

HERON ELECTRIC COMPANY LTD

BASIC USER Manual

MCI-4, MCI-8, MCI-12, MCI-16, and MCI-96

March, 1999

1. About This Controller

Congratulations, you are now the owner of a Heron MCI irrigation controller.

Your controller will operate 24volt AC* solenoid valves. The controller will run the valves for the length of time, and in the order you specify. This sequence of running solenoid valves is known as an **irrigation program**.

Irrigation programs can be started automatically at pre-set start times. Alternatively, an irrigation program, a single solenoid valve or the pump, can be started manually at any time.

PLEASE NOTE

This controller has been supplied to you in its simplest configuration.

That is it is set up to run :-

- One irrigation program
- With three automatic starts
- Valve run times set in minutes and seconds.

Your controller is capable of running more complicated irrigation programs. Section 12 **“More Complicated Matters”** briefly describes some of the more advanced

* DC valves can be operated from a DC controller.

2. About This User Guide

Section 3 “**Wiring Up**” and **section 4** “**More Inputs and Outputs**” provide instructions for a qualified electrician on how to install your controller.

Section 5 “**Your First Irrigation Program**” will describe to you how to assign run times to valves and so create an irrigation program. Automatically starting the irrigation program at pre-set times of the day is also covered in this section.

Section 6 “**A Couple of Short Cuts**” explains :

- ☒ How the “**Select All**” key can be used to set a number of valves to the same run time
- ☒ How to skip through a program using the “**Manual Advance**” key.

Section 7 “**Starting and Stopping**” describes how to manually start and stop a valve, the pump or an irrigation program.

Section 8 “**Resetting the Clock**” describes how to change the controller’s clock.

Section 9 “**Fault Messages**” explains the meaning of the common messages your controller may display.

3. Wiring Up

This section is intended to provide instructions for a qualified electrician on how to mount your controller on a wall and wire it up.

Mounting the Controller

The controller should be mounted on a wall using four screws, one screw through each of the corner lid bolt holes.

WARNING

Additional holes should not be drilled through the back of controller casing.

Ensure mains power is always disconnected **before**

Wiring Up Your Controller

The MCI-96, MCI-16, MCI-12 and all DC controllers should be wired up as shown in Fig 1. below.

The MCI-8 and MCI-4 controllers should be wired up as shown in Fig 2 below .

For an MCI-96 with more than 16 valves, wire up the output expansion box to the connector marked "EX".

Connecting Mains Supply

As with any equipment used in damp conditions, the mains supply should be fused with a **Residual Current Circuit Breaker** (3 amp fuse). Connect the mains supply to the three terminals as shown in Figs 1 and 2, L to Live, N to Neutral E to Earth.

Do not wire other equipment in parallel with the controller supply.

Connecting Solenoid Valves

Connect each solenoid valve to the appropriate output as shown in Figs 1 and 2. The common wire from each solenoid valve should be connected to the "C1" terminal. Valves can be connected in parallel provided the maximum valve output current does **NOT** exceed the output current rating of the controller, see **“Advanced Operation”** Manual.

Connecting Pumps

The MCI-96 has two pump control outputs, namely “Pump-1” and “Pump-2”.

The MCI-16, MCI-12, MCI-8 and MCI-4 have one pump control output, “Pump-1”.

The “Pump-1” output is across the "O1", "C1" terminals. Connect a suitable 24V relay across these terminals to control the pump.

The “Pump-2” output is across “O3” and “C1”. Connect a suitable 24V relay across these terminals to control the second pump.

The second pump start output, “Pump-2”, operates with irrigation programs 5 to 7.

Fig 1 Wiring Diagram for MCI-4 and MCI-8

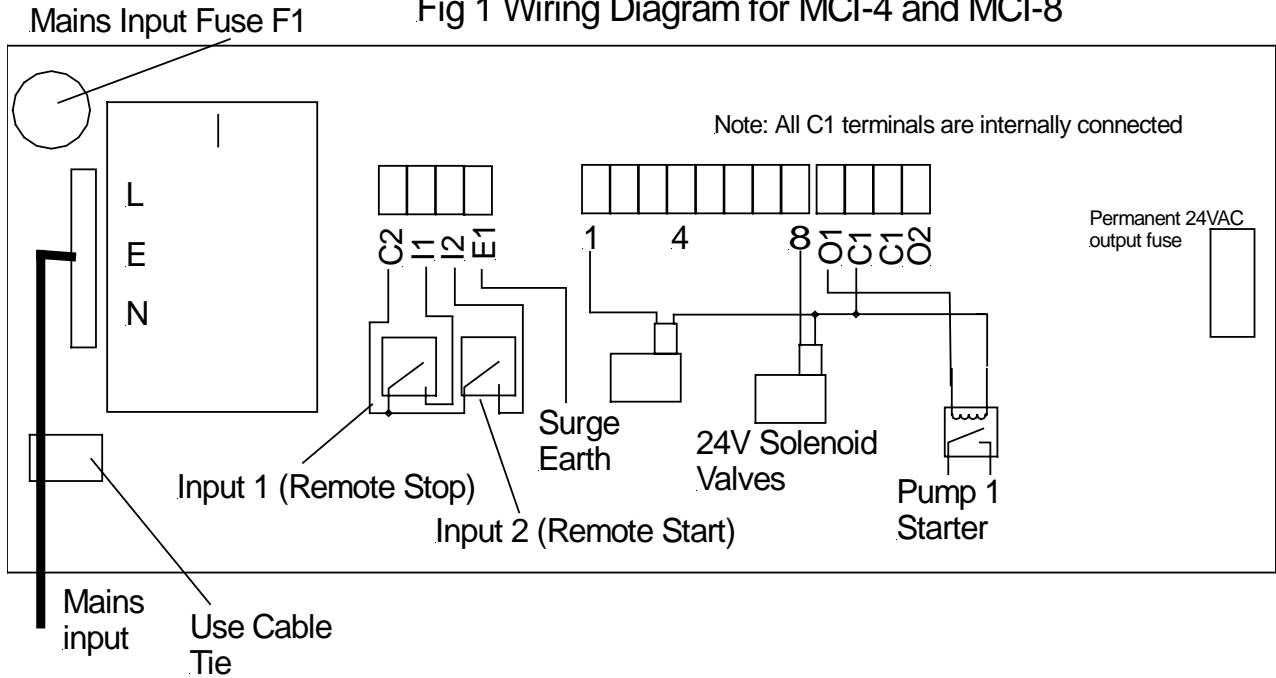
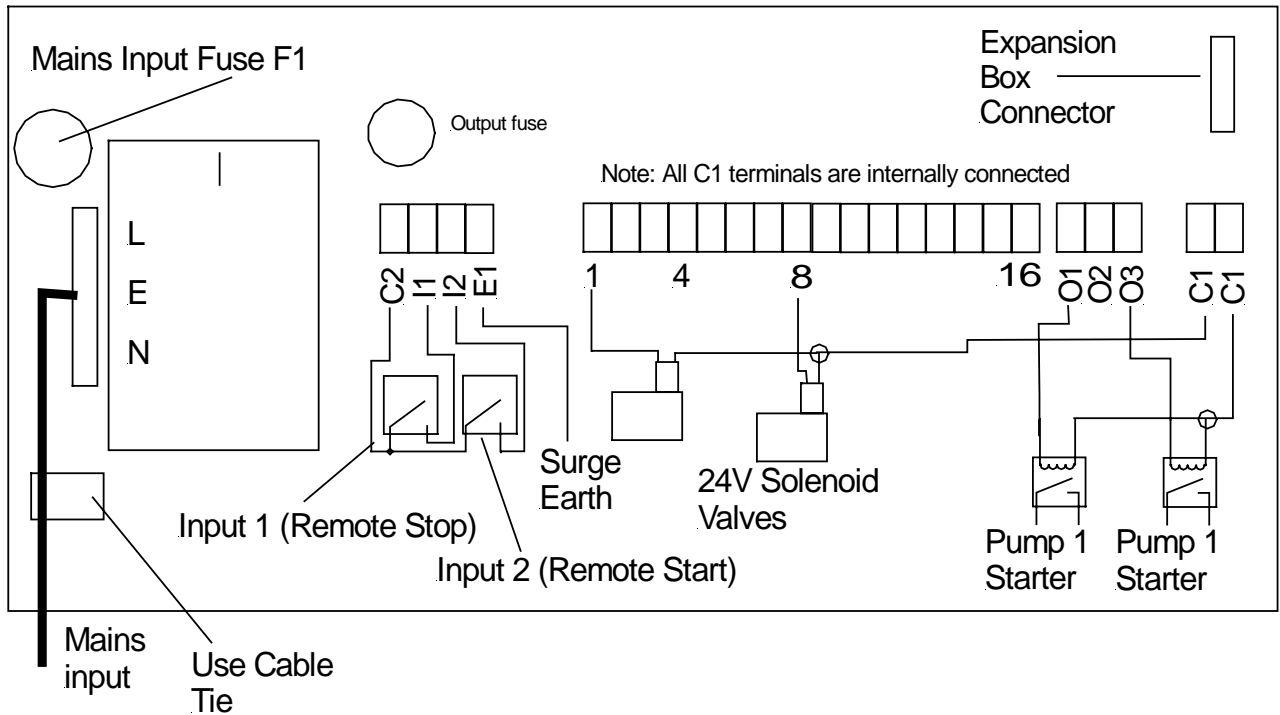


Fig 2 Wiring Diagram for MCI-12 MCI-16 and MCI-96



4. More Inputs and Outputs

This section describes the additional inputs and outputs of the controller that can be used to connect your controller to external sensors.

Remote Start

The remote start input is across "I2" and "C2". Joining these terminals will start program 1. The terminals have to be connected for only a short period, 1 second, to activate the program. If the contacts are left shorted program 1 will continually cycle.

Remote Stop / Low Water Cut Out

The remote stop input is across "I1" and "C2". Joining these inputs halts the irrigation programs. The programs will continue once the short is removed.

This input may be connected to a float switch in the water reservoir so that the irrigation sequence is halted if the water level is low.

24V Output

A 24V supply is permanently available across "O2" and C1".

5. Your First Irrigation Program

We are going to set an irrigation program with the first valve set to 10 minutes 30 secs and the second valve set to 5 minutes
It will then be set to start at 18:00

The Irrigation Program - The Steps

Press the arrow forward key ">" until the first **"Enter Valve Time"** page is displayed.

VALVE	1	2	3
	10:30	5:00	0:00

With the cursor flashing under **"VALVE 1"**, press "1" and then "0" on the keypad to enter 10 minutes for the first valve run time.

Press the arrow forward key ">" once more and you will see the flashing cursor has moved to the other side of the colon ":".

Now press the "3" and the "0" on the keypad to enter the remaining 30 seconds of the first valve run time.

Don't worry if you go too far, you can always press the arrow back "<" key to move back a space.

The first valve in your irrigation program is now set to run for 10 minutes and 30 seconds.

Press the arrow forward key “>” until it is under “**VALVE 2**”.

With the cursor flashing under “**VALVE 2**”, press “5” on the keypad to enter 5 minutes for the second valve run time.

AUTO	ON	OFF	OFF
1	6:30	0:00	0:00

Automatic Start Times - The Steps

Press the arrow forward key ">" until the “**Automatic Start Time**” page is displayed.

With the cursor flashing on the first zero, press the “6” on the keypad to enter a 6:00 am start time for your irrigation program.

Press the arrow forward key “>” once more and you will see the flashing cursor has moved to the other side of the colon “:”.

Now press the “3” and the “0” on the keypad to enter the remaining half past the hour for the start time.

You have entered a 6:30 am start time. **However**, the irrigation program will not start at this time until you **activate the start time**.

This is simply done by pressing the "**Select**" button whilst the flashing cursor is still positioned on the start time to be activated.

You will see the display above the start time change from “**OFF**” to "**ON**".

“**ON**” indicates that a start time has been activated as shown above.

To enter a second automatic start time, press the arrow forward key “>” until it is positioned on the first zero of the second start.

Use the keypad to enter a start time of 18:00hrs.

Remember to press “**Select**” to activate the start.

Press the arrow forward key “>” to return to the “**Time Page**”.

Congratulations....You have now set up your first irrigation program.

Run Time

When the irrigation program starts the “**Time Page**” will change to show the number of the valve running and the time it has left to run.

TIME	VALVE	1	ON
6:31	9:29	LEFT	

In the example above :

It is 6:31am

The first valve in the irrigation program is running

The valve has 9 minutes and 29 seconds left to run.

6. A Couple of Short Cuts

The “**Set All**” key can help you to quickly set a number of valves to run for the same length of time.

The “**Manual Advance**” key enables you to skip on through an irrigation program that is already running.

Set All

When setting up an irrigation program, the '**Set All**' key is a quick method of setting a number of valves to the same time.

When the “**Enter Valve Time**” page is displayed, press the "**Set All**" key. The following page will be displayed.

VALVES 2 > 5 20:00

Using the arrow forward key “>” and the keypad, the range of valves to be set to the same run time, and the run time itself, can be entered.

In the example shown above, valves 2 through to 5 have all been set to run for 20 minutes each.

Pressing "**Set All**" again will return you to the “**Enter Valve Time**” page. You will see the 20 minute run time under “**VALVE 2**”, “**3**”, “**4**” and “**5**”.

Manual Advance

When the irrigation program is running, simply pressing the "**Manual Advance**" key will move the program onto the next valve in the sequence.

This can be useful when testing your system.

7. Manual Start Stop

This section describes how to manually start and stop :

- A valve
- The pump
- An irrigation program.

The pump, an individual valve or an irrigation program, can be started manually at any time by pressing the **"Start/Stop"** key.

When **"Start/Stop"** is pressed from any of the pages the display below will be shown.

```
START >PUMP VALVE
          PROG
```

Pump Start

With the flashing arrow pointing at **"PUMP"** press **"Select"** to start Pump 1. The display below will be shown.

```
TIME PUMP ON
10:55
```

Valve Start

To start a valve:-

Press the arrow forward key ">" to position the flashing arrow to point at **"VALVE"**.

Press **"Select"** and the page below is shown.

Enter the number of the valve to be started.

```
START VALVE 10 TIME 2
```

Press the arrow forward key ">" and then enter the number of minutes the valve is to run.

In the example above valve 10 has been set to run for 2 minutes.

Now press **"Select"** to start this valve. The **"Time Page"** will be displayed showing the selected valve is running, and the length of time the valve has left to run.

Program Start

To start an irrigation program press the arrow forward key ">" to move the flashing arrow to point at **"PROG"**.

Press "**Select**" to start the irrigation program.

The "**Time Page**" will again be displayed, showing the amount of time the first valve in the program has left to run.

Manual Stop

Pressing "**Start/Stop**" at any time when a program, valve or pump is running will stop the program, valve or pump immediately.

8. Resetting th Clock

This section describes how to reset the clock on your controller.

Resetting the Time

To reset the clock on your controller complete the following steps.

Press the arrow forward key ">" until the **"Time Page"** is shown.

Now Press and hold down the **"Select"** key for five seconds. A black flashing cursor will appear.

Using the keypad numbers the arrow forward key ">" the correct time of day can be entered.

When you have reset the time, press the **"Select"** key again. The black flashing cursor will disappear.

The time has been reset.

9. Fault Messages

Valve Fault

During the running of an irrigation program a current overload condition may occur. The most common reasons for a current overload condition are:-

- ☒ A short circuit on the solenoid valve wiring
- ☒ Too many valves running at the same time
- ☒ A faulty solenoid valve.

Should a current overload condition occur then the irrigation program will skip to the next valve to be run in the sequence.

Once the irrigation program has finished, the **“Valve Fault”** message will be displayed along with the number of the valve where the fault was detected. In the example below, the second valve in the irrigation program was faulty.

The controller will continue to run irrigation programs until four overload conditions are registered. The **“Valve Fault”** message will continue to be displayed after an irrigation program has run until the **“Start/Stop”** button is pressed.

If four overload conditions are registered then the running of all irrigation programs will cease. Pressing **“Start/Stop”** will reinitiate the running of irrigation programs again.

HERON ELECTRIC COMPANY LTD

Advanced Features Manual

MCI-4, MCI-8, MCI-12, MCI-16, and MCI-96

NOTE: This manual refers to MCI controllers using software version 4444E.

Document Reference MCI4-96 4444E ADVANCED

May 7, 1991.

1. Introduction

This manual describes the advanced features of the controller. Advanced features are activated by changing the configuration options of your controller. How to change a configuration option is described in **section 2** below.

Section 3 of this manual lists the configuration options of the controller in numerical order for quick reference, look up, purposes.

Sections 4 to 9 of this document describe the configuration options in detail, explaining both their function and how they should be set up to activate them. The options have been grouped under the following headings :

- ☒ **Section 4 - Pump Control Options**
- ☒ **Section 5 - Irrigation Program Options**
- ☒ **Section 6 - Automatic Start Options**
- ☒ **Section 7 - Water Saving Options**
- ☒ **Section 8 - Special Features**
- ☒ **Section 9 - Installation Options**

Section 10 lists the fuses to be found in your controller.

2. CHANGING CONFIGURATION OPTIONS

To access the configuration options press and hold down the "**Manual Advance**" button or 5 seconds.

The following page will be displayed.

OPTIONS	1	2	3
	32	4	15

The arrow forward key ">" is used to position the cursor under the option you want to change. Use the keypad to enter the required number, as described below, to activate the option.

In the example above, Option's 1,2 and 3 have been set to 32, 4 and 15. When the required options have been set, press the arrow forward ">" or arrow backward key "<" repeatedly until the 'Time' page is shown.

The configuration options of your controller have now been changed.

3. CONFIGURATION OPTIONS - LOOK UP (4444 Software)

Option	Brief Description	Section	Default Value
Option 1	Set number of valves.	Section 5	*
Option 2	Set number of automatic starts.	Section 6	3
Option 3	Set pump pressurisation time in minutes.	Section 4	0
Option 4	Set pump pressurisation time in seconds.	Section 4	3
Option 5	Allocate the remote start input to a specific program.	Section 5	1
Option 6	Number of back flushing valves.	Section 8.3	0
Option 7	Which program to start Pump 1.	Section 4	7
Option 10	Specify a delay period between valves running.	Section 5	0
Option 11	Delay period (hours) between back flushing cycles.	Section 8.3	0
Option 12	Delay period (minutes) between back flushing cycles.	Section 8.3	0
Option 13	Battery powered controller. B	Section 9	0
Option 15	Run multiple programs.	Section 5	0
Option 16	Run on a daily or weekly basis.	Section 6	0
Option 17	Programs to be set in hours or minutes.	Section 5	0
Option 18	Continual cycling of program 1.	Section 8.1	0
Option 19	Battery fitted.	Section 9	1
Option 20	Advance to next valve if low current detected.	Section 9	0
Option 21	Light sensor attached.	Section 9	0
Option 22	Specify irrigation programs in litres.	Section 8.5	0
Option 23	Display comms. errors (relevant to manufacturer only).	Section 9	0
Option 24	Wean.	Section 8.2	0
Option 25	Temporarily increase or decrease irrigation programs by a given percentage.	Section 7	0
Option 26	Allow programs to run in parallel.	Section 5	0
Option 27	Remote stop option.	Section 9	0
Option 29	Allow program 1 priority running.	Section 8.1	0
Option 30	Battery powered controller with latching valves.	Section 9	0
Option 31	Prevent program 1 starting pump 1.	Section 4	0
Option 32	EC controller connected	Section 9	0
Option 33	Display a second Time page for parallel programs	Section 5	0
Option 34	Continual cycling of 4 irrigation programs.	Section 8.1	0
Option 35	Rain sensor to reduce watering for programs 4-7 only.	Section 7	0
Option 36	Fertigation.	Section 8.4	0
Option 37	Rain sensor to reduce watering.	Section 7	0
Option 38	Flow meter to be connected to the remote stop or remote start input.	Section 8.5	0
Option 39	Continual cycling using remote start.	Section 8.1	0
Option 40	Use a pressure sensor to control the back flushing	Section 8.3	0
Option 42	Disable all automatic starts.	Section 6	0
Option 43	Display the 'Low Tank' message.	Section 9	0

- Set to size of controller / number of valves.

1. Pump Control Options

Pump Pressurisation Time in Minutes (Option 4)

The pump pressurisation time (in minutes) can be set with Option 3. (Values between 0 and 99 minutes are allowed).

Pump Pressurisation Time in Seconds (Option 4)

The pump pressurisation time (in seconds) can be set with Option 4. (Values between 0 and 99 seconds are allowed).

Pump 1 Control (Option 7)

This option controls which irrigation programs start Pump 1. If option 7 is set to '1', program 1 will start Pump 1. If it is set to '2', programs 1 and 2 will start Pump 1. If it is set to '3', programs 1, 2 and 3 will start Pump 1. Values between 1 and 7 can be used. If option 7 is set to '7', all programs will start Pump 1. Default is '7'

Pump 1 Controlled from Program 1 (Option 31)

Option 31 prevents Pump 1 being started from program 1. Set option 31 to '1' if Pump 1 is not required to start with program 1. Default is '0'.

2. IRRIGATION PROGRAM OPTIONS

Number of Valves (Option 1)

If you increase the number of valves on your controller you will need to change Option 1. For example if you have upgraded a 16 valve controller to a 32 valve controller, enter '32' under Option 1. There will be no change to the operation of the controller, just more valve pages will be displayed. (Values between 3 and 96 are allowed).

Minutes or Hours (Option 17)

For program times in minutes and seconds set Option 17 to '0'. For program time in hours and minutes set Option 17 to '1'.

Multiple Programs (Option 15)

For a single program set Option 15 to '0'. For multiple programs set Option 15 to '1'.

When this option is set to '1', the controller will allow up to 7 different irrigation programs to be set up. To set up one of the programs press ">" until the Time Page is displayed as shown below.

```
TIME VALVES OFF
12:11
```

Press ">" and the following page will be displayed.

```
EDIT PROGRAM ?
```

Enter the number (1 to 7) of the irrigation program you wish to set up. Press ">" again and the first valves of the program will be displayed. The program can now be set up as described in the User Guide.

Now you are using multiple programs you will also need to assign the automatic starts to the correct program. To do this press ">" until the automatic start pages are displayed, as shown below.

```
AUTO OFF OFF OFF
1 0:00 0:00 0:00
```

The automatic start time is entered in the same way as described in the User Guide, but now you must assign the start to the particular irrigation program. With the cursor positioned under the automatic start time press **Select** until the correct program number is displayed. In the example below Program 2 is set to start at 12:00.

```
AUTO PRG2 OFF OFF
1 12:00 0:00 12:00
```

Note: Any automatic start can be assigned to any irrigation program.

If you wish to disable an automatic start, position the cursor under the automatic start and press **Select** repeatedly until 'OFF' is displayed above the automatic start time.

Programs Running in Parallel (Option 26)

This allows programs to be run in parallel. If this option is set to '0' then irrigation programs will run sequentially. If this option is set to '1' then up to 4* irrigation programs can be run in parallel by assigning the same automatic start time to irrigation programs.

* - For an MCI-4 or MCI-8 it is recommended that the number of programs running in parallel is limited to 2 due to the maximum current output of the controller (0.6A).

Display Second Run Time page (Option 33)

If more than 2 irrigation programs, are running in parallel this option will allow you to view the run time information for the third and fourth programs. By setting option 33 to '1' the second run time page will be displayed. Default is '0'. You may also want to set this option if your are using the Back Flush facility.

Allocate Remote Start to a Specific Program (Option 5)

The remote start input can be assigned to initiate irrigation programs 1 to 7. Simply enter the number of the irrigation program you want the remote start input to initiate. If this option is not set the remote start input will trigger irrigation program 1 by default.

Delay Between Valves (Option 10)

A delay between the operation of the valves within an irrigation program can be introduced using this option. The delay can be set from 1 to 99 seconds. Enter the number of seconds delay required. The delay will apply to all irrigation programs.

3. AUTOMATIC START OPTIONS

Number of Automatic Starts (Option 2)

If you need to increase or decrease the number of automatic starts change Option 2. Enter the required number under Option 2. There will be no change to the operation of the controller just more automatic start pages will be displayed. (Values between 3 and 42 are allowed).

Day or Week Programming (Option 16)

For daily programming set Option 16 to '0'. For weekly programming set Option 16 to '1'. When weekly programming is selected six automatic starts for each day will be provided.

When weekly programming is first selected you must set the controller to the correct day of the week. To do this Press ">" until the time page is displayed as shown below.

TIME VALVES OFF MON
12:57

Now proceed as follows:-

- Press and hold down **Select**. The cursor will start flashing.
- Press **Manual Advance** and the day of the week shown in the top right hand corner will change.
- Press **Manual Advance** until the correct day is displayed.
- Press and hold down **Select** again until the cursor stops flashing.

When weekly programming is selected six automatic starts for each day of the week are provided. Once on the automatic start pages, pressing the ">" button repeatedly will enable you to view and set up the weekly automatic starts.

Three automatic starts for Monday will appear as the first automatic start page, as shown below.

MON OFF OFF PRG2
1 10:30 0:00 12:00

This is followed by the second set of three automatic starts for Monday, then the first three automatic starts for Tuesday etc. Entering automatic start times is the same as described in the User Guide.

Automatic Start disable (Option 42)

Option 42 allows all automatic starts to be disabled by pressing the **Set All** key when on the Time page. When automatic starts are active the controller will display the following:-

TIME AUTOS ON
12:11

If the **Set All** key is pressed the controller will then display the following and all automatic starts will be disabled until the **Set All** key is pressed again.

TIME ALL AUTOS OFF
12:11

4. WATER SAVING OPTIONS

Percentage Up and Down (Option 25)

Percentage Up and Down allows all irrigation run times to be temporarily adjusted by a specified percentage (0%-600%). With Option 25 set to '1' the following page will be displayed after the Automatic Start pages.

If no increase or decrease is required, then the percentage value must be set to 100%.

If the irrigation run time is to be temporarily increased, for example doubled, then the percentage value should be set to 200%.

If the irrigation run time is to be temporarily reduced, for example halved, then the percentage value should be set to 50%..

SET PROGS 1-7 00%

IMPORTANT: Do not leave the percentage value at 0%. No irrigation will be run.

Limitations to Use

This facility will not work with volume.

This facility is not recommended with valve times less than 15 seconds.

Rain Sensor to Reduce Watering (Option 37)

The Heron rain sensor allows the irrigation program to be reduced depending on the amount of rain that has fallen over the last 24 hours (this is a rolling count accurate to six hours). Two trip points can be set.

If you have a rain sensor, set this option to '1'. Default is '0'.

Connecting the Rain Sensor

Connect the two terminals inside the rain sensor to "I2" and "C2" (the remote start input). The terminals in the rain sensor are accessed by lifting off the lid and removing the screw at the side of the rain sensor.

Using the Rain Sensor

When option 37 is set to '1' the rain page is displayed after the automatic start pages. Press ">" or "<" to view the page. The quantity of rain that has fallen in the last 24 hours is shown in the bottom left hand corner of the rain page.

RAIN	ADJ	50%	00%
2mm	TRIP	4mm	9mm

On the rain page you can set two trip points in mm of rain fall. When these trip points are met irrigation programs will run for either :

50% (half) of their normal time

or 0% of their normal time (i.e. not run).

To set a trip point move the cursor under the appropriate percentage (50%, or 0%) and enter a number . In the example above trip points have been set at 4 mm and 9 mm. The value under the "RAIN" heading is the actual count of rainfall within the last 24 hours. That is 2 mm of rain has fallen in the last 24 hours.

If option 35 is set to '0', then all irrigation programs will be reduced by the specified trip levels.

Testing the Rain Sensor

The rain sensor can be tested by pressing the spoon down inside the rain sensor. Now press ">" or '<' until the rain page is displayed and you will notice that the rain fall will have incremented by 1 mm. If you press the spoon enough times so that a trip level is reached you will see a reduction in the irrigation watering programs. Note: a minute elapsed time must be allowed between each time the spoon is pressed down in order for the 1 mm in rain fall to register.

Note

The rain sensor has no effect on a manual valve or manual program start.

The percentage adjustment currently active i.e. 100%, 50% or 0% is displayed on the Time Page.

Rain Sensor to Reduce Watering for Programs 4-7 only (Option 35)

If a rain sensor is connected - see option 37 below then option 35 allows you to specify that only programs 4 to 7 will be effected.

5. SPECIAL FEATURES

8.1 Continual Cycling

Continual Cycling - Program 1 (Option 18)

This option allows irrigation program 1 to be continuously cycled with a programmable delay at the end of the program. This is normally used for misting/propagation applications.

Set Option 18 to '1' for program 1 continual cycling. Default is '0'. The time of day through which continuous cycling is active can be specified. For example, continual cycling can be disabled at night.

Note: Option 34 will allow irrigation programs 1,2,3, and 4 to be continually cycled.

Setting Up Continual Cycling

With option 18 set to '1', an extra page will be displayed after the Automatic Start Pages, as shown below. With option 34 set to '1', four of these extra pages will be displayed, one for each continual cycling program.

These pages allow you to:-

- specify the start and stop times throughout the day for the continual cycling period
- set the delay period (in hours & minutes) between each cycle
- Disable / Enable the continual cycling program.

P1	START	STOP	DELAY
	06:00	21:30	00.20

In the example above, program 1 has been set to continually cycle from 6:00 hours to 21:30 hours, with a 20 minute delay between each cycle.

Disabling Continual Cycling

You can disable the continual cycling program by pressing the **Select** button when the continual cycling page is displayed. The page will change to the one shown below i.e. the start time is replaced with "NEVER".

P1	START	STOP	DELAY
	NEVER	21:30	00.20

To re-enable continual cycling press the **Select** button again on this page. The start time will be redisplayed.

Other Options you May Want to Set

Using a Remote Start Sensor

You can use a sensor to control the continual cycling program. Connect the sensor to the remote start input and set Option 39 to '1' (a closed contact will start the program).

The remote start input works by immediately cutting the continual cycling delay time to zero. Therefore, you need to set the delay time to a large value so under normal operation the sensor will initiate the irrigation rather than the delay timer expiring of its own accord.

Running Multiple Continual Cycling Programs in Parallel

If you are running multiple continual cycling programs there is a possibility that two programs will overlap. Provided there is enough pressure in the system, continual cycling programs can run in parallel, by setting option 26 to '1'. If option 26 is left at '0' and continual cycling programs overlap then the overlapping program will start once the first continual cycling program has finished.

Continual Cycling - 4 Irrigation Programs (Option 34)

By setting option 34 to '1', irrigation programs 1, 2, 3 and 4 can be continually cycled. Additional pages for specifying the start, stop time of the continual cycling and a delay between cycles, one for each continual cycling program, will automatically be displayed. Default is '0'.

Continual Cycling Using Remote Start (Option 39)

This option sets Continual Cycling to use the remote start input. Set Option 39 to '1' to allow this facility. If Option 39 is set to '0', continual cycling will ignore the status of the remote start input. Default is '0'.

Priority Program (Option 29)

This allows program 1, the continual cycling program, to take priority over other irrigation programs. With this option set, if another irrigation program is running, program 1 can cut-in and run. The halted irrigation program will then continue from where it was stopped, once program 1 has completed.

If you want this facility set Option 29 to '1'. For normal operation set Option 29 to '0'. Default is '0'.

8.2 Wean Facility (Option 24)

The wean facility allows individual beds to be watered at less frequent intervals as plants mature. Weaning works by program one continually cycling and then Programs 2 to 4 starting at less frequent intervals based on the number of times Program 1 starts. This is described by the table below. Programs 2 to 4 run after program 1, when program 1 is running its delay period.

To activate the wean facility the following options must be set :

- Option 15 to '1' (Multiple Programs)
- Option 24 to '1' (Wean facility)
- Option 18 to '1' (Continual cycling)
- Option 26 to '1' (Parallel Programs).

Now you must set up Program 1 to continually cycle as described in the previous section. Also make sure the delay period is longer than the total irrigation times of the other programs (Programs 2 to 4), otherwise valves may come on simultaneously.

With these options set the first 4 irrigation programs will operate as follows :

Irrigation Initiated	Irrigation programs Run			
	Prog 1	Prog 2	Prog 3	Prog 4
First Time	X			
Second Time	X	X		
Third Time	X		X	
Fourth Time	X	X		X
Fifth Time	X			
Sixth Time	X	X	X	
Seventh Time	X			
Eighth Time	X	X		X
Ninth Time	X		X	

That is :

- Program 1 will start **every time** the delay time expires
- Program 2 will start every **second time** program 1 starts
- Program 3 will start every **third time** program 1 starts
- Program 4 will start every **fourth time** program 1 starts.

The display below shows what the Time page may look like with the Wean facility. Program 1 (P1) is in the delay period and program 2 (P2) is running.

```

TIME  P2 VAL 4 01:30
      12:30 P1 DELAY 00:15
    
```

8.3 Back Flushing

Number of Back Flushing Valves (Option 6)

Heron irrigation controllers can be used to control the back flushing of sand filters. ***If this option is set to '0', back flushing will not be activated.***

The back flushing program will continually cycle when ever the pump is running. When the irrigation stops the back flushing program will also stop. The controller will remember the position of the back flushing program ready to restart when the irrigation commences again.

After a back flushing cycle has completed a delay can be set, in hours and minutes, before the next back flushing cycle starts. Alternatively a delay between back flushing cycles can be controlled using a pressure sensor.

If a pressure sensor is attached to the remote start input of the controller the next back flushing cycle will not be initiated until the threshold of the pressure sensor is reached.

Setting Up the Back Flushing Program

If back flushing is required then the following options must be set :

- Option 15 to '1' (Multiple Programs)
- Option 26 to '1' (Programs Running in Parallel)
- Option 33 to '1' (Display Second Run Time Page).

Option 6 should be set to the number of back flush valves you require in the back flush program.

The controller will then assign the last valves on the controller as the back flush valves. For example, if using an MCI-8 controller and option 6 is set to '4', then valves 5 to 8 on the controller will be reserved for the back flushing program. Irrigation program 7 will be the back flushing program.

Specify the Valve Run Times

The back flushing valve run times should be entered in the back flushing program (programme 7) in the normal manner, i.e. as described in sections 7.1 and 4.2.

Note: Valves assigned to the back flushing program will no longer appear on the normal irrigation programs. Hence, in our example, only valves **1 to 4** will appear on the Irrigation Program Set Up pages for irrigation programs 1 to 6.

Setting Up a Delay between Back Flushing Cycles

If a delay is required between back flushing cycles then :

- Option 11 should be set to the number of hours delay required between cycles
- Option 12 should be set to the number of minutes delay required between cycles.

The time delay period will only be counted when the pump is running. Hence, if a controller was set up with a 10 minute delay between back flushing cycles. The pump is on for the first 5 minutes of the delay period but then the irrigation stops. The second 5 minutes of the delay period will not start to be counted until the irrigation / pump starts to run again.

Alternatively, the delay can be controlled via a pressure sensor. If this is required set Option 40 to '1'. A closed contact on the pressure sensor will initiate the back flush program. The back flush program will not run again until another closed contact is registered.

Back Flushing Operation

The status of the back flush program is displayed on the second run time page. This is displayed by pressing ">" from the 'Time Page'. The back flushing program can be in three different states.

Back Flush Running

In the example, below the back flush program (P7) is running valve 4 with 10 minutes remaining.

P7 VAL 4 10:00

Irrigation Not Running

If no normal irrigation program is running and the main irrigation pump is off, the back flush program will stop. The following will be displayed. The back flushing program, will start again where it left off once the irrigation is restarted.

P7 STOP

Back Flush Delay

When the back flushing program has finished and there is a delay period before the next back flushing cycle starts and the pump is running the following will be displayed

P7 DELAY 01:30

In the example above the delay has 1 hour 30 minutes left to run.

Back Flushing Delay - Hours (Option 11)

After a back flushing cycle has completed a delay can be set before the next back flushing cycle starts. This delay can be set in hours and minutes. Option 11 is used to specify the number of hours delay required between back flushing cycles.

Back Flushing Delay - Minutes (Option 12)

Option 12 is used to specify the number of minutes delay required between back flushing cycles.

Back Flushing Delay - Pressure (Option 40)

Rather than specifying a time delay between back flushing cycles (options 11 and 12), a pressure sensor can be used to control the delay period. A pressure sensor should be attached to the remote start input and option 40 set to '1'. The next back flushing cycle will not be triggered until the threshold of the pressure sensor has been reached.

8.4 Fertigation (Option 36)

Option 36 should be set to '1' if a fertigation operation is required. Default is '0'.

Heron irrigation controllers can be used in fertigation applications controlling up to 32 irrigation valves and one fertiliser valve. If the fertigation option is activated, then for each valve in an irrigation program, the Heron controller will :

- Irrigate fresh water for a specified period of time
- Add fertiliser to the irrigation line for a specified period of time
- Irrigate fresh water only again for a specified period of time.

The last valve output of the controller is assigned to operate the fertiliser valve. Hence if using an MCI-8 controller, the 8th valve is assigned as the fertiliser valve.

When the fertigation option is activated, each valve time on the Irrigation Program Set Up page is divided up into three time periods, period 'a', 'b' and 'c', as illustrated below.

VALVE	1a	1b	1c
	05:00	10:00	05:00

The fertiliser valve will be opened when ever the 'b' time period is run. The fertiliser valve will be closed when ever the 'a' and 'c' time periods are run, and fresh water only will be irrigated.

Hence, if the irrigation controller was to run the irrigation program in the example above, the following sequence of events would occur :-

Step 1	Switch valve 1 on for 5 minutes and irrigate fresh water only.
Step 2	Leave valve 1 on and open the fertiliser valve for 10 minutes to introduce fertiliser into the irrigation line.
Step 3	Close the fertiliser valve and leave valve 1 on for another 5 minutes to irrigate fresh water only.
Step 4	Switch valve 1 off. Valve 1 has remained open for a total of 20 minutes.

8.5 Irrigation by Volume (Option 22)

The volume facility will allow you to set programs in litres of water rather than in minutes. The volume facility is designed to operate with flow meters that give a pulse out for every one or ten litres of water. The pulse should be made by the closing of a volt free contact. The minimum open or shut time should not be less than 0.1 seconds.

To use Volume set Option 22 to '1'. Default is '0'.

Connecting the Flow Meter

Option 38 controls which input the flow meter should be connected to. Connect the flow meter to the Remote Stop input (across C2" and "I1"), if Option 38 is set to '0'. Connect the flow meter to the Remote Start Input (across "C2" and "I2"), if Option 38 is set to '1'.

In the example below, valve 1 is set for 11,000 litres and valve two for 5,000 litres with a flow meter giving one pulse per 10 litres

VALVE	1	2	3
	1100	0500	0000

Flow Meter or Cable Failure

If the controller does not receive a pulse for 15 minutes it will stop the irrigation program.

Flow Meter input (Option 38)

The flow meter used for irrigation by volume is normally connected to the remote stop input. This can be changed to the remote start input by setting Option 38. Set Option 38 to '1' if you want the flow meter to use the remote start input. Set Option 38 to '0' if you want the flow meter to use the remote stop input.

1. INSTALLATION OPTIONS

Battery Fitted (Option 19)

Option 19 should always be set to '1'. This tells the controller a battery is fitted.

Low Current Detection (Option 20)

This option will make the controller advance to the next valve in the program if less than 0.1 A is being drawn from the active valve output.

Set Option 20 to '1' if you want the controller to advance on a low current condition. Set Option 20 to '0' if you do not want controller to advance.

Default is '0'.

Remote Stop Option (Option 27)

This controls whether irrigation programs should freeze or permanently stop when the remote stop input is activated.

Set option 27 to '0' to freeze irrigation programs. Irrigation programs will start again from the point at which they stopped when the remote stop condition is removed.

Set option 27 to '1' to stop irrigation programs. Irrigation programs will not automatically start again when the remote stop condition is removed.'

'Low Tank' Display (Option 43)

Option '43' changes the remote stop input message to 'Low Tank'. To display 'Low tank' instead of 'Freeze' or 'Stop', set option '43' to '1'. Default is '0'.

Light Sensor Attached (Option 21)

If a light sensor is attached to the controller, then this option should be set to '1'. Default is '0'. See separate 'Light Sensor' manual.

EC Controller Attached (Option 32)

If the Heron MPD5 EC controller is attached to the controller, then this option should be set to '1'. Default is '0'. See separate 'MPD5' manual.

Battery Powered Controller - Conventional Valves (Option 13)

This option is only applicable to battery powered controllers. This option should be set to '1' if the controller is a battery powered controller controlling conventional 12V DC valves . Default is '0'. See separate 'Battery Powered Controller' manual.

Battery Powered Controller - Latching Valves (Option 30)

This option is only applicable to battery powered controllers. This option should be set to '1' if the controller is a battery powered controller controlling using latching solenoid valves. Default is '0'. See separate 'Battery Powered Controller' manual.

Display Communications Errors (Option 23)

This is for the manufacturer's testing purposes only. This option should always be set to '0'.

10. FUSES

Controllers are equipped with the following fuses.

Model	Mains Input Fuse	Main 24V Supply Fuse	24V Output Fuse(O2)	Valve Output Fuse
MCI-8AC/ MCI-4AC	0.5A left of transformer	1.0A F2	0.1A F3 on right	0.6A Electronic
MCI-96AC/ MCI-12AC	0.5A left of transformer	2.0A F2	0.1A F3 in middle	1.0A Electronic
MCI-96DC	0.5A left of transformer	2.0A F2	Uses F3	1.0A F3 in middle