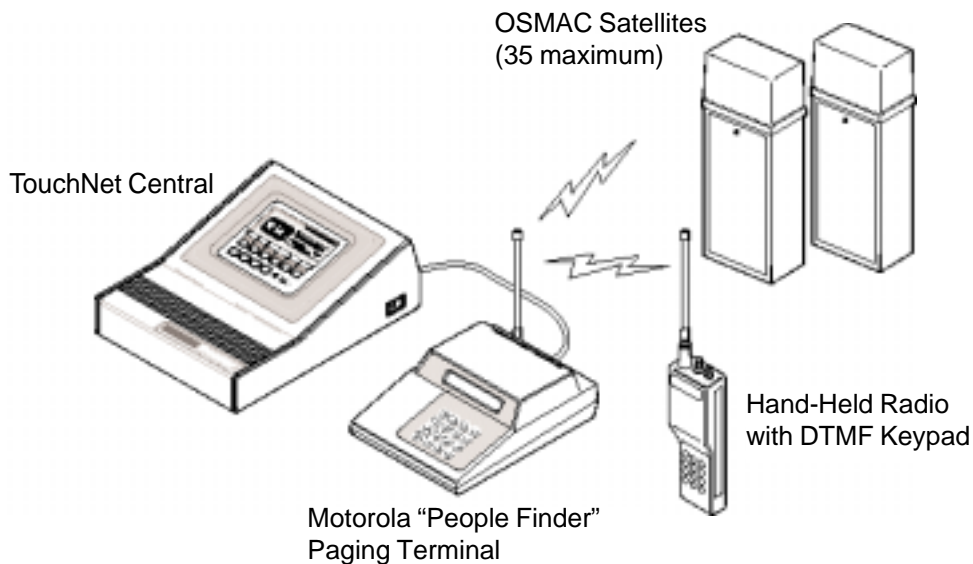


Table of Contents

Section 1:	Introduction and System Overview	1-2
Section 2:	Installation Procedure	3-4
Section 3:	Configuring the Controller	5-11
	■ The Home Screen	5
	■ The Menu Screen	6
	■ System Setup	6
	■ Set Current Time	7
	■ Set Current Date	10
	■ Set Day Change Time	10
	■ Set Update Time	11
	■ Set Flow Units	11
	■ Show Days As	11
Section 4:	Programming the Controller	13-29
	■ Golf Course Layout Example	14
	■ Worksheet Example	15
	■ System Hydraulics Setup	16
	■ Defining Programs	17
	■ Naming Programs	17
	■ Set Program Run Time and Flow	21
	■ Satellite Setup	22
	■ Address Number	22
	■ Name/Area	22
	■ Number of Stations	23
	■ Maximum Simultaneous Programs	23
	■ Flow Zone Assignment	23
	■ Satellite Station Setup	24
	■ Set Watering Sequence Starts	26
	■ Sequence Start Number	26
	■ Set Start Time	26
	■ Set Active Watering Days	27
	■ Set Program Priority	27
	■ Program Sort	28
	■ Set Syringe Time	29
	■ Total Run Time Calculation	29
Section 5:	Manual Operation	31
Section 6:	Special TouchNet Features	33-42
	■ Rain Delay and Permanent Rain Hold	33
	■ Cancel All Watering	34
	■ Removing The Cancel Command	35
	■ Run Time Adjust	36
	■ Station Review Screen	37
	■ The Water Window Screen	37
	■ System Alarms	40
	■ Auxiliary Service Features	42
Appendix A:	Troubleshooting	43
Appendix B:	Specifications	45

Introduction To TouchNet

System Overview



Welcome to TouchNet, the easy-to-use central irrigation control system from The Toro Company.

TouchNet for OSMAC is a radio-based central control system that utilizes Motorola's digital radio paging technology. It communicates to RDR satellites through the Motorola "People Finder" paging terminal. The TouchNet controls up to 35 OSMAC RDR satellites (a total of 1,680 stations) and manages up to 12 irrigation programs and 20 discrete flow zones.

You will find the TouchNet amazingly simple to use with its unique AcuTouch™ programming feature. All system programming and operation commands are easily made on intuitive, self-prompting screen displays.

The automated hydraulic management feature, HydroGuard™, protects your system from excessive flow demands and optimizes your system irrigation cycles for peak efficiency.

Introduction to TouchNet – 1

Irrigation scheduling will be simplified with up to 12 watering sequence starts allowing you to easily select active days and to prioritize or re-prioritize all programs within a start sequence in either Normal or Syringe mode.

In addition to its powerful automated features, the TouchNet also enables you to manually start, syringe or cancel any program at any time.

Its programmable Rain Delay feature enables you to suspend watering operation up to seven days, or indefinitely if you choose, by simply entering one number. The Touchnet will automatically resume operation at the end of the delay period.

Continue now to the installation procedures on the following pages. Please read through the installation steps before starting to ensure that you have the necessary tools and/or additional materials on hand.

About this manual...

Throughout the manual, two symbols are used to bring attention to helpful or very important points of information.



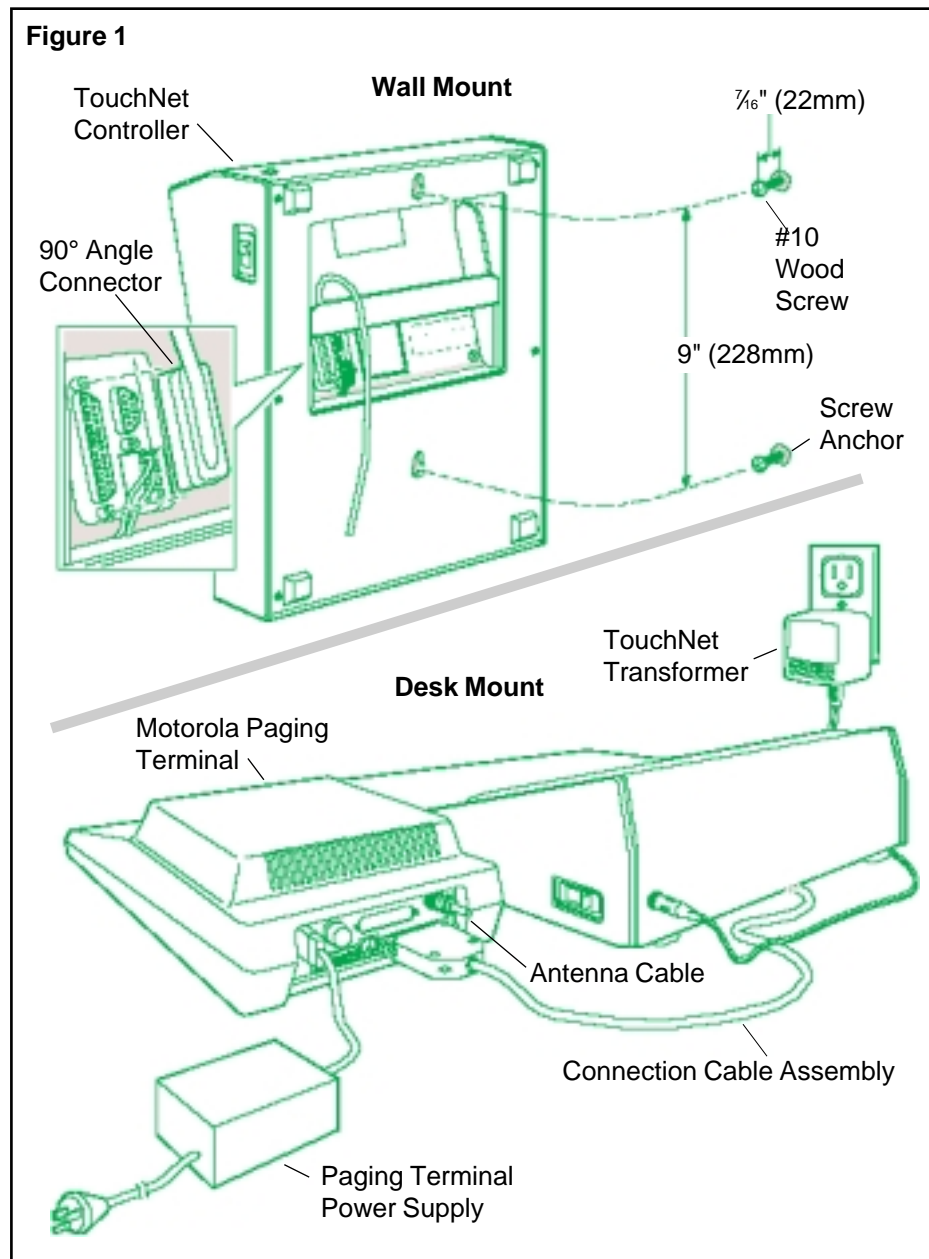
The **Note** symbol is used to highlight special information which is helpful to know about the installation, programming or use of the TouchNet control system.



The **Alert** symbol is used to highlight special points of information or procedures which are critical for the proper function, operation or safety of the TouchNet control system.

Installation Procedure

The TouchNet controller can be wall mounted or positioned on a stationary work surface or desk top. Select a location for the TouchNet which enables the connection cable (provided) to easily reach the paging terminal (People Finder).



Installation Procedure – 2



The TouchNet controller is not weather resistant and must be installed indoors only. The temperature range of the installation site must within 0°–40°C (32°–104°F). Non-compliance can void product warranty

- ❑ First, plug the 90° angle connector of the connection cable assembly into the receptacle located on the bottom of the TouchNet enclosure. See Figure 1.
- ❑ Plug the remaining cable connector into the Motorola paging terminal receptacle labeled EIA RS-232C.



The power supply and attaching cable, when installed in close proximity to the antenna of the Motorola paging terminal (People Finder) are susceptible to interference and may cause the power supply and People Finder to reset during signal transmission.

To prevent this occurrence, the following installation configuration should be used:

- Position the power supply unit as far away from the People Finder as possible
 - Route the power supply power and output cords as far away from the antenna as possible
 - Alternately, mount the antenna remotely and connect it to the People Finder using low-loss coax cable.
- ❑ If installing the TouchNet on the wall, install a #10 x 1.5" (38mm) wood screw into wall (stud) at eye level. Install a second wood screw 9" (228mm) directly below the top screw. Leave the screw heads extending from wall 7/16" (11mm).



If installing the controller on dry wall or masonry and a wall stud cannot be located, install screw anchors to prevent screws from loosening.

- ❑ Hang the controller enclosure on the screws using the keyhole slots. Ensure the screw shafts engage the slotted portion of the keyholes.
- ❑ Attach the paging terminal power supply cable and plug the power supply into a wall outlet.
- ❑ Ensure the TouchNet On/Off switch is in the Off position. Insert the TouchNet transformer cable plug into the receptacle provided and plug the transformer into a wall outlet.



Switch on the paging terminal first, then the TouchNet controller. **The units must be switched on in this order.**

When using a hand-held radio for remote system operation, the TouchNet must not be communicating with the paging terminal at the same time. If a radio signal is received, communication with the TouchNet may be interrupted, in which case the system alarm "Missing Connection To Paging Terminal" will be generated. See System Alarms, pages 40–42 for more information.

Configuring The Controller

The Home Screen

When the TouchNet controller is first powered-up, you will be greeted with the Home screen as shown below. The Home screen is used to identify the controller, the type of Toro satellite it controls, and the version of the TouchNet software.



Figure 2 - Home screen.

As you navigate through the various TouchNet screen displays, you can return to the Home screen by touching the TORO key displayed in the lower left corner of the Menu screen.

The Home screen has no active programming controls but does provide six standard function keys - MENU, RAIN, CANCEL, MANUAL, ADJUST and STARTS. The function keys are found on most TouchNet screen displays. In some cases they will change depending on individual screen needs. The RAIN and CANCEL keys implement their labeled functions. The remaining function keys enable you to select other screen displays.



The TouchNet for OSMAC can be fully programmed and operated using only the touch control areas on the screen display.

Configuring The Controller – 3

The Menu Screen

To access the system Menu screen, touch the MENU function key located on the bottom left corner of the Home screen.

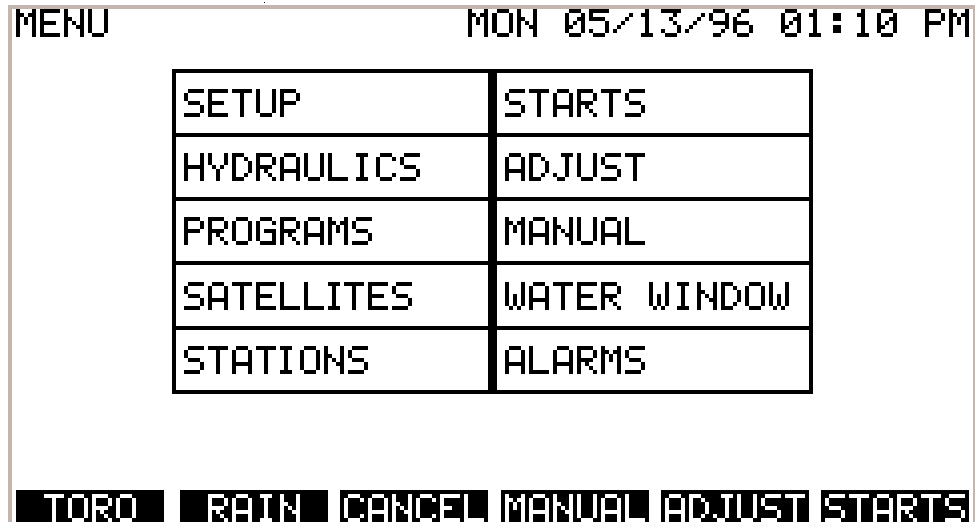


Figure 3 - Menu screen.

From the Menu screen you can access virtually all configuration, programming, operation and system information screens available for your TouchNet controller.

To configure the TouchNet for operation, you will need to enter some basic information about your irrigation system which will enable the TouchNet to accurately calculate and optimize water flow throughout the system.

System Setup

To start, select the Setup screen from the Menu screen by touching SETUP. The Setup screen will appear as shown in Figure 4.

Configuring The Controller – 3

SETUP	MON 05/13/96 01:10 PM	
TIME	1:10 PM	MODE
DATE (M/D/Y)	05/13/1996	MODE
DAY CHANGE	7:00 AM	
UPDATE TIME	5:00 PM	
FLOW UNITS	GPM	
SHOW DAYS AS	LETTERS	
MENU RAIN CANCEL MANUAL ADJUST STARTS		

Figure 4 - Setup screen.

On this screen you will set up your general system information and the overall operating parameters of your system.

Set Current Time

The first item to set is the current time. The current time and date will be displayed in the upper right corner of all screens.


To enter the current time, touch the box displaying the time. A pop-up keypad, as shown in Figure 5, will be displayed with the "Hours?" prompt.


SETUP	MON 05/13/96 01:10 PM	
TIME	1:10 PM	HOURS?
DATE (M/D/Y)	05/13/	1 2 3
DAY CHANGE	7:00 AM	4 5 6
UPDATE TIME	5:00 PM	7 8 9
FLOW UNITS	GPM	- 0
SHOW DAYS AS	LETTERS	DEL ESC ↵
MENU RAIN CANCEL MANUAL ADJUST STARTS		


Figure 5 - The pop-up keypad.

To use the keypad, note the following special keys and their uses as described on the following page.

Configuring The Controller – 3

 The **Delete** key is used to remove information being selected on the keypad. For example, if you touched key 4 but meant to touch the 7 key, touching DEL would remove number 4 so the correct number could be selected.

 Touching the **Escape** key either selects the next keypad prompt or exits the keypad returning you to the underlying screen. You can discontinue using the keypad at any time by touching the ESC key.

 Touching the **Enter** key places the keypad selection into the TouchNet memory.

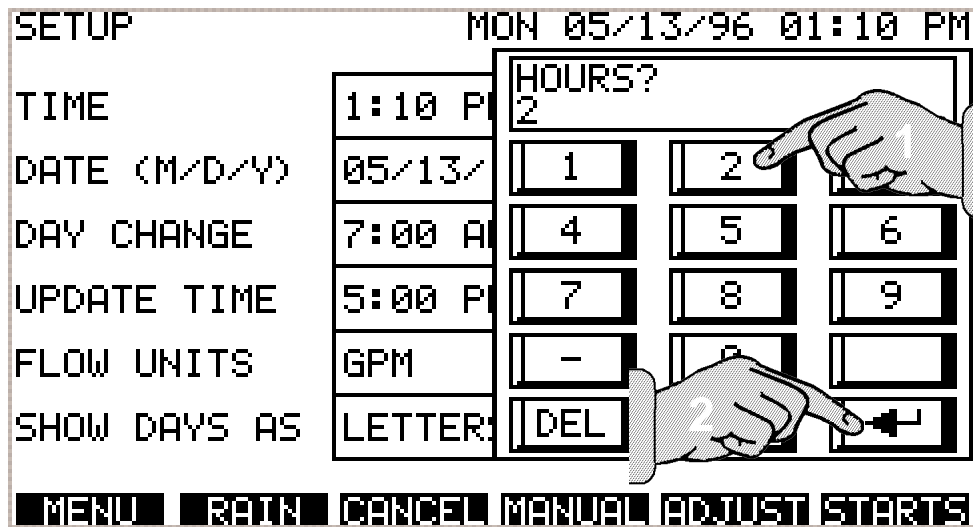


Figure 6 - Entering the current hour.

In the example shown above, we will adjust the current time of 1:10 PM to Daylight Savings Time. We have selected 2 from the keypad when prompted “Hours?”. We then touch the Enter key.



If you attempt to enter information into the TouchNet which cannot be accepted, you will be prompted by the message “Bad Input”. For example, if “0” was entered in the above example, the prompt “Bad Input” would appear. A valid number could then be selected.

Configuring The Controller – 3

A new prompt will appear asking for MINUTES?. We will select 10, then touch the Enter key.

SETUP	MON 05/13/96 01:10 PM			
TIME	1:10 PM	MINUTES? 10		
DATE (M/D/Y)	05/13/	1	2	3
DAY CHANGE	7:00 AM	4	5	6
UPDATE TIME	5:00 PM	7	8	9
FLOW UNITS	GPM	-	0	
SHOW DAYS AS	LETTER:	DEL	ESC	←
MENU RAIN CANCEL MANUAL ADJUST STARTS				

Figure 7 - Entering the current minute.

If the system is in the 12-Hour (AM/PM) time mode, a third prompt will appear as shown in Figure 8.

SETUP	MON 05/13/96 01:10 PM			
TIME	1:10 PM	1=AM 2=PM 2		
DATE (M/D/Y)	05/13/	1	2	3
DAY CHANGE	7:00 AM	4	5	6
UPDATE TIME	5:00 PM	7	8	9
FLOW UNITS	GPM	-	0	
SHOW DAYS AS	LETTER:	DEL	ESC	←
MENU RAIN CANCEL MANUAL ADJUST STARTS				

Figure 8 - Entering PM.

We will select 2 for PM, then touch the Enter key.



To use the clock in 24-hour mode, press the MODE box next to the time display. The clock mode will be automatically converted. The keypad prompt shown in Figure 8 would not be displayed in the 24-hour clock mode.

Configuring The Controller – 3

SETUP	MON 05/13/96 02:10 PM	
TIME	2:10 PM	MODE
DATE (M/D/Y)	05/13/1996	MODE
DAY CHANGE	7:00 AM	
UPDATE TIME	5:00 PM	
FLOW UNITS	GPM	
SHOW DAYS AS	LETTERS	
MENU RAIN CANCEL MANUAL ADJUST STARTS		

Figure 9 - The Setup screen with the current time.

Programming the information for all the other items on the Setup screen is made in a similar manner as setting the time.

Set Current Date

Set the date by touching the box displaying the date, then enter the information on the pop-up keypad as prompted.



The Date also has a Mode option. The normal display is Month/Day/Year. You can change the display to read Day/Month/Year by touching the MODE box.

Set Day Change Time

For irrigation scheduling purposes, the day change occurring at midnight may be inconvenient because watering is usually required for some period before and after midnight. This can be awkward when scheduling active watering days.

The Day Change time option enables the 24-hour day reference to be shifted forward or backward so all watering required per day can then be completed without a day change occurring during operation.

In our example shown in Figure 9, the Day Change time is set at 7:00 AM. To set the Day Change time, touch the display box adjacent to DAY CHANGE, then use the pop-up keypad to enter the desired time.



When selecting a Day Change time, a system alarm will occur if the day change time occurs **before** the irrigation cycle end time. Refer to “System Alarms”, page 40 and “The Water Window Screen”, page 38 for additional information.

Configuring The Controller – 3

Set Update Time

The Update Time determines when the TouchNet will automatically calculate the complete watering duration for the active watering day.

To set the Update Time, touch the UPDATE TIME display box, then use the pop-up keypad to enter the desired time.



The Update Time should be set to a minimum of 1 hour prior to the earliest sequence start time. This enables the TouchNet to perform the required calculations and enables you to make any necessary adjustments to the watering schedule before watering begins. Refer to “The Water Window Screen”, page 38 for more information regarding Update Time.

Set Flow Units

The next item on the Setup screen is Flow Units. The TouchNet can be programmed to operate in either GPM (Gallons Per Minute) or LPM (Liters Per Minute) measurement systems.

The default value is GPM. To select LPM touch the GPM box.

The Flow Units selected on this screen will be displayed on all screens where flow units are shown.



The Flow Units option is used as a label only and has no unit measurement conversion function. Selecting the alternate flow units will not convert the numeric values previously entered. For example, 100 GPM will be displayed as 100 LPM if the flow units are changed from GPM to LPM.

Show Days As

This portion of the Setup screen enables you to select how the watering day schedules will be displayed.

Days can be shown as letters (S M T W T F S, Sunday, Monday, etc.), or as numbers (1 2 3 4 5 6 7, 1 = Sunday, 2 = Monday, etc.).

The default display is the LETTERS format. To select the NUMBERS format, touch the LETTERS box.

This completes the general setup procedure. Return to the Menu screen by touching the MENU function key.

Programming The Controller



A golf course application is used as an example for the following instructions. The same principles and procedures apply in general to commercial applications as well.

In this section we will take you step-by-step through the programming process of the TouchNet controller.

In order to program the TouchNet for your application, you will need to have the following system information on hand:

- An “as-built” plan of your irrigation system showing all sprinklers and satellite controllers.
- Watering areas on the plan grouped into Flow Zones (20 maximum).
- Total system flow.
- Maximum flow rate of each Flow Zone.
- Maximum flow rate of each satellite station.
- Optimum run time of each satellite station.

Stations can be grouped together for the purpose of making adjustments easy, for example, Greens, Tees, etc. We call these groups “Programs”.

For each program (12 maximum) you will need to record the irrigation function in addition to the run time and flow rate of the majority of stations which will be assigned to that program. This data will be the default values entered during the satellite programming procedure.

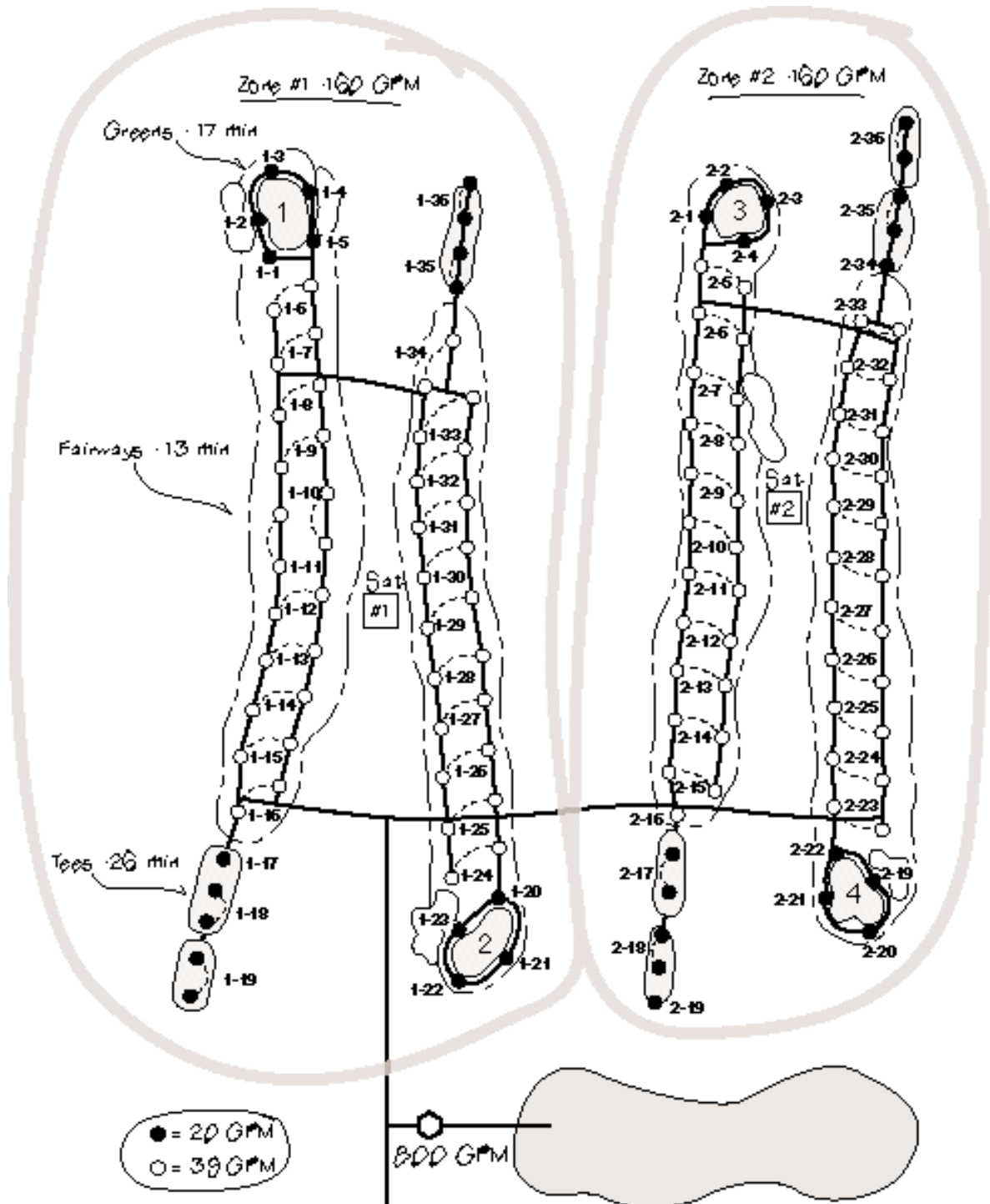
A worksheet pad has been provided with the TouchNet to help you gather and organize all of the required system and satellite data needed for programming.

On the following pages you will find an example of a typical golf course system along with the completed worksheets.

As you begin the programming process you will be taken through each step using this model as an example. Use the information for your system to program the TouchNet for your specific application.

Programming The Controller - 4

Golf Course Layout Example



Programming The Controller – 4

System and Satellite Worksheets Example

Flow Units	<input checked="" type="checkbox"/> GPM	<input type="checkbox"/> LPM	TouchNet™ System Worksheet
System Flow	800		

Zone	Flow	Zone	Flow	Pgm	Name	Time	Flow
1	160	11		1	Greens	17	20
2	160	12		2	Tees	26	40
3	120	13		3	Odd Fairways	13	78
4	160	14		4	Even Fairways	13	78
5	120	15		5			
6	120	16		6			
7	160	17		7			
8	120	18		8			
9	120	19		9			
10		20		10			
				11			
				12			

Satellite No.	1			
Name/Area	Holes 1 and 2			
Max Sim Pgm's	3			
Zone	1			

Sta.	Function	Time	Flow	Zone	
1	Green	17	20	1	
2	Green	17	20	1	
3	Green	15	20	1	
4	Green	17	20	1	
5	Green	17	20	1	
6	Odd Fairway	14	78	1	
7	Odd Fairway	13	78	1	
8	Odd Fairway	13	78	1	
9	Odd Fairway	13	78	1	
10	Odd Fairway	13	78	1	
11	Odd Fairway	13	78	1	
12	Odd Fairway	13	78	1	
13	Odd Fairway	13	78	1	
14	Odd Fairway	13	78	1	
15	Odd Fairway	13	78	1	
16	Odd Fairway	13	78	1	
17	Tee	26	40	1	
18	Tee	26	40	1	
19	Tee	26	40	1	
20	Green	17	20	1	
21	Green	17	20	1	
22	Green	17	20	1	
23	Green	16	20	1	
24	Even Fairway	14	78	1	
25	Even Fairway	13	78	1	
26	Even Fairway	13	78	1	
27	Even Fairway	13	78	1	
28	Even Fairway	13	78	1	
29	Even Fairway	13	78	1	
30	Even Fairway	13	78	1	
31	Even Fairway	13	78	1	
32	Even Fairway	13	78	1	
33	Even Fairway	13	78	1	
34	Even Fairway	13	78	1	
35	Tee	26	40	1	
36	Tee	26	40	1	
37					
38					
39					
40					
41					
42					
43					
44					
46					
46					
47					
48					

Programming The Controller – 4

System Hydraulics Setup

To begin, you will need to define your irrigation system hydraulic capacities (limits). Entering accurate information on the Hydraulics screen is essential for proper operation of the HydroGuard flow management system.

The HydroGuard flow manager ensures that system and zone flow capacity is utilized at peak efficiency throughout the watering cycle. This results in the maximum amount of water being supplied in the minimum amount of time, while protecting the system and defined Flow Zones from excessive flow conditions.

Select the HYDRAULICS box from the system Menu screen. The Hydraulics screen will appear as shown in Figure 10.

HYDRAULICS		MON 05/13/96 02:15 PM	
SYSTEM FLOW	<input type="text" value="800"/>	GPM	
ZONE 1	<input type="text" value="160"/>	GPM	
ZONE 2	<input type="text" value="160"/>	GPM	
ZONE 3	<input type="text" value="120"/>	GPM	
ZONE 4	<input type="text" value="160"/>	GPM	
MENU RAIN CANCEL MANUAL << ZONE ZONE >>			

Figure 10 - System and Zone flow values.

Enter the flow capacity of your irrigation system by touching the box adjacent to SYSTEM FLOW. Use the pop-up keypad to enter a maximum of 3,000 GPM or 12 000 LPM.

Next, enter the flow limit for each Zone (1-20) in the same manner.



Only 4 zones can be displayed at one time on the Hydraulics screen. To scroll forward through the zone list, touch the ZONE >> key. To scroll backward, touch the << ZONE key.

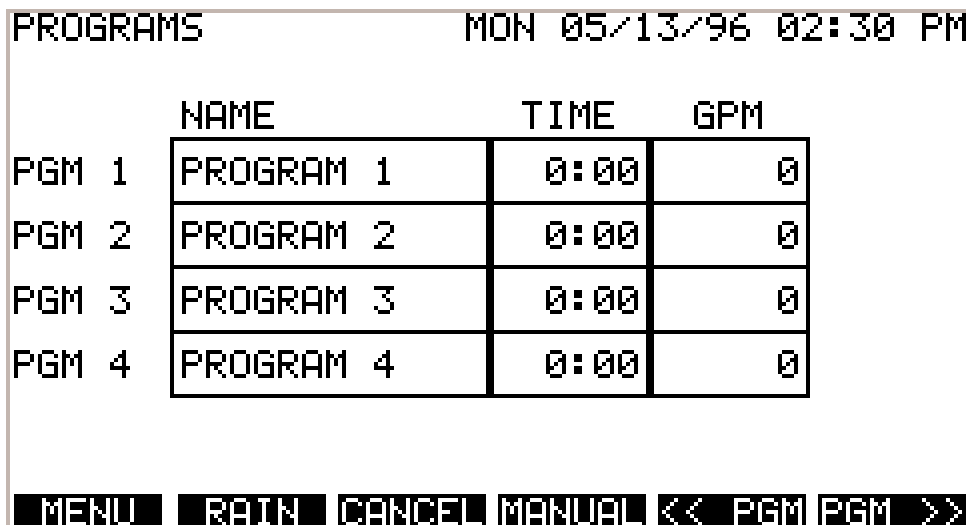
Return to the Menu screen by touching the MENU function key.

Programming The Controller – 4

Defining Program Default Values

The next step is to define the irrigation programs default values. The information entered on this screen will be transferred to the Satellite Stations setup screen to help simplify and expedite the programming process.

Select PROGRAMS from the system Menu screen. The Programs screen will appear as shown in Figure 11.



	NAME	TIME	GPM
PGM 1	PROGRAM 1	0:00	0
PGM 2	PROGRAM 2	0:00	0
PGM 3	PROGRAM 3	0:00	0
PGM 4	PROGRAM 4	0:00	0

MENU RAIN CANCEL MANUAL << PGM PGM >>

Figure 11 - Programs screen.

The Programs screen enables you to select a specific name for each program, and define a run time and flow rate for the typical stations within the program.

Naming Programs

By default, the programs are named Program 1, Program 2, etc. For your convenience, you may rename the programs as desired utilizing up to 12 characters and spaces for each name.

In a golf application for example, typical program names would be Greens, Tees, Fairways, etc.

Programming The Controller – 4

To rename Program 1, touch the PROGRAM 1 box. A pop-up keypad will appear as shown in Figure 12.

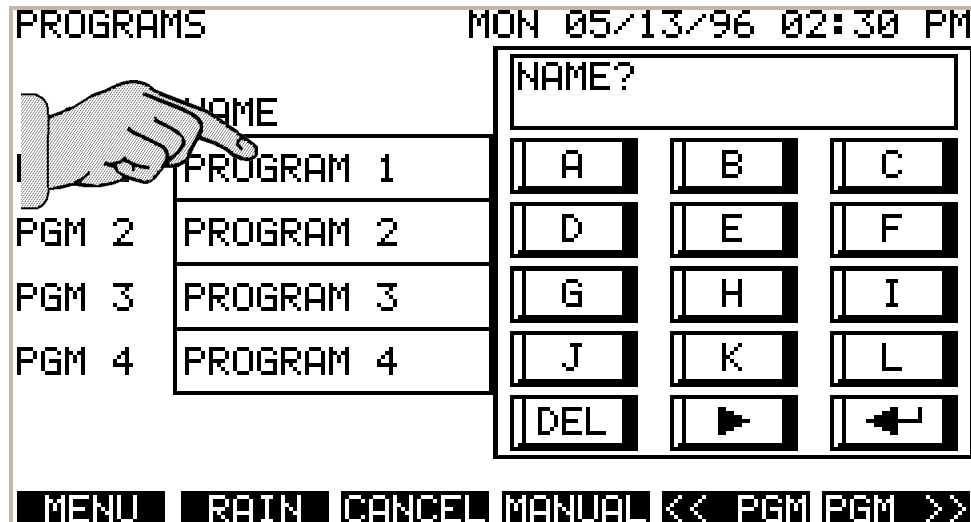


Figure 12 - This keypad allows you to type in specific names for your programs. Up to 12 characters/spaces can be used for each name.

Because the keypad is not large enough to hold all 26 letters of the alphabet, multiple keypads are provided as shown in Figure 13.

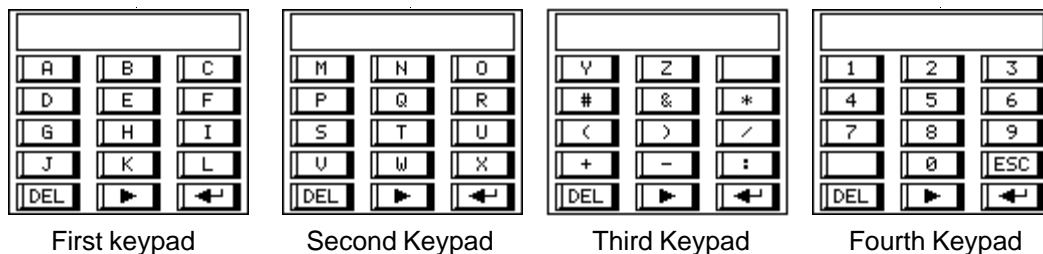



Figure 13 - Sequence of multiple keypads.

 An **Advance** key is provided on the bottom row of each keypad. Touching this key will advance to the next keypad in sequence.



If you require a space in the program name, use the blank key provided on the third keypad.

Programming The Controller – 4

For example, to change Program 1 to “GREENS”, touch the letter “G” from the keypad as shown on Figure 14. Press the Advance key to access the next keypad.

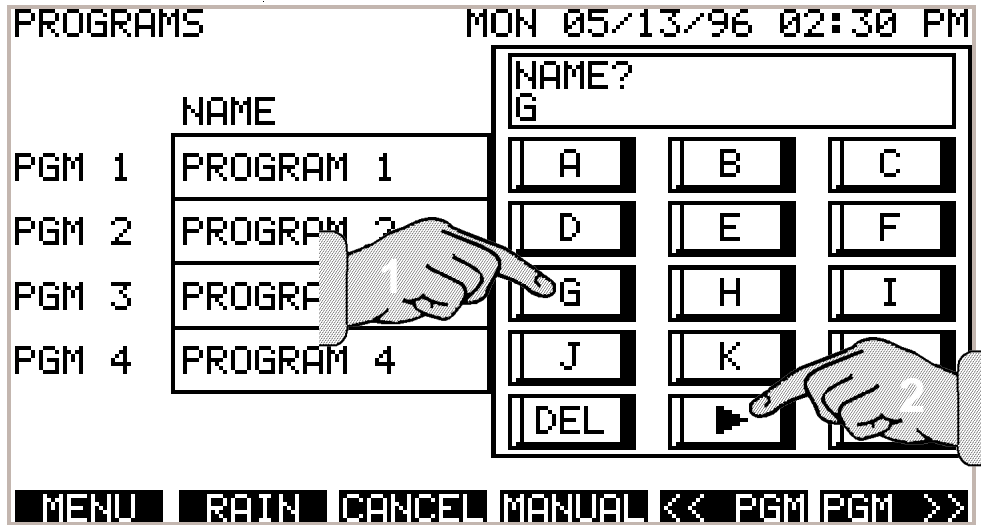


Figure 14 - The Letter “G” is selected under the “NAME?” prompt.

Touch the letter “R”, then press the Advance key three times to access the first keypad.

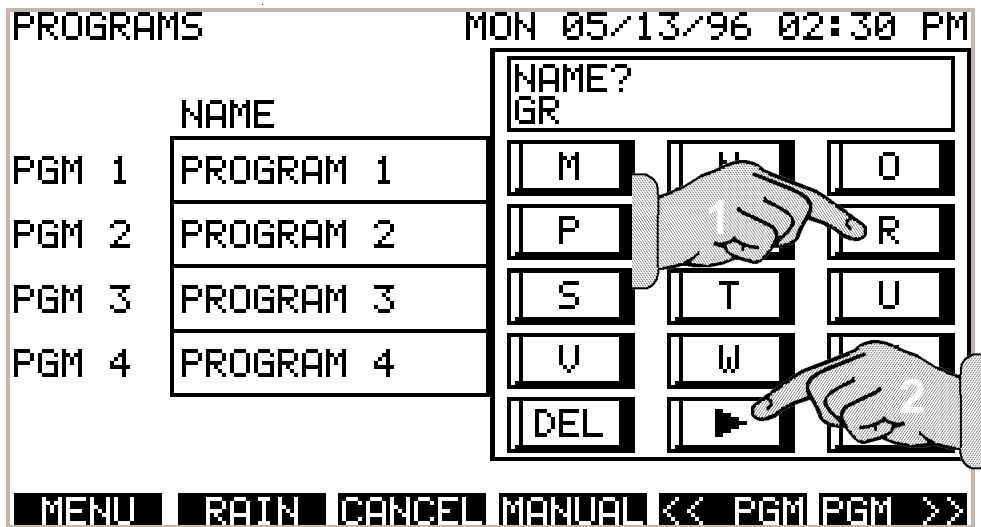


Figure 15 - Selecting the letter “R”.

Programming The Controller – 4

Touch “E” twice, then scroll to the next keypad using the Advance key as shown in Figure 16.

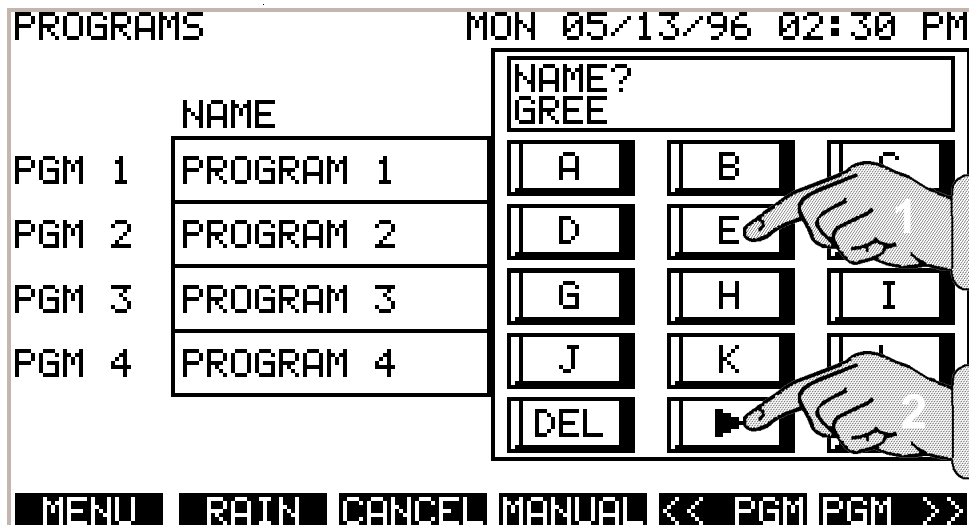


Figure 16

Touch “N” then “S”. Touching the Enter key will enter the word “GREENS” in the program name box.

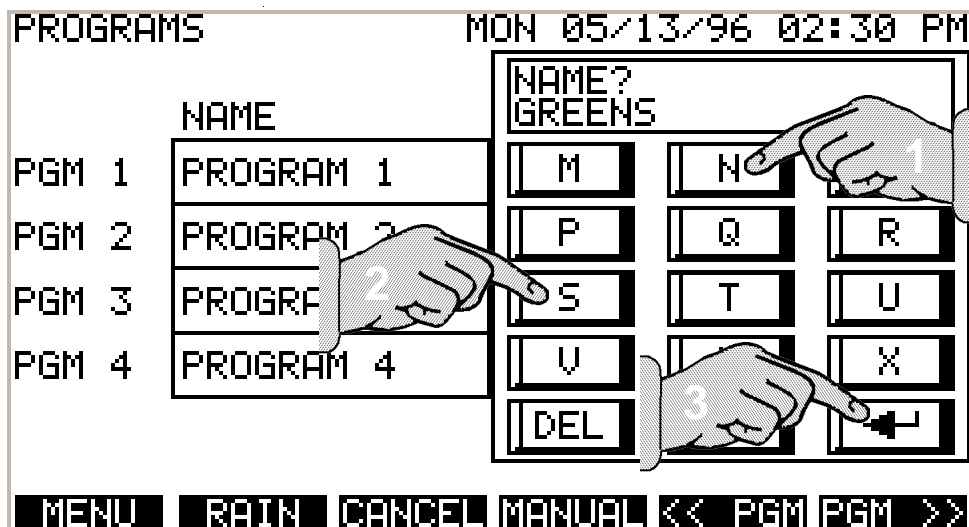


Figure 17 - Entering the program name.

Continue entering the name for each program in this manner. We will name program 2 “TEES”, program 3 “ODD FWYS” and program 4 “EVEN FWYS”.



Only 4 programs can be displayed at one time on the Programs screen. To scroll forward through the program list, touch the PGM >> key. To scroll backward, touch the << PGM key.

Programming The Controller – 4

Set Program Run Time and Flow

In addition to assigning a program name, you can define the default station run times and station flow rates for each program. This data will be carried forward to the Satellite Stations screen to expedite the programming process. Enter the run time and flow rate which will be used for the majority of stations to be assigned to each program.

PROGRAMS		MON 05/13/96 02:42 PM	
	NAME	TIME	GPM
PGM 1	GREENS	0:17	20
PGM 2	TEES	0:26	40
PGM 3	ODD FWYS	0:13	78
PGM 4	EVEN FWYS	0:13	78

MENU RAIN CANCEL MANUAL << PGM PGM >>

Figure 18 - The Programs screen.

Enter this information into the appropriate box for each program using the pop-up keypad.



The run time is entered in minutes (0–255), but is displayed in hours and minutes (0:00–4:15).



The station flow rate must not exceed the System and/or Zone flow limits. A system alarm will be generated if this occurs.

To scroll forward through the program list, touch the PGM >> key. To scroll backward, touch the << PGM key.



The data entered on the Programs screen is for default value setup purposes only. After the initial satellite programming steps are accomplished, further changes in the Program screen will **not** automatically update the data on the Satellite Stations screen.

Programming The Controller – 4

Having defined the programs, the next step is to enter specific operating information for each satellite.

Satellite Setup

Select SATELLITES from the system Menu screen. The Satellites screen will appear as shown in Figure 19.

Address Number

A unique satellite number must be entered for each satellite. This number is important, as it is the actual receiving address of the satellite.

SATELLITES		MON 05/13/96 2:50 PM	
SATELLITE #	<input type="text" value="1"/>		
NAME/AREA	<input type="text" value="HOLES 1/2"/>		
STATIONS	<input type="text" value="40"/>		
MAX SIM PGMS	<input type="text" value="3"/>		
FLOW ZONE	<input type="text" value="1"/>		
MENU RAIN CANCEL << SAT SAT >> STAS			

Figure 19 - Satellites screen.



Without an accurate satellite address, the TouchNet cannot communicate to the satellite. Each satellite address number in the system should be different.

To set the satellite address, touch the box next to SATELLITE #, then enter the desired number (0 through 255) using the pop-up keypad.



Assigning a “0” address number will prevent stations on that satellite from watering. This is the default value.

Name/Area

The Name/Area option allows you to rename the satellite as you choose. The satellites are named by default as Satellite 1, Satellite 2 etc.

To enter a name, touch the box next to NAME/AREA and enter the desired name using the pop-up keypad. A maximum of 12 characters/spaces can be used.

Programming The Controller – 4

Number of Stations

The TouchNet must know how many stations are in the satellite. Touch the box next to STATIONS and make your entry from the pop-up keypad.



If the number of stations is not an even multiple of 8, the TouchNet will round the number up to the nearest multiple of 8, to a maximum of 48.

For example, if 44 stations were entered, TouchNet would round to 48 because the OSMAC satellite is available in 8-station increments only.

Maximum Simultaneous Programs

Each program runs one satellite station at a time. The number entered here limits the number of programs (stations) the satellite can run at the same time to prevent exceeding its electrical output capacity.

Touch the box next to MAX SIM PGMS and make your entry using the pop-up keypad.

Flow Zone Assignment

The last item on the Satellite screen is the Flow Zone number assignment. By default, the satellite is assigned to Flow Zone 1.

Assign the satellite to the Flow Zone where most of its stations are located. The entry you make will become the Flow Zone default number and carry over when stations are assigned during the satellite stations setup procedure.

Touch the box next to FLOW ZONE and make your entry using the pop-up keypad.



When assigning a satellite to a Flow Zone, make sure the flow capacity of the Flow Zone is equal to or greater than the flow requirements of any station controlled by the satellite. If it is not, the station will not operate, its run time will be set to "0", and a system alarm will be generated.

You will need to repeat these steps for all satellites in your system. Use the << SAT and SAT >> scroll keys to access the remaining satellite name list.



Do not use the Satellite # box to select a satellite. If this is done, it will change the address of the satellite.

Programming The Controller – 4

Satellite Station Setup

Select STATIONS from the system Menu screen. The Stations screen will appear without data, as shown in Figure 20.

To select the satellite you wish to program, use the << SAT or SAT >> scroll keys as needed to display the satellite number.

	PROGRAM	H-TIME	GPM	ZONE
STA 1		0:00	0	1
STA 2		0:00	0	1
STA 3		0:00	0	1
STA 4		0:00	0	1

Figure 20 - The Stations screen.

To assign a station to a program, touch the appropriate box in the PROGRAM column. The Select Program screen will appear as shown in Figure 21.

GREENS	PROGRAM 5	PROGRAM 9
TEES	PROGRAM 6	PROGRAM 10
ODD FWYS	PROGRAM 7	PROGRAM 11
EVEN FWYS	PROGRAM 8	PROGRAM 12

Figure 21 - The Select Program screen.

From the Select Program screen, touch the program you wish to assign to the station, then touch OK. In our example we are assigning the Greens program to Station 1 on Satellite 1.

Programming The Controller – 4

STATIONS		MON 05/13/96 03:03 PM		
SAT #	1	HOLES 1/2	A-TIME	
	PROGRAM	N-TIME	GPM	ZONE
STA 1	GREENS	0:17	20	1
STA 2	-----	0:00	0	1
STA 3	-----	0:00	0	1
STA 4	-----	0:00	0	1
MENU RAIN << STA STA >> << SAT SAT >>				

Figure 22

When we return to the Stations screen, the program name, run time and flow rate (from the Program screen) and the assigned Flow Zone (from the Satellites screen) will be entered.

The normal station run time (N - Time), flow rate and Flow Zone number assignment can now be modified as desired.

For example, we have decided to change the run time for Station 3 from 17 minutes to 15 minutes, as shown in Figure 23. This was done by selecting the desired box under the N-TIME column and using the pop-up keypad to enter the time.

STATIONS		MON 05/13/96 03:15 PM		
SAT #	1	HOLES 1/2	A-TIME	
	PROGRAM	N-TIME	GPM	ZONE
STA 1	GREENS	0:17	20	1
STA 2	GREENS	0:17	20	1
STA 3	GREENS	0:15	20	1
STA 4	GREENS	0:17	20	1
MENU RAIN << STA STA >> << SAT SAT >>				

Figure 23

Programming The Controller – 4

Repeat the programming process for each station of each satellite in your system. Use the << STA and STA >> scroll keys to access the stations, and the << SAT and SAT >> scroll keys to access the satellites.

When all satellite stations have been programmed, watering sequence starts schedules must be established.

Set Watering Sequence Starts

From the system Menu screen, touch STARTS. The watering sequence Starts screen will appear as shown in Figure 24.

Information entered on the Starts screen determines the time when a watering sequence will start, the active day schedule for the sequence, and the order in which the selected programs will operate. Up to 12 sequence starts can be programmed.

STARTS	MON 05/13/96 04:01 PM								
STRT #	1	AT 12:00 AM	S	M	T	W	T	F	S
	PRI	SYRNG							
GREENS	0	0:00							
TEES	0	0:00							
ODD FWYS	0	0:00							
EVEN FWYS	0	0:00							
			TOTAL						
			0:00						
MENU RAIN << PGM PGM >> SORT CLEAR									

Figure 24 - The watering sequence Starts screen.

Sequence Start Number

First, select the sequence start time number by touching the box next to STRT #, then use the pop-up keypad to enter the desired number from 1 to 12.



The watering sequences are prioritized by the start number assigned. Number 1 is the highest priority and 12 is the lowest. A sequence with a higher priority start number will interrupt a lower priority sequence start number during operation.

Set Start Time

Next, touch the box displaying the start time (the default time is 12:00 AM), then enter the desired start time using the pop-up keypad.

Programming The Controller – 4

Set Active Watering Days

Next, set the active day schedule for the watering sequence by touching the box showing S M T W T F S or 1 2 3 4 5 6 7. The Set Water Days screen will appear.

<input type="checkbox"/> SUN	<input checked="" type="checkbox"/> MON	<input type="checkbox"/> TUE	<input checked="" type="checkbox"/> WED
<input type="checkbox"/> THU	<input checked="" type="checkbox"/> FRI	<input type="checkbox"/> SAT	

ALL DAYS...

Figure 25 - The Set Water Days screen.

To select active days, touch the boxes of the desired days. An “X” will appear, indicating the day is selected. To remove a day, touch the box again and the “X” will disappear. We have selected Monday, Wednesday and Friday as active days.



You can easily select or remove all days simultaneously by pressing the All Days ON or OFF box.

To disable a start time, select All Days OFF. With no active days assigned, the start time will be ignored.

Once you have selected the desired watering days, press OK to return to the Starts screen.

If you decide to make no changes to the screen, press ESCAPE to return to the Starts screen.

Set Program Priority

Next, programs will be assigned to the watering sequence and prioritized for order of operation.

Programming The Controller – 4

In our example, shown in Figure 26, sequence start number 1 is active on Monday, Wednesday and Friday and begins at 7:00 PM. We want to assign the programs to run in the order of Odd Fairways, Tees, and then Greens. We therefore assign priority number 1 to Odd Fairways, 2 to Tees, 3 to Greens and 0 to Even Fairways. This is done by pressing the desired program box under the PRI (priority) column and using the pop-up keypad to assign a priority number.

STARTS		MON 05/13/96 04:01 PM	
STRT #	1	AT 7:00 PM	S <input checked="" type="checkbox"/> T <input checked="" type="checkbox"/> F <input checked="" type="checkbox"/>
	PRI	SYRNG	
GREENS	3	0:00	
TEES	2	0:00	
ODD FWYS	1	0:00	TOTAL
EVEN FWYS	0	0:00	9:00
MENU RAIN << PGM PGM >> SORT CLEAR			

Figure 26 - The Starts screen.

Each program in a start sequence must have a unique priority number (except "0"). If a program is given a priority number of "0", it will not be included in the start time sequence. We have excluded the Even Fairways program from this watering sequence by giving it a "0" priority number.

Assign a priority number to each program. Use the << PGM and PGM >> keys to scroll through the program list.

Program Sort

Once you have set the priority for all desired programs, press the SORT function key to automatically organize the programs into numerical sequence. Figure 27 shows the display after the sort function has been applied.

Programming The Controller – 4

STARTS	MON 05/13/96 04:01 PM								
STRT #	1	AT 7:00 PM	S	M	T	W	T	F	S
		PRI	SYRNG						
ODD FWYS		1	0:00						
TEES		2	0:00						
GREENS		3	0:00						
EVEN FWYS		0	0:00						
				TOTAL					
				9:00					
MENU RAIN << PGM PGM >> SORT CLEAR									

Figure 27 - The Starts screen after sorting the programs by priority.



To reprogram the sequence start, you can reset all programs to “0” priority by pressing the CLEAR function key.

Set Syringe Time

Within the Starts screen, you can set a program to run a syringe cycle instead of its normal station run times. To do this, select the desired program in the Syringe column and use the pop-up keypad to set the amount of syringe time (1–30 minutes).

During operation, the syringe run time will override the normal station run time.

Repeat these programming steps for each watering sequence start required (12 starts maximum).

Total Run Time Calculation

The TOTAL box indicates the calculated run time for the entire watering sequence. This information will appear after the TouchNet performs the flow management calculations at the Update Time (specified on the Setup screen) and/or after CALCULATED END TIME is selected on the Water Window screen. In our example, the total run time required for sequence start number 1 is 9 hours.



To enable the TouchNet to operate manually or automatically, the flow management calculations must first be performed. To accomplish this, refer to Calculated End Time on page 38.

This completes the TouchNet programming procedure. If you wish to test the system operation, continue to “Manual Operation” on page 31.

Manual Operation

Select MANUAL from the system Menu screen. The Manual screen will appear as shown in Figure 28.

To run a watering program manually, select the program by touching the PROGRAM name box. The Select Program screen will appear. Touch the program you wish to operate and press OK.



Figure 28 - The Manual operation screen.

Next, select a specific satellite by touching the SATELLITE number box and entering its address number from the pop-up keypad. To select all satellites, enter "0".

To run a syringe cycle, touch the SYRINGE time box and enter a syringe run time (1–30 minutes) using the pop-up keypad.

Press START to begin watering.

To cancel watering at any time, press STOP.

Special TouchNet Features

Rain Delay

The Rain Delay feature enables you to prevent all watering operations for a period of 1 to 7 days or indefinitely with Permanent Rain Hold.

To select Rain Delay, touch the RAIN function key. A pop-up keypad will appear as shown below in Figure 29.

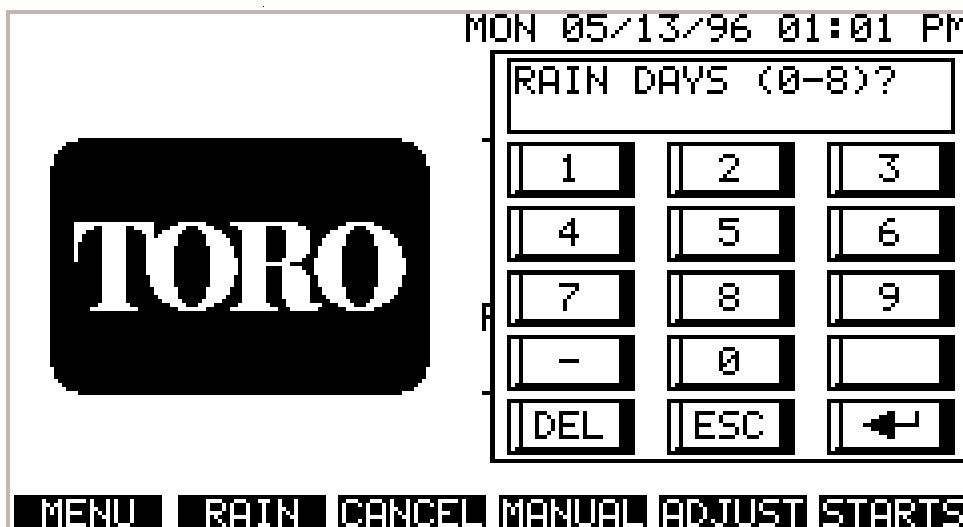


Figure 29 - The Rain Hold keypad.

A prompt on the keypad will ask for the number of days you wish to delay watering. The Rain Delay number can be set from 0 to 8. Numbers 1 through 7 will delay watering for that specific number of days. Entering the number 8 will place the TouchNet in Permanent Rain Hold until any number between 0 and 7 is entered. Entering "0" cancels Rain Delay or Permanent Rain Hold, returning the system to normal operation.



Selecting Permanent Rain Hold will generate a system alarm. This serves as a reminder that all system operations are indefinitely suspended. See "Alarms", page 40 for more information.

While the system is in Rain Delay, the RAIN function key will change to display the number of days remaining until automatic irrigation resumes.

For example, a 3-day Rain Delay would be displayed as RAIN:3. This number will decrease accordingly at the watering Day Change time.

If Permanent Rain Hold is selected, the RAIN function key will be displayed as <RAIN>.

Cancel All Watering

A “Cancel All” command will stop all irrigation that is currently running and cancel any additional programmed sequence starts until the watering schedule is either recalculated manually or automatically at the Update Time.

When you touch the CANCEL function key, the Confirm (confirmation) screen will appear.

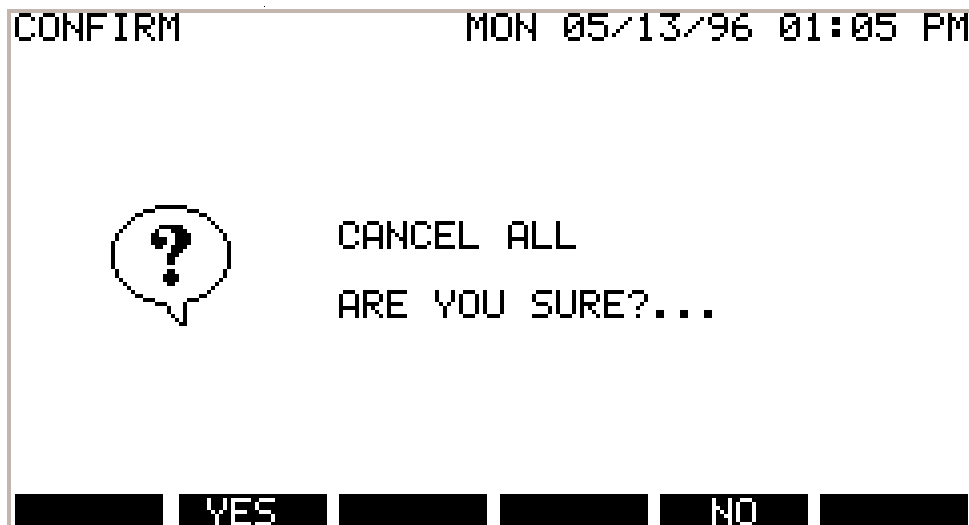


Figure 30 - The Cancel All confirmation screen.

To initiate the Cancel All command, touch the YES key. All irrigation activity will be canceled. The Confirm screen will remain displayed until the TouchNet completes the cancel process. The previous screen will then be displayed.

While in the Cancel mode, the CANCEL function key will be displayed as <CNCL>.

Touching the NO key will ignore the Cancel All command. No action will be taken and system operation will not be affected.

Removing The Cancel Command

After the cancel command has been given, it can be manually removed enabling the automatic watering schedule to resume as programmed.

To accomplish this, a flow management calculation must be performed on the Water Window screen

From the system Menu screen touch WATER WINDOW. On the Water Window screen, touch the time display box adjacent to CALCULATED END TIME. The watering schedule will be calculated by the HydroGuard flow manager.

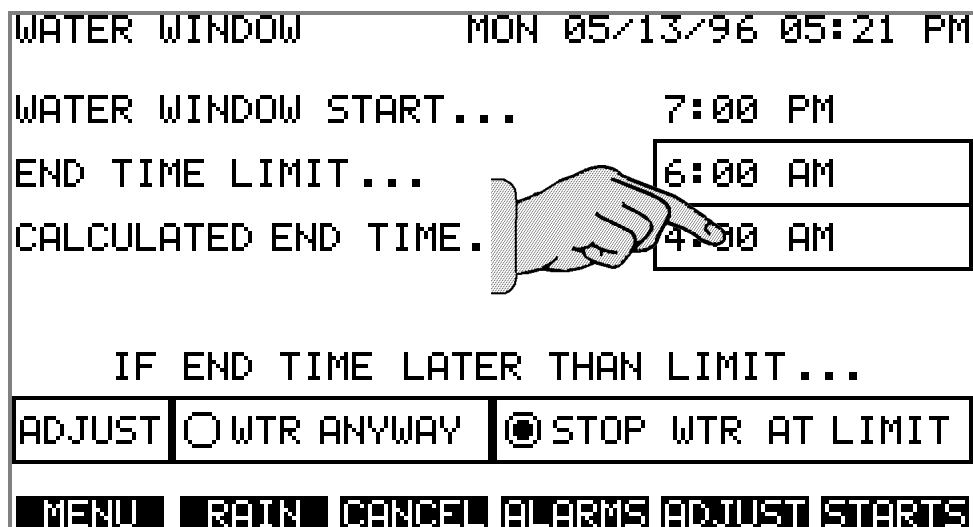


Figure 31 - The Water Window screen.



During the calculation process, a screen will appear stating “CALCULATING STARTS PLEASE WAIT”. The time required to complete the calculations is determined by the size of the watering schedule data base. In some cases, it may require more than 30 minutes to complete this process.

Upon completion of the calculation, all watering sequences scheduled to start (after the time of day the calculation was performed) will operate automatically as programmed.

Run Time Adjust

Once your system is programmed, you can fine tune it with the station run time Adjust factors. From the system Menu screen, select ADJUST. The Adjust screen will appear as shown below in Figure 32.

This feature allows you to change the station run time by a percentage factor from 10% to 250% for the entire system as well as for individual programs.

ADJUST		MON 05/13/96 04:20 PM	
	SYSTEM	<input type="text" value="100"/>	%
PGM 1	GREENS	<input type="text" value="110"/>	%
PGM 2	TEES	<input type="text" value="100"/>	%
PGM 3	ODD FWYS	<input type="text" value="100"/>	%
PGM 4	EVEN FWYS	<input type="text" value="100"/>	%
MENU RAIN CANCEL MTEWIN << PGM PGM >>			

Figure 32

A System adjustment alters the run time of every station in the system. A Program adjustment alters only the stations assigned to the selected program.

The percentage values of the System and the Program adjustments are both applied to the station run time.

For example, a 17-minute station run time in the Greens program will be adjusted to 18 minutes with a Program adjustment value of 110%. If the System is also adjusted to 110% that station run time would be increased to 20 minutes.

In our example the System factor is 100%, so our adjusted run time for the station in the Greens program will be 18 minutes.



The displayed Program adjust value will not change when the System adjust value is changed.

To enter an adjustment, touch the desired percentage box and use the pop-up keypad to enter the value.

Station Review Screen

The Station Review screen is accessed from the Stations screen to provide the actual run time values resulting from any changes made on the Adjust screen.



This screen is for review only and does not allow program changes to be made.

To access the Station Review screen, touch the STATIONS box on the system Menu screen. From the Stations screen touch the A-TIME box displayed in the upper right corner.

STATION REVIEW		MON 05/13/96 04:25 PM		
SAT #	1	HOLES	1/2	N-TIME
	PROGRAM	A-TIME	GPM	ZONE
STA 1	GREENS	0:18	20	1
STA 2	GREENS	0:18	20	1
STA 3	GREENS	0:16	20	1
STA 4	GREENS	0:18	20	1

MENU RAIN << STA STA >> << SAT SAT >>

Figure 33 - Station Review screen showing Actual time.

In the example shown in Figure 33 above, the Station Review screen shows that the actual run time (A-Time) for stations 1, 2 and 4 has been increased from 17 minutes to 18 minutes. Station 3 has increased from 15 minutes to 16 minutes.

To view additional stations and/or satellites, use the << STA STA >> and << SAT SAT >> scroll keys as needed.

To revert to the Stations screen, touch the N-TIME box.

The Water Window Screen

The Water Window screen, as shown in Figure 33, is accessed from the System Menu screen by touching WATER WINDOW.

“Water Window” is a term used to describe the total duration of time allotted for system operation on an active day. It potentially begins at the System Update time and ends at the watering Day Change time.

The actual water window will begin at the earliest scheduled sequence start time (shown as the Water Window Start time) and end at the Calculated End Time or at a specified End Time Limit.

WATER WINDOW		MON 05/13/96 05:21 PM
WATER WINDOW START...		7:00 PM
END TIME LIMIT...		6:00 AM
CALCULATED END TIME...		4:00 AM
IF END TIME LATER THAN LIMIT...		
ADJUST	<input type="radio"/> WTR ANYWAY	<input checked="" type="radio"/> STOP WTR AT LIMIT
MENU RAIN CANCEL ALARMS ADJUST STARTS		

Figure 34 - The Water Window screen.



The selections provided on the Water Window screen will not directly alter the watering schedule to make it fit within the water window. It will however, enable you to allow the system to run past the limit, or stop all watering at the limit if you choose. If run time adjustments are required, the Adjust screen can be easily accessed by touching the ADJUST box.

End Time Limit

The End Time Limit is the time you decide that the watering cycle must be completed. To set the End Time Limit, touch the time display box adjacent to END TIME LIMIT and enter the desired time using the pop-up keypad.



To prevent a system alarm, the End Time Limit must be set to occur at least **1 minute before the Day Change time.**

Calculated End Time

The Calculated End Time is derived from the total run time of all stations programmed to water on the same day. Touching the time display box adjacent to CALCULATED END TIME prompts the HydroGuard flow manager to calculate the watering schedule for the day and display the watering end time. The total watering time for the watering day is displayed on the Starts screen TOTAL box as shown on page 28. This calculation automatically occurs at the scheduled Update Time.

Special Features – 6



During the calculation process, a screen will appear stating “Calculating Starts Please Wait”. The time required to complete the calculations is determined by the size of the watering schedule data base. In some cases, it may require more than 30 minutes to complete this process.

Watering Schedule Diagram

The diagram in Figure 35 below is provided to help illustrate the various event times and durations of the watering schedule example we have used throughout the programming steps.

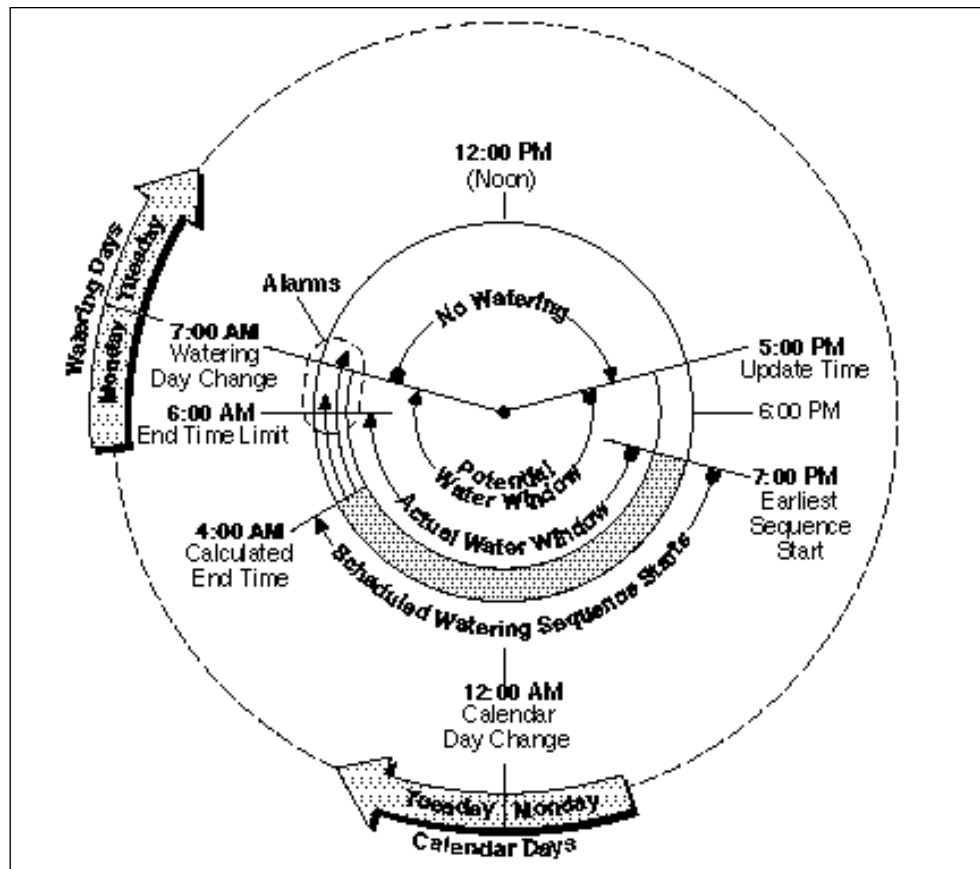


Figure 35 - Example watering schedule diagram.

In our example, the water window potentially starts at the 5:00 PM Update Time (when flow management calculations are automatically performed) and ends at the 7:00 AM Day Change time. The actual water window begins at 7:00 PM (the earliest scheduled sequence start time) and ends at the 6:00 AM End Time Limit. The scheduled watering sequences for Monday begin at 7:00 PM and end at the Calculated End Time of 4:00 AM Monday. Notice that since the Watering Day change occurs after midnight, the watering day continues past the calendar day change.

Special Features – 6

If the Calculated End Time exceeds the Day Change time and/or the End Time Limit, an alarm will be generated. Several options are available to resolve the problem:

- Change the earliest sequence start time to an earlier time.
- Extend the End Time Limit (which may also require extending the Day Change time).
- Decrease station run time on the Adjust screen until the Calculated End Time is within the watering window.
- Touch the WATER ANYWAY box, which allows the system to continue watering past the End Time Limit.
- Touch the STOP WATER AT LIMIT box, which will cause all irrigation to stop at the end time limit. (This selection will activate an alarm tone.)

System Alarms

The Alarms screen, as shown in Figure 36, will be displayed automatically along with a periodic beep tone alerting you to system operating problems and/or important information regarding system operation.

A checkmark next to the alarm description indicates the cause. Touching the QUIET ALARM box will turn off the beep tone until another alarm occurs.

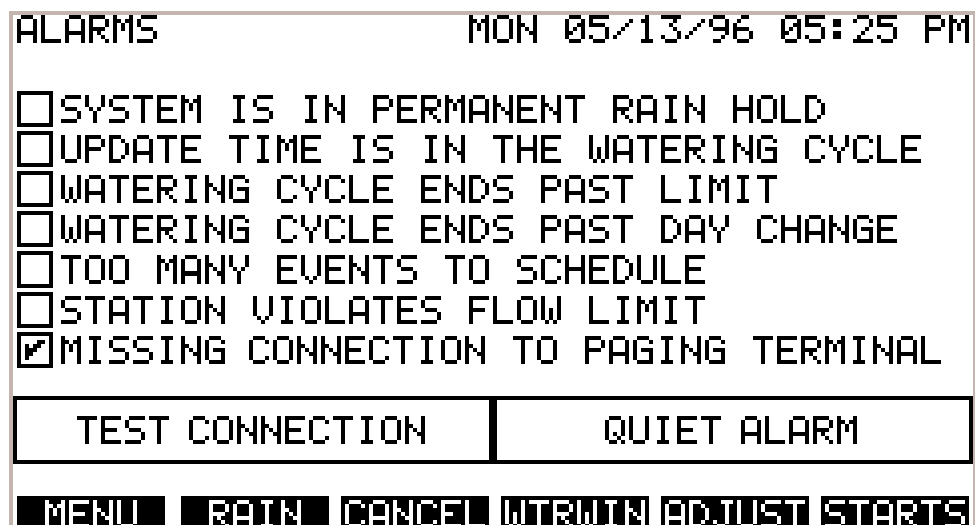


Figure 36 - The system Alarms screen.

Once the alarm has been resolved, the checkmark will disappear and the TouchNet will resume normal operation. The Alarm screen will remain displayed until another screen is selected.

The following is a description of each alarm and the recommended procedure(s) to resolve the problem.

System Is In Permanent Rain Hold

When the TouchNet is put into Permanent Rain Hold, an alarm is generated to remind you that no irrigation will take place while the system is in this mode.

Update Time Is In The Watering Cycle

If you select an Update Time which would occur during an irrigation cycle, this alarm will be generated. The Update Time should be set to occur at least **1 hour before** the start of any irrigation cycle. If the Update Time occurs during a water cycle, the TouchNet flow manager system will be unable to perform system update calculations properly.

To resolve the alarm, reset the Update Time to occur at least 1 hour before the earliest start time.

Watering Cycle Ends Past Limit

An alarm will be generated if a programmed watering cycle duration extends past the Water Window End Time limit.

To resolve the alarm, use one or more of the following options:

- Adjust the total run time or change to an earlier start time.
- On the Water Window screen, extend the End Time Limit (which may also require extending the Day Change Time).
- Select WATER ANYWAY.

Watering Cycle Ends Past Day Change

An alarm will be generated if the calculated watering cycle will end beyond the watering Day Change time.



If this situation occurs, the watering cycle will be ignored and no watering will take place for the entire watering day.

To resolve the alarm, use one or more of the following options:

- Adjust down the station run time.
- Change to an earlier start time.
- Change to a later watering Day Change time.

Too Many Events To Schedule

If more stations have been scheduled to operate within a watering day than can be properly managed by the TouchNet, this alarm will be generated.

To resolve the alarm, reschedule your irrigation cycle to run fewer stations per watering day.

Station Violates Flow Limit

If the station flow is greater than the flow capacity of the System or the assigned Flow Zone, this alarm will be generated. If this occurs, the run time of the station in violation will be set to “0” which will prevent its operation.

To resolve the alarm, scroll through the station information on the Stations screen to locate the station(s) which have be reset to “0” run time. Reset the desired run time and the flow to a value which is equal to or less than the System and Flow Zone capacity.

Missing Connection To Paging Terminal

If the communication link between the TouchNet and the paging terminal is interrupted or cannot be established, this alarm will be generated.

The cause of the disruption may be mechanically related, such as a loose cable connection, or by a radio transmission received by the paging terminal while the TouchNet is communicating.

To resolve the alarm, ensure the connection cable between the TouchNet and paging terminal is properly installed. Also ensure the paging terminal has power and is switched on.

Touch TEST CONNECTION to send a test signal to the paging terminal. If communication is reestablished, the alarm will be turned off and the system will resume normal operation. If the alarm persists, reset the paging terminal by turning paging terminal power off and on again.

If the alarm was generated by radio interference, the TouchNet will automatically remove the alarm at the next scheduled operating time.

Auxiliary Service Features

The TouchNet incorporates some auxiliary service features which enable certain screen display characteristics to be altered and discrete system information to be accessed.

Due to the technical nature of these features, they are not readily accessible to the user and should be accessed with the assistance of a qualified Toro service representative.

Contact an authorized Toro distributor for assistance.

Troubleshooting

If the following troubleshooting solutions do not resolve the problem, or you experience a problem not covered in this section, contact an authorized Toro distributor for assistance.

The power indicator light does not illuminate when the On/Off switch is in the On position.

- Ensure the power supply is plugged into an outlet and the outlet has power.
- Ensure the power supply cord is plugged firmly into the TouchNet receptacle.
- Check for 11 to 14 VDC on the orange power connector.
- Ensure the polarity is correct - plus to plus terminal and minus to minus terminal.

No display appears on the screen.

- Ensure the power indicator light is on and the On/Off switch is in the On position.
- If the power indicator light does not come on, refer to the solutions above.
- If the power indicator light is on, touch any part of the display screen. The TouchNet screen is designed to dim after a brief period of non-use.

A program will not run.

- Ensure the program is part of a sequence start and the start has an active day schedule.
- If the program is part of a start sequence, ensure the priority is not set to “0”.

A satellite will not operate.

- Ensure the satellite address number is not set to “0”.
- Ensure the satellite stations are assigned to a program, and the program is part of a sequence start.
- Ensure the station run times are not set to “0”, (using either normal or syringe run time).
- Ensure the flow rate of a station does not exceed the set flow capacity of the assigned Flow Zone.

Appendix B – Specifications

TouchNet

UL-listed, CUL-listed, SAA-certified
Input = 12 VDC, 1.0 Amp

Housing

ABS plastic suitable for installation within a sheltered location protected from direct exposure to heat and moisture.

Dimensions:

13-1/2" L x 4-3/4" H x 10-3/8" W
(34.3cm L x 12.1cm H x 34.9cm W)

Operating Temperature Range

0°–40°C (32°–104°F)

Motorola Paging Terminal (People Finder)

Motorola paging terminal with software level 3.31.8 or later will interface with the TouchNet central controller via cabling through an RS-232C port. The paging terminal will signal the remote satellites via the PET protocol. Signaling is unidirectional and contains no feedback from the satellites.

TouchNet Power Supply

For Model TNO-90-06:

UL-listed Class 2 and CSA-certified.

Input = 120 VAC, 60 Hz, 18 W, $\pm 10\%$

Output = 12 VDC, 1.0 Amp

For Model TNO-90-36:

SAA-approved.

Input = 240 VAC, 50 Hz, 18 W, $\pm 10\%$

Output = 12 VDC, 1.0 Amp

Software

TouchNet, version 1.0

Electromagnetic Compatibility

Domestic: This equipment has been tested and found to comply with the limits for a FCC Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to the radio communications. Operation in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

International: This is a CISPR 22 Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.