Installation

- Insert the Surveyor CD in the drive.
- Installation should begin to run automatically in a few seconds.
- If Autorun is disabled, or the installation does not begin in a few minutes, open Windows Explorer (right-click the My Computer icon, and then left click "Explore"), and locate the Surveyor CD drive.
- Locate the file on the CD called "SurveyorInstall.exe", and double-click it.

Either method will begin the Surveyor installation wizard. The wizard will advance through a series of steps, including asking for your name and company, etc. When each step is complete, click "Next" until the wizard completes the actual installation.

The wizard will normally install Surveyor in the folder, "**C:Program Files\Surveyor**".

We strongly recommend that you use this suggested location for the Surveyor installation (simply click Next on this screen).

Basic Navigation

Basic Navigation

Mouse operations

Function keys

Mouse operations
"**Click**" will always mean "left" click with the left mouse button. [Left-handed users often switch the mouse buttons, so translate accordingly.]

"**Right-click**" always means click with the right mouse button (unless buttons are swapped for left-handed use, as above).

Like many Windows-based programs, right-clicking on an object often brings up drop-down menus, and then a [left] click in that menu makes a choice.

"**Double-click**" will always refer to rapidly double-clicking the standard left mouse button. There are no right-double-click functions in Surveyor.

"**Click and Drag**" means to click and hold down the left mouse button on an object, move it to a new location, and then release the button.

"**Highlight**" means to click an object once, so that it appears in a colored block. Some text words must be highlighted by clicking and holding the left button in the word, and dragging the pointer (cursor) over the whole word. Then the original text can often be replace by typing in the highlighted area.

"**Check**" and "**uncheck**" indicate that you click in a box (to place or remove a check mark or x) or a circle, to place or remove a dot.

"**Tree**" or "tree-view" refers to a list of items which are displayed according to their order and "rank". Usually, there are + and − signs next to items in the list. Click the + to expand the item, and see the other objects below it (the + will change to a − after you click it).

Objects with items underneath them are sometimes called "parent" items; the objects at lower levels are their "children". Objects which are equal to one another in rank are called "peers".

 Function keys

Function keys
Windows keyboards usually have a series of function keys, labeled F1, F2, etc.

In Surveyor, **F1** will start the online **Help**.

F2 is a shortcut for the **Back** button. If you are switching between two screens frequently (such as Controller Configuration and Hydraulics, during setup), you can use F2 to toggle back and forth between them. The Back function only goes back one level, so pressing it repeatedly will switch back and forth between the same two screens.

 Launching Surveyor

Launching Surveyor

 Unlocking the Installation

 Opening Surveyor

 Save

 Overview screen:

Unlocking the Installation
After installation, you will need to unlock the software.

□ In Windows Explorer, locate the Surveyor directory under C:\Program Files.
□ Find the file called "License Manager.exe", and double-click it.
□ This will generate an Installation ID, which is a long series of numbers.
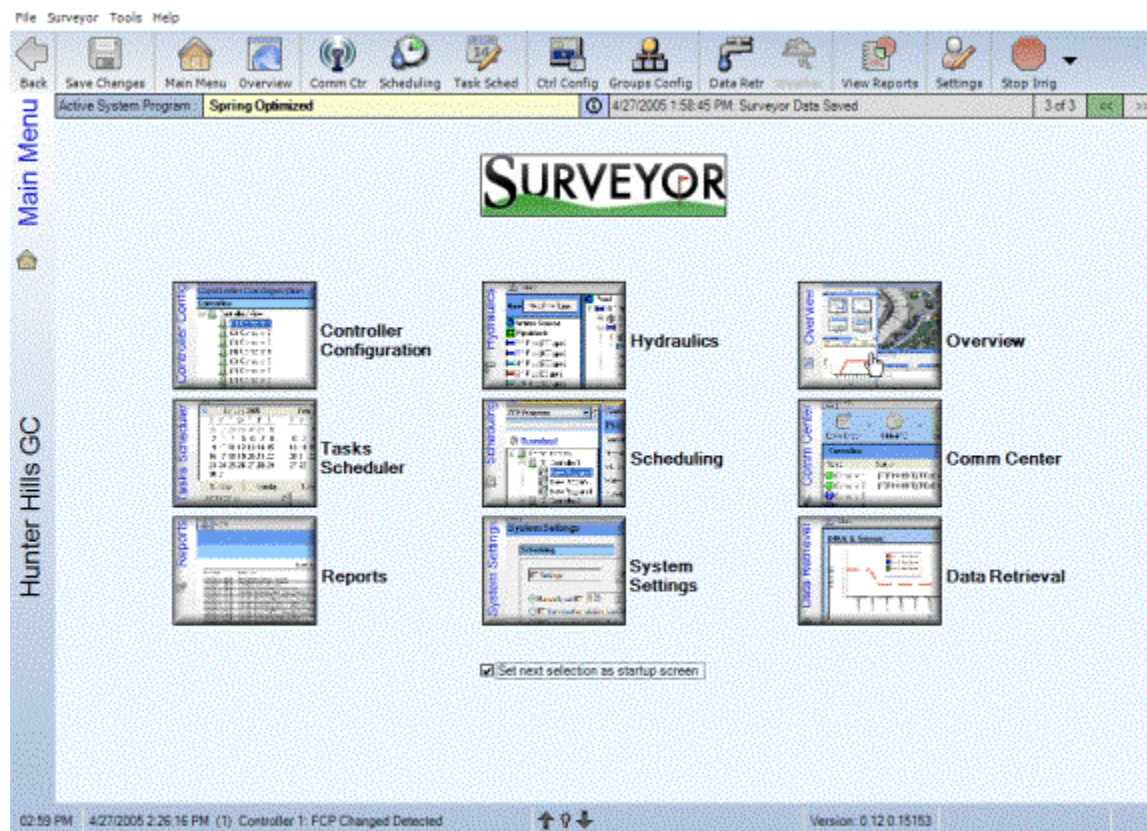□ Call your Hunter Field Service Manager, or Hunter Technical Services at (760) 591-7383, with this number ready.

They will be able to supply you with an Unlock Code, which you must enter exactly in the License Manager (including all dashes).

☒ Opening Surveyor

Opening Surveyor

Double-click the Surveyor icon on your desktop.
Surveyor will first open to the Main screen.

Near the top of the screen is a toolbar with various buttons for common screens and functions. The upper left button is "Back", and clicking it will take you back to the screen you have just left (note that Back only goes back one screen. If you keep clicking it, you will toggle back and forth between the first screen and the previous screen).

There is also a **Main Menu** button (looks like a house) to provide instant access, from anywhere in the software, back to the Main screen. If you are ever lost or confused, you can click the house, and return to the Main screen.
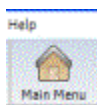

The buttons on the Main Menu screen contain pictures of common screens in Surveyor setup and operations.
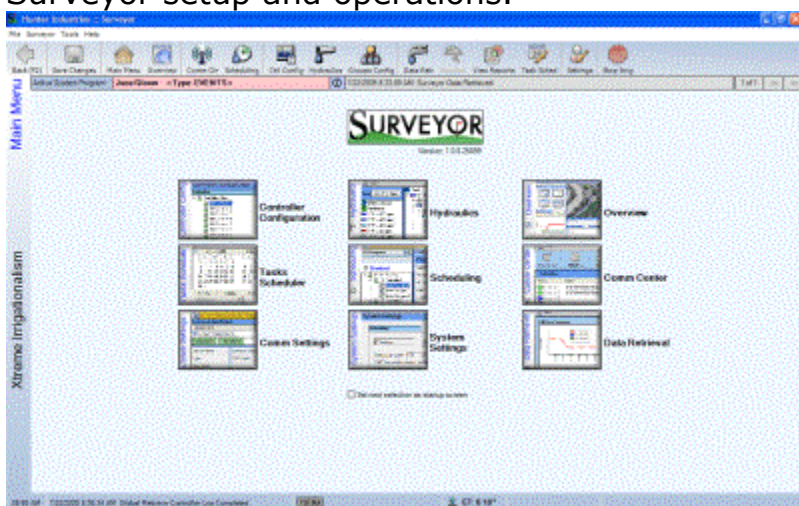

If you click on one of the buttons, you will go to the screen shown in the button (try it- you can use the Back button on the top left of the toolbar to return to Main, and you can use the F2 function key as a shortcut for "Back").

You can configure your own Main screen with any buttons in any order. Right-click on any of the buttons, and a drop-down menu will appear with other screen shortcut names.
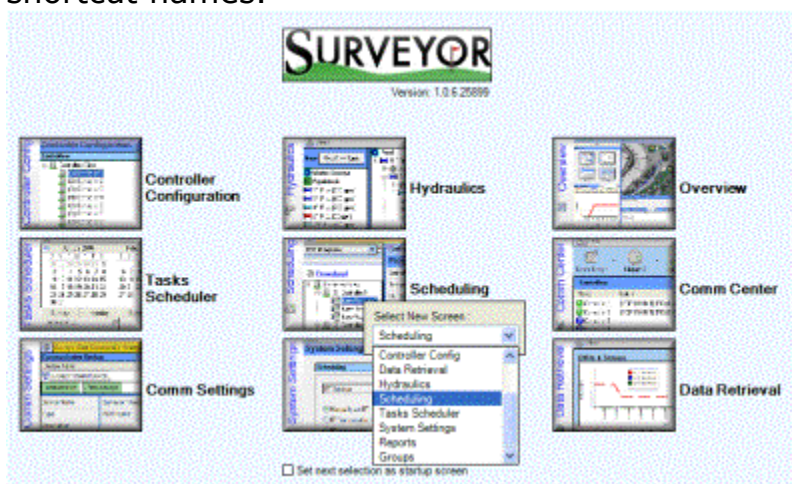

You can select any of the screens to replace the one you have right-clicked, to customize the Main screen with any buttons in any order.

You can also select one of the screens for Surveyor to open automatically at start up (the next time the software is opened). To do this, check (click) the little box at the bottom of Main, and then click the button for the screen you want to start with in the future.
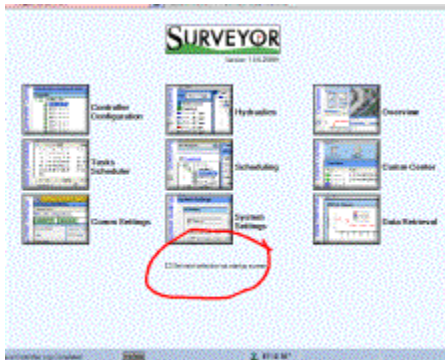

The **Overview** screen is a good startup screen, once your system is set up and operational. During the set up process, you may want to set one of the other screens as your opening screen. You can change this at any time with the check box on the Main Menu (check again, then click a different screen).
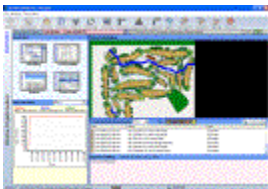
Overview Screen

At the very top of the Surveyor screen is a word menu, including **File**, **Surveyor**, **Tools**, and **Help**. Clicking any of these buttons will also show a drop-down list, and you can click any item to go that function.
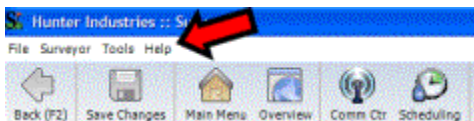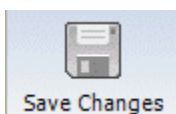

You can use any of these methods to navigate around Surveyor.

☒ Save

Save

The Save button is in the toolbar at the top of the screen (you can also choose Save under the File menu). Whenever you have made significant changes, or a large number of changes, click Save. You don't have to wait until you are finished with all of your changes to click Save. Whenever you are interrupted while in the middle of making changes, it is wise to Save, so that you do not lose all of your

work.

Caution: If you are making experimental changes just to see what happens, or you are not sure whether you want to keep the changes, do not click Save. As soon as you click Save, your changes are permanently in effect and your old information is replaced.

***Note: Some setup screens (Data Retrieval, Map, Comm Settings) have their own Save buttons for certain setup functions.***
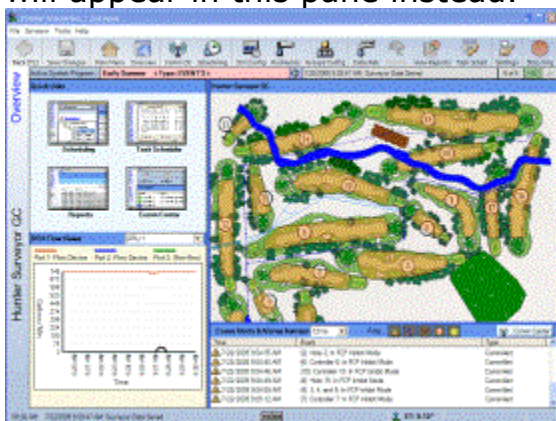
 Overview screen:

Overview screen:

The Overview screen is designed to be your "window" into the real world, when you are not actively editing the irrigation system. It is divided into several panes of information, and provides shortcuts to some of the most common functions in the software.
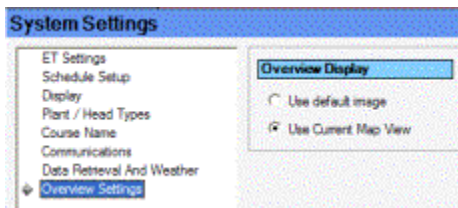
The large center view pane has a Surveyor golf irrigation graphic.
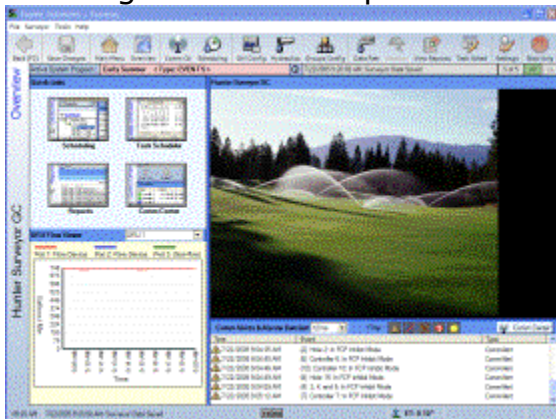
If you opt to create graphics of your course to operate from, your course graphic will appear in this pane instead.


You can select this option from System Settings, in the Overview Settings.

The upper left has shortcuts to some of the most commonly used screens in a working Surveyor system, including Scheduling, the Task Scheduler, Reports, and the Communications Center. Clicking on any of these icons will take you to that screen.
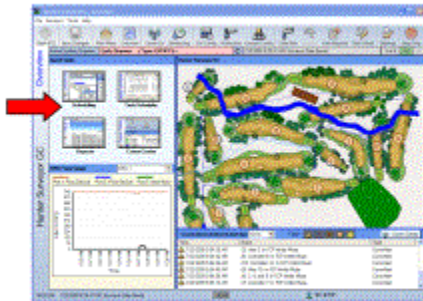

The lower left pane is reserved for "live" Data Retrieval information. If you have configured a Data Retrieval unit with flow sensors in your system, the current actual flow will be displayed here. Clicking in this pane will take you to the Data Retrieval screen, Current Readings tab.
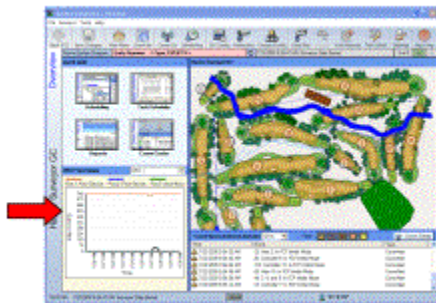

Beneath the graphics pane, you will normally have a communications events viewer. This shows current and recent communications activity in the system. Clicking the Comm Center button will take you to the full version of the Comm Center. Above it are filter buttons, for certain types of communications events.
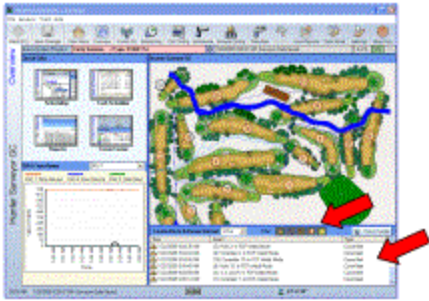
If you have a Weather Station installed, a weather status pane will appear above the communications events viewer. This will show the latest readings from your Weather Station sensors. Clicking in this area will take you to the Weather screen.
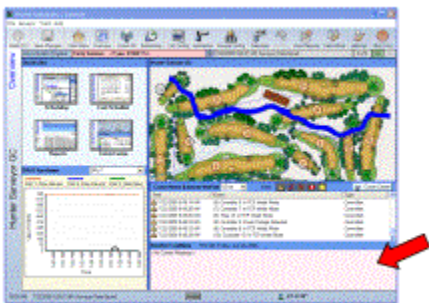
The current active System Program is always displayed in the upper left.
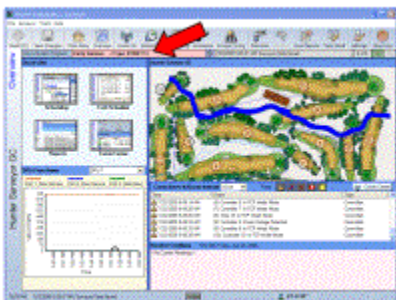
The red and green arrow lights at the bottom center show communications activity, including transmit and receive signals. These apply to both hardwired and radio communications with controllers or Data Retrieval Units.
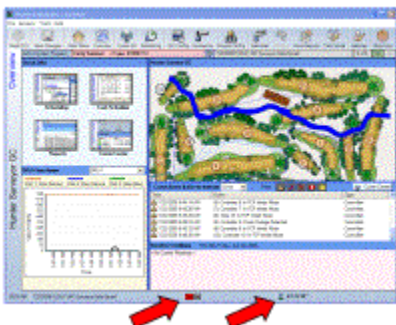
System ET is always shown at the bottom of the screen. Click it to jump to the ET settings.

Setting up Surveyor

Setting up Surveyor

Quick Set Up checklist (Save after every software step, or whenever you have entered a large amount of information). Complete these steps in order for smoothest start up.

- ❑ Connect all hardware.
- ❑ Address all Field Controllers (at controller keypads).
- ❑ Install Surveyor software and obtain Unlock Code.
- ❑ System : Language & Measurement.
- ❑ Comm Settings: Communications port settings.
- ❑ Comm Center: Controller Search (optional)
- ❑ Controller Configuration: Add New Controllers (if Controller Search not used).
- ❑ Comm Center: Communications check.

If controllers have previously been operational in standalone mode:

- ❑ Comm Center: Global FC/Receive Programs.
- ❑ Save As (new System Program).

If controllers are new:

- ❑ Scheduling: Select/Create System Program, then Add New Programs, or Add New Programs with Wizard (these commands create Field Controller Programs for fastest start up… see Event mode section for advanced programming).
- ❑ Comm Center: Global FC/Send Programs.
- ❑ Add Data Retrieval, Weather Stations, other devices.

System Settings

Comm Settings

To find the correct Com Port, use the following procedure:

Setting Up Controllers

If controllers are already installed…

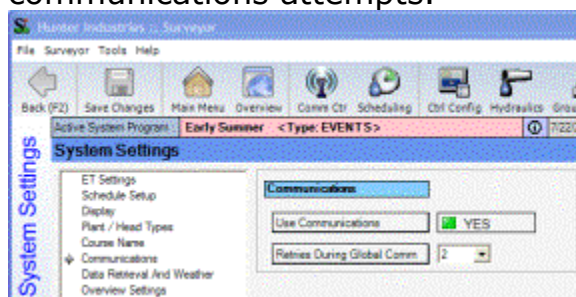Communications Check

System Settings

You can get to System Settings from the icon on the tool bar, the Main shortcut buttons, or the drop-down menu under the word "Surveyor" in the menu at the top of the screen. This is the first item in setting up a system.

The System Settings screen contains several menu items on the left, and clicking one to highlight it will show the different settings and options available in the open space on the right.

Click once on **Display** to set your language and measurement unit preferences. Language always starts at English, and Metric is set to "no" (red button). You can choose another language by clicking the down arrow next to it, and you can choose Metric measurement by clicking the button (it will turn green when Metric is selected).
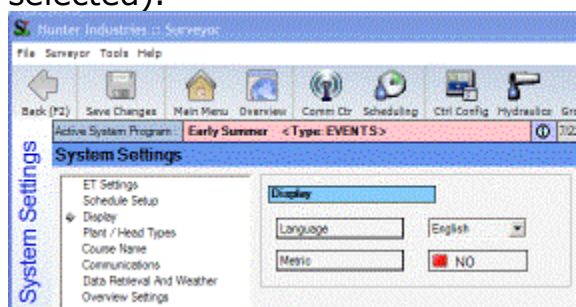
Click once on **Communications**, and verify that the Use Communications button is green (if not, click the button and save). The only time Use Communications should be off (red) is when you want to work with the software, and you are not connected to a central interface. For demonstrations, or setting up a system off-site prior to actual installation, turning Use Communications off will prevent unnecessary communications attempts.

Remember to **Save** before you leave, to keep your selections. For a more complete description of System Settings, see System Settings section.

 Comm Settings

Comm Settings

The next step for a quick start up is to set your communications from the computer to your controllers and other devices. To do this, the central interface must be installed, connected to AC power, and turned On.

The central interface must be connected to one of your computer's serial ports with

a serial cable. The serial ports are type DB9, 9-pin connectors with a rectangular shape (rounded on two corners), and there may be more than one on your computer.

Laptop computers may not have any serial ports at all. Surveyor was not specifically designed for laptop computer operations, but should work with good quality USB to Serial adapters, available from various third party vendors (one such adaptor is Belkin Model F5U103). Once these adaptors are installed, they will also use a Com Port setting, like a standard serial port.

You can try a quick communications check to see if Surveyor will work with your current settings. With the central interface connected and powered up, open Surveyor and click the Comm Ctr button.

Click the Comm Check button at the top of the Comm Center:
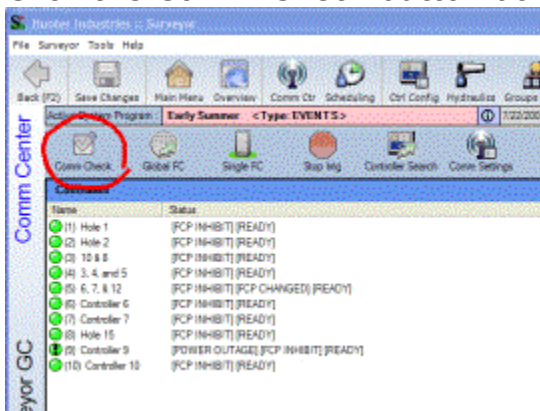
Surveyor will attempt to communicate with the field controllers. For setup purposes, it does not matter if they respond or not, because you only want to see whether the signal is reaching the TriSend, or central interface. You can observe the lights flashing in the central interface enclosure to verify whether the computer signal is reaching the interface. If the system is radio-equipped, you can use a handheld radio on the same frequency to hear the TriSend communications.

If the lights do not flash, you will need to change the **Com Port** setting.

Locate the button near the top of the Comm Center called **Comm Settings**, and click it.
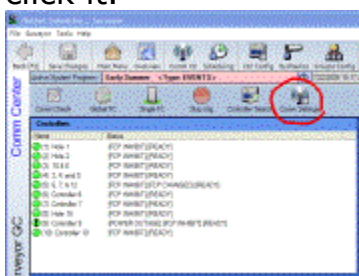
The Comm Settings screen sets basic communications and is normally only adjusted once, at setup.
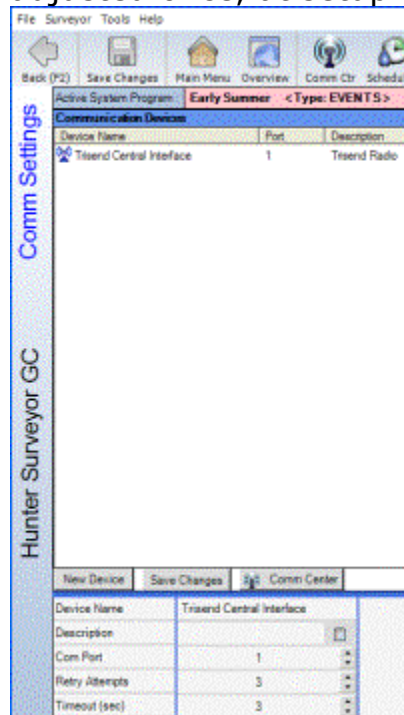
A central interface device will already be created for you, shown in the center as "TriSend Central Interface". Click once on this name to highlight it.

You must configure the Com Port on your computer so that it can connect to the central interface. Each computer is different, so you may need to try different settings until one works.

Technically, Surveyor uses serial communications to connect to the central interface. In Windows, this is called a Com Port. Modern computers may have 16, or more, possible Com settings, but usually one of the first four will work.

The default setting is to "1" which represents Com 1 in your computer's Windows system settings. If your computer has an internal modem, the modem is usually set to at least one of the Com Ports, so it will be unavailable for Surveyor.

To find the correct Com Port, use the following procedure:

To find the correct Com Port, use the following procedure:
- ❑ Highlight the TriSend Central Interface (click on it once).
- ❑ Change the Com Port setting in the lower left corner to 2.

- ❑ Click the Save Changes button.
- ❑ Return to the Comm Center and repeat the Comm Check.
- ❑ If Surveyor detects that the Port you have selected is incorrect, it will generate a "Save Failed" message. This means the Com Port is unavailable, and you can try another Port without bothering to run the Comm Check.
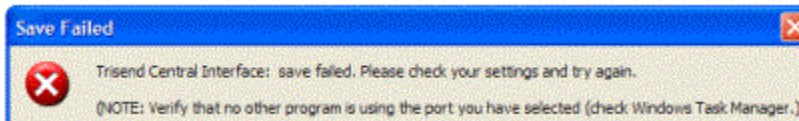
- ❑ If this is unsuccessful (no lights flashing in interface), return to the Comm Settings screen and repeat the process with Com 3. Continue until the central interface lights flash during a Comm Check (or you can hear the TriSend communicating), and then save that Com Port setting.

Generally, the correct setting will be one of the first 4-5 ports (Com 1-5).

The other fields at Comm Settings are not vital to system set up. Hunter recommends leaving Retry Attempts and Timeout at the default settings of "3" each, unless communications difficulties are encountered.

Setting Up Controllers

Setting Up Controllers

The next step is to create, or find, your field controllers. There are two possibilities in the field: you already have the controllers in place with addresses set in the controllers, OR you are setting the software up first, and plan to address the controllers later.

If controllers are already installed…

If controllers are already installed…

Each controller must be uniquely addressed, with a number between 1 and 999. Controller addresses are set at the controller keypad, and Surveyor software needs to use addresses which match the controller addresses in the field exactly.

You cannot ever use the same controller address number twice. There can only be one Controller number 22, for instance.

They do not have to be numbered in any order. They could be 1, 12, 36, 57, etc. Some golf courses number them for the hole of golf, and add other digits if there are more than one per hole (Hole 14 could have 141 and 142 on its two controllers, for example). Use whatever works for you.

You do not have to enter zeroes in front of single digit numbers. Controller 1 just gets "1". Controller 27 gets "27". Controller 999 gets "999".

If you have selected the Com Port and connected the TriSend (including any radio antennas and hardwired cable), you are ready to let Surveyor find the controllers for you.

At the Comm Center, locate the button at the top called "Controller Search". Click Controller Search, and prepare to wait several minutes while Surveyor locates the controllers.
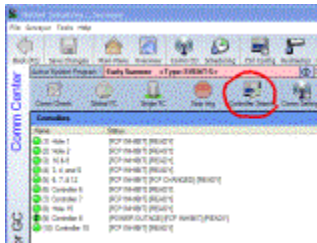
Surveyor will now attempt to locate all the controllers on its own. If they have an address and their communications are working, they should all be found. This process can take several minutes or even longer, depending on the size and type of the system.

Surveyor will start asking for controllers to call in and identify themselves. As it locates each controller, an entry will appear in the Comm Center screen for that controller, with its name as "Controller xx" (where xx equals the address) and other information.

Surveyor will let you know when it thinks it has found all the controllers.

Then, go to the Controller Configuration screen to add the "found" controllers to your database.

It is very important to make sure that all controllers have been found. The number of controllers on the final list should equal the number of controllers you have installed and addressed.

If some controllers are missing from the list, you need to find out why. Possible causes are:

Controller not installed yet. You can add more controllers at any time (see Controller Configuration).

No address assigned to controller: An un-addressed controller cannot be communicated with. Find the un-addressed controller in the field, and enter an address (see controller manual for procedures).

Duplicate addresses assigned in the field: Each controller must have a unique address. If two have the same address, they will both receive the same information from the central (even though they operate different irrigation devices). The central will never know which one is calling or responding. You must find any duplicate addresses and correct them. This may require visiting each controller in the field.

Poor communications at the controller: If the controller communications are

defective, it may not be able to hear or respond to the Controller Search request. Verify that the communications components are connected and operating correctly. If the communications are radio, it is also possible that the communications are operating, but the controller has been located in a poor position for wireless communications (this is supposed to have been verified prior to installation by a Site Survey, but has been known to happen). In these cases, either change the antenna type and/or position, or relocate the controller to a communicable location.

Consult the controller and central interface manuals, or contact your Hunter technical representative, for hardware troubleshooting assistance.

If the Controller Search quits and there are still unfound controllers in the field, you can add them to the software manually (see Controller Configuration). You will still need to troubleshoot the communications before they can operate, however.

If you are setting up the software in advance, and Controller Search is not possible: You can set up the controllers in the software without actually communicating. This may also be necessary if Controller Search did not successfully find all the controllers.

Controller Configuration. Go to the Controller Configuration screen (click Main, then click the Controller Configuration button).

At start up, this screen will be mostly empty, with an entry near the top left called Controllers View. If you have saved the results of a Controller Search, it should already have some controllers listed on the left side of the screen.
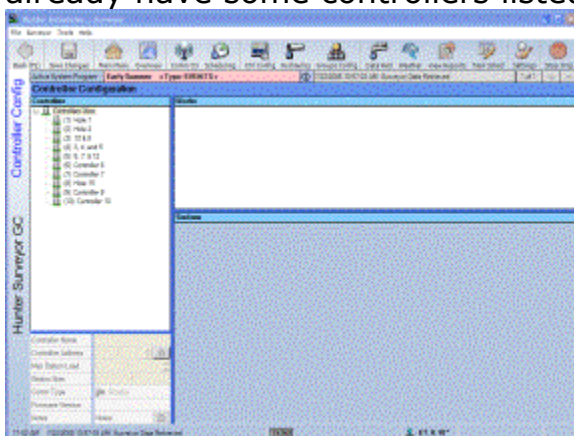
Right-click in or near Controllers View, and a menu will offer choices. Click "Add New Controller" and the Add New Controller window will appear.
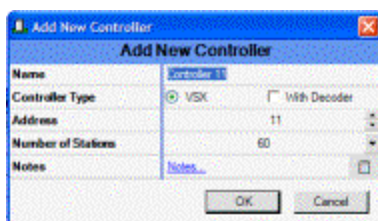
Fill in the information in this window. Only two of the items are required for basic operations: Controller Type, and Address. It is best to supply all the information at this time, although you can add it later. However, it MUST have an address to communicate (even in the future), and the Type of controller will insure that you receive the correct types of scheduling screens for the selected controller.

Continue adding controllers until the system is complete. Save before exiting this screen. You can edit, add, and delete controllers at any time in the future, but this is the bare minimum to get started.

Gif

There are additional hardware and communications settings for other devices, such as weather stations and Data Retrieval units, but they will be covered in detail elsewhere. Once the computer's communications and the controllers are set up and communicating, you can start basic irrigation.

When the controllers are installed and communications are implemented, you need only make sure that the "real world" controllers are addressed in the same way that they are set up in the software.

Communications Check

Communications Check

The best way to verify a successful installation of the communications network after the settings above is to run a Comm Check.

Go to the Comm Center, and click the Comm Check button   .
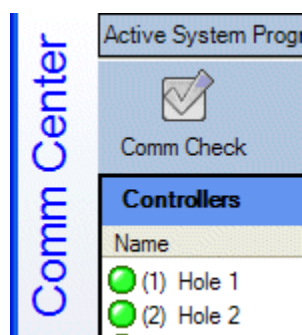
The software will attempt to communicate with each device in the system. At the bottom of the screen, you should see the TX and RX lights flashing, showing transmit and receive activity. The red light shows that the software is transmitting, and expecting a response. The green light shows when a response is actually being received.

Note that these lights are repeated in the central interface, and in the controllers in the field. If communications fail, tracing these lights can pinpoint the source of the problem (see additional info in Communications Troubleshooting).

As the Comm Check progresses, the individual communications are displayed in the lower half of the Comm Center screen. Also, as each controller responds (or fails), the LED next to it in the upper left is updated for Green (good), Red (communications failures), or a ? (if the controller has never been communicated with). The text next to the LED will give indications about the controllers' status.
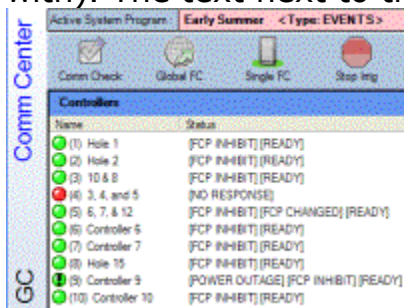
A perfect communications check will have all green LEDs. Until the system can repeatedly run perfect communications checks, it cannot be considered fully reliable.

Name	Status
(1) Hole 1	[READY]
(2) Hole 2	[READY]
(3) 10 & 8	[READY]
(4) 3, 4, and 5	[READY]
(5) 6, 7, & 12	[READY]
(6) Controller 6	[READY]
(7) Controller 7	[READY]
(8) Hole 15	[READY]
(9) Controller 9	[READY]
(10) Controller 10	[READY]

 Irrigation Scheduling

Irrigation Scheduling

Once you have reliable communications, you can program irrigation from the computer.

If you were already using the controllers in standalone mode (before the Surveyor

software was set up), it is also possible to retrieve those programs from the controllers to the computer, and save them as a start up program (see Retrieving FCPs).

IMPORTANT: If you want to retrieve existing programs from controllers that previously operated as standalones, retrieve those programs FIRST, before sending any new programs to the field.

If you send new programs to the field, they will replace the programs you have created at the controller keypads, and there will be no record of those programs.

Irrigation Modes

Field Controller Programs (FCP mode)

FCP advantages

Event Mode

Event mode advantages:

Irrigation Modes

There are two modes of automatic irrigation in Surveyor, "FCP" and "Event" mode.

Field Controller Programs (FCP mode)

Field Controller Programs (FCP mode)

These are traditional sequences of stations, where you specify the water days, the start times, and a sequence of stations and their run times. Depending on which controllers you have, they may have up to 64 programs (VSX) per controller of this type.

In FCP mode, stations are viewed as members of programs, and programs belong to field controllers.

FCP programs are not automatically flow managed, and you must spread the flow for these programs over the watering period manually, by adjusting their start times.

FCP advantages

FCP advantages

Absolute human control over when stations run.

Requires very little set up information… all you need are the controller and station numbers.

Can be created or edited at the controller as well as the computer, and can be retrieved from the field by the software.

[x] Event Mode

Event Mode

In Event mode, each station is assigned irrigation time and scheduled independently by the computer, based on various factors.
In Event mode, stations are viewed as members of Plant Management Groups (like Greens, Tees, and Fairways) and are attached to the hole of golf they irrigate. In Event mode you only need to manage plant irrigation, and the computer figures out which stations are connected to what.
Event mode is always flow-optimized over the entire course, to individual station level.

"Events" are any station start of any kind. Technically, whenever a station starts in the FCP mode, that is an event. In FCPs the events occur in pre-programmed sequences, and the start time of the sequence is the most important scheduling factor.
In Event mode, the station-level events themselves are juggled, shuffled, and organized individually, giving Surveyor the most control over flow optimization.
Event mode groups stations by what they irrigate instead of when they start.

[x] Event mode advantages:

Event mode advantages:
Perfectly balanced flow at safe velocities.
Irrigates in shortest possible time.
Easiest type to adjust for golf areas (once data is entered).
Event mode irrigation requires a very complete setup of station, plant, and hydraulic information, and cannot be edited from the controller.
Event mode may not be best-suited to special irrigation, such as overseeding.
Events may be viewed in the field, at the controllers, but they may not be changed or edited in the field.

[x] System Programs

System Programs

Fortunately, you can create and save both types of programs and change back and forth between them. You can schedule one type to follow the other automatically, even in the same irrigation day.

Every time you set up a watering scenario for the entire golf course, it is known as a System Program. The System Program is always one type or the other (FCP or Event).

System Program definition: The System Program is a complete set of irrigation instructions for the entire site (golf course) that fit a given watering need. This set of instructions can be saved under its own descriptive name (Spring, Summer, Overseeding, etc.). It includes all programs or events for all controllers.

There is no limit to the number of System Programs you can create and save. Some superintendents only use one or two System Programs, and modify them as conditions change. Others may create dozens of System Programs for various contingencies, such as changes in weather, special applications, or any other reason. They can then load a saved System Program for each condition.

Only one System Program may be active at a time. If you download an Event System Program, it will inhibit the FCP programs in the controller, and they will not run. If you download an FCP System Program, the Events in the controllers are turned off.

☒ Basic FCPs (Controller Programs)

Basic FCPs (Controller Programs)

Each VSX controller may contain up to 64 automatic Field Controller Programs (FCPs). VSX controllers can also have a special type of program called a "Preset", and each Preset also uses one of the 64 programs. You can make any combination of FCPs and Presets, out of the available 64 programs.

☒ FCP Rules

☒ Creating FCPs

☒ Creating and Selecting System Programs

☒ To create a new FCP System Program:

☒ Viewing FCPs vs. Event

☒ Creating FCPs

☒ Viewing FCPs by Controller

FCP Rules

An FCP program is a sequence of stations, which will begin irrigating at a Start Time, on a specified Water Day, and which will run each station listed in it, one at a time, for the specified Run Time.
FCPs can run any stations in any order. Each station can have its own run time. More than one FCP can run at once. VSX can run at least 12 standard solenoids

simultaneously (provided you have sufficient water pressure and flow). VSX decoder controllers can operate up to 20 solenoids at once.

The number of stations, and therefore programs, you can run at once is determined by how many solenoids are connected to each station output.

FCPs each have a maximum of 30 stations, or events.

FCPs never run at the same time as the "Event" mode of irrigating (see next section). The controller is always either in one mode, or the other. The mode can be switched automatically, based on the type of System Program that has been downloaded to it.

 Creating FCPs

Creating FCPs

Go to the Scheduling screen.
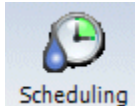
The upper left corner will always display the active System Program. Next to the name of the active System Program is a down arrow, and clicking it will allow you to view the other System Programs available.
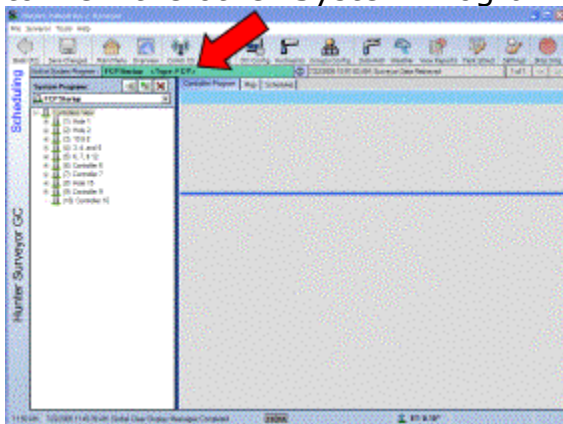
Surveyor will first open with sample System Programs of each type (FCP and Event) already created. They will not contain any irrigation information, however. You are free to use these, but you can rename them, or create your own.
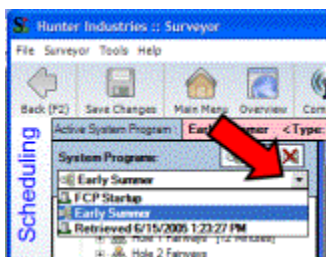
 Creating and Selecting System Programs

Creating and Selecting System Programs

To create a new System Program, click the button near the upper left of the Scheduling screen, Add New System Program.
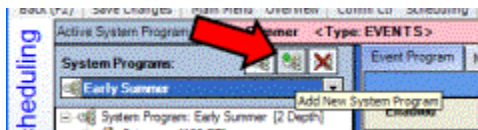
The Add New System Program window will appear.
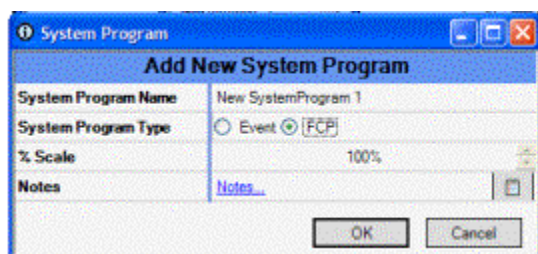
The Name will be highlighted and is automatically filled in as "New System Program 1). You can type your own name for the System Program, or leave it as is.
System Program Type is the most important setting. Choose Event or FCP for one of the two types of irrigation modes available in Surveyor.
Remember that you can only run one mode at a time (see Irrigation Modes for more information).
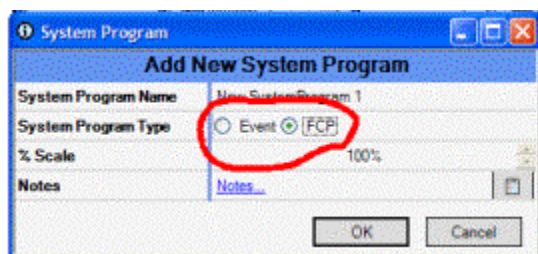
To create a new FCP System Program:

To create a new FCP System Program:

- ❑ Click the Add New System Program button.
- ❑ Type a name for your new System Program.
- ❑ Check the FCP button (for quick start purposes. There is no limit on the number of System Programs you can create, name, and save).

You may also add Notes about the new System Program. The Notes are optional, but nice for documentation purposes if you plan to create many System Programs. When the new System Program is named, and the mode is selected, click OK. The new System Program will appear in the System Programs window.
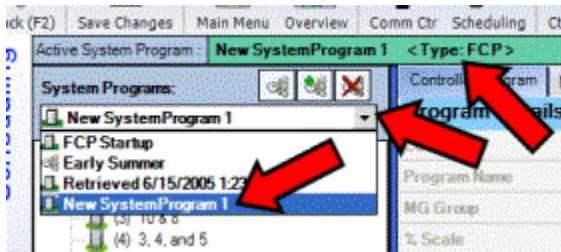
The drop-down arrow next to the System Program name allows you to view all System Programs. Whichever System Program name you click becomes the Active System Program, and is what will be downloaded to the field next.

All System Programs have an icon next to the System Program name, that indicates whether they are FCP mode, or Event Mode.
FCP mode: Controller icon (shows the irrigation is using Controller Programs).
Event Mode: miniature Groups icon (shows the irrigation is scheduled by Groups).
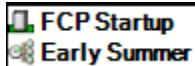
Once a System Program has been selected, the color-coded name of the active System Program appears at the top of most screens: Event Programs in red, FCPs in green.

The Active System Program is the one you select to appear in the System Program window. All others are available, but not currently in effect. You can, however, schedule another System Program to become active automatically, at a future time and date (see Task Scheduler).

 Viewing FCPs vs. Event

Viewing FCPs vs. Event

A new FCP System Program will display a list of all known controllers in the left window of the Scheduling screen, beneath the System Program name.
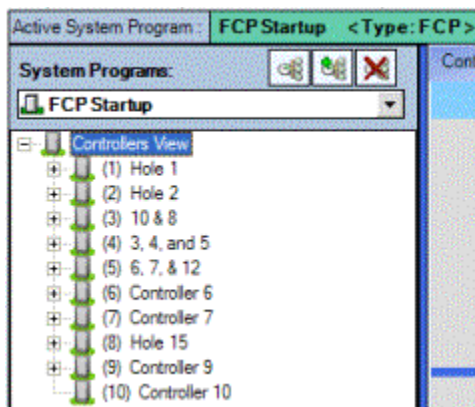
A new Event based System Program will display a list of all Management Groups in the left window of the Scheduling screen, beneath the System Program name.
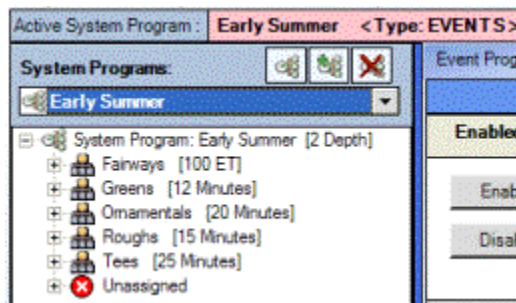
In FCP mode, the Scheduling screen has 3 tabs across the top of the right-hand pane, including the Controller Program tab, the Map tab, and the Schedules tab (in Event mode, there is a fourth tab for "Processing").
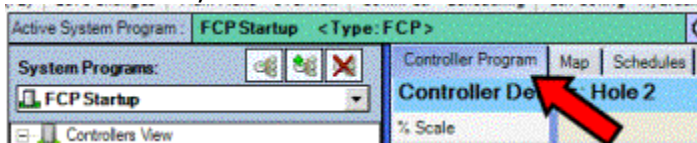
Click the Controller Program tab to begin creating Field Controller Programs.

FCP and Event Mode settings are completely different, from this point onward. Each has its own program creation screens and instructions.

☒ Creating FCPs

Creating FCPs

VSX controllers each have 64 Field Controller Programs, or FCPs. You don't need to use all of them (most users don't), but you can.

An FCP is a sequence of stations, which will run sequentially at a Start Time, on specified Water Days, for their given Run Times.

Example: Controller 1 has Program 1 set to run every day of the week except

Fridays. This is its Day Schedule.

Program 1 has a Start Time of 9:00 PM. It will begin at that time on any scheduled Water Day, as defined in the Day Schedule.

Program 1 contains stations 7, 5, 3, and 1. Each station may have its own run time.

At 9:00 PM on every day but Friday, station 7 will run for 12 minutes. Then, station 5 will run for 15 minutes, then, station 3 for 11 minutes, then station 1 for 12 minutes, and then the Program is complete.

Gif

Program 1 in this example is an FCP. You could have 63 others, per controller. All of the FCPs together, in all of the controllers, are what make up the "System Program".

FCPs don't really care or need to know what kind of valves, rotors, or other devices they operate. They will activate the station for the specified number of minutes, regardless of what is attached to them. For this reason they are often the first type of irrigation to be used, because you don't need to set up a complete station database.

First, make sure you are in an FCP System Program, or create a new one (see **To Create a New FCP System Program**).

Under the System Program name, you should see a list of all of your controllers (if you don't, see the Controller Search or Controller Configuration sections above).
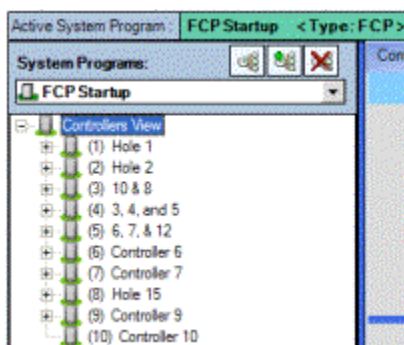
Click on the first controller in the list, to highlight it.

Then, right-click on it, and a drop-down menu will appear.

You can create a new FCP program from scratch (Add New Auto Program), or you can use the Wizard to create one for you (Add New Auto Program with Wizard). You can always modify it later.

Click Add New Program with Wizard, and the Program Wizard will appear. The

current System Program name will already be selected for you.
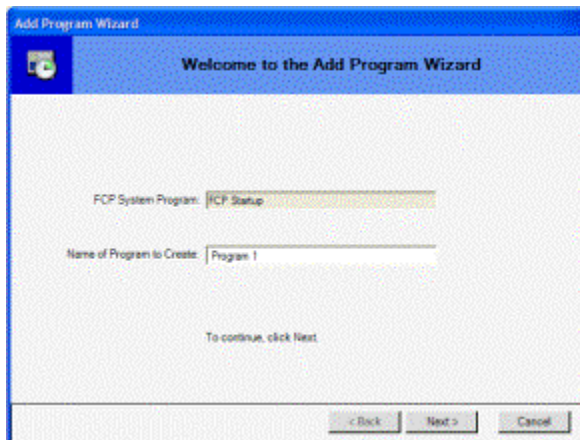
The "Name of Program to create" field will already be filled in with "Program 1" (or the next program number).

You can type a new name for the program right here, or change it later, if you wish. The program name can only be 10 characters long (this name will appear in the controller display after download, and VSX can only display 10 characters).

If the program is for the Greens on Hole 1, you could swipe the mouse over the name "Program 1", and type "1 Green".
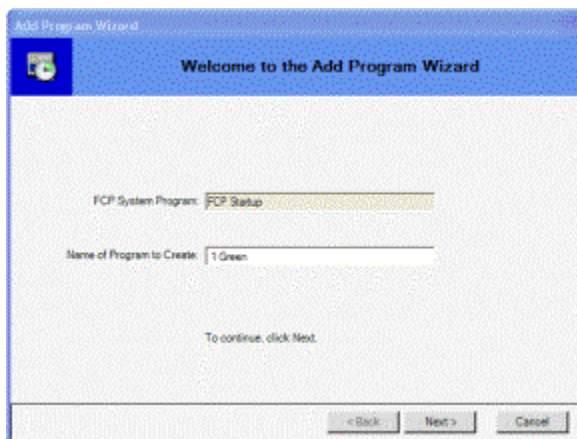
When the name is correct, click the **Next** button (if you have typed more than 10 characters including spaces, the Wizard will not let you move on until you have shortened the name).

The Wizard will present the selected Controller for the program. If it is the wrong one, click Cancel, highlight the right controller, and restart the wizard. If it is correct, just click Next.
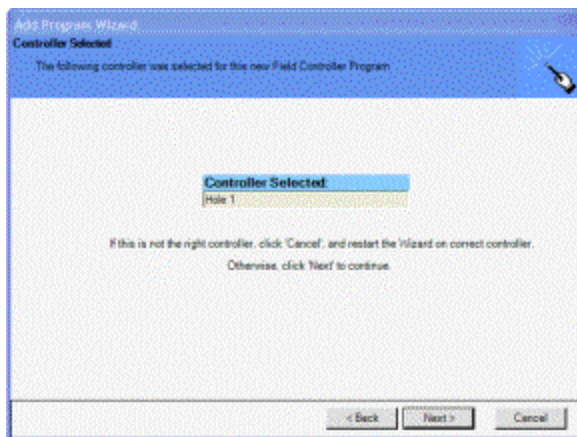
The Wizard will now prompt you to Select Stations/blocks, and will display the list of stations for this controller.
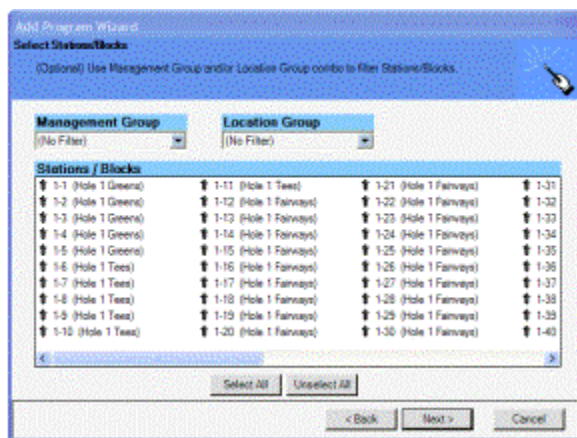
At the top are two filters, which allow you to see lists of stations of only a certain type, in certain locations. "No Filter" means you are viewing the whole list of stations in the controller.

The filters will not work until the station database has been completed (see **Controller Configuration**). They are not required for basic irrigation, but they are darned handy. If the Controller Configuration tables are filled out, and you only want to see stations on Greens, you select the Greens filter (under Management Groups) and only see Greens stations.
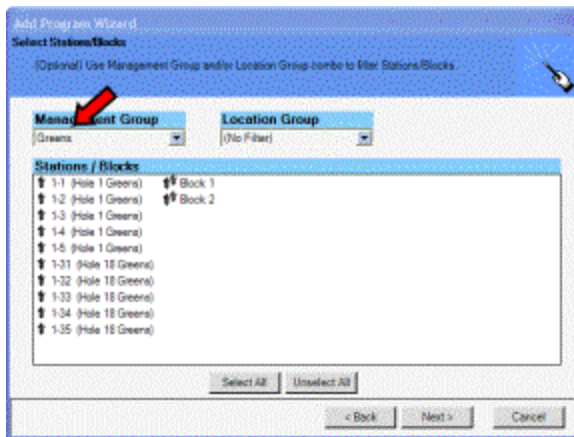
You could further narrow the selection with the Location Groups filter, to see only Greens stations on Hole 1, for example.

Select the stations you want to include in this program here (you can add or delete stations later).

To select multiple stations, hold down the Control key (Ctrl) on the keyboard while clicking on each station.
You can also click a station, then hold down the Shift key, and click another station in the list, and it will select all of the stations in between those stations. You can select a range of stations this way (with the Shift key) and then add others which are not adjacent by pressing the Control key while clicking them.
You can also click in a blank space in the wizard and drag a rectangle around a group of station names, and they will be selected.
If you want to include all the stations in the list, click the Select All button. All of the stations will be highlighted and included in the program.
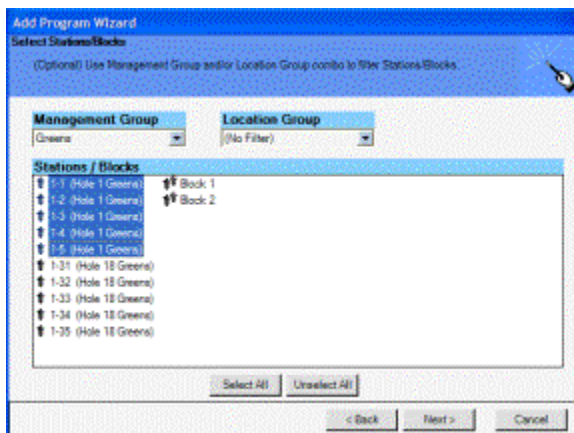
When you have selected the stations you want to include, click Next. The Select Program Details will appear.

These are the actual irrigation instructions for the FCP program, and they will already be filled in with some information. You can change any or all of this data, and you should review it carefully before proceeding.

The **Start Time** is when the program will begin. There is a default time (this is set in the System Settings screen), but you can and often should change it. Otherwise, all the programs will try to start at the same time.

Run Time is the time that will be assigned to each station in the program. This is only a base run time, and you can change each station later. Change it to a run time that it is typical for the stations you are including in this program.

Cycles will start at "1". This is the number of times the program will occur after the start time. This is often used when plants need more water than the soil can absorb in a single application. You can set up to 15 Cycles, or even Continuous Cycles (see Cycle Delay, and End Time).
Enter the number of Cycles you want for this program.

Cycle Delay sets the waiting period between each Cycle. This is time for the water from the previous Cycle to infiltrate the soil, before the next Cycle starts. If your plants need 20 minutes worth of water, but they are on a slope, the water may begin to run off after 5 minutes. In this example, you could set 4 Cycles and a Delay that was long enough for the 5 minute Cycle to soak in.
The Delay will occur between each Cycle.
You do not have to enter a Delay to use the Cycle feature. The stations in FCP programs run sequentially, so if there are many stations in the program, enough time may have elapsed by the end of the program for the first application (Cycle) to have soaked in. Then the multiple cycles can be allowed to run back-to-back. You will see effects of this setting after the Wizard is complete, and you can then change it if you want.

Pump Use refers only to the specialized 24VAC Pump/Master Valve output available in each VSX controller. If you are not using this connection, this setting does not matter. If you do use the connection to trigger a Pump Start Relay or Master Valve, setting this to Yes (green) means the Pump/MV output will turn on

whenever this program runs.

Schedule represents the days on which the program will run. In Surveyor, different schedules (or patterns of days) can be created and saved with descriptive names. Surveyor will always have a schedule called "Daily", which runs every single day. A Water Days table will appear below Schedules, showing the selected irrigation days pattern.

Only Schedules that are already created can be shown as choices in the Schedule drop-down menu. If you want to create a different Schedule for the program that you are creating in the Wizard, just leave the default selection (whatever is in the window) and finish creating the program, then edit the Schedule later (see Schedules Tab).

When the information is correct, press Next (you're almost finished).
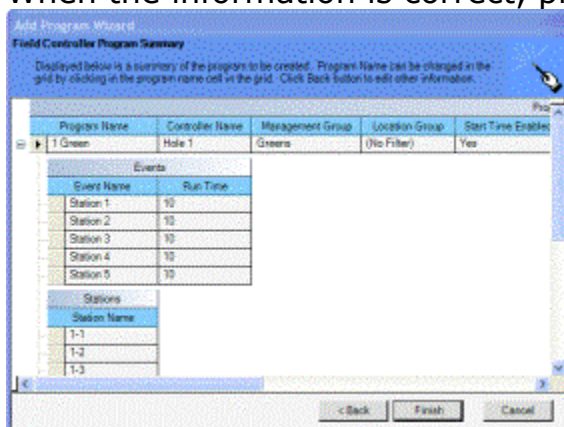
The Field Controller Program Summary displays the program, as it is about to be created. This is an opportunity to customize anything about the program before it is ready. You can type a new name for the program here. If you want to change the other basic settings, click the Back button in the Wizard, and make your changes.

When the program looks right, click the Finish button. Surveyor will return you to the Scheduling screen.
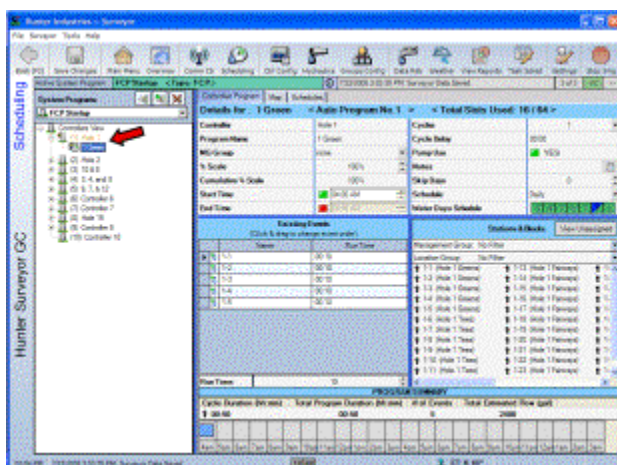
This is the new program, with detailed information in the window on the right. You can change any elements of it here, if necessary.

When it is correct, click Save.
Remember that it is not in effect until it has been downloaded to the controller. You can do this immediately, or let Surveyor download it automatically with the Task Scheduler function.

When a program is new, or has new, but unsaved changes, the color of its name in the tree-view on the left will change to gold.
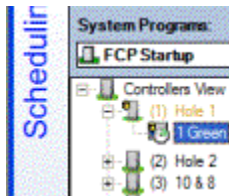
When you save the new information, the controller or program name turns black again.

 Viewing FCPs by Controller

Viewing FCPs by Controller

Click the + next to the controller name in the tree-view to expand the contents of the controller. All programs for a controller will be listed beneath it.

Click once on one of the program names, to highlight it. The right side of the Scheduling screen will display the exact information for that program.
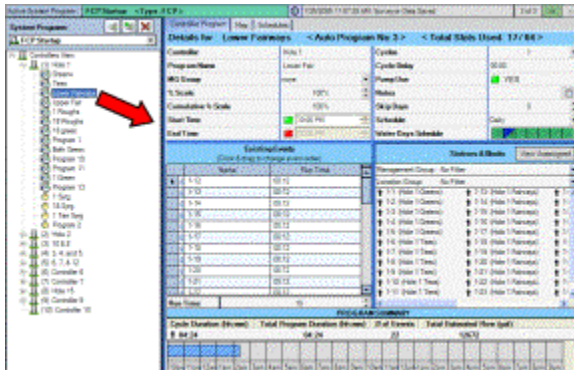
 VSX Special Features: Blocks and Presets

VSX Special Features: Blocks and Presets

VSX Controller features are documented in the Owner's Manual included with the controllers. The Controller Configuration and FCP Scheduling screens basically emulate the VSX controller.

VSX has two unique features which are represented in Surveyor. These features can be set up and used directly from the Surveyor software, as well as from the controller keypads.

 Blocks

 To create a Block

 Presets

 To create a Preset

Blocks

Blocks are an optional grouping of stations into a single unit, for programming purposes. You can electronically combine from 2 to 8 stations into a Block, which can then be assigned a single run time within an FCP (or a Preset). Blocks can also be started with Maintenance Radio commands.

Whenever a Block is activated, all stations within it start and run together, for the same run time.

Blocks can be used for several purposes. You can create Blocks of similar stations, with similar flows, and then sequence the Blocks in an FCP, like individual stations. This can move irrigation through an area in roughly equal blocks of flow.

You can also use Blocks for rapid syringeing of Greens or other areas. Since a single command starts all the stations at once, you can put all of the stations on a single Green in a block, and start the block for a single run time. All the heads will come on at once, run for the run time, and turn off at once. If you are trying to cool a green down between golfers, this is the fastest and simplest command to use.

In Controller Configuration, the upper right area is dedicated to listing and creating Blocks. This area will display any Blocks created for the controller selected on the left.
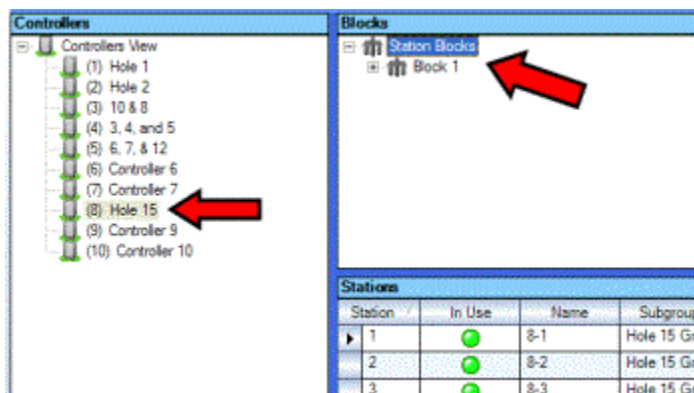
Blocks are also displayed in a tree-view format. If you click the + sign next to Station Blocks, all current blocks are displayed. If you click the + sign next to an individual Block, all of its member stations are displayed.
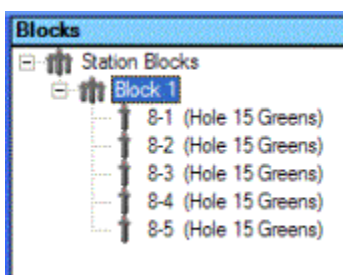
To create a Block

To create a Block

Right-click in the area to begin creating a Block.
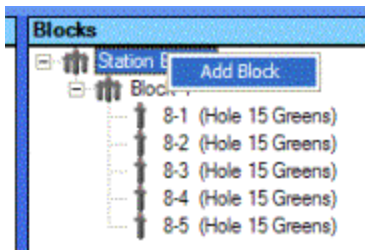
A new numbered Block will appear in the tree-view, and the Edit Block dialog window will appear.
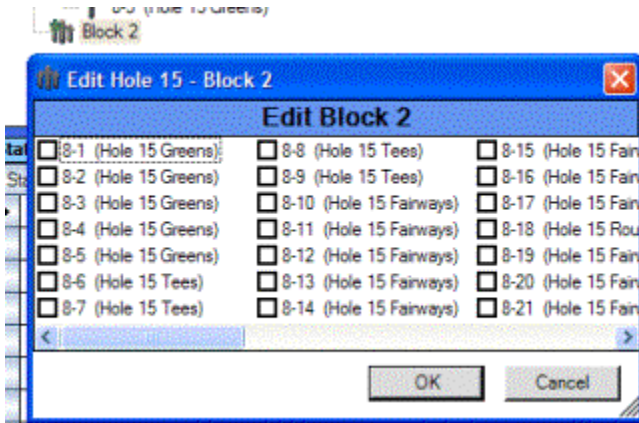
Each station in the controller will be displayed, along with its Subgroup information if that has been filled out.

Check from 2 to 8 boxes to group those stations into a Block, and click OK.
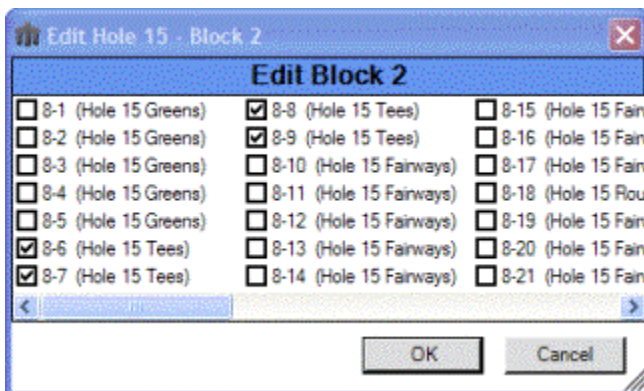
Make sure you do not include more stations than can be safely run at once!
When a Block is activated, the individual stations are actually staggered at 1-second intervals to prevent the simultaneous inrush of electrical demand. However, it is up to you to verify that you have sufficient water pressure to run the block of irrigation.

The new Block will appear in the tree-view.
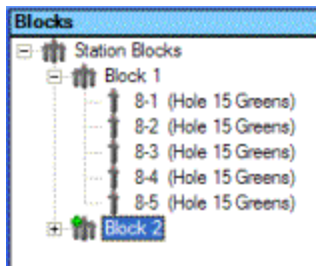
You can expand it with the + sign to verify its contents.
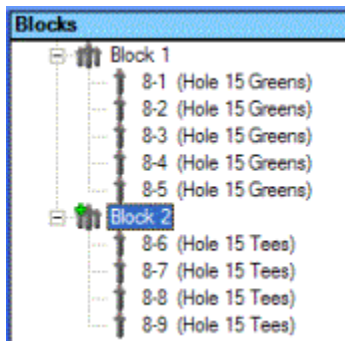
The new Block is now available when creating FCPs and Presets to include in sequences, just like individual stations. You can mix Blocks and individual stations within the same program, if you wish.

This Block will simply follow the stations, in the program.

 Presets

Presets

Presets are sequences of stations and run times, much like automatic FCP programs, except they do not run automatically. They do not have a Start Time or a Day Schedule.

Instead, Presets are special programs that you can start whenever you want, for common functions. Many operations, such as Greens syringeing, watering in fertilizers, or knocking dew or frost off of Tees, are repeated frequently. Rather than entering each station in a Manual start, consider saving these actions as named "Presets". Then you can start that Preset with a single command, whenever you need to repeat that function.

Presets can also include Blocks. You can save a Green's stations into one or two Blocks, and place the Block into a Preset. Then, with a single command, you can cool down the entire Green, in the shortest possible time. Start the Preset, all stations begin and run for 3 minutes, and turn off together.

Each VSX controller has 64 "programs", but they can be divided in any proportion between automatic FCP programs, and Presets. You could theoretically have 32 of each, or 63 of one, and 1 of the other. Presets are created and programmed very much like FCPs,

 To create a Preset

To create a Preset

Go the the Scheduling screen in an FCP System Program.

Right-click on the controller to which you want to add a Preset, and select Add New Preset Program.

Presets are distinguished from automatic FCPs by a hand icon. The new Preset will appear in the tree-view under the controller.
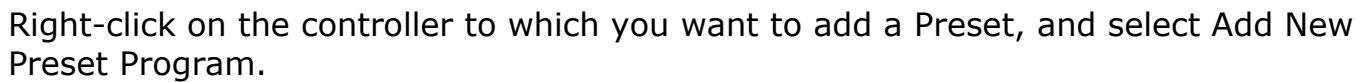
You can now click and drag stations and/or Blocks into the Preset to create the program. You can also adjust any of the details in the header area above, including Cycles and Cycle Delays.

The Program Name you enter must be 10 characters or less, so it will fit in the controller display.

Most of the same rules and features apply to Presets, as to regular FCPs. However, there is no Start Time and no Day Schedule. This specialized program will run only when you start it from the software, the controller keypad, or the Maintenance Radio.

The Preset must be downloaded (like any other Program) before it will exist in the controller.

Downloading

Downloading

Hunter controllers have Field Resident Memory. This means the information is downloaded to the controllers, and the controllers (not the computer) do the actual irrigating.
Downloaded programs do NOT require the computer to irrigate. Once they have been downloaded, they will run exactly as written.
New Surveyor programs do not affect irrigation until they are downloaded.
You can download new programs at any time, and you can also schedule them to download automatically.

You can download programs to individual controllers, OR you can download the entire System Program at once, to all controllers.

It is usually best to download entire System Programs at once. Depending on the size of the system and the status of communications, this may take from 1 to 20 minutes. The average Golf System Program probably takes about 5 minutes, to completely download all programs to all controllers.

To Download a System Program now:

Download Details

Retrieving FCPs (Uploading from the field)

To Download a System Program now:

At the **Scheduling** screen, verify that the correct System Program name is selected (the active System Program).
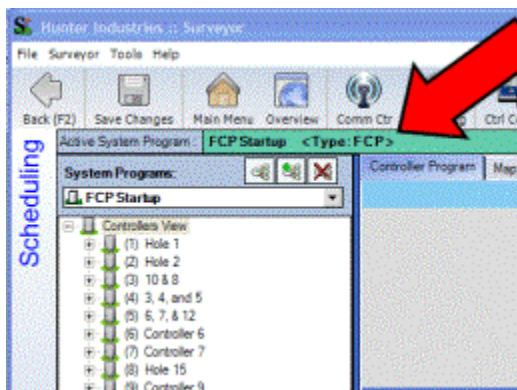
At the **Comm Center**, click the down arrow next to Global FC.
Click Send Programs from the drop-down list.
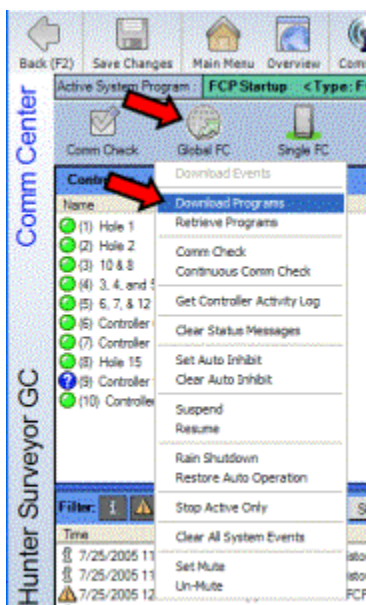
A message will appear, reminding you that this will overwrite (replace) all FCP programs in the field controllers.
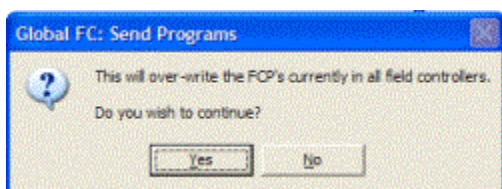
Click Yes if you are sure you want to proceed. Surveyor will begin communicating with the field controllers.

As Surveyor begins communicating, you will see the lights at the bottom of the screen light up for transmit and receive activity. Above that, in the lower half of the Comm Center screen, you will see the individual communications taking place, listed in real time.
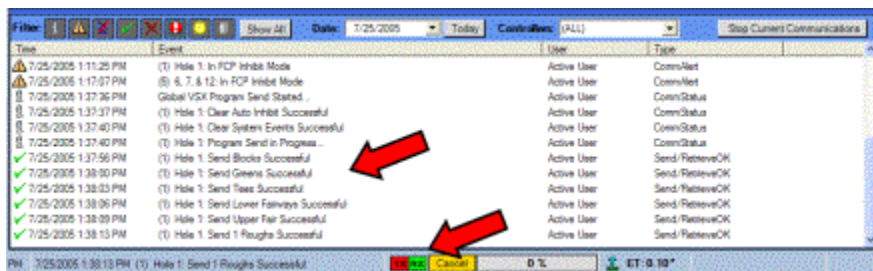
If you need to Cancel the communications, there is a Cancel button in the bottom center of the screen. The progress bar to the right of it shows the percentage of the system download which has been completed.

WARNING: Cancelling a System Program download, after it has begun communicating, is risky.

 Download Details

Download Details

Once a download has begun, Surveyor begins replacing programs at the first controller, and works its way through the list to the last program in the last controller. Cancelling a download in progress means some information will have been replaced, and some will not (it will continue to operate with the old information).

If you cancel a download after it has begun, it is important to download the entire System Program again, before irrigation begins. This will insure that the whole system runs as you intended it. Fortunately, Surveyor's automated Task Scheduler can automatically download for you, so this should not occur (see Task Scheduler).

Clicking the Cancel button will cancel any type of communications from the central. The cancellation is not instantaneous, but should happen within a minute (once the software has engaged your computer' communication port, it takes time for it to "let go" and cease communicating).

When a successful download is complete, the communications will be kept in memory and can be viewed in a report. Surveyor will generate an alarm on-screen

if any of the controllers have failed to respond and accept a full, successful download.

The overall time it takes to download depends upon the number of controllers, the number of programs, and the communications environment. Radio systems in areas with considerable radio interference may need to retry more often, increasing the download times. Average golf systems can take from 4 to 15 minutes to download, depending on the various factors.

Retrieving FCPs (Uploading from the field)

Retrieving FCPs (Uploading from the field)

You can retrieve FCPs from any controller, or all the controllers, into a new System Program at the computer, or save them as your existing System Program.

Some reasons you might want to retrieve programs from the field:

- If you want to view changes that were made by someone else in the field, with access to the controller keypads (and then choose whether to save or delete them, and replace with something else).
- If you want to create a new System Program in the computer, based on information that was created at the field controller keypads.
- If you want to verify that whatever is in the field matches what you have on the computer.

It is not possible to retrieve programs from a selection of individual controllers… you must either choose one controller, or get all of them.

It is not possible to retrieve Event-based program information from any of the controllers, only FCPs (events cannot be edited in the field, so they should always match the Event information in the computer).

Hunter controllers notify the central computer whenever their programs have been changed in the field. If other persons have access to the controller programming in the field, it might be wise to see exactly what has been changed. The retrieve feature allows you to bring the programs into Surveyor for examination. If you don't approve of the changes, you can always load the original System Program and send it back out to the controller(s). This will replace the changes.

To retrieve field controller programs, go to the **Comm Center**.

To retrieve ALL controller programs, click the down arrow next to the Global FC

icon.

To retrieve programs from any one controller, click once on the controller you want to retrieve, and then click the down arrow next to the Single FC controller.
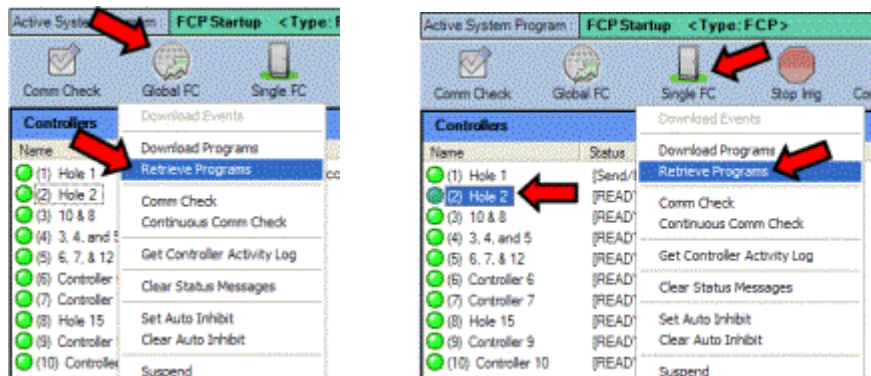
In either case (one or all), click Retrieve Programs on the selected drop-down menu, and the Retrieve Programs window will appear.
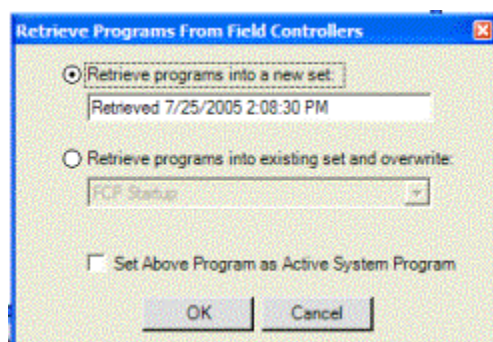
Pay attention to the selectable options in this window, to avoid accidental loss of data! Surveyor can automatically create a new System Program to store in the field data in, and will suggest a name for the System Program called "Retrieved …" followed by the date and time. **This is generally the safest technique**, since it will not affect your existing System Programs in the computer.

You can type a new name for the retrieved program set, by just typing over the automatic name.
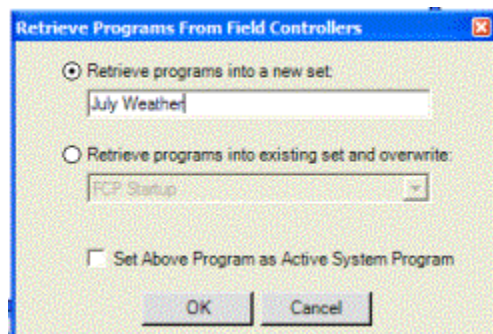
You can also save changes made in the field to the current active System Program. If you are certain that you want to save the changes in the field under the current System Program name, click "**Retrieve programs into existing set and overwrite**".

The retrieved programs will "save as" the current System Program. **This will replace all information under that System Program name!**

This is most useful when you are the only operator of the system. You can adjust your program settings at the controller, while you are in the field looking at the effects of irrigation on your plants. When you return to your office, you can upload the System Program with those adjustments, and save them under the original name.
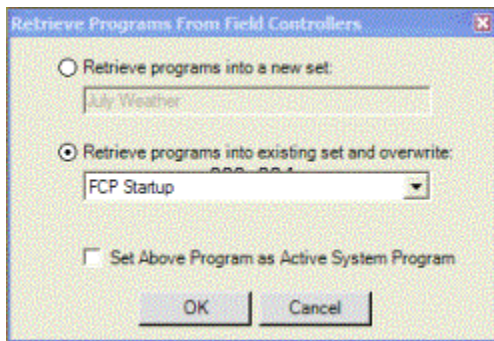
If you are not sure, check "Retrieve programs into a new set" and let the software name it.

Once you select the type of Retrieve (and name it), you can also check the box for "Set Above Program as Active System Program". This will automatically switch the system over to the System Program you have just retrieved.
   ❑ **If you only want to see what is out there, do not click this box**.
   ❑ If you have edited the system in the field (at one or more of the controllers), check this box *only* if you want the programs to go into effect immediately.
   ❑ If you are not sure, leave the box unchecked. You can always make it active later.

Choose one of the Retrieve options, and click "OK". Communications will begin immediately. The Tx and Rx (transmit and receive) lights at the bottom of the screen will become active, and the communications events will scroll in the lower portion of the Comm Center screen.

When the retrieve is done, the final message in the events area will be Program Retrieval Completed.

```
8 7/25/2005 2:19:45 PM     (10) Controller 10: Program Retrieval in Progress...
✓ 7/25/2005 2:19:54 PM     (10) Controller 10: Retrieve Blocks Successful
✓ 7/25/2005 2:19:57 PM     (10) Controller 10: Program Retrieval Completed
8 7/25/2005 2:19:57 PM     Global VSX Program Retrieval Completed
```

 Event Mode - Advanced Irrigation

Event Mode – Advanced Irrigation

 Event Mode Principles

 To use Event-based scheduling correctly, you must first set up an advanced database, including:

 Event Scheduling Operations

 Levels

 Changing Settings

 To create custom Cycle and Soak settings:

 Priorities

 To set Priorities (Scheduling screen, Event Program tab):

 Schedules Tab (from Scheduling screen)

 Add New Schedule button

 Edit a Schedule

Event Mode Principles

Each VSX controller can also contain individual station "events" in a second storage area on board the controller. Unlike the 64 FCP storage area, this memory has no internal structure to it. This is where the Event mode irrigation is kept. This memory can run any stations, in any order, any number of times. Because creating such a schedule is so complex, the computer will create the events for you and download them to the controllers.

The Surveyor software, running in the computer, creates a complete, system-wide, flow-optimized System Program, which calculates individual station run times and start times, and then downloads them into this storage area (sometimes known as the "event buffer").

In Event-based irrigation, stations (valves, and/or valve-in-head sprinklers) are organized into the types of areas they irrigate, such as Greens, Tees, Fairways, etc. Event-based System Programs are also subdivided by Location Groups (usually, but

not always, Holes of Golf).

More precise control is achieved through the resulting Sub-Groups.

For example: Greens are a Management Group (for all greens), Hole 9 is a Location Group (for all stations around Hole 9), and Hole 9 Green is a specific Sub-group. The Groups do not necessarily irrigate in sequences, like the Field Controller Programs. Surveyor will determine how many stations it can activate in any given area at once, according to your priorities, and schedule the stations independently for best results.

In Event-based System Programs, you can make irrigation adjustments at any of these levels. You could apply a general rule to the whole course (System level), then modify just the Greens (Management Group level), and then make further modifications to just Hole 9 Green (Sub-group level). At the lowest level, you can still modify individual stations (such as station 9-5).
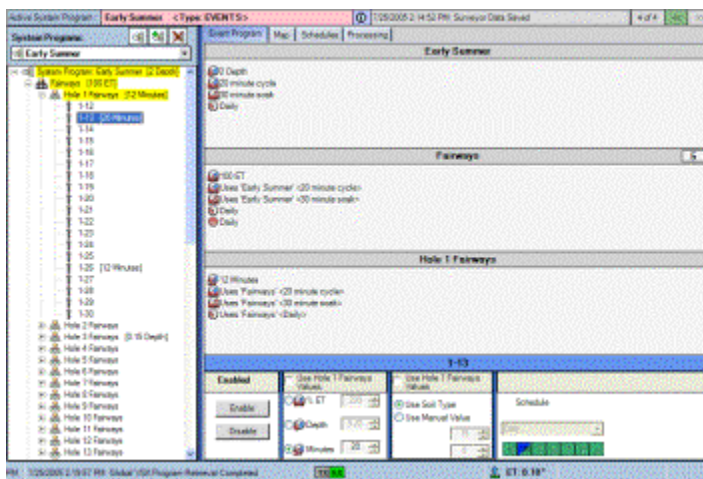
In the Event-based schedule, you simply indicate where you would like more, or less, water. Surveyor then processes the results, to fit the irrigation into the water window (if it can) and to spread the flow evenly over the pipe network. Surveyor will "shuffle" the individual stations, within broad priorities and guidelines which you create, to create a neatly "**flow-optimized**" irrigation schedule for the day.

Because Event-based programming is flow-optimized, these programs can only be viewed, not changed, at the field controllers themselves. Course-wide flow optimization means that individual events at all of your controllers have been timed by the central computer to create a smooth, level-loaded flow across all the pipes, throughout the water window.

Flow-optimized System Programs run as close to the pump optimum (as specified by the pump manufacturer) as possible, for as long as possible. This reduces wear on the hydraulic system and excessive electrical consumption.

Important: Event programming is a system-wide organization of individual events. Once an Event-based program has downloaded to the field, do not make any further changes to the irrigation unless you reprocess and download the entire system program again.

 To use Event-based scheduling correctly, you must first set up an advanced database, including:

To use Event-based scheduling correctly, you must first set up an advanced database, including:
- ❑ Create Head Types and Plant Types (see System Settings).
- ❑ Create the Management Groups and Location Groups, into which you will organize the stations (see Groups).
- ❑ Complete the data for each station in your system (see Controller Configuration screen).
- ❑ Complete the hydraulic model of your system (see Hydraulics).
- ❑ Event-based control requires more information to set up, but the results are well worth it. It is the easiest mode to operate, after the initial data is created.

See "Setting up for Event Scheduling" before proceeding with Event Scheduling Operations.

 Event Scheduling Operations

Event Scheduling Operations

Go to the Scheduling screen, and create or select an Event mode System Program (see System Programs). In Event mode System Programs, most irrigation settings are made at the Event Scheduling tab in the Scheduling screen.
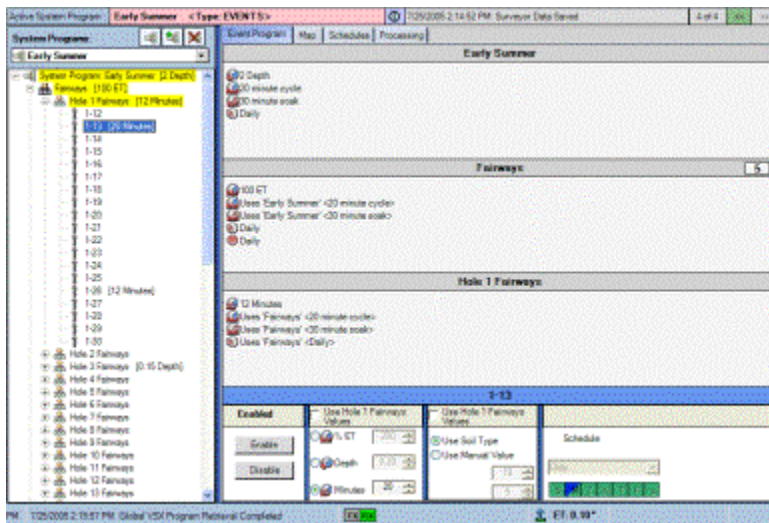
The Management Groups you have created will be displayed in the left pane of the Scheduling window. They will each have + or – signs next to them, in a tree view similar to the Hydraulics tree.
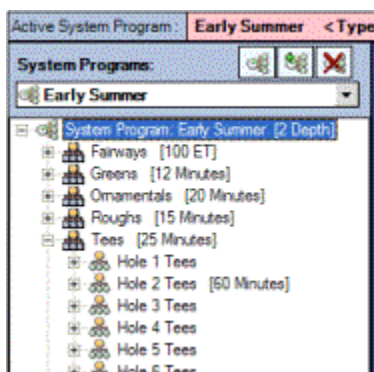
At the top of the tree is the System Program. Click once to highlight the System Program level, and settings for the entire system will appear in the pane on the right.
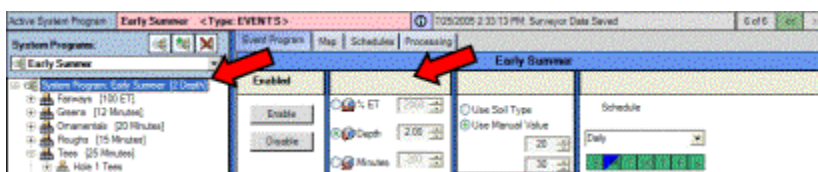
This is the "top" level of your irrigation control. You can set general rules for all irrigation here. However, you can also adjust groups, sub-groups, and individual stations at their respective levels.

Anything that is not adjusted at a lower level will follow the settings at the System Program level.

 Levels

Levels

There are 4 levels of settings in Event mode.

System Level: The "top" level, sets irrigation rules for all stations in the entire system.

Management Group Level: These are broad Groups of stations into the types of plants they irrigate. In Golf, this is generally by golf course features. The most common Management Groups are Greens, Tees, Fairways, and Roughs. Many others are possible and you can create your own (see Groups). Management Groups are also the level at which Day Schedules and DNSUs (Do Not Start Until) times are set.

Sub-Group Level: Sub-groups subdivide the stations into their Management Groups and their location group. For example, Greens is a Management Group; Hole 1 Green is a Sub-group. Surveyor knows what and where the stations are, based on the information you provide at the Controller Configuration screen's station database.

Station Level: At the lowest level, you can adjust times, cycle and soak, and other items for individual stations.

Navigating the levels is simple. In Event mode Scheduling, the levels are displayed in a tree-view on the left side of the screen. The top level contains the name of your System Program. Next to it is a + or − sign, and clicking the + will expand the tree to show the Management Groups.
Next to each Management Group is another + sign, and clicking that will show each sub-group.
Click the + sign next to the sub-group to see the list of individual stations in the sub-group.
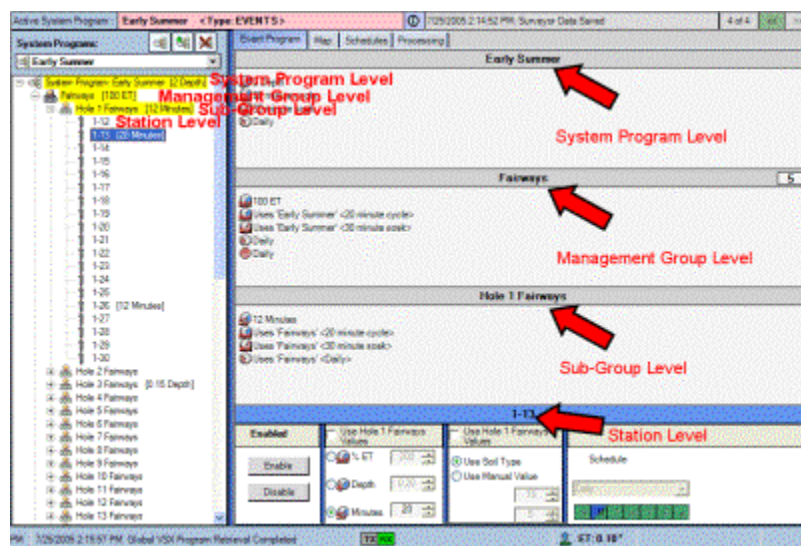
Click once, directly on the name of any level, to highlight it. The right side of the screen will then become active, and allow settings to be made at that level only.
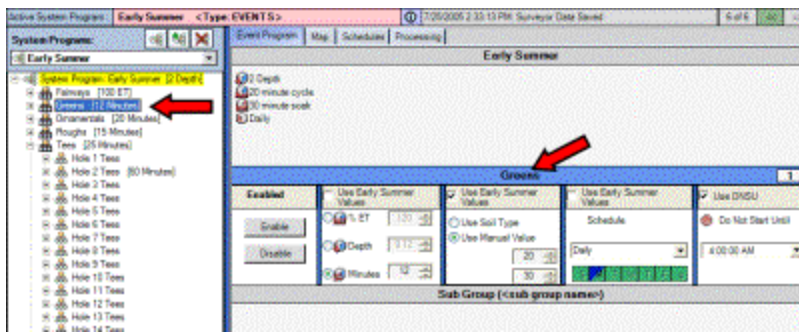
Each level has check boxes to permit a "local override" of the settings of the next higher level. If one of the boxes is checked, you cannot make adjustments at this level, because it will follow the settings for the next higher level.
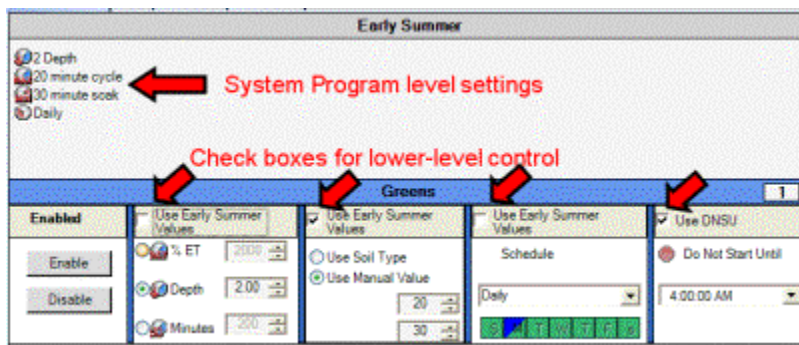
If you want to make different adjustments at the selected level, un-check the box (click in it) to permit local override of the higher level settings. Then, you can "tweak" the selected level for its own unique requirements.
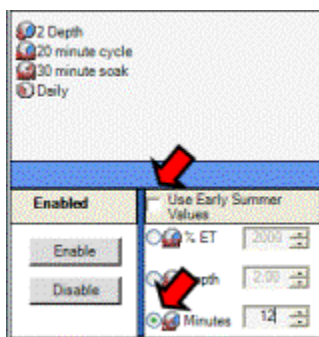
Changing Settings

Changing Settings

With the System Program level highlighted (click it once to highlight it), the right pane first allows you to enable or disable the entire System Program. Disabling at this level is the same as turning the entire irrigation system off, once the setting is sent to the field! (There are other ways to shut down the system immediately, see Communications).

If you click Disable, a red X symbol replaces the System Program icon in the tree view (and everything beneath it) and the system will be Off, after processing. Click Enable, and everything is active again.
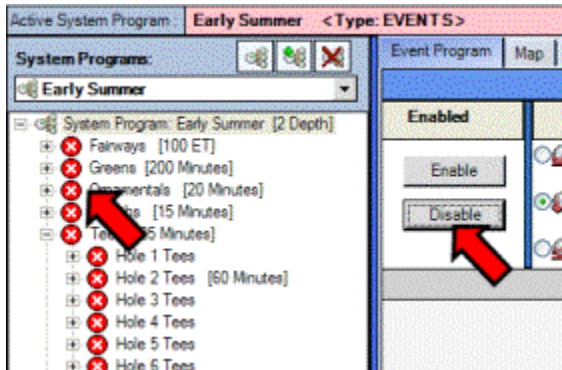
To the right of the Enable controls are the system irrigation settings. You will have similar choices at each level of an Event mode System Program as you work your way down to individual station level.
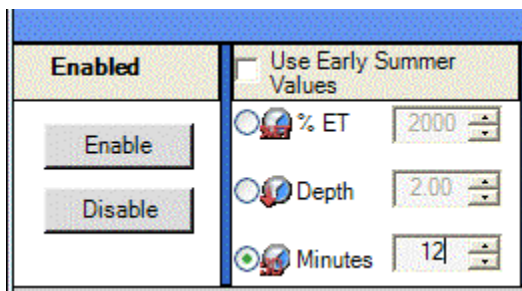
The choices are:

% of ET: If you are using an ET (Evapo-Transpiration) source, such as a weather station or manual input, this sets a percentage of the current ET to be applied in the next irrigation cycle. If you are not using ET, do not use this setting.
Inches/Millimeters: Allows you to specify irrigation amounts in precipitation amounts, or "depth". This setting may result in different run times for different stations, because they can have different precipitation rates. They will all run long enough to apply the amount specified here.
Minutes: Allows you to specify a number of minutes for stations to run. If Surveyor knows the precip rate of the stations, it will be able to calculate the approximate application amount based on the number of minutes.

Whichever setting you specify at this level will determine the irrigation of all stations in the system, unless you continue to adjust them at the lower levels.

Next (to the right) are the System-level Cycle and Soak settings. You can specify a maximum run time for the stations, and a minimum soak period, before they are allowed to run another cycle. You can also opt to let the Soil Type (if applicable) to determine cycles and soaks.

Cycle and Soak is different than the Cycle and Cycle Delay settings in the FCP mode (for VSX controllers)!

The purpose of Cycle and Soak is to let the computer break up the total irrigation amount for each station into smaller amounts that the ground can absorb. Slopes, heavily compacted soils, and clay may begin to puddle or run off, because the water is being applied faster than the soil can absorb it. Cycle and Soak lets you program the maximum run time allowed, before the stations need to take a break and let the water soak in.

Example: The Roughs stations on Hole 7 irrigate a steep slope. The plant requirement is for 15 minutes of irrigation, but after only 5 minutes, the water is running off the slope and puddling at the base.

- Select Hole 7 Roughs.
- Clear the "Use Roughs Values" check box.
- Set a Cycle (maximum) of 5 minutes, and a Soak of 30 minutes. Surveyor will schedule 3 different cycles of 5 minutes for the station, to apply all 15 minutes worth of irrigation to the plants. However, it will wait a minimum of 30 minutes (may be longer) between those cycles to let the water be absorbed.
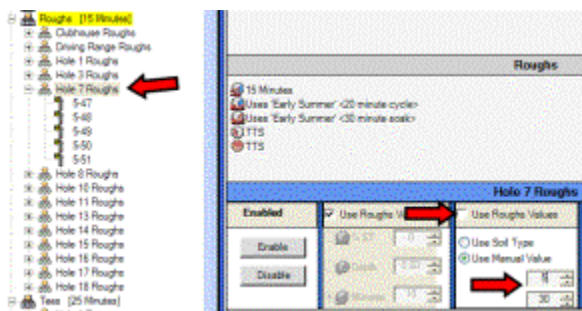
You are not required to specify a Cycle and Soak.
You can set cycle options differently at each of the different levels (System, Group, sub-group, and individual station). Anything not set differently will use the System-level cycle and soak settings.
You can also allow the station database to determine this automatically, if you choose to enter the soil types for individual stations (see Controller Configuration).

To create custom Cycle and Soak settings:

To create custom Cycle and Soak settings:
- Click the Use Manual Value button.

> ❑ Set a Maximum Run Time and a Minimum Soak Time.
> ❑ Save.

To create Cycle and Soak settings at any lower level (that differ from the System level settings), uncheck the box at the top of the field that says "Use [next highest level] settings".

Check either "Use Manual Value", or "Use Soil Type". If you select Use Manual Value, add your Cycle and Soak preferences for the selected group or station. Soil Type will automatically base the cycles and soaks on the soil types in the Controller Configuration tables. The Cycle & Soak settings will be grayed out, since they no longer necessarily apply.
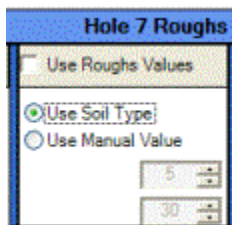
Schedule: Next, set the water day Schedule for the level. At the System level, you can click the drop down arrow and choose a day schedule for the entire course from your list of Schedules (see Schedules tab).
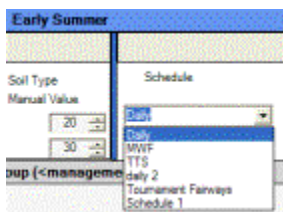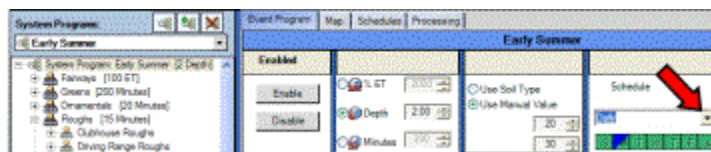
You can also click a Management Group in the tree view and give it its own Schedule, which differs from the System or the other Management Groups. To do this, uncheck the box above the Schedules setting for "Use [system program name]" and select the Schedule for the Management Group.

Example: You could have the System level water every day, Tees every other day, and Fairways only on weekdays. Anything without a different setting (Greens, for example) would water every day, because that is the System level setting.
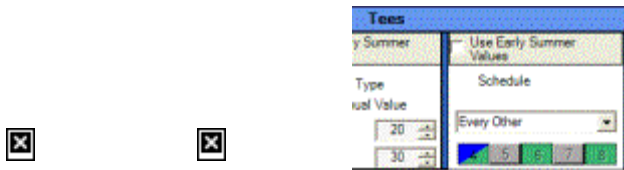
Schedules cannot be set below the Management Group level. The System Program level, and each individual Management Group, may have their own day Schedules.

Subgroups and stations follow the Schedule of the Management Group to which they belong.

 Priorities

Priorities

Priorities determine the order in which Surveyor will look through the Groups for more stations to schedule on. In general, they determine the order in which the groups will irrigate.

Surveyor will schedule station events by Management Group. You can set Priorities for the order in which Management Groups are considered for irrigation. You can even specify priorities by Sub-groups if you wish.

Surveyor does not necessarily run one Management Group at a time. It will turn on as many stations as it can, to reach the Optimum flow, within safe velocities. If there is more capacity in a piped area after all the stations in one Group have been scheduled, it will look at another Management Group, in order of Priority, for more stations to turn on.

Example: Surveyor is reaching the end of the scheduled Hole 6 Fairway irrigation, but there are no longer enough stations in Hole 6 Fairways to reach the Optimum flow. The next Priority is Tees.
Surveyor begins looking at Hole 6 Tee stations to see if it can safely add them to the event schedule, without violating maximum flows in each pipe segment. If it can, it will. If it cannot, because of velocity constraints, it will assess the next priority group or sub-group (maybe Greens or Roughs, or an adjacent hole's Tee) until it can find more events to schedule.

Remember that this all happens in advance, prior to downloading. You will have opportunities to look at the final result and decide whether that is how you want to irrigate, before you download to the field (see Processing).

 To set Priorities (Scheduling screen, Event Program tab):
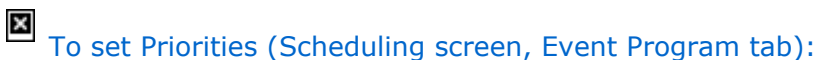
To set Priorities (Scheduling screen, Event Program tab):

Select a Management Group (click once to highlight it in the tree-view). To the far right of the Management Group name, you will see a priority box, with either a – or a number in it.
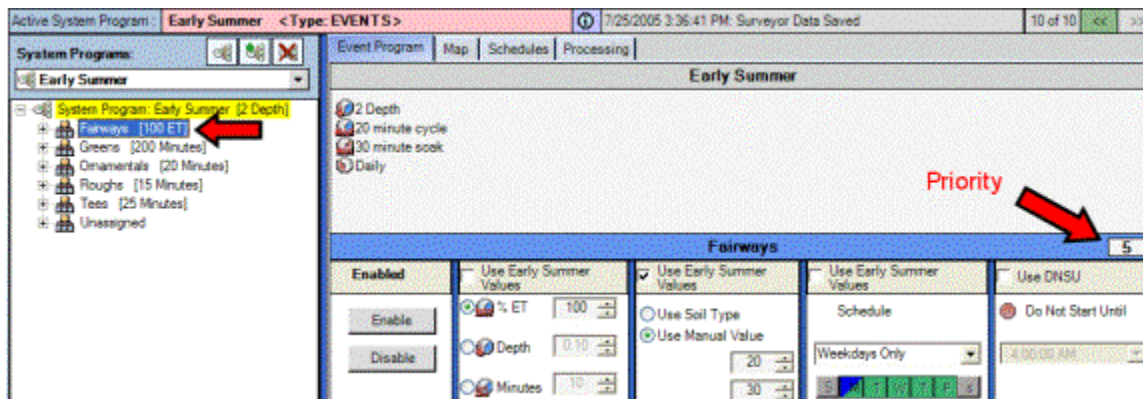
Click the box, and the Scheduling Priority window will appear.
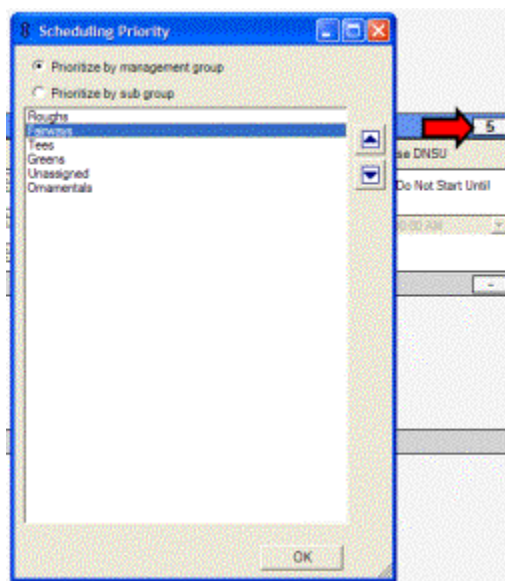
There are two ways to prioritize: by Management Group, or by Sub-Group. Click the button for the type you want to use.

To prioritize Groups, click once on the group to highlight it, then click the up and down arrows to move the group up or down in the priority order. To prioritize by Subgroup, click that button and move the same way.

Items closest to the top of the priority window are most likely to irrigate first.
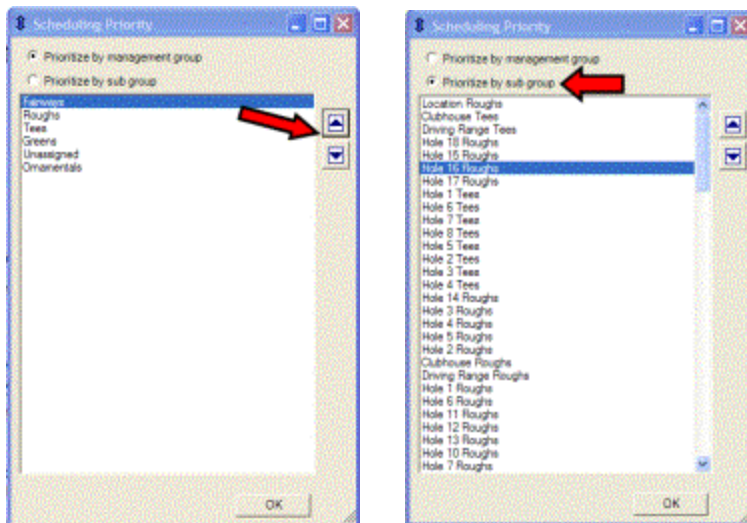
Arrange all the Groups to run in the order you prefer, and click OK. The Scheduling Priority window will close. In the priority box next to each Group (as you select them in the tree-view), a number will now appear, indicating the Group's order among the groups. Be sure to Save after this change.

We recommend prioritizing by Management Group only, unless you have special requirements that require further micro-management. Prioritizing by Management Group allows the smoothest system flow and fastest processing. Prioritizing by sub-group may prevent Surveyor from scheduling stations that could otherwise run, and may therefore lengthen the total watering time.

DNSU (Do Not Start Until): Management Groups have another optional setting which is only available when a Management Group is selected in the tree view. DNSU means that Surveyor will not attempt to run any stations in the Management Group until after the specified time.
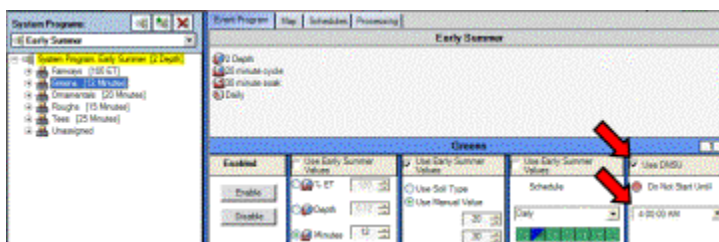
If you don't specify a DNSU, Surveyor will run all groups in order of the priorities (see Priorities) you set. It will attempt to run at your optimum flow, so it will continuously look for stations to turn on, throughout the water window.

However, if you don't want a certain area (such as Greens) to stay wet all night, you could specify a DNSU of 3:30 AM. This means that Surveyor will have to wait until 3:30 AM to run any Greens stations, even if it runs out of other stations to run.

DNSU settings almost always mean that there will be a gap in your flow graph, as Surveyor waits until the specified time to turn on the Management Group.
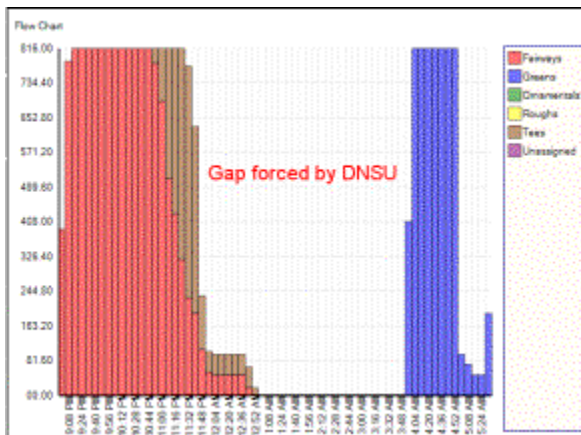
It is important to verify that you will be able to complete all irrigation for the Management Group, between the DNSU and the end of the water window! In the example above, if you specify a Greens DNSU of 3:30 AM, and the water window is set to end at 4:00 AM, you will only have 60 minutes within which to complete your Greens irrigation (stations which cannot fit in the time allowed will be listed in the Processing report).

Gif

 Schedules Tab (from Scheduling screen)

Schedules Tab (from Scheduling screen)
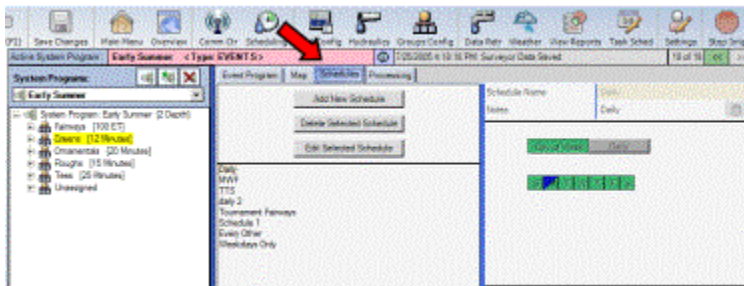
In the Scheduling screen, one of the tabs across the top of the right pane is the Schedules tab. Click it to create or edit named Schedules. The Schedule is a pattern of Water Days, and many different schedules are possible. The Schedules you create and name here become the choices you see in either FCP or Event mode programming, when you click the drop-down arrows for the Schedules.
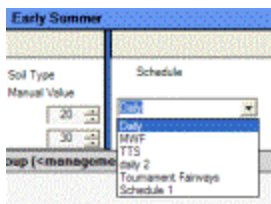
The Schedules tab displays buttons in the top left, a list of available Schedules beneath, and day settings in the upper right area.
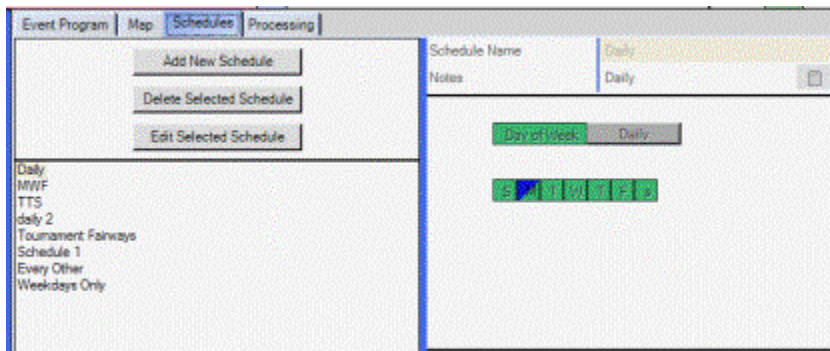
Surveyor will come with one default Schedule called Daily, which is set to irrigate every day.

 Add New Schedule button

Add New Schedule button
To add a new schedule, click the Add New Schedule button.

The upper right corner will display a highlighted automatic name, such as "Schedule 2". You can then type a new name over it that is more descriptive, and press Enter.
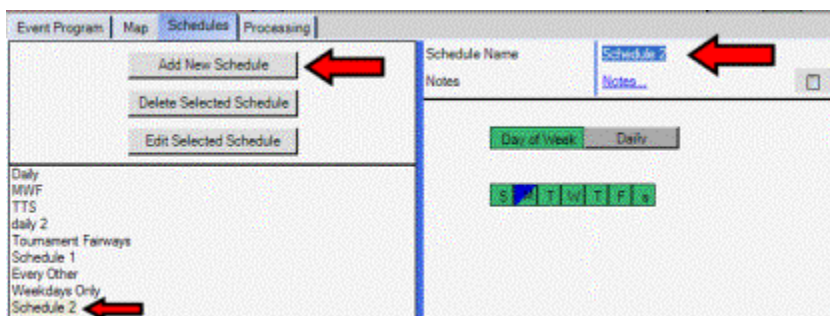
The new Schedule name is now displayed in the center list of available schedules.

For VSX controllers, there are two possible schedule types: **Day of Week** or **Daily**.

"Daily" does not necessarily mean the Schedule will irrigate every day… it is a different type of day scheduling for patterns that run independently of

days of the week. The length of the schedule, and the pattern of water days, is up to you.
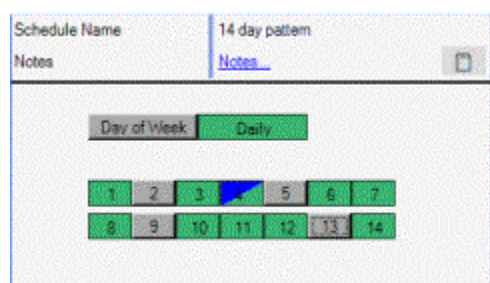
The current day will always have a blue diagonal section.

Click the button for one of the two Schedule types, Day of Week or Daily.

"Day of Week" allows you to specify water days in a "SMTWTFS" actual days of the week format. Click Day of Week to select this type of schedule, and then simply click or unclick days for watering (green days water, grey days are no water).
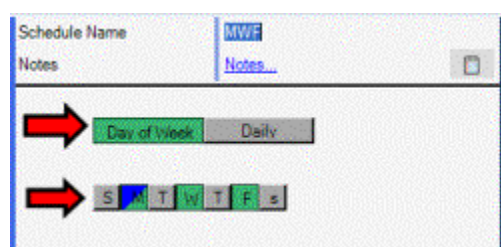
"Daily" allows you to specify any pattern of water days, within the Schedule Length set for the controllers (see System Settings to change the global Schedule Length). Click Daily to select this option, and a matrix of buttons will appear showing the number of days you have specified as the Schedule Length (to change the Schedule Length, see System Settings screen). The Schedule Length can be anything from 1 to 31 days (represented by the buttons) as set in System Settings.
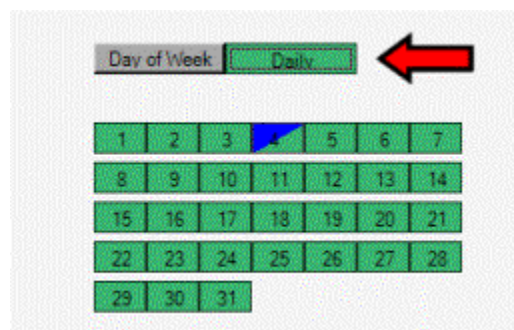
Click days to water (green), or click again for no water (gray). The current day will always have a blue diagonal section to show you where today is, in the pattern. You can also change where today is in the pattern (see System Settings).

In Daily pattern watering, the entire schedule will repeat continuously, independently of Days of the Week.

When the Schedule appears correct, click the Save button. Until you click Save, the added new schedule name appears in gold lettering in the Schedule list… after saving, it turns black.

Example: A 6-day Daily schedule is selected. The Greens Management Group waters every day. All buttons are clicked, and this Schedule might be named "Every Day".
The Tees water every second day (every other button is clicked), and this schedule might be called "Every Other Day". The Fairway Group might water every third day, with a name of "Every 3 Days". These patterns repeat every 6 days, regardless of the day of the week on which they happen to occur.

Edit a Schedule

Edit a Schedule

- ❑ Click a name on the list of Schedules, and click the Edit Selected Schedule button.
- ❑ Change the Schedule Type or water days as needed.
- ❑ Click Save when finished.

Editing a Schedule which is already in use will affect all Programs and Events which use that Schedule.

There is no limit to the number of named Schedules you can create and save.

Processing Tab

Processing Tab

Processing tells your computer to organize station events, in order to fit them within your water window at optimum system flow, while balancing the flow over the entire pipe network. Processing considers your irrigation settings for all the groups, sub-groups, and stations, including cycle/soak settings and ET/precip data. It is also possible that some station events will not be scheduled, depending on your settings and the many variables that are calculated.

NOTE: Processing is not available in FCP mode and has no effect on FCPs.

When you change irrigation settings in Event mode, they will not affect irrigation until they are Processed, and then Downloaded (Sent) to the field.

Processing causes the computer to be intensely busy for a few minutes, depending on the size of your system. The result will be an irrigation program as perfectly flow-balanced as the computer can make it, with the supplied information.

You can make Processing occur automatically at a certain time of day (see Task Scheduler), which is a very good idea. You can also Process manually at any time, to see if you like the results of changes to your schedule, or just to see what might happen.

To Process any Event System Program, first go to the Scheduling screen and make whatever changes you would like to try on the Event Program tab.
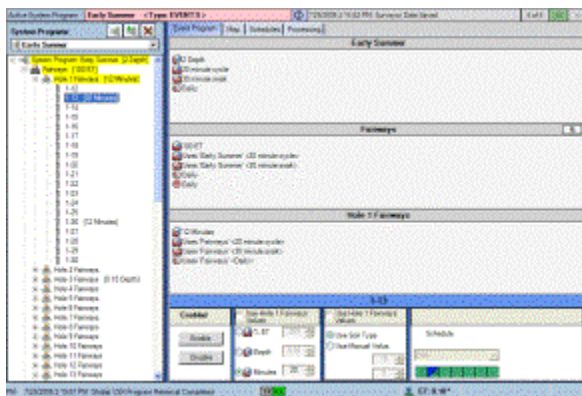
Click the Processing tab. Before doing anything else, check the Water Window Start and End settings. Surveyor will try to reach the optimum flow you have specified for the Pump Station(s) and run at that level as long as possible. It will try to fit the events between the Water Window Start and End. The irrigation will usually begin at the Start time shown, so verify that it is not too early.
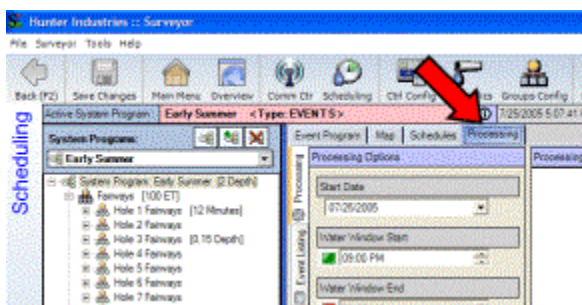
Surveyor will generally not allow irrigation to run past the Water Window End. With a new schedule, it is a good idea to make sure that all of your irrigation will fit in the allotted time (between the Start and End).
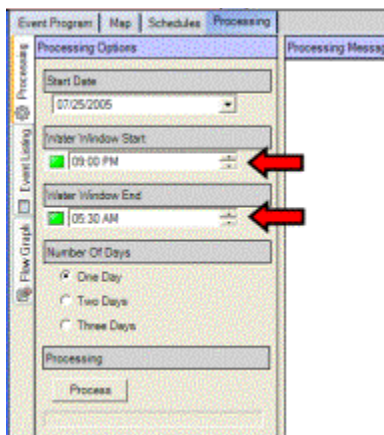
You do not have to specify both Start and End, but you must enter one of them.

☒ Set Water Window Start Time Only

☒ Set Water Window End Time only

☒ Set Water Window Start and End Times

☒ Number of Days to Process

☒ Reasons for Processing Failures

☒ Troubleshooting Processing failures

☒ Viewing Processing Results

☒ Graphing Other Days

Set Water Window Start Time Only

Verify that the Water Window Start button is green. Type or use the arrow buttons to set the start time. Don't forget the AM/PM setting!
Click the square button under Water Window End, to change it to the red Off indication.
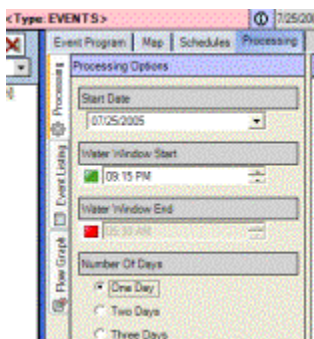
If there is no End time, Surveyor will begin at the Start, and continue until the

whole irrigation program is complete.

 Set Water Window End Time only

Set Water Window End Time only

If there is no Start time, Surveyor will figure out the total length of the irrigation, and move it back so that it finishes at the End time. You will not know when it begins, until Processing has been completed and viewed.
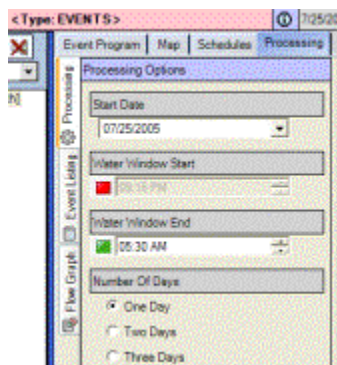
Set the hour, the minute, and the AM/PM setting separately. You can type in each space, or just click to highlight them and use the keyboard up and down arrows (↓) to change them.

 Set Water Window Start and End Times

Set Water Window Start and End Times

It is possible to specify both a Start *and* an End Time for the Water Window, but it is not generally recommended.
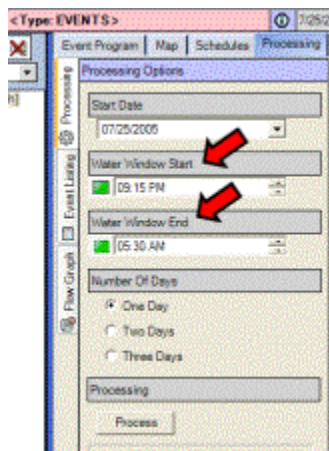
The risk is that some watering may be missed, because Surveyor will be unable to fit the irrigation into the specified water window.

If you decide to set both a Start and an End, you should process and examine the results before downloading to the field. ***It is not recommended to set both Start and End when processing and downloading automatically with the Task Scheduler.***

You cannot override both times. Surveyor needs either a Start or an End time to work with.

If you set a Start but no end, Surveyor will schedule all stations, but depending on what you have scheduled it may run well into daylight hours.

If you set an End but no start, you are telling Surveyor that it must complete all irrigation by a certain time, but you will have no control over when it begins.

In either scenario, it is important to check the flow graph to verify that you can live with the results.

⊠ Number of Days to Process

Number of Days to Process

You can also set the number of days to Process. Surveyor can calculate up to a three day "look-ahead" System Program, which will take up to 3 of your Schedule days into account. This means that if your Fairways are set to water every other day, a 3-day program will download at least one water day.

If your control system loses communications for any reason, the Events that have been downloaded will repeat until communications are restored. This is the reason for up to 3-day Event Processing… if communications were lost on a non-water day, the non-water day might repeat for an unacceptable period of time. With a 3-day schedule, if the following day is a water day for a certain group, it will still water correctly until communications are restored.

Click the button to select a 1, 2, or 3 day Processing period (this is what will be downloaded if you choose to send it to the field). The trade-off is that longer schedules take longer to process and download, since there is 2 to 3 times as much information.

When you have selected the number of days, click the Process button under the Day settings.
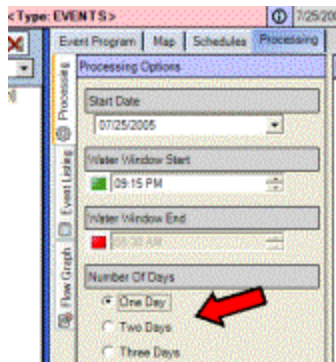
The progress bar under the Process button will display Surveyor's progress as it schedules and flow optimizes all irrigation events. This runs up to 100% for each processed day. If you are processing a 3 day schedule, it will progress up to 100% three separate times.
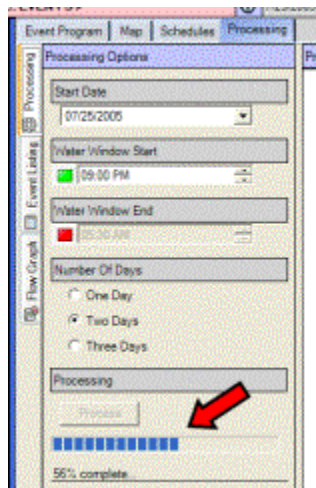
When Processing is finished, the Processing Messages area will display the results.
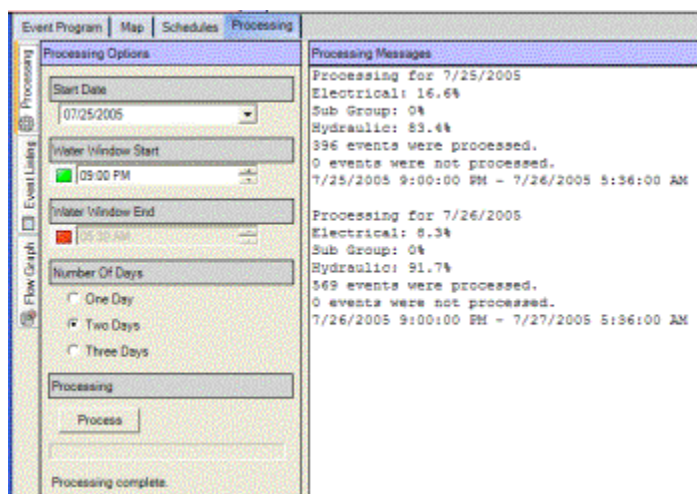
The most important information here is the number of events NOT processed. This number should be "0". The total event count may be greater, or less than, the total number of stations (some may not be scheduled or enabled today, and some may

have multiple cycles).

It will, however, show the total number of station activations processed for each day, and ready for downloading, and the total which will be missed because they have failed.

The % statistics are not terribly important, but show how many stations were deferred in irrigation processing for each of the possible reasons (this is the Flow Optimization process at work).
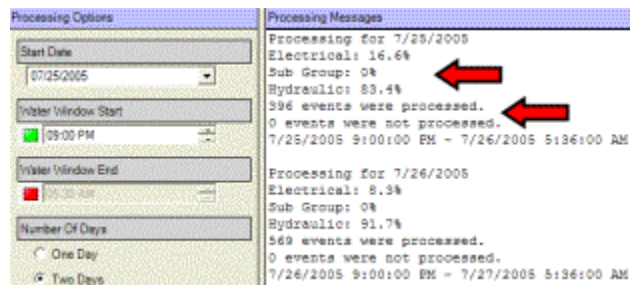
If all events "passed" Processing, they are ready to be sent to the field (see Downloading). Remember that they will have no effect on irrigation until they are downloaded.

 Reasons for Processing Failures

Reasons for Processing Failures

If some events have "failed" processing, each event will be listed along with a reason message in brackets after the station. You could still download the Processed System Program, but the failed events will not run.

It is a better idea to investigate why they have failed (usually because they fall outside the water window) and correct the problem, or make other plans for those stations.

Outside Water Window: Usually because both Start and End times were set for the Water Window, and there was insufficient time to complete irrigation. Remove or adjust the times, and reprocess.
Flow: If a station has too much flow for the pipe network, it will fail processing. This means that turning on the station in question, even by itself, exceeds the capacity of the pipe supplying it. Look for an error in the hydraulic data for the pipes and the station or Pipe Block.
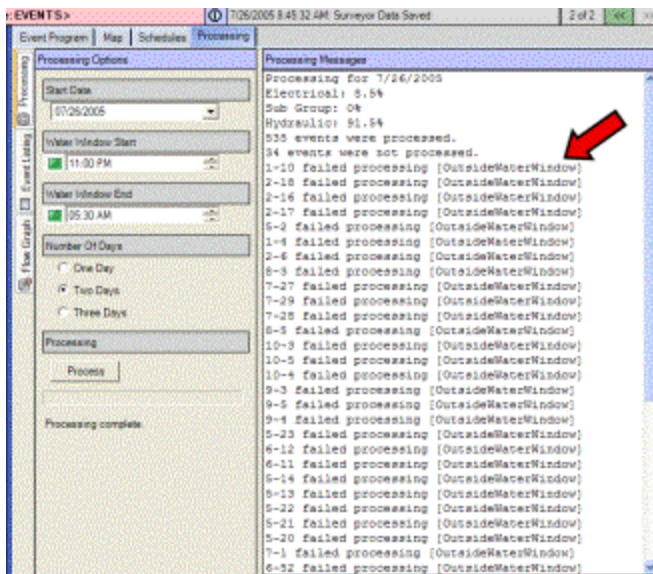
Troubleshooting Processing failures

Troubleshooting Processing failures

There are many settings that can contribute to the underlying causes for stations to fall outside the Water Window.

Hydraulic: Flow optimizing is limited by the Water Source, the specified optimum flow, the size and number of your pipes, and the safe velocity constraint for each type of pipe. This is one of the most important factors in processing, and any errors in the Hydraulic setup will cause inaccurate processing.

Electrical: Controllers can only run a certain number of solenoids at once (see Controller Configuration) based on their electrical capacity. You can set this electrical maximum to an even lower number for various reasons, including safety. If Surveyor still has hydraulic capacity but reaches the controllers' electrical maximums, it cannot schedule anything else on, until a station times out.

Settings: DNSU (Do Not Start Until) settings for Management Groups are useful, but also create miniature water windows of their own. If you set a DNSU of 4:00 AM for a Management Group, and the total Processing window Ends at 5:00 AM, there is only one hour available for that particular group to complete. If that group had 90 minutes worth of processed irrigation, it would not all fit in the mini-window and some events would be missed.

Cycle and Soak settings can also force station events outside the designated Water Window. Surveyor has no choice but to wait for the specified Soak period(s) to elapse before it can schedule more events for a given station. This could force them outside the Water Window.

Other reasons: Other errors which appear in Processing results may be a problem with the Surveyor database. Contact Hunter or your Field Service Manager with the exact wording of any messages.

When stations fail processing, it is important to understand the underlying

cause. Experimenting with different settings, trial and error, and common sense are the best tools for determining successful schedules. You can process as often as you like, and only send the most successful variation to the field.

In some cases, it may also be advisable to schedule additional irrigation for failed stations outside the specified water window using FCP irrigation. The best way to do this is to create a separate FCP System Program for only those stations that need to run outside the Water Window, and use the Task Schedule to download that System Program automatically after the "normal" water window has ended. This allows you to run a perfectly balanced schedule for as long as possible, and then use ordinary start times to run the remaining irrigation (see Task Scheduler).

☒ Viewing Processing Results

Viewing Processing Results

It is important to verify the results of a newly processed System Program before sending them to the field! This is even more important when a Surveyor system is new, or when major changes have been made to key factors.

There are 3 ways to view the results of a processed schedule immediately: Graphing, Event list, and the Applications Times and Amounts report.

On the side of the Processing tab there are vertical tabs for Event Listing and the Flow Graph.
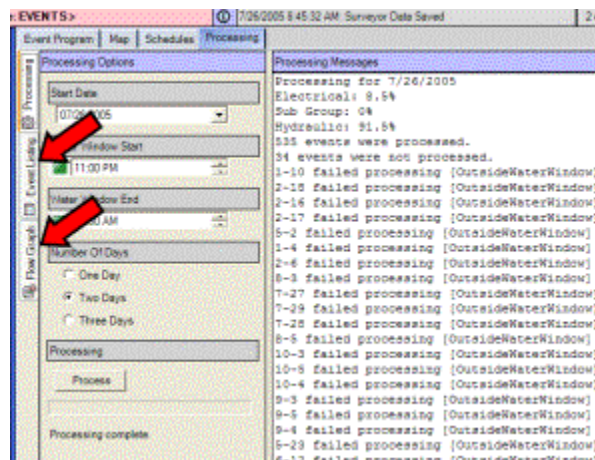
The purpose of these is to display the results of Processing. Click the Flow Graph button to visualize the processed irrigation in time.
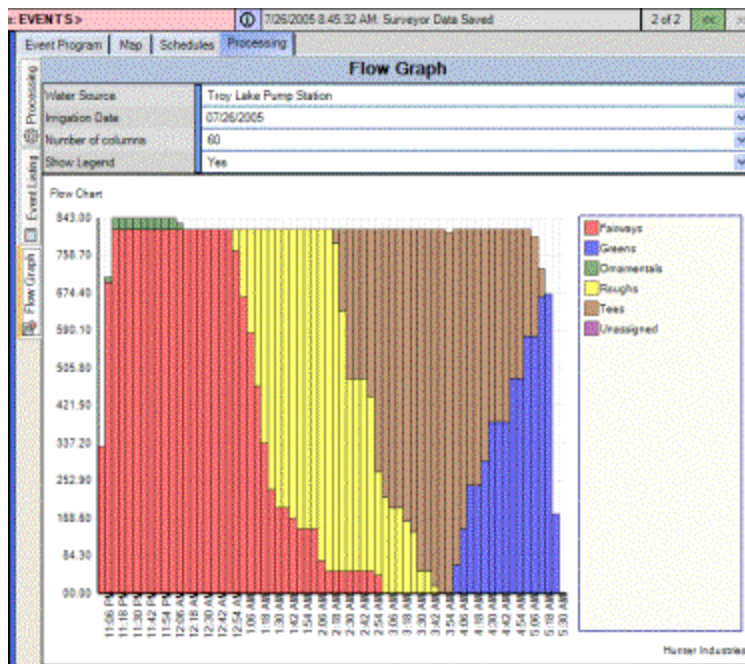
The Flow Graph will show total system flow. The vertical height of the graph shows the amount of total system flow. The horizontal element shows time. This is a visual representation of flow within your water window.
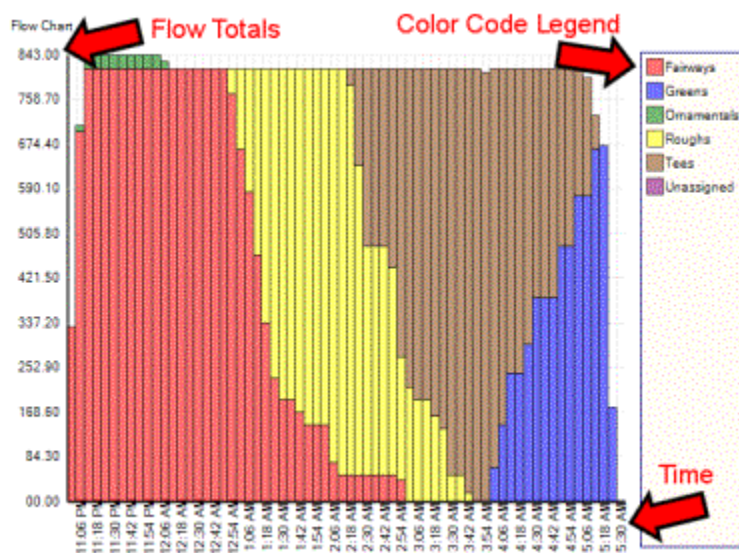
The graph will be color-coded by Management Group. A legend on the right explains the color-codes (these are assigned automatically, and if you have a very large number of Management Groups some colors may appear similar).

Move your mouse around the graph, without clicking, and a "tool tip" will appear over the cursor to show the flow at any given point in the graph. The flow will be for the Management Group you are positioned over, during the block of time shown in the vertical column.
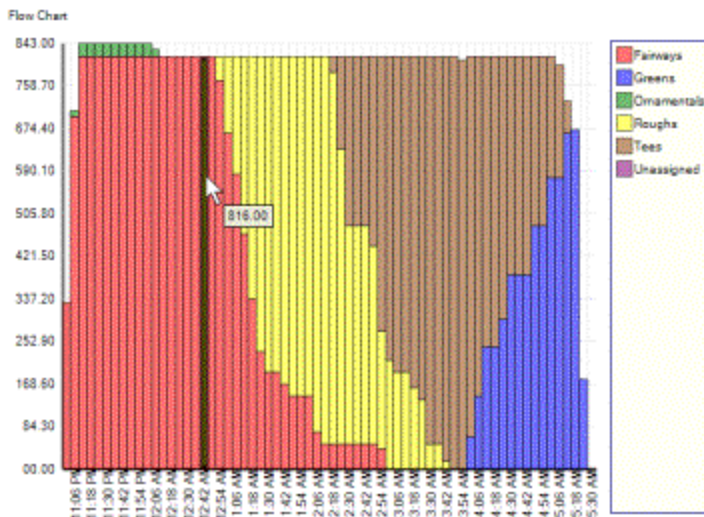
More than one Management Group can be running at once, so move the mouse over each color to see the total flow for each Management Group during any given time column.
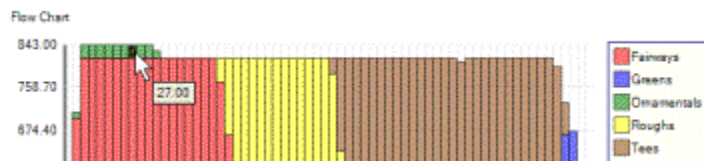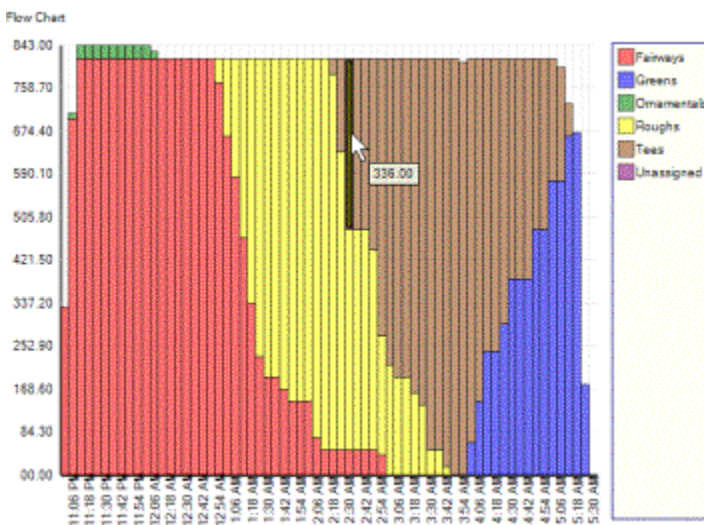
If you have multiple Water Sources, they will be graphed separately, because each Water Source represents a separate hydraulic system. Select the Water Source you want to graph by clicking the down arrow to the right of the Water Source name. The sources will be listed, and you can click on each one to see its graph.
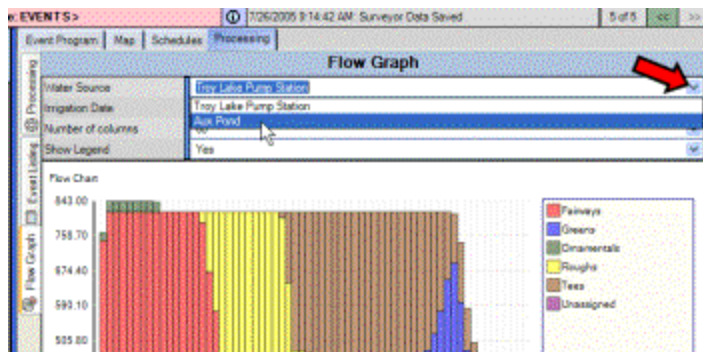
You can change the number of columns displayed in the graph. Since the column width represents a period in time, increasing the number of columns allows you to see smaller or larger "slices" of irrigation in time.
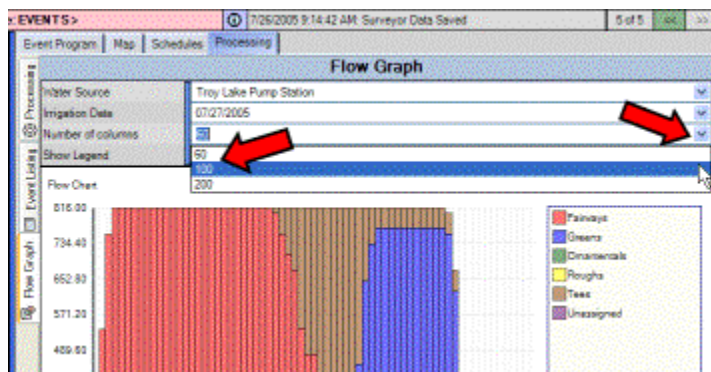
You can get an exact list of what has been scheduled to run, in any one of the columns, by simply clicking the column.

The Irrigation List window will appear. The list shows stations running during the time represented by the column you clicked.

The higher the number of columns, the smaller the slice of time represented by the list. The time represented by each column is a function of the length of the water window divided by the number of columns. Some slight inaccuracies are possible, because a station may overlap the beginning or the end of a column, sometimes by only a few seconds.

Many flow graphs ramp up to optimum flow fairly quickly (following your Staging Delays), remain flat near the optimum flow for most of the water window, and taper down near the end (as Surveyor runs out of stations to schedule on).

If there are gaps in the graph, it is usually because DNSU (Do Not Start Until) settings have been made for Management Groups. If Surveyor runs out of stations to turn on, and must wait for a DNSU time to schedule more events, you may see a dip or gap in the flow graph.

If the graph has a very long tail at low flows near the end, this is often the result of Cycle and Soak settings which force the last cycles of the final stations to run either by themselves or with only a few others.

Graphing Other Days

Graphing Other Days

You can select other days to view as well… including tomorrow and the next day, if you have processed a 2 or 3 day schedule. Click the down arrow to the right of the Irrigation Date field, and a drop down calendar will let you graph a different day's irrigation.

You can only see graphs for dates which have, or had, processed schedules. If you ran FCPs only, on certain days, there will be no Event graph for those days.
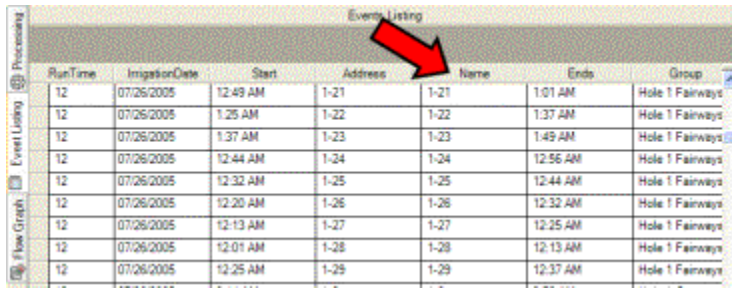
Event Listing: The other vertical tab on the side of the Processing windows is "Event Listing". Click the tab to see a spreadsheet list of all station events in chronological order.

In a large system, this may be a very large report, and the scroll bar on the right will let you move up and down the report (you can also use the keyboard Page Up and Page Down keys).

Stations may be listed more than once in the report. If a station has been scheduled to start more than once due to Cycle and Soak settings, there will be a separate line item for each occurrence of that station. This list is meant for a quick view only.

You can sort the Event Listing by clicking on the header (the label in the top cell) of each column, to sort the list by that value.

Application Times and Amounts report: The most powerful and flexible report is the Application Times and Amounts report, available under the Reports button at the top of the Surveyor toolbar (see Reports). Use this report if you want to print a hard copy of the processed schedule.

☒ Setting Up for Event Scheduling (advanced database creation)

Setting Up for Event Scheduling (advanced database creation)

To complete this information, it is best to have a reasonably accurate hydraulic plan on paper (or electronically). The more accurate the information, the better job Surveyor will do in optimizing and scheduling irrigation events, saving water, time, and money.

System Settings screen: System settings are important choices you make for Surveyor, which are not normally changed on a regular basis. Review and understand your System Settings before entering a large amount of information into Surveyor.

Click the System Settings toolbar icon to go to the System Settings screen.
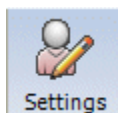
System Settings is divided into subsections. In the window in the upper left, you can select an item (click on it once to highlight it), and the rest of the window will show the settings and options under that heading.
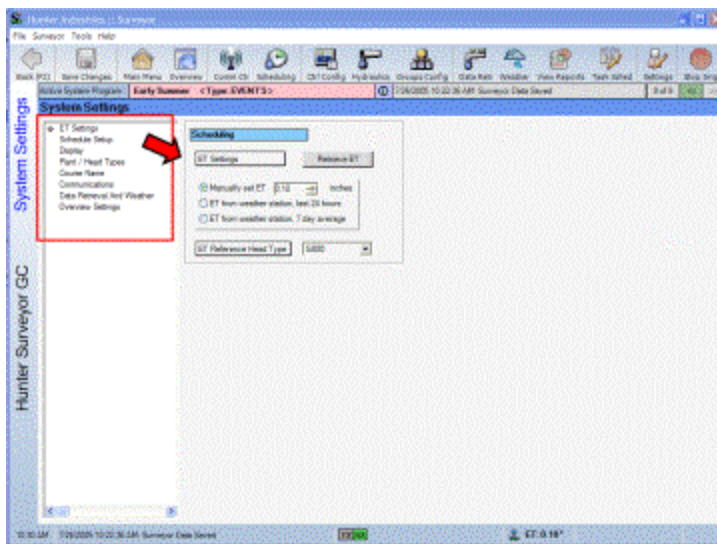
 ET Settings

 Schedule Setup

 Display Settings

 Plant/Head Types

 Communications (Settings screen)

 Data Retrieval and Weather

 Overview Settings

ET Settings

The first item is ET, or evapo-transpiration, Settings. You can have Surveyor automatically calculate run times using this information.

Surveyor can retrieve ET data from a system weather station, if you have a compatible station installed. These are the Hunter TW (TurfWeather) series, or the CWS4 weather station. Consult the weather software documentation for establishing communications with weather stations and linking them to Surveyor. You can also enter ET from any source manually, by typing it in the space provided.

Once a weather station is linked, you can retrieve the current ET immediately with the Retrieve ET button.

The 3 buttons beneath the ET select how the system will use ET.

Manually Set means you are entering or overriding the ET with a value you type into the field. The value must be in inches or millimeters.

ET from Weather Station, last 24 hours: uses evapo-transpiration data on a daily basis.

ET from Weather Station, 7 day average: averages ET over a "rolling" 7-day period. This provides a less dramatic change to irrigation amounts based on recent weather activity, and may be more appropriate for areas or seasons with volatile weather conditions.

ET Reference Head Type: This determines how ET settings will be summarized at higher-than-station levels in a mixed system with different head types. The Default setting should be the predominant type on your installation. If you choose to set a group of stations with the "% of ET" amount, Surveyor will calculate and display the equivalent of this in amount and run time. The ET Reference Head Type really serves as a tie-breaker for levels with mixed head types, since Surveyor can only display a single minutes value when "% of ET" has been selected.

Example: A system contains mostly G880 heads, but has G875 heads on the greens. These heads will have different precipitation rates. If settings are made for ET adjustment to the entire course, the equivalent value in minutes is shown at the System level (see Event Scheduling). The ET Reference Head Type determines which head type's precip rate is used to calculate the equivalent amount and minutes displays at higher levels.

NOTE: At the individual station level, the ET/Minutes display will be exactly correct for the selected station. It will also remain correct for any level (System, Group, Sub-group) where all head types are identical.

 Schedule Setup

Schedule Setup

The "Schedule Setup" selection includes controller settings related mostly to FCP scheduling.
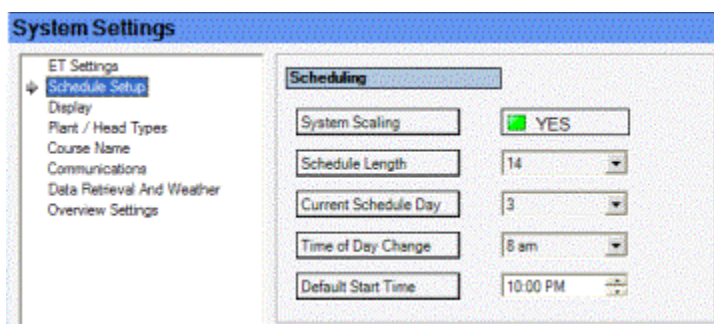
System Scaling enables % adjustment of the entire system. This adjustment is cumulative with controller and FCP program level scaling, which is confusing unless you thoroughly understand it. If you are afraid it will cause trouble, disable it.

Schedule Length sets the length of controller schedule day patterns. If the Schedule Length is set to 14 days, you have established a 14 day pattern, within which you can set Water Days on, or off. Some superintendents use a 6-day Schedule Length, because it easily enables water intervals of every day, every other day, and every third day, regardless of the day of the week. The controllers can have a schedule length of from 1 to 31 days. If you are unsure which to use, set it to 7 to correspond to a normal week (you can always change it later).

Current Schedule Day determines which day of the Schedule Length today happens to be. For example, if you set the Schedule Length to 7 and today is Wednesday, you could set the Current Schedule Day to 4 (if your irrigation week starts on Sunday) or 3 (if your week starts on Monday).

Time of Day Change determines when one irrigation day turns into the next. "Normal" days change at midnight, but this is often right in the middle of the irrigation. To avoid confusion with water days and no-water days changing at midnight, you can force the day change to a time (usually in the morning) when the irrigation is complete. You can set this to any hour, on the hour (there is no minutes setting for day change).

Default Start Time automatically fills in the start time for new programs. You can change the start times to any hour:minute setting you want, but the time set here will automatically appear in each new program's start time window.

 Display Settings

Display Settings

The "**Display**" settings selection determine the language and measurement system used throughout Surveyor.
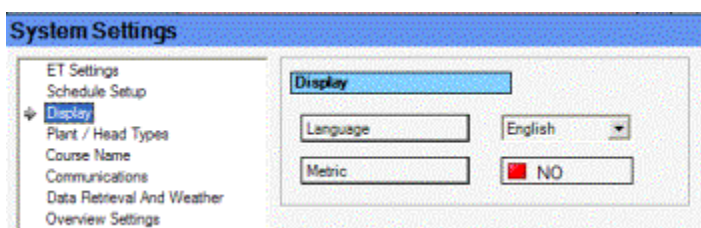
Select a language from the list. Currently Surveyor is English-language only, but Spanish will be added in the future.

Click Metric button to set measurement. The red NO setting will display all Surveyor measurements in American measurement. The green YES setting will display all measurements in international metric units.

 Plant/Head Types

Plant/Head Types

This is where you create the plant and head types from which you can select, when entering data for individual stations (see Controller Configuration). ***This important step should be completed before beginning advanced setup***, including Controller Configuration, Hydraulic Modeling, and Event Programming.
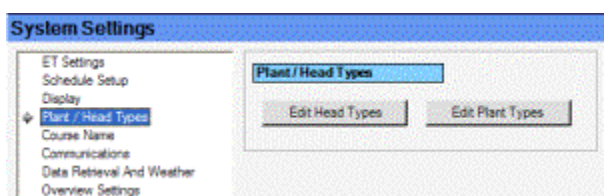
Creating Head Types: At System Settings, select Plant/Head Types, and then click the Edit Head Types button. The Edit Head Type window will appear.
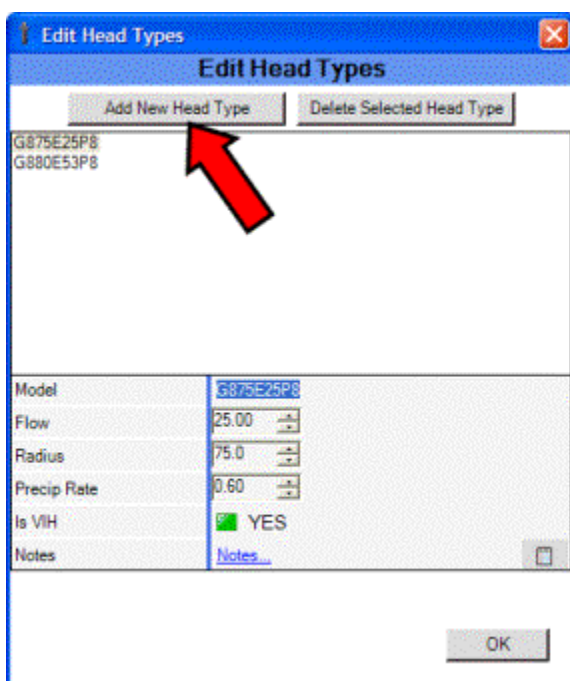
Click the **Add New Head** type button to create each type of irrigation head used on your installation.
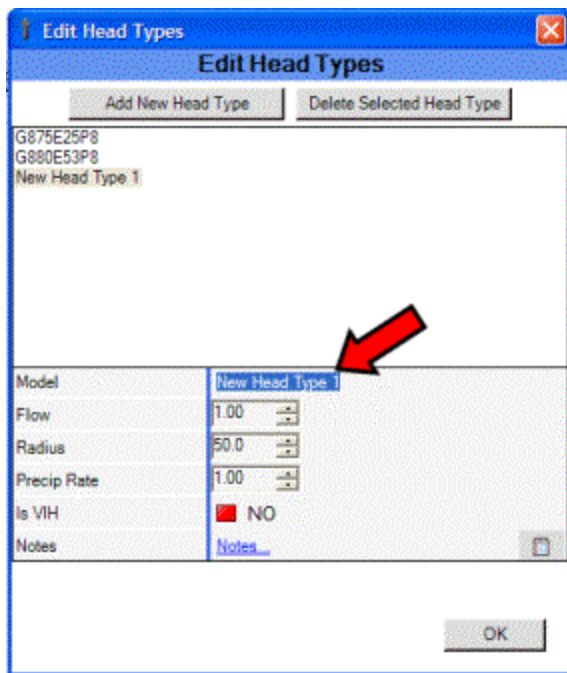
A New Head Type will appear in the Model field. You can highlight this name and type over it to create an exact description of the head you are creating:
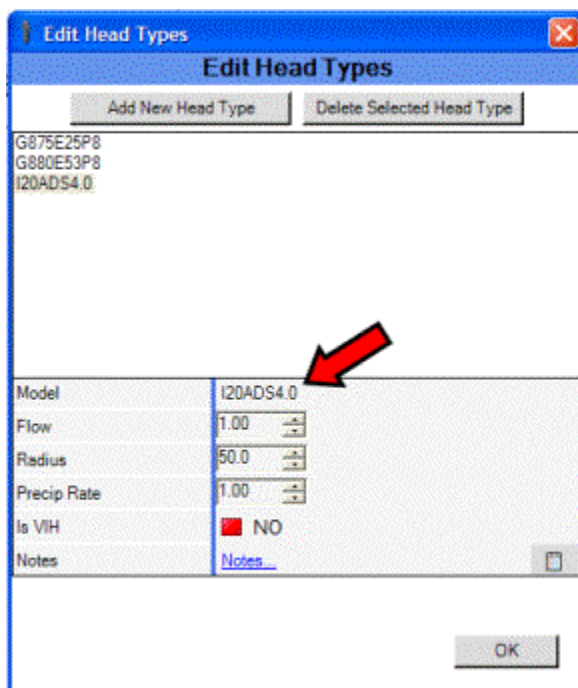
The values (Flow and Precip) that are assigned to the Head Types are very important, because these numbers are used in the mathematics of the flow optimization process. The closer they are to reality, the better job Surveyor will do to determine run times and schedule your flow.

Flow is the flow for that head type (taking into account its pressure and nozzle combinations) in gallons or liters. This is the amount Surveyor will have to account

for, each time flow is processed.

Radius is the approximate coverage radius of the sprinkler's arc, in feet or meters.
Precipitation Rate represents the depth (in inches or millimeters) that the head type will apply per hour. Surveyor does not calculate precip rates. You should enter the precip rate based on your head spacing, or as measured with a catchment test.
Is VIH indicates whether the station is a valve-in-head rotor. This is not used in programming and is not a critical field for Surveyor's scheduling functions.
Notes can be used to keep maintenance or other records and comments.

Set the values and click OK. Be sure to Save before exiting the Settings screen.
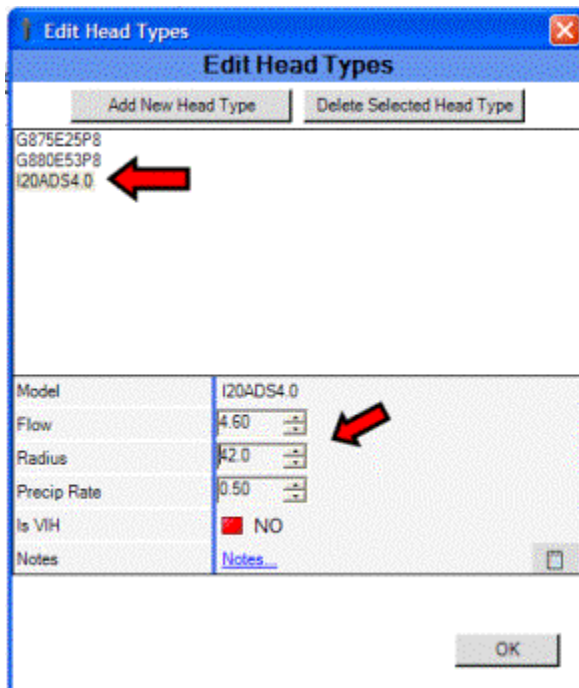
Creating Plant Types: From System Settings, Plant/Head Types, click the button "Edit Plant Types". The Edit Plant Type window will appear.
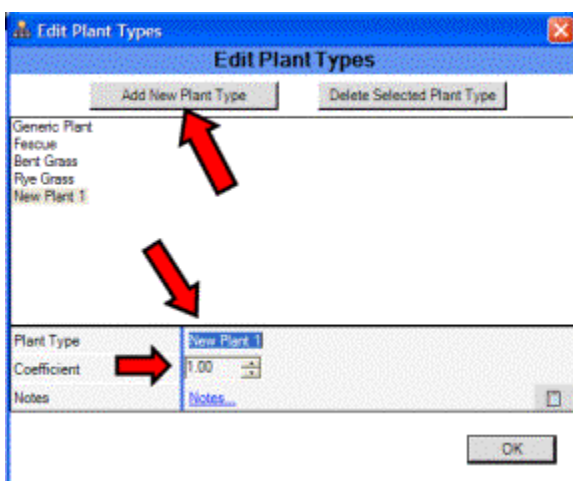
Plant Types include an important piece of information: the Crop Coefficient.

Plant Types will be associated with your Management Groups, and the crop coefficient will be used to modify the daily Evapo-Transpiration (ETo) data if you are using the ET option. (If you are not going to use ET, this information is not necessary, but still nice to have).

Use the Add New Plant Type button to create the types of plants found on your course, and enter the crop coefficient (often called "Kc" in arithmetical notation).

Click OK and Save to create the new plant type.

You can find sources for crop coefficient information from suppliers, local meteorological sources, or on the internet. You may also consult an agronomist or other qualified professional for specific plant information.

The **Course Name** field allows you to enter your own installation's name in the software. This will display the name of your course on the screens and reports throughout Surveyor, as well as the vertical title on the left of all Surveyor screens.
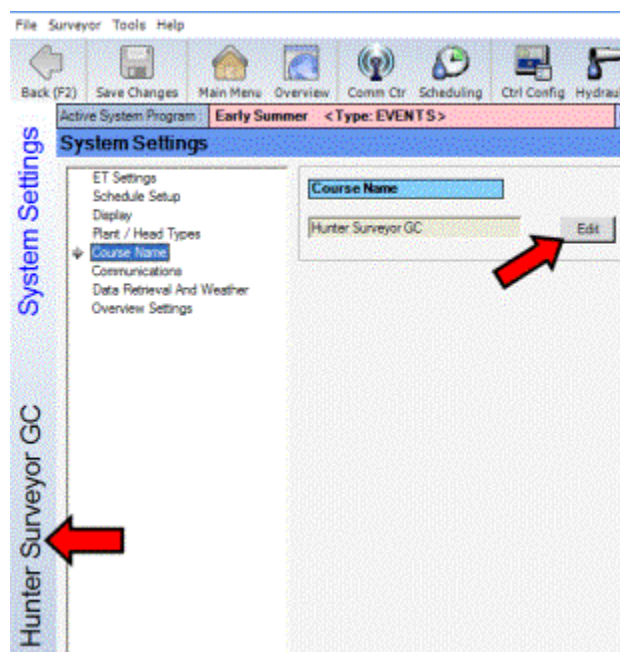
Communications (Settings screen)

Communications (Settings screen)
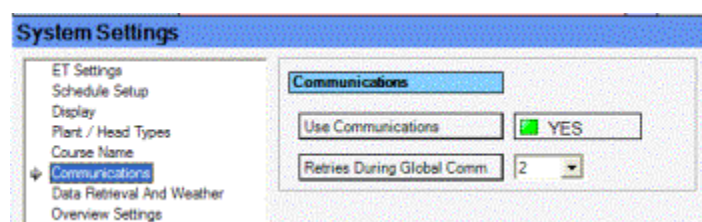
"Communications" sets whether or not the software will attempt to communicate. If you are using the software to setup a system for a customer, or as a demonstration, setting Use Communications to NO will prevent the software from trying to communicate with hardware that does not exist.

Retries During Global Communications determines how many times Surveyor will attempt to contact controllers when "global" commands are issued. The default is 2, and this is adequate for hardwired systems. Some radio systems in noisy areas may require higher numbers of retry attempts if communications are frequently blocked.

 Data Retrieval and Weather

Data Retrieval and Weather

These settings are only necessary if you have, and are using, these optional devices.
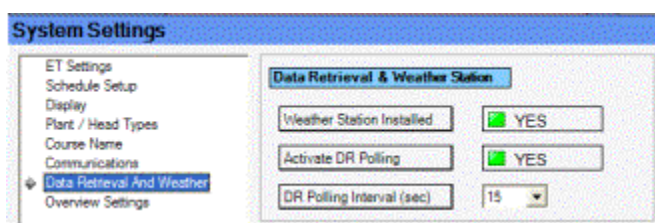
Weather Station Installed sets whether Surveyor will automatically start the Weather Station software when Surveyor starts. Setting Weather Station Installed to YES also activates the Weather icon in the Surveyor toolbar, and includes weather sensor readings on the Surveyor Overview screen.

The Hunter **Data Retrieval** unit monitors various sensors in the field, and the information from these sensors is obtained by "polling". This means that the computer will ask the Data Retrieval unit(s) for sensor readings every few seconds. Click the button to show a green YES if you wish to activate Data Retrieval polling automatically, when Surveyor starts up. ***NOTE: Polling is required if you want automatic shutdowns when sensor alarms occur.***

DR Polling Interval sets how often the Data Retrieval unit will be polled for data. Polling too frequently can slow down the computer, and can also cause extra "chatter" in a radio system. Set the longest interval you can live with (choices are 15, 30, or 60 second intervals). There is no loss of data with longer intervals.

 Overview Settings

Overview Settings

This setting determines the graphic in the Overview screen. If you have inserted a scan or photo, or created a custom graphic with the drawing tools in Surveyor, you

can select Use Current Map View to make your custom graphic appear in the Overview window. "Use default image" will tell Overview to use the generic photo supplied with Surveyor.
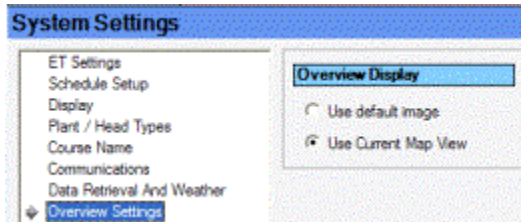
 Creating Groups

Creating Groups

Use the "Groups Config" button on the toolbar (or one of the other navigation methods) to go to the Groups screen.

The purpose of Groups is to create a list of plant types and geographical areas that include all your irrigated areas. Later, you will tell each station which Management Group and Location Group it belongs to. Each individual station technically belongs to a "Subgroup", meaning the intersection of a Management Group and a Location Group.
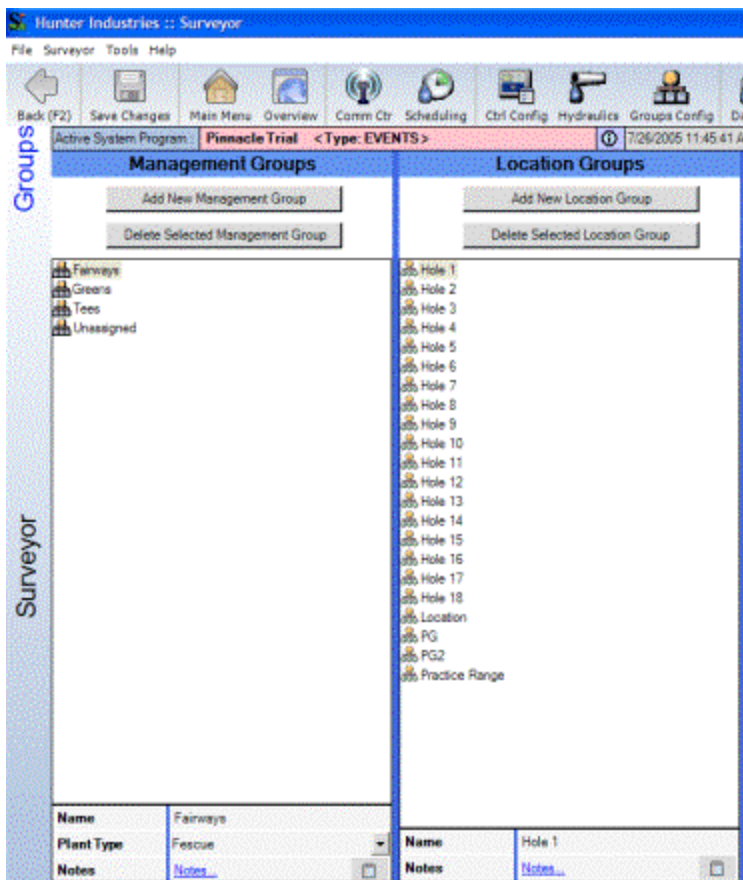
Example: Station 1-1 is located on Hole 1 (the Location Group), and is on a Green (the Management Group). Station 1-1's "Subgroup" is "Hole 1 Greens".

Locate the area of the screen called **Management Groups**. A few groups will already be created for you (Greens, Tees, Fairways).

A Management Group is a selection of stations which irrigate a similar plant type, with similar needs. Management Groups are not area-specific. For example, Greens are located all over the course, but generally contain the same type of plant with similar (not identical) needs. They are a logical Management Group. Management Groups are not the same as plant types, however. There may be bent grass on other course areas, but you will not treat those areas the same as Greens.

Management Groups will share a common water day schedule (you could set Fairways to water every other day, for example, and that schedule will apply to all Fairways).

You can create new Management Groups for any general plant type. For example, if you have a large number of ornamental plantings that have significantly different watering needs than turf, you could create an Ornamentals Group, and adjust them separately.

Create new Management Groups

❎ To create additional Location Groups

Create new Management Groups

Click the Add New Management Group button. The Add New Management Group window will appear. Type a name for the new Group and select its plant type (the plant types are from the lists created in Settings, Edit Plant Types).
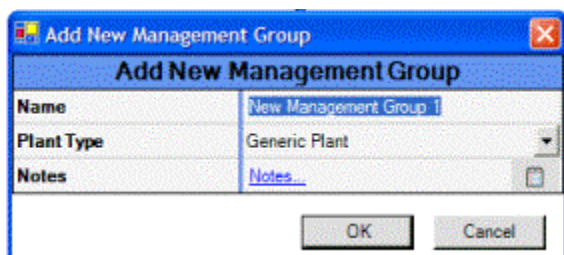
Management Groups must be restricted to a single plant type. Click the down arrow next to the Plant Type field to select a type from your list.
If the plant type you need is not listed, go to Edit Plant Types and create the Plant Type.

Once all the Management Groups are created, locate the Location Groups section.

Location Groups are logical geographical areas, typically Holes of Golf. In addition to holes of golf, unique areas such as Practice Greens, Clubhouse, and Driving Range may be good choices. Location Groups may overlap different controllers, if more than one controller operates stations on a specific hole of golf. This is relatively common in large systems.

❎ To create additional Location Groups

To create additional Location Groups

Click the Add New Location Group button. The Add New Location Groups button will appear. Type a name for the new Location Group.
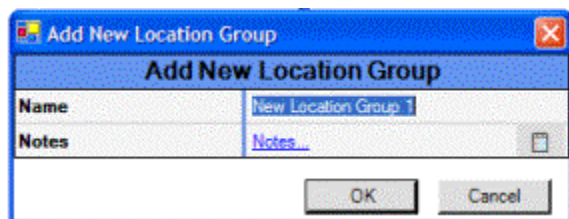
You should at least create one location group for each Hole of Golf. Practice facilities (such as Driving Ranges and Practice Greens) and landscaped areas like the Clubhouse may also be good choices.

If you plan to treat or schedule the irrigation of an area separately, you should create it in a Location Group.

Once you have created a basic list of Management Groups and Location Groups, you are ready to tell each station what it is. In other words, you will assign each station its Types and Group memberships.

[x] Controller Configuration

Controller Configuration

Use the button on the toolbar, or one of the other navigation methods, to go to the Controller Configuration screen.

The upper left area of the Controller Configuration screen shows a list of all controllers currently configured. Click on one of the controller names once to highlight it, and data for that controller will be displayed.
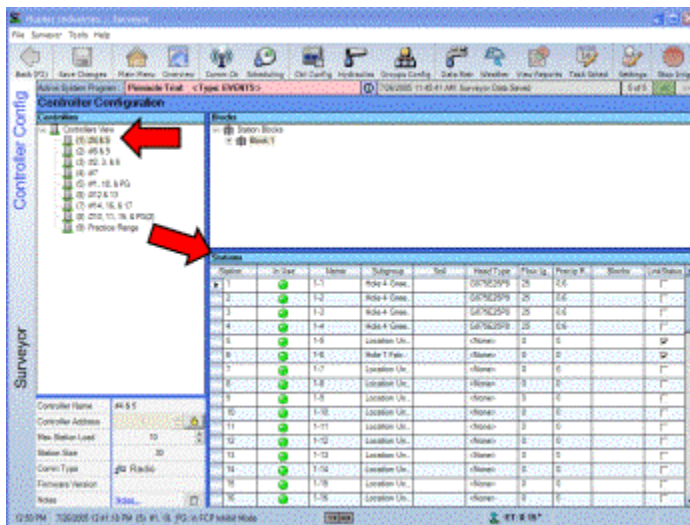
You can create new controllers here, by right-clicking in the Controllers area, and choosing Add New Controller from the drop-down menu. If you have performed a Controller Search, all controllers should already appear.

[x] Controller Data

[x] Resizing Controllers

[x] Station Data

 Adding Multiple Heads to a Station

 Removing or Changing Heads

 Subgroup assignment

 Soil (Infiltration Rate): You can select the soil type for each station with this optional feature. Soil types cannot be created, but are selected from the list provided.

 To set the Soil Type

 In Use/Not In Use

 Shortcuts for Station Data

Controller Data

The lower left corner of the screen will show the setup data, including the station size, for the highlighted controller (if the size is incorrect, you can right click on the controller and click Resize Controller).

Remember to Save after changing any controller data.
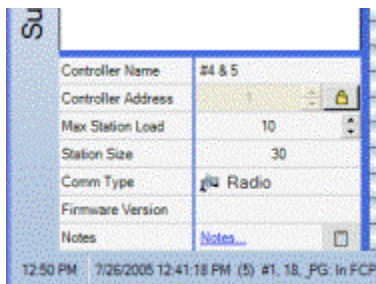
Controller Name is any name you would like to call the controller (just highlight the Name field, type a new one, and press the Enter key). This can be the same as the Address, but it does not have to be. Frequently controllers are named for the golf features they irrigate, or the feature they are located closest to on the course.
Controller Address is the most important field, because this is how the software communicates with the controller. The address in the software must match the address in the controller. If, for some reason, you have to change a controller address in the field, click the padlock to edit the address in the software. The address can be anything from 1 to 999.
Type the new address and press the Enter key. ***Make sure you do not type any address which is already in use in another controller!**** Each controller must be uniquely addressed.
Max Station Load is the maximum number of stations you will allow the controller to operate at once. This can prevent Surveyor from scheduling stations (in Event mode) even if there is additional hydraulic capacity. Max Station Load can be set anywhere between 1 and 10.
Station Size is the total capacity of the controller, based on the number of station

output boards installed in the controller (NOT the number of stations that are actually in use). ***Station Size must also match the controller, or stations may be missed for irrigation scheduling.***

 Resizing Controllers

Resizing Controllers

You can add or remove stations from a controller in Surveyor, if those changes have been made in the field. In Controller Configuration, right-click on the controller you need to resize, and select Resize Controller.
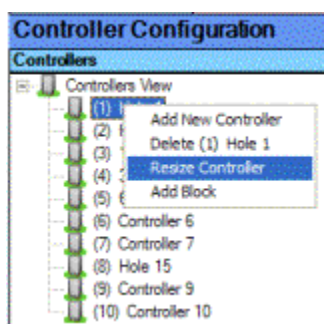
Surveyor will first attempt to communicate with the selected controller, to determine the actual station count in the field. After a pause for communications, the Resize Controller dialog will appear.
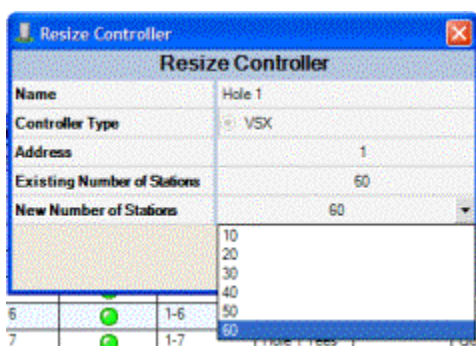
Click the down arrow next to New Number of Stations, and select the new controller size from the choices listed. VSX controllers are always expanded in increments of 10 stations. It does not matter whether all stations are "in use", because the controller only identifies complete 10-station increments.

When the new size is entered, click OK. The size will be permanently changed after you Save.

Comm Type is the form of communications the controller uses to communicate with Surveyor. It can be either Hardwire (via GCBL cable) or Radio.
Firmware Version is the version of the microprocessor program in the controller's memory. This is not a setting that can be edited. It is information that is retrieved

from the controller, and may be useful in troubleshooting.

Notes are any maintenance or other reminders you wish to keep for yourself.

 Station Data

Station Data

The lower right section of the screen will show data for each station in the selected controller. This spreadsheet view is the fastest way to view and enter data for individual stations.

Note that each station has a row in the spreadsheet. The number of rows will equal the reported station size of the controller (a 30 station controller will have 30 rows, etc.). Initially, the only other information about the station will be its Name, which always will initially be presented as "Controller number-station number" (1-7 is controller address 1, station number 7).

Rename the stations (if you wish) by clicking in the name field, and typing a new name. Station names are not displayed in the VSX controller displays, but will be used in all Surveyor programming screens and reports. Note: names are not changed permanently, until you click the Save button.

The pencil icon on the left shows that the station has been edited, and not yet saved.

The other columns in the station spreadsheet are important, because complete and accurate station information is one of the keys to getting the most out of Surveyor.

NOTE: After reviewing each of the station setting descriptions below, look at the following section on Shortcuts for Station Data to set up your stations as quickly as possible.

Head Type: Selecting the Head Type will fill in the Flow and Precip Rate fields for

you, based on your library of Head Types (you can still edit these values individually later, if necessary).

Right-click in the Head Type cell to show the Head Type selection window. If a station has a head or heads assigned, they will be displayed in the window. If no heads have been assigned yet, a message will display "This station has no heads assigned."
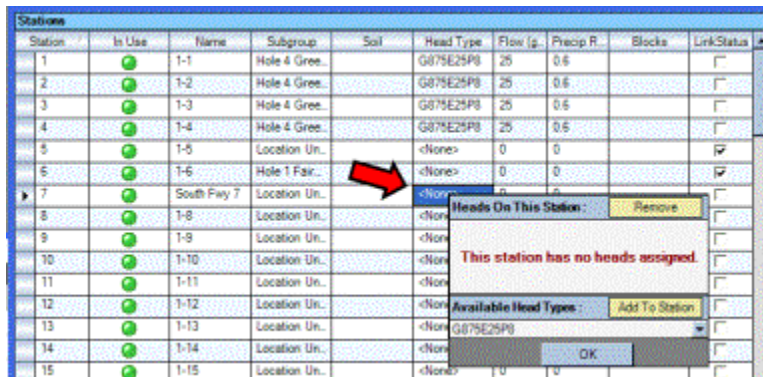
The lower part of the window shows the Add Head Type selection with a down arrow. Clicking the down arrow will display the list of all Head Types created in your system.

To add a head, simply click the down arrow, click on the type you want to add, and click the Add button. (If the head type you wish to add is not shown on the list, you will need to add it to your library… see System Settings, Add Head Types).
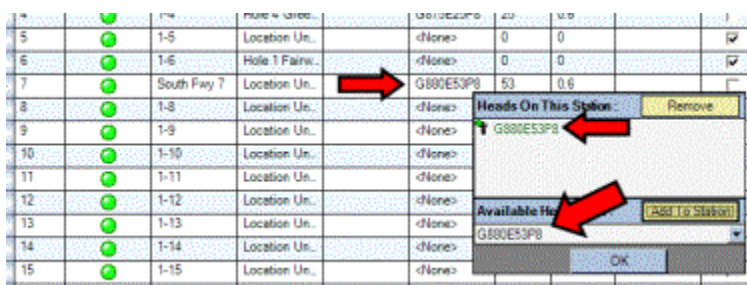
⊠ Adding Multiple Heads to a Station

Adding Multiple Heads to a Station

Some stations have more than one head (block systems, or multiple valve-in-head sprinklers wired to the same output). You need to add a head to the station for each head that actually exists in the field.

Each time you click the Add button, another head of the selected type will be added to the window. Surveyor will combine the flows of the individual heads when estimating the output of the station.

Added heads will display a green + sign, until the Save button has been clicked (to show that they are new). After saving, the + signs will no longer be displayed.

When the window is correct, click OK. The window will disappear and the new head configuration will be shown for the station in the spreadsheet. Note that the cells in the spreadsheet for Flow and Precip Rate will also be filled in, based on the information for the Head Type(s).

 Removing or Changing Heads

Removing or Changing Heads

If the Existing Heads shown in the window need to be changed, it is important to Remove them first. Click to highlight the head you wish to remove, and click the Remove button. An X will appear over the icon and the name of the head will turn red. When you click OK, the head will be removed. After you click the Save button, the removed head will no longer be shown.
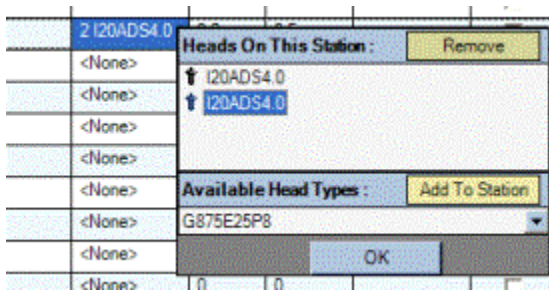
If you wish, you can then click the Head Type down arrow and replace it with another head type (click OK to make the change).

When there are multiple heads on a station, Flow will show the combined flow for each head.

Precip Rate should remain unchanged regardless of number of heads (the same precipitation rate, in inches or millimeters per hour, would simply apply over a larger area).

Combining heads of different types on a station may not generally be a recommended irrigation practice, but if this is the case in the field, it can be reflected in the Surveyor software. Select the different head types until they are all displayed in the Existing Heads window, and click OK.

The **Flow** cell will show the combined flows of all the different Head Types. However, the Precip Rate cannot be correct in such a case. Surveyor will average the Precip Rates of the selected heads and apply the result to the whole station. If this is unsatisfactory, you can click directly in the Precip rate cell and enter any rate you wish.
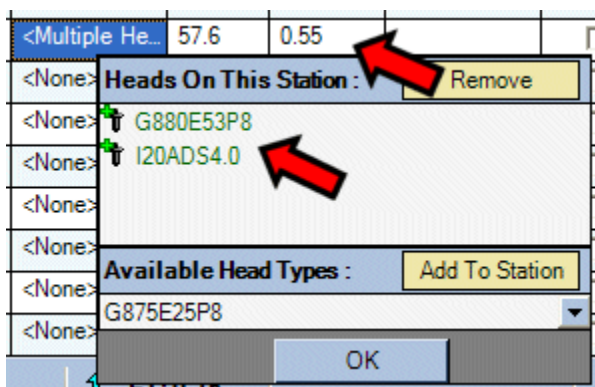
Once the head type(s) have been selected, you can still edit the Flow and Precip Rate values. Factors such as pressure loss due to elevations, pipe scaling, and many other variables can affect the actual performance of different stations.

If you want to "dial in" the actual performance of individual stations, select the Head Type first, then click in the Flow and Precip Rate cells, and type in the preferred value. Click Save when finished (edited cell remains yellow until Saved).

G875E25P8	25	0.6
G875E25P8	25	0.627
<None>	0	0

Subgroup assignment

Subgroup assignment

In addition to Head Type, you will also want to set each stations Subgroup. This is another key to unlocking the power of Surveyor's Event-based programming… telling each station what course area, and plant type, it irrigates.

A Subgroup is the combination of the Location Group (where a station is) and a Management Group (what type of plant the station irrigates). The Subgroup is created automatically by selecting a Location and a Management Group. The purpose of a Subgroup is to adjust irrigation by course features, such as Hole 4 Green, without fussing with individual station names and other details.

To set a station Subgroup

Right-click in the Subgroup cell to display the Location Group and Management Group selections.

The down arrow next to the Location Group field will display a list of all the Locations you have created. If the area you need is not displayed, you will need to go the Groups screen and add it to your list (see Groups).

Click the course area, or Location Group, to which the station belongs.

Set the station's Management Group by clicking the down arrow next to the Management Group field, to display a list of available Management Groups (if the Group you want is not displayed, you will need to go the Groups screen and add it to your list (see Groups).

When you have set both Groups, the spreadsheet will show the new Subgroup assignment for the station.

If you ever need to change a station's Subgroup assignment, just right-click in the Subgroup cell and reselect the Location and Management Groups.

☒ Soil (Infiltration Rate): You can select the soil type for each station with this optional feature. Soil types cannot be created, but are selected from the list provided.

Soil (Infiltration Rate): **You can select the soil type for each station with this optional feature. Soil types cannot be created, but are selected from the list provided.**

The Soil setting can be useful, because it can be used to automatically divide the total station run time into Cycle & Soak times. The Soil setting is more than just a name… it includes the infiltration rate of water into one of the five types of

standard soil textures (as commonly used by US Natural Resources Conservation Service, or US NRCS).

For example, suppose that a station needs 20 minutes worth of water. However, if it is installed on clay soil, you begin to experience run off or puddles after 10 minutes of irrigation. If the Soil has been set to "clay", Surveyor might schedule 10 minutes of irrigation for the station, 40 minutes of Soak time, and then a second cycle of another 10 minutes. The actual Cycle and Soak would also be based on the Precip Rate for the station, since that determines how quickly the soil is saturated.

☒ To set the Soil Type

To set the Soil Type

Right-click the Soil cell for the station you want to set, and the Soil Type selection window will appear.
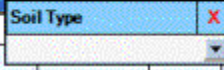
Click the down arrow, and choose a Soil type that matches your own.

Note that you can override the Soil infiltration rates at any level (System, Group, or by station) and create your own maximum Cycle time and minimum Soak time, at the Scheduling screen (see Scheduling). You may only wish to override certain troublesome locations, or you can specify each station's settings. You are not required to use this feature.

You can also control for other soil phenomena with this setting. For example, if you have Loam soil but it is heavily compacted, or on a slope, you can set the station to Clay and it will schedule shorter Cycles and longer Soaks. Extreme cases can be better managed with the manual override feature.

☒ In Use/Not In Use

In Use/Not In Use

The square buttons in the In Use column determine whether a station output in the controller is actually wired to real valves or solenoids. In a controller of any given size, there are often stations which are not "wired up" or which are left for future expansion. If Surveyor does not know the station is unused, it may try to schedule it, and this will count against the maximum number of stations it can run.

Mark these unused stations as Not In Use with this button, so that Surveyor will ignore them when automatically scheduling stations.

To designate a Not In Use station, right-click in the cell and click the red Not In Use button. The station will be ignored. If you connect it in the future, repeat the process and click the In Use button, and fill in the rest of the cells for the new station.
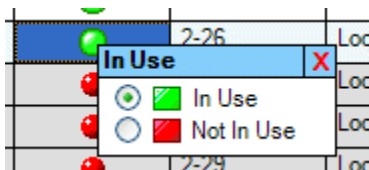
Shortcuts for Station Data

Shortcuts for Station Data

It is possible to set data for large numbers of similar stations at once, using shortcuts based on Windows standards. These are especially useful on initial start up.

Increased Work Space: You can click and drag the dividers between panes of the screen to increase the size of the work area.

Hover the cursor (move the mouse without clicking) until it is right over one of the dividing lines between screen areas. The shape of the cursor will change when it detects a windows boundary.

Click on the border while the cursor is in this shape, and drag the window to a larger size.
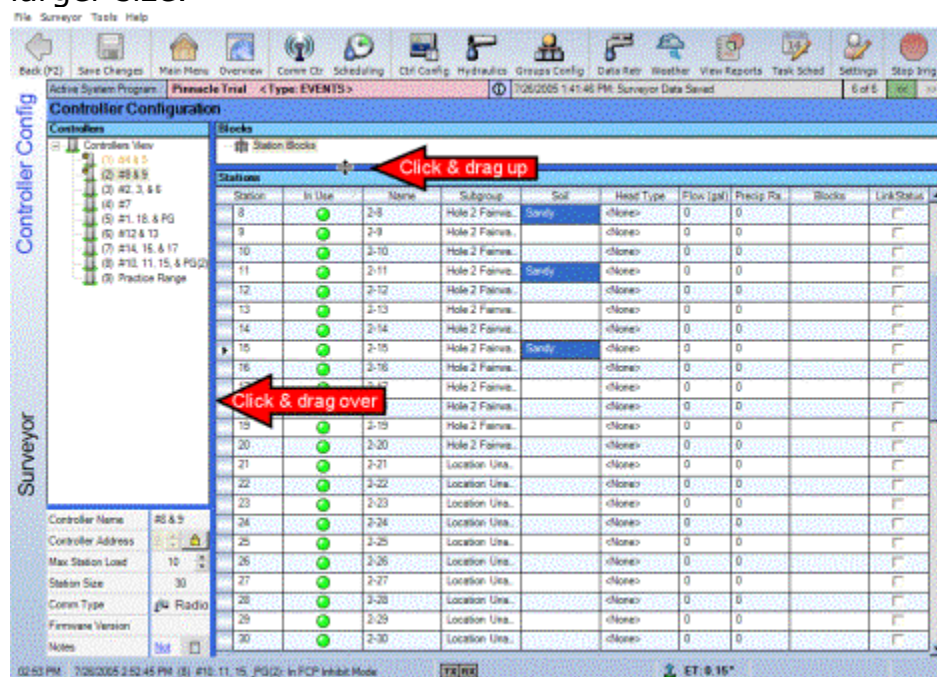
Shift key: You can select cells for a range of stations between any two points in a column by clicking a cell, holding down the Shift key, and clicking another cell in the same column. All the cells between the two points will be selected. You can now set the values in the column for all the selected stations at once.
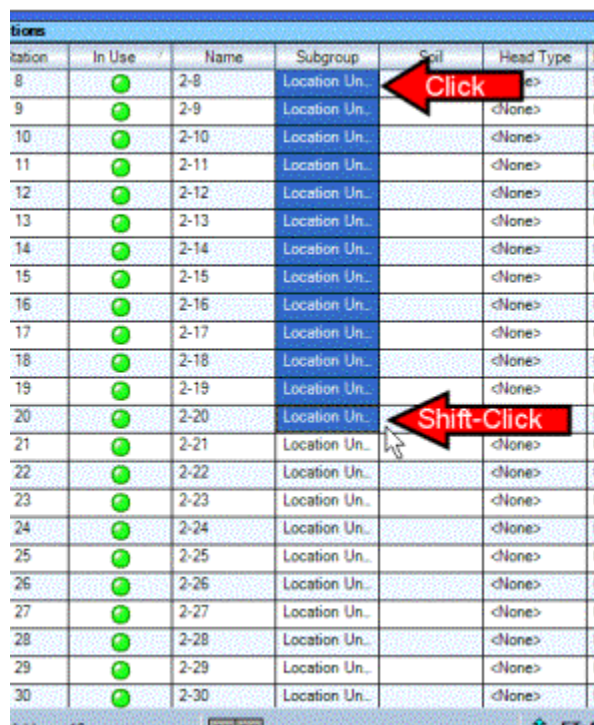
Example: stations 2-8 through 2-20 are all on Hole 2 Fairways.

In the Subgroups column, click the cell for 2-8.
Hold down the Shift key, and click the Subgroup cell for 2-20. All cells in the Subgroup column from 2-8 to 2-20 will be selected (highlighted).
Right-click in any of the selected cells, and set the Location Group to Hole 2, and the Management Group to Fairways.
All of the selected stations will be set to Hole 2 Fairways.

You can use Shift to select an entire column: click the top (first) cell, then scroll down and click the bottom (last) cell in the same column (for the value you want to change). This will select every station in the controller, and you can apply the change to all of them.

Control key: You can select cells for multiple stations within a column by holding down the Control key (often shown as just Ctrl), while clicking each individual cell you want to set within the column. This is a good way to set multiple values which are not adjacent.

When the multiple cells are selected, right-click and make the settings as described under the Shift key shortcut.

Example: Stations 2-8, 2-11, and 2-15 are all on sandy soil.
Hold down the Control (or CTRL) key, and click the Soil cell for each of the stations.
All of the stations will be highlighted.
Right-click in one of the highlighted cells, and set the Soil Type to Sandy.
All of the selected stations will be set to Sandy.

Page Down+Shift: To select all visible cells in an entire column, click a cell, hold down the Shift key, and click the Page Down key at the same time. All cells from the first cell down to the bottom of the visible page will be selected, and can be set at once (as with the Shift and Control keys described previously). This will NOT select the entire column, only the visible cells.

When you are entering station data, click the Save button <u>often</u>. You may have several hundred stations or more, spanning dozens of controllers, so the more often you Save, the less information you could lose by accident.

As soon as you have finished entering all station data, it is a good idea to **Backup the Database** (see Backup the Database).

Blocks are powerful features, and are also shown in separate columns per station, but they are not used in Event-based irrigation. These cells display information for the stations, but the settings are not made here (see Blocks).

☒ Hydraulics

Hydraulics

The last major area to set up for Event-based scheduling, and flow-optimization, is the Hydraulic network. The Hydraulic screen actually creates a model of your pump and pipe system. It is extremely helpful to have a record drawing, as-built, or other reasonably accurate record of your hydraulic system with station connections, when setting this screen up.

The purpose of the Hydraulics screen is to provide Surveyor with flow and velocity information to use when flow optimizing your irrigation plan.

Surveyor will use the Hydraulic tree to:
a) maintain the Optimum flow for your pump,
b) spread the flow demand across the pipe network within safe velocities, according to your priorities.

Surveyor spreads the flow by scheduling individual stations to turn on and off, and calculating the flow demand of each one on the pipe system. Station starts are treated as individual "events". Surveyor can start any stations, in any order, and can automatically "shuffle" individual events to make the shortest, safest water window.

Use the drop-down navigation, the buttons on the Main screen, or the selections under Surveyor in the menu bar to go to the Hydraulics screen.
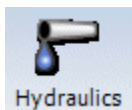
The Hydraulic screen is divided into 4 major areas.
Upper left: **New Hydraulic Objects**. This contains Water Sources, some common types of pipe, and Pipe Blocks. It also allows you to create and define new ones.
Lower left: **Station list**. All stations in your system are listed here, until they are assigned to the Hydraulic system. This area can be filtered by Management Group, Location Group, and Controller, so that you will see only stations of a certain type in a certain area. As stations are assigned to the pipe network, they will disappear from this list. When all filters are removed and no more stations appear, the Hydraulic model is complete.
Center: This displays the actual **Hydraulic model**, and is the work space for building the model. It is empty when the system is new, and will fill up with pipe segments and stations as you build the model.
Right: **Assigned Stations**. This lists all the stations which have been connected to any object selected in the Center work space.
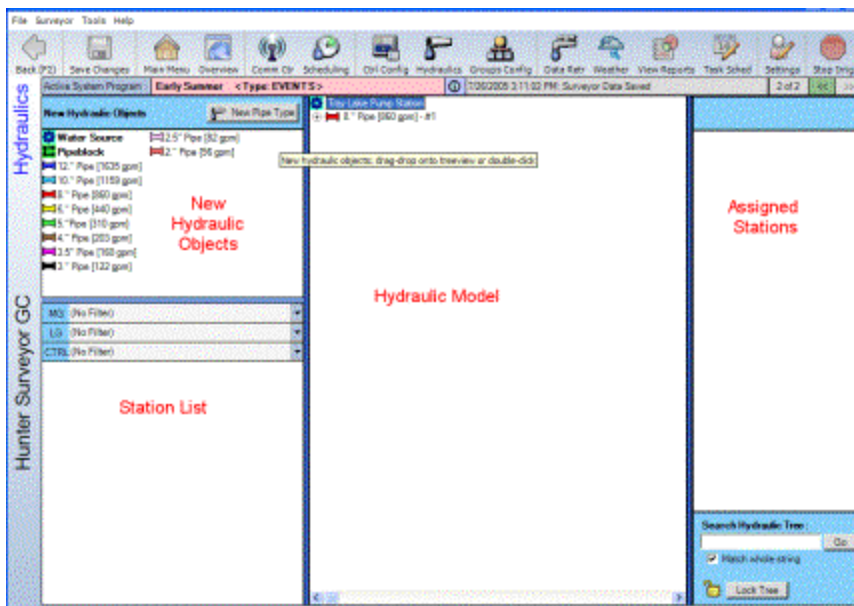
Water Source(s): The beginning of each pipe network is a water source. You may also have more than one water source, but you must have at least one.

[x] To create a Water Source

[x] Staging Delays

[x] Pipes

[x] Pipe Overview

[x] Hydraulic Tips

[x] Pipeblocks

[x] More Hydraulic Tips

[x] Tips for Assigning Stations

To create a Water Source

Click on the Water Source icon in the upper left New Hydraulic Objects area, drag it over into the center work space, and release it. A new Water Source icon will then appear in the work space.
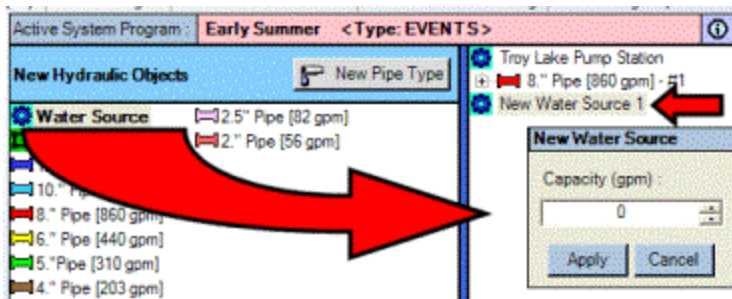
A pop-up menu will ask for a flow capacity for the new Water Source. Type the desired flow capacity for the Water Source in the window and click OK. This is the "optimum" flow that Surveyor will try to maintain throughout the water window.

Right-click on the Water Source icon, and choose Edit Properties from the drop-down menu. You will see the Edit Water Source & Pump Data window.
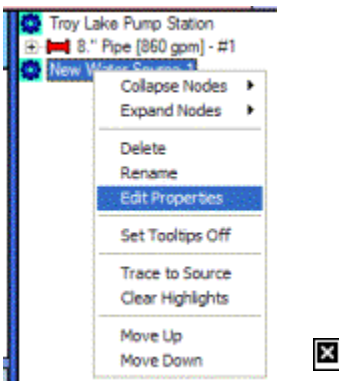
The **Total Flow** window should equal the amount you entered when you created the water source (or you can edit it here). Total Flow may be less than the amount for the Water Source in some conditions, but it will never be more.

 Staging Delays

Staging Delays

Underneath the Total Flow entry are the **Staging Delays**. Staging Delays are increments of flow that restrict how many stations Surveyor can activate, for a period of minutes. They prevent pump stations from accidental low pressure discharge, when too many stations are suddenly turned on at once. You may specify up to 5 steps to reach the optimum flow.

Example: If your optimum flow is 1000 gpm, Surveyor will normally try to reach 1000 gpm immediately. However, if 1000 gpm worth of stations activate at once, some pumps will interpret the sudden drop in pressure as a problem, and shut down.

Using Staging Delays, you can "sneak up" on the optimum flow in safe, manageable increments. You could specify a stage of 200 gpm for a period of 1-2 minutes, and Surveyor would only schedule as many of your stations as required to reach 200 for a minute or two.

You could specify another stage (check the box next to the next Stage) of another 200 gpm, and specify a duration of 1-2 minutes for this stage. This allows Surveyor to schedule up to 400 gpm worth of stations for the second minute or two of start up.

The Cumulative field will add the stages and display the total flow of each stage.

You could add another stage of another 200 gpm, and the system would operate at the total of 600 gpm for the duration time.

If that seems like an adequate "ramp up" to optimum flow, you don't need to specify a final stage. Surveyor will automatically go to optimum (1000 in the example) after the last specified stage. Surveyor will continue to try to schedule to the 1000 level for the remainder of the water window, until it starts reaching the end of the schedule.

You may also include any maintenance or other records in the notes field.

Pumps – TBD

⊠ Pipes

Pipes

After creating a Water Source, you will need to construct a pipe network that resembles your real world pipes as closely as possible.

In the upper left corner is a library of Pipe Types you can use to build your system. You can also create new types, or edit the existing ones. The more closely this model matches your real world system, the more accurately Surveyor will operate your flow optimization. It is possible to build a perfect model if all pipe types are known.

New Hydraulic Objects	New Pipe Type
Water Source	2.5" Pipe [82 gpm]
Pipeblock	2." Pipe [56 gpm]
12." Pipe [1635 gpm]	
10." Pipe [1159 gpm]	
8." Pipe [860 gpm]	
6." Pipe [440 gpm]	
5."Pipe [310 gpm]	
4." Pipe [203 gpm]	
3.5" Pipe [160 gpm]	
3." Pipe [122 gpm]	
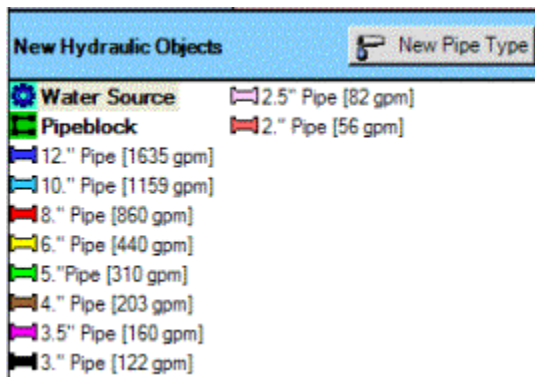
⊠ Pipe Overview

Pipe Overview

Build a Hydraulic "tree" in the center area, showing the hierarchy of pipes from the water source down to the individual station level. Do this by clicking and dragging the Pipe Types from the New Hydraulic Objects section into the center area, and releasing them when they highlight the object to which you wish to attach them. The new pipe segment will then appear below the object to which you attached it.

- ❑ Click and drag a Water Source into the center to start the tree.
- ❑ Click and drag the Pipe Type for your Main onto the Water Source.
- ❑ If there is more than one Main, click and drag the appropriate Pipe Types onto the Water Source, and all the main lines will be "peers" in the tree.
- ❑ Click and drag the pipe segments onto the Mains, to represent each run of a given pipe size. Continue through all pipe sizes. Be sure to attach them to the pipes which feed them in the hydraulic tree.
- ❑ Where you are uncertain of actual pipes, and wish to specify a maximum safe flow for an unknown collection of related pipes, click and drag a Pipeblock onto the last known pipe type and set the Max Flow.
- ❑ Finally, assign the individual stations to the appropriate pipe segments by

clicking and dragging them to their feeder pipes in the tree.
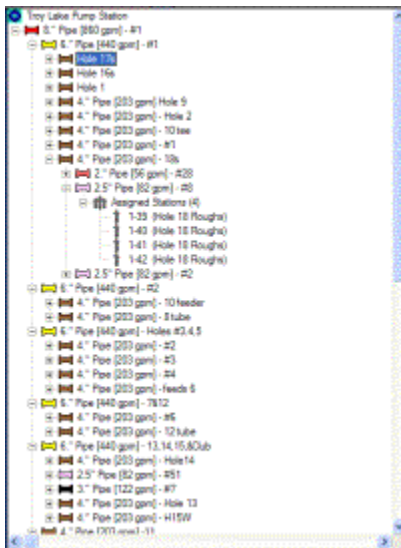
 Hydraulic Tips

Hydraulic Tips

- ❑ Use the filters to view unassigned stations (lower left) by Management Group, Location, and/or Controller, to ease the task of recreating the hydraulics. This allows you to complete one area at a time, without fishing through hundreds of stations.
- ❑ When stations are assigned, they disappear from the lower left unassigned stations area. If you click on the pipe or object in the tree to which they are assigned, they will appear in the Assigned Stations area (upper right).
- ❑ When all filters are off (No Filter) and no more stations appear in the Unassigned Stations area, you are finished.
- ❑ Save often as you build the hydraulic tree. Don't wait until you have completed it. It is a good deal of valuable work, and it's better to save as you go.
- ❑ Whenever you exit the Hydraulics screen and then return, the tree will have "locked" to prevent accidental changes. Click the padlock in the lower right corner to unlock it, and you can edit freely.
- ❑ As soon as you have finished, ***Backup the Database!*** (see Backup the Database).

Start with the main pipe(s) connecting your water source to the water distribution network. This is generally the largest pipe type in the irrigation system, and is connected directly to the pump station.
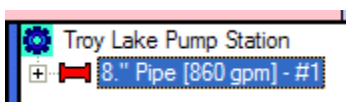
The **New Hydraulic Objects** section of the screen, in the upper left, displays

common pipe types found on golf courses. If you see a pipe size that matches your Main pipe(s) from the pump station or water source, just click on it and drag it over onto the Water Source icon, and release. The pipe icon will be displayed in the center area under the Water Source icon.
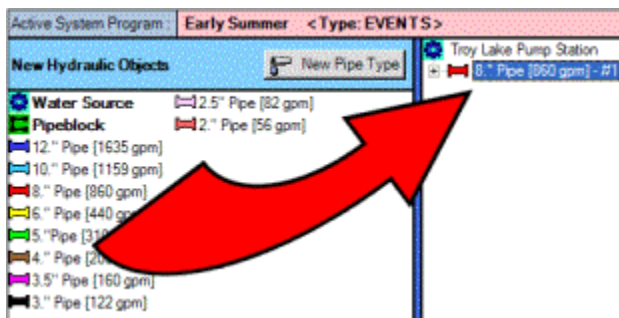
If you have a Main pipe that is NOT shown on the list, create a new one. Click the New Pipe Type button, and the **Create New Pipe Type** window will appear.
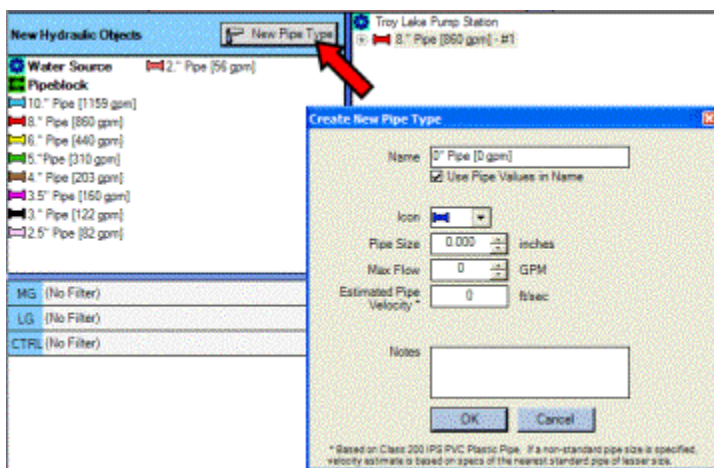
You can name the New Pipe Type anything you want, or just leave the Pipe Type as the name (to name it, highlight the name field with the mouse, type a new name, and press Enter).

You can select the color for the new pipe's icon. The New Pipe Type window will offer a color selection, but you can click the down arrow next to it, and assign any color you want.

Specify the new pipe size (internal diameter) in inches or millimeters.

Specify the maximum flow for the new pipe type in gallons per minute, or liters per second, or cubic meters per hour.

As you enter a maximum flow, the estimated velocity of water through the pipe at that flow is calculated and displayed in the Estimated Pipe Velocity field. Velocities are estimated, based on formulae for Class 200 IPS PVC plastic pipe. It is your responsibility to verify the accuracy of other pipe types based on their performance charts, but this is relatively close.

If the Flow for the pipe type causes an estimated velocity of over 5.00 fps/1.5mps, the field will turn red, and a warning will appear that you are specifying potentially unsafe velocities. You can save and operate with a pipe type that permits over 5.00fps/1.5 mps, and sometimes you may have to. However, the industry generally recognizes this as the safest velocity for long term equipment life.

You cannot directly enter a velocity. Instead, change velocity by altering the Max Flow. The best practice is usually to run at the lowest velocity that still permits irrigation to be completed within the available water window. Lower velocities extend pipe and valve life.

Surveyor will not permit a pipe with a higher Max Flow to be attached to an object with a lower Max Flow.

If you have finished creating a New Pipe Type, click OK and the new Pipe Type will appear in the list of new Hydraulic Objects.
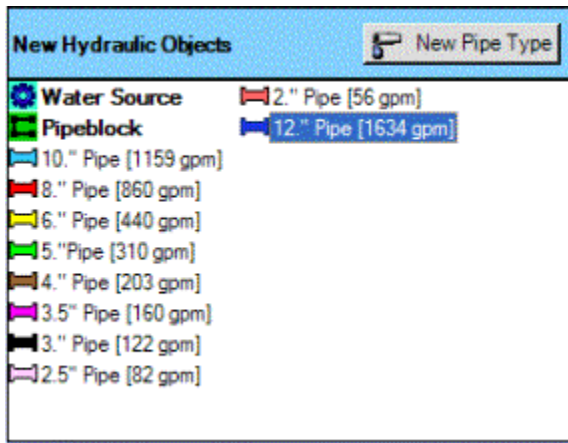
You can change the characteristics of the existing Pipe Types to control velocities throughout your system. To do this, right-click on the Pipe Type in the New Hydraulic Objects area that you wish to change, and click Edit Properties. The **Edit Existing Pipe Type** window will appear.
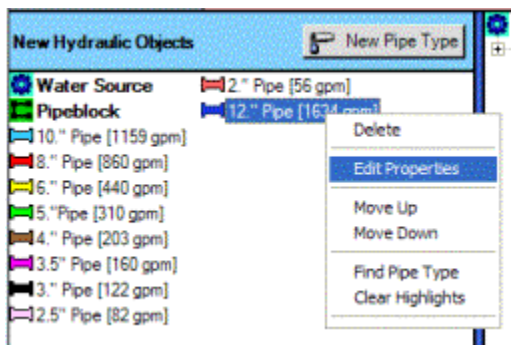
Like the Create New Pipe Type window, this allows you to change the characteristics of the selected pipe. You can change the name, the color, the size, and the maximum flow for the style of pipe.

Any change you make to a Pipe Type in the library (New Hydraulic Objects) will apply to all sections of that pipe currently in the Hydraulic tree!
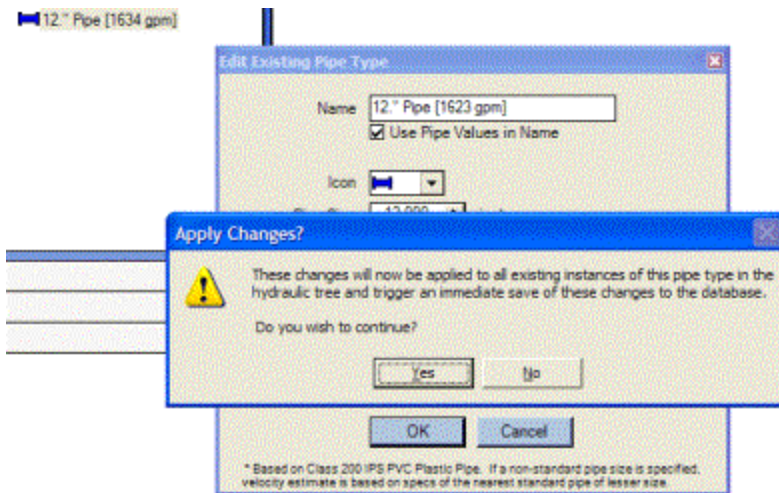
This also allows you to experiment with different velocities, by applying changes to the Pipe Type.

Changing the Max Flow of a pipe in the New Hydraulic Objects library will change the flow of every such pipe segment in your hydraulic tree.

You can also **delete Pipe Types** which appear in the Hydraulic Objects section if they are not used on your installation (right-click on the Pipe Type in New Hydraulic Objects, and click Delete). This will eliminate clutter and allow more room to see stations and other objects. If you add one of these pipe types later, you can always create it again.
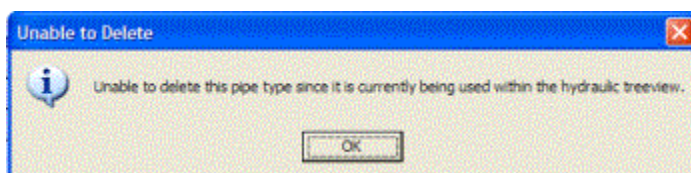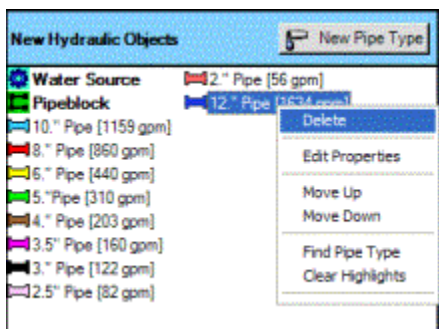
Surveyor will not let you delete a Pipe Type which is already in use in your hydraulic tree!

If you find you have made a mistake and assigned stations to an incorrect pipe type, it is easier to simply edit the Pipe Type properties to make it the correct type. Otherwise, you will need to delete all instances of the pipe type in the hydraulic tree, before you can delete it from the New Hydraulic Objects library.

Ways to assign pipe to the tree: You can click one of the Pipe Types, and drag it onto whichever pipe segment feeds it.

You can also highlight an existing pipe segment in the tree view (click on it once), then double-click a Pipe Type in the New Hydraulic Objects area. This will assign a new pipe segment of that type to the highlighted segment.
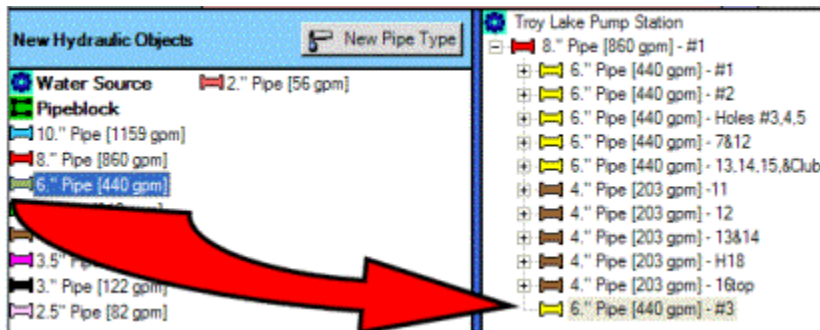
Pipe networks can be very large, and will not always fit into the center screen. Once the hydraulic tree has grown too large to fit in the center area, a scroll bar will appear to the right. Use the scroll bar (click and drag) to move the view up and down the tree.
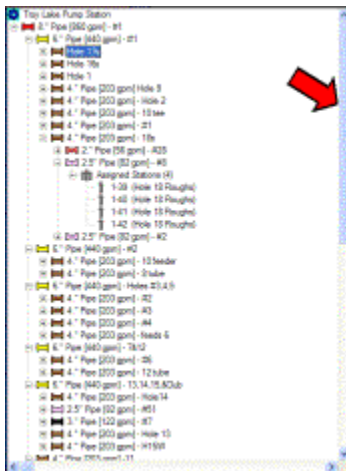
You can expand or collapse parts of the tree with the little +/- signs next to the pipe segments.
Click a + sign to expand the tree and see what's beneath it.
Click a – sign to collapse that portion of the tree, and get it out of the way.
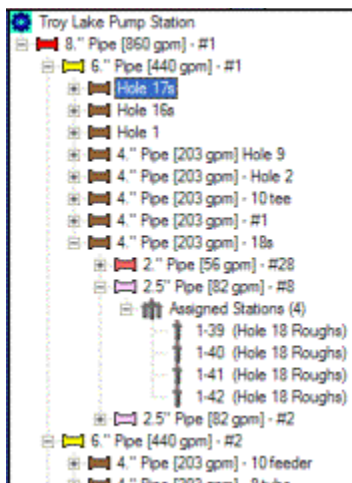
There are also shortcuts for expanding or collapsing the entire tree, at different levels. Right-click in the tree, and look for Expand or Collapse Nodes. These let you specify how far down the tree you will expand or collapse the + and – signs.
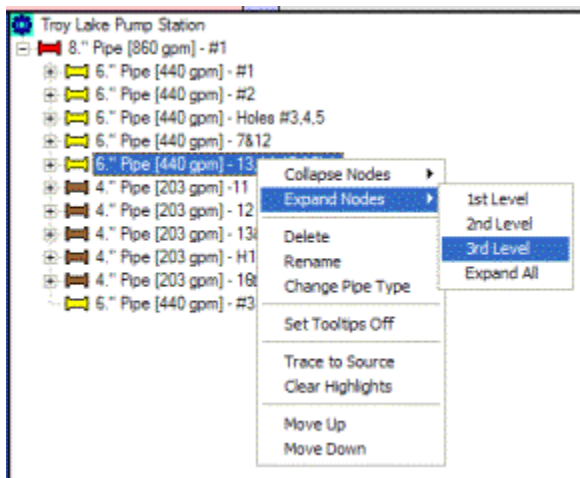
The dotted lines from the +/- signs are important, because they show the relationship of items in the tree to "parent" items above them.

When multiple objects are on the same vertical line, and indented the same amount, they are "peers", meaning they are at the same level in the hydraulic tree. If the vertical line goes up to an object (like a bigger pipe), they are all connected to that pipe. For example, these three 6" pipes are peers, and are connected to the 8" pipe above them:
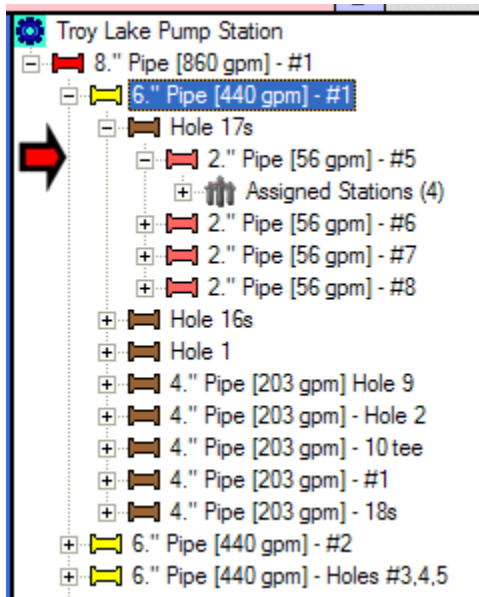
Objects which are indented , and have a horizontal dotted line connecting them to one of the verticals, are "children" of the "parent " pipes.
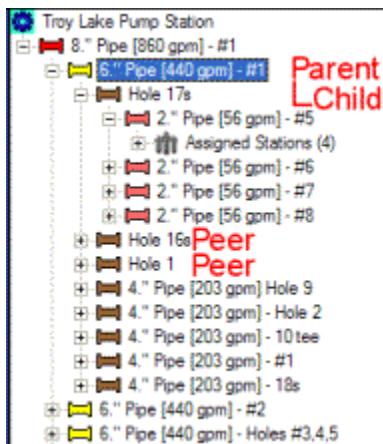
In other words, peers are connected to the same pipe, and children are fed by a higher-level parent pipe. Stations may be assigned at any level of pipe, depending on where they are located in real life.

Assigning Stations: Stations can be assigned in the same way as pipes. In the simplest method, choose a station from the Available Stations in the lower left area, and drag it onto the pipe that feeds it.
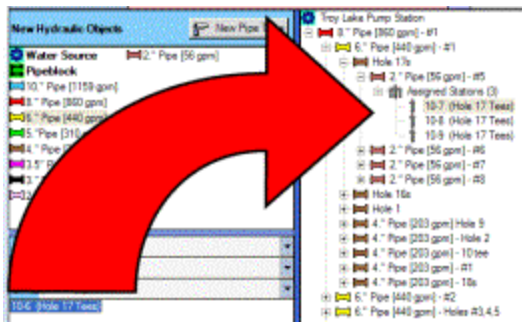
The station will disappear from the Available Stations list and will become part of the hydraulic tree, under the pipe.
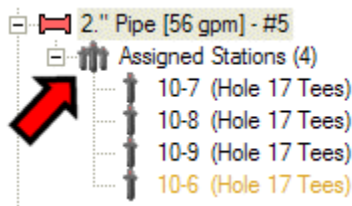
As soon as a station is assigned to a pipe, an object called Assigned Stations will appear under the pipe, and the station will be under the Assigned Stations icon. You can view all the assigned stations by either:

Clicking the + sign next to the Assigned Stations object, and they will expand in the tree underneath.

Click once on the Assigned Stations object to highlight it. The stations assigned to the pipe will be displayed in the Assigned Stations window in the upper right portion of the screen.
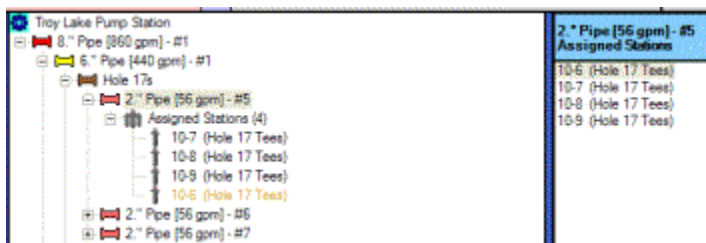
There are much faster ways to assign groups of stations at once, and filters to reduce the stations to specific controllers, Management Groups, and Locations. These are covered in more detail under **More Hydraulic Tips**, after the Pipeblock explanation.

 Pipeblocks

Pipeblocks

Pipeblocks are a type of New Hydraulic Object that allow you to summarize sections of unknown, or poorly documented pipe, and assign a maximum safe flow to stations assigned to the Pipeblock.

Pipeblocks do not have any awareness of velocities! Their only purpose is to limit flow to their assigned stations.

Unlike Pipes, there is no Pipeblock "type". If you need to create a Pipeblock, just add it to the hydraulic tree by clicking and dragging it onto the last known pipe, which will feed it. Then, specify the Maximum Flow that you will allow within the Pipeblock in the Pipeblock Properties window, which appears automatically when a Pipeblock is added to the tree.
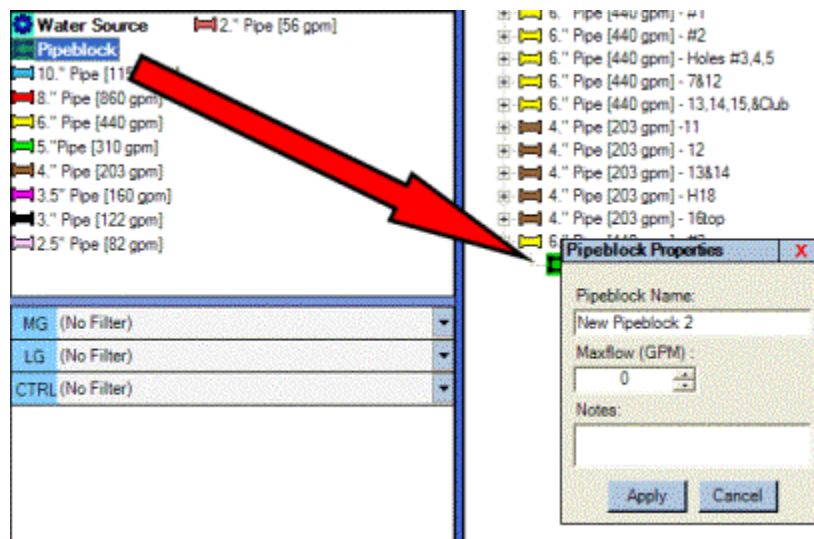
Pipeblocks are a tool that might be used sparingly. If you have a Tee with unknown pipes, but need to include it in your irrigation immediately, you can create a Pipeblock and specify a maximum flow that you feel safe with. However, there are real pipes in the ground, and there is no guarantee that the max flow you assign to the Pipeblock really is safe for those pipes (it might also be unecessarily low, since the real pipes might safely handle more than you set for the Pipeblock).

The correct solution is to physically determine the actual pipes, and edit the Hydraulic tree to include them. However, to begin irrigation immediately, the Pipeblock is a means of regulating flow to a safe level during flow optimization for the assigned stations.

You can also attach pipes downstream from the Pipeblocks, as with any other object in the tree. Surveyor will not permit pipes with a higher maximum flow to be attached downstream from a Pipeblock, and will warn you if attempt to do so.

☒ More Hydraulic Tips

More Hydraulic Tips

You can move entire sections of pipe and stations from one part of the tree to another, by clicking and dragging. When you move a pipe to another location, all objects below it are moved, too. If you discover a mistaken connection in the tree after creating many objects, just click and drag the highest-level object in the misplaced area, and move it to the right place. All of the objects below will move with it.

Assigning large numbers of stations is easier if you work on logical groups of stations, instead of all of them at once. The Available Stations area has 3 filters, and you can use any combination of them to view only related stations (note: the filters require creation of Groups and completion of the station tables. See Controller Configuration screen, and Groups).
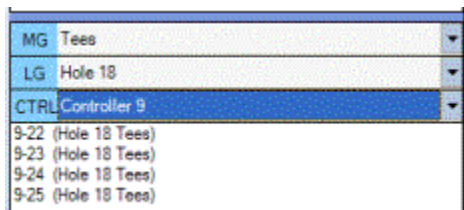
The **MG filter** (Management Groups) allows you to view only unassigned stations belonging to a particular Management Group.
The **LG filter** (Location Groups) allows you to view only stations in a particular Location Group.
The **Controller filter** lets you see only stations attached to a particular controller. A combination of filters might show only stations for Controller 3, on Hole 3, in the Fairways.
If you are following pipes around on a drawing as you build the Hydraulic tree, the filters allow you to complete one section at a time.

⊠ Tips for Assigning Stations

Tips for Assigning Stations

You can select multiple stations and assign them all at once. You can hold down the Control (CTRL) key and click different stations to highlight them, then drag them all to their pipe or Pipeblock.
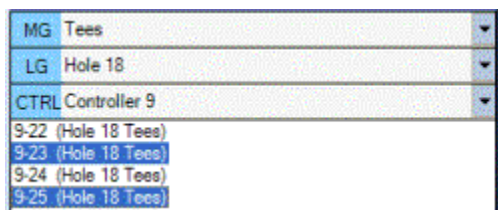
You can select a range of consecutive stations by clicking the first station, holding

down the SHIFT key, and clicking the last station you want. All of the stations between the first and the last one will be highlighted, and you can then drag them to the pipe or Pipeblock.
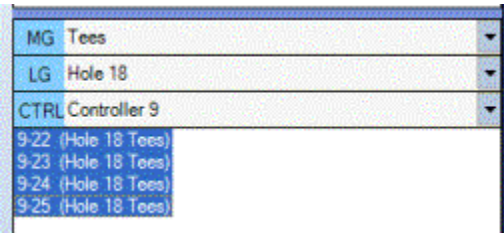
You don't even have to drag the stations, if you highlight the pipe you are going to attach stations to, first. Click the pipe or pipeblock in the tree, where you want to attach stations.

Then, use one of the above techniques to select a station or station in the unassigned stations display. When the stations you want to assign are highlighted, right-click on one of them, and click Assign. The highlighted stations will be assigned to the pipe you originally selected (it should still show a gray highlighting bar).
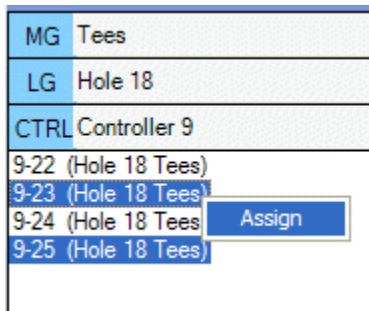
You can also select a group of stations to assign by clicking the mouse, holding the mouse button down, and dragging a rectangle around adjacent stations (even if they are in multiple columns). When you release the mouse button, everything inside the rectangle will be selected. Then assign to a pipe as described above, by dragging to the tree or choosing Assign.
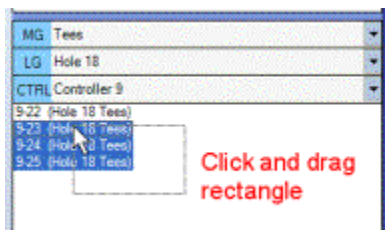
Unassigning Stations: If you make a mistake and need to un-assign a station from its location in the tree, click the pipe to which it is assigned (or the Assigned Stations icon underneath the pipe). All of the stations attached to that pipe will be listed in the upper right Assigned Stations area.
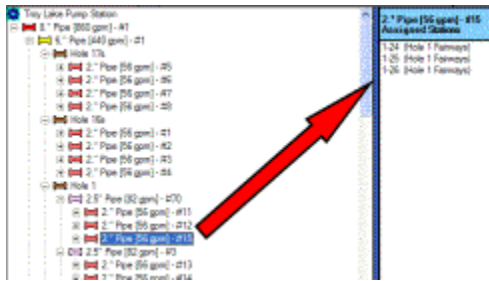
Locate the station or stations you need to un-assign and select them (you can use all the same techniques for selecting multiple stations, including Control, Shift, and the selection rectangle). Right-click on a highlighted station, and click Unassign.
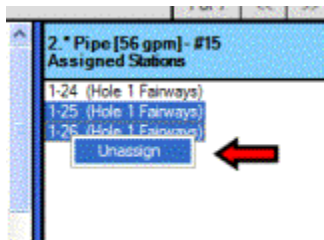
The stations will be removed from the Assigned Stations area, and will reappear in the Unassigned stations box (lower left). Now you can reassign them where they are supposed to be.
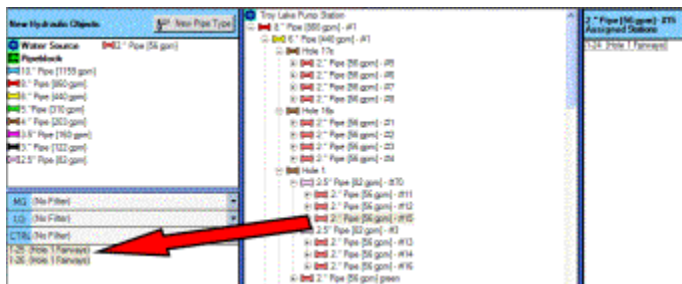
Search: Find a specific station or pipe quickly with the Search function (lower right corner, Search Hydraulic Tree). Type a station or other name, and click Go. The tree will expand automatically and the station will be highlighted in the tree.

You can search for any text or numbers you wish. If you search only for "3", Search

will highlight every instance of the number "3" in the tree (including all pipes and stations whose names happen to include the number 3). It is best to keep Searches very specific, by typing the exact name of the item you want. For example, a Search for "7-12" will find station 12 on controller 7, but a search for only "12" would find any object that contained the numbers "12". It would also find stations 3-12, 4-12, and even 12" pipe.
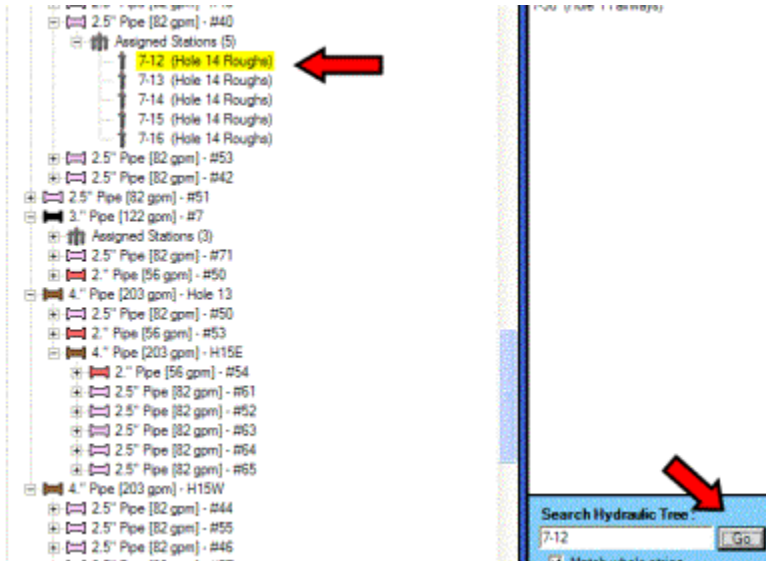
When a Search finds multiple objects, they may not all fit on the screen. However, if you scroll up and down with the scroll bar, they will be highlighted wherever they happen to be.
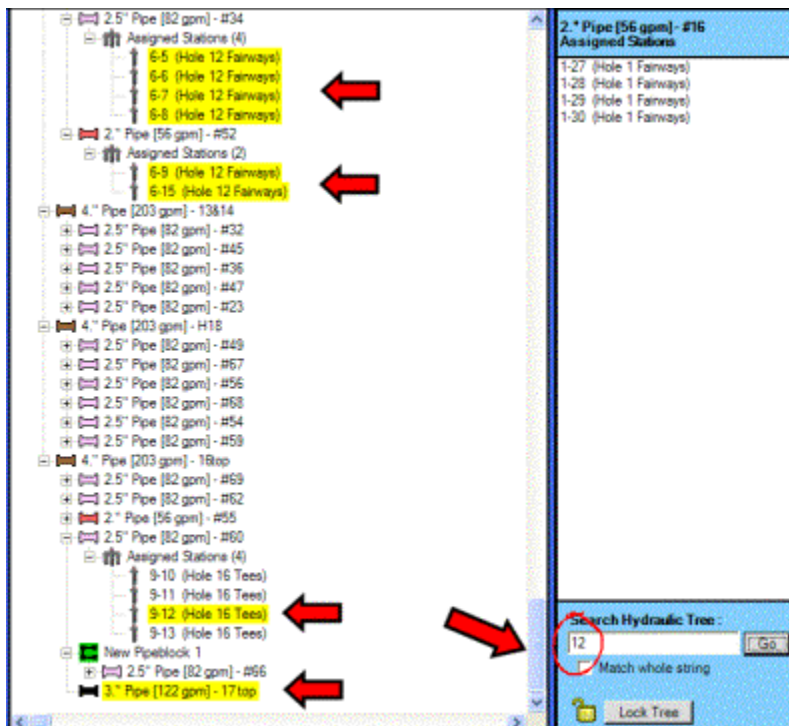
You can clear the highlights at any time by right-clicking anywhere in the tree, and

selecting Clear Highlights. This will clear out highlighted items from previous Searches, so that your next Search is more easily identified.
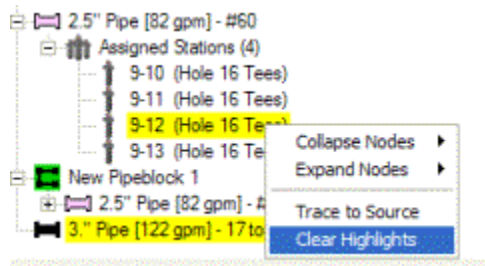
Trace: You can also Trace the connection of an object back to the Water Source. Large hydraulic trees can be confusing, and you may wish to see at a glance how a station is connected, all the way from the station back through all connecting Pipes and Pipeblocks to the Water Source.

To do this, right-click on the station, and click Trace to Source. Surveyor will highlight the direct path all the way back to the Water Source. The highlights will show every object that water must pass through to reach the station. (It is a good idea to Clear Highlights before doing a Trace, so that you only see highlights for the new Trace in the tree.)
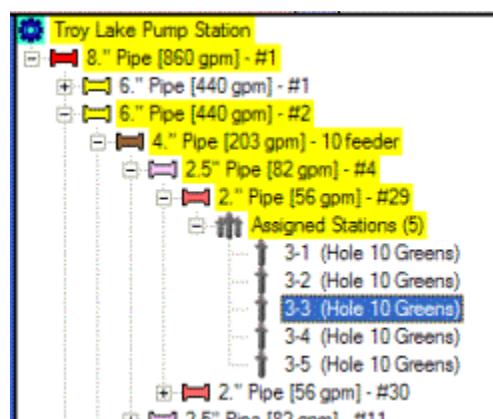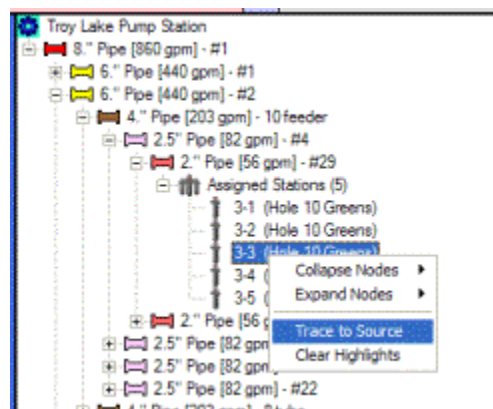
You may need to collapse portions of the tree to see the whole path, or you can

scroll up and down to find the highlighted objects.

Find Pipe Type: You can also highlight every instance of a certain pipe type in the tree. To avoid confusion, Clear Highlights first. Select a Pipe Type in the New Hydraulic Objects area (upper left) and right-click on it.
Click Find Pipe Type.
Every instance of that pipe type will be highlighted in the tree.
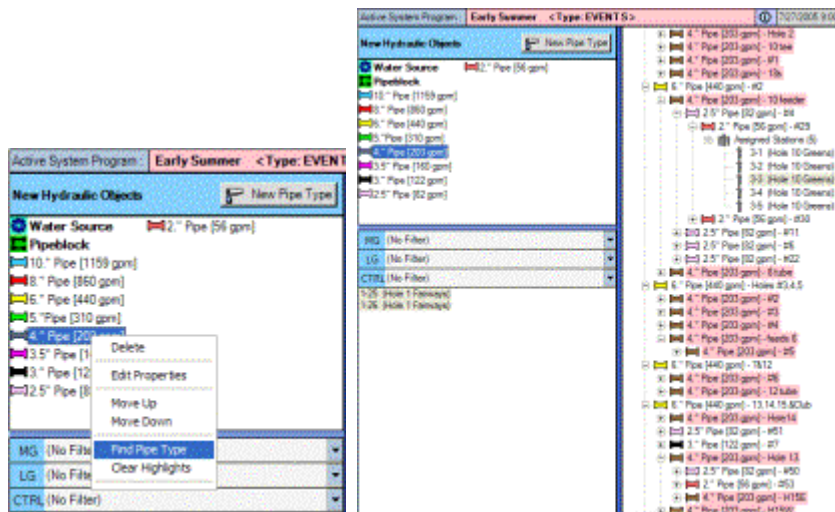
Final Tip on Hydraulics: Save often as you build, and when you are finished, back up the database!
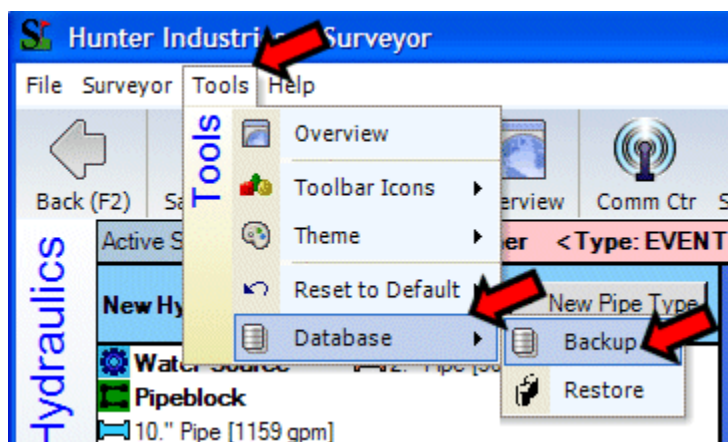
Keep a copy of the database somewhere safe, outside of the computer. Copying on to CD-ROM, sending to another computer, or transferring to a safe location with a memory stick are all possibilities.

The database may be too large for 3.5" diskettes, and they are not a very safe long term storage solution, anyway.

A good hydraulic model can be a lot of work, and even if your computer is stolen or destroyed, it can be restored quickly from a backup.

 Communications

Communications

Communications are fundamental to Surveyor's operations and are woven throughout almost every function Surveyor performs.

Most of the primary communications functions are controlled by the **Communications Center** (Comm Ctr button) and the Comm Settings screens. Generally, Comm Settings determines how you communicate, and is concerned with the settings for the various communications.
The Communications Center allows you to issue various commands and monitor the progress of key communications.
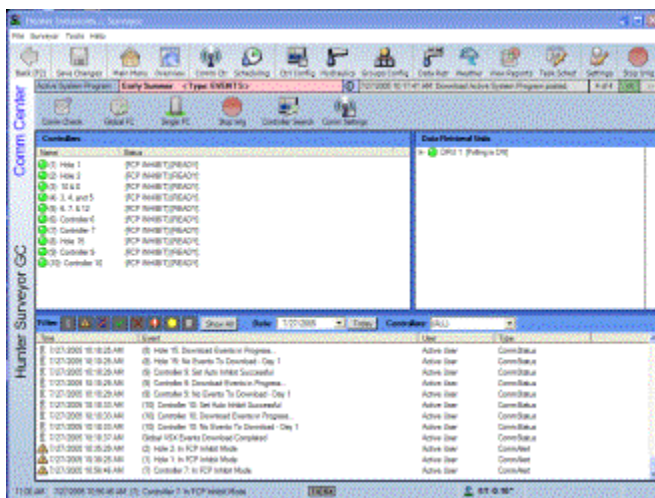
The Communications Center also offers direct control of emergency shutdowns.
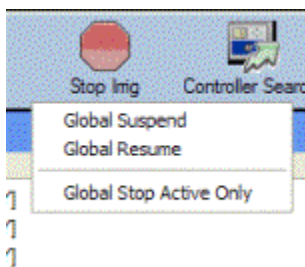
The Communications Center is divided into 3 major screen areas, and its own specialized toolbar across the top. If you have configured controllers in your system, they will be listed in a tree-like view on the left side.

Next to each controller, an indicator light will show the status of the controller (green = good, red = alarm, yellow = operational, but with cautions or notices).
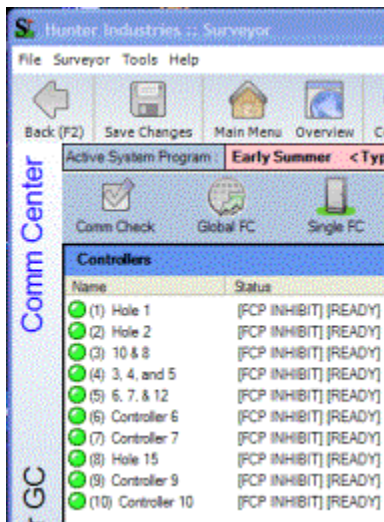
Data Retrieval status is shown in the upper right area, if one or more are configured in your system. If you do not have any Data Retrieval units, you can add them later (to monitor the state of sensors and retrieve actual flow information from flow meters).
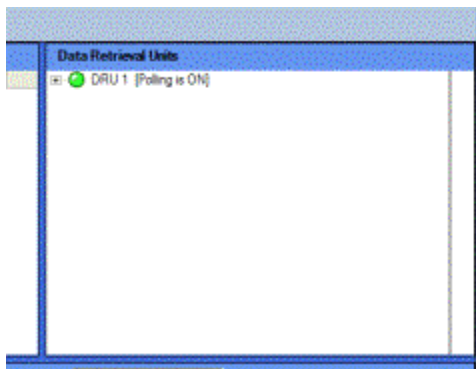
The lower half of the screen shows communications events in real time. The events can be filtered (if you only want to see certain types of events) with a series of buttons in the divider area that separates the upper and lower halves of the screen.
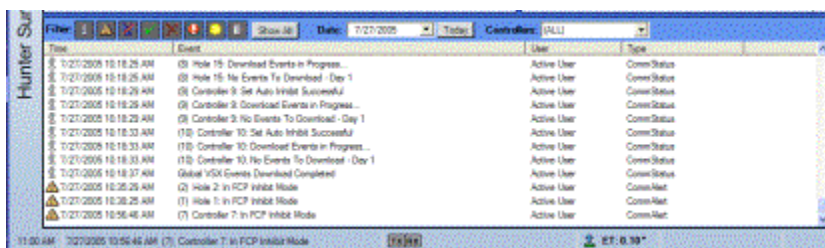
Most operations in the Comm Center involve selecting a controller, and then issuing commands to it. The Global FC offers most of the same choices, but they apply to ALL controllers in the system.

The button in the upper left is a Global Communications check, and will always apply to ALL controllers. If you click it, it will immediately begin checking with the entire list of controllers, one at a time.
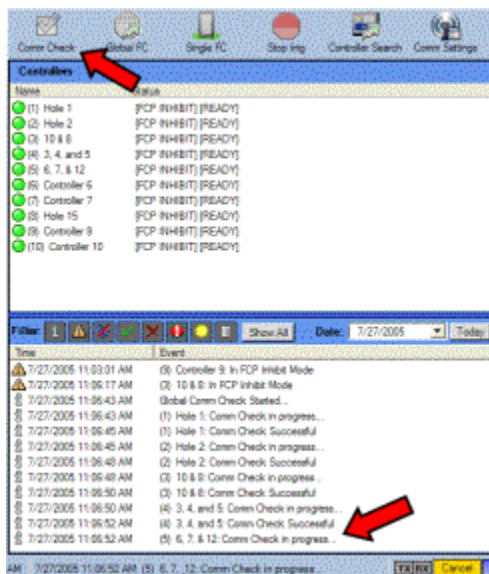
This verifies the status of each controller, and updates the condition of the indicator lights next to each controller. In the Status column, the Comm Check will update the messages showing information about each controller's condition (the controller documentation will have more detailed information about some of the possible conditions listed here).

Status Messages may include the following.
READY: Controller is ready to run automatic programs.
RAIN SHUTDOWN: Controller will not run, until Rain Shutdown is cancelled.
SUSPENDED: Irrigation has been suspended, due to alarm or command from central.
FCP INHIBIT: FCPs will not run (controller will run any Event-mode irrigation).
OVERLOAD: Excessive current draw detected in field, controller will resume if possible.
POWER OUTAGE: Power outage occurred and some irrigation may have been missed.
FUSE OPEN: Fuse on Power Supply Board (in VSX) is open.
RUNNING: Stations are actively running.

COLDSTART: Controller memory has been erased.
PAUSED: Irrigation is temporarily halted, from keypad or Maintenance Radio.
EVENTS AT MAX: Controller event buffer is full.
MAX STATIONS RUNNING: Controller is operating maximum number of stations.
STATION SIZE ERROR: Controller size does not match software's information.
BLOCK CHANGED: Block station configuration has been edited in controller.
FCP CHANGED: A Controller Program has been changed in the field, no longer matches software.
PINS RESET: Password protection on controller has been changed or removed.

Send/Retrieve FCPs Succesful: Temporary status, indicates successful communications.
Excluded from communications by user: Operator has chosen to ignore controller for communications purposes (LED is gray).

As you move the mouse over each controller after a comm check, a tool tip will appear with information about the controller, based on the last communications check. This will include the controller's version of firmware, the date of the last comm check, and other settings and indications for the controller.
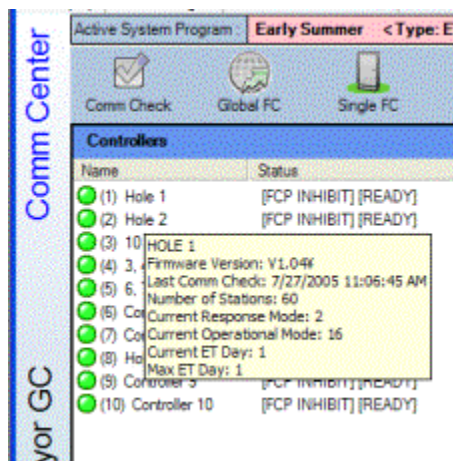
A controller which does not respond will automatically receive a red indicator light, as will any controller with an alarm condition.

☒ Global FC commands

☒ Single FC Commands

 Stop Irrigation (Emergency Shutdown)

Global FC commands

The Global FC (Field Controller) has a drop-down arrow next to it, from which you can select a large list of functions. These will always apply to all controllers.
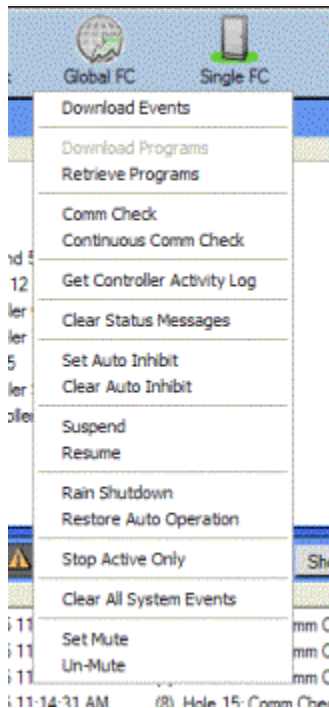
Commands available here are:

Download Events: Send Event System Program to Field Controllers (only active with Event System Program selected). This can be set to occur automatically in Task Scheduler, or you can download a processed Event System Program from here, immediately.

Download Programs: Send FCP programs to Field Controllers (only active with FCP System Program selected). This can be set to occur automatically in Task Scheduler, or you can download FCP System Programs from here, immediately.

Retrieve Programs: Retrieve FCP programs from Field Controllers to view or save.

Comm Check: Checks communications with all controllers and updates status info.

Continuous Comm Check: As above but runs continuously for up to 2 hours, for diagnostic purposes.

Set Auto Inhibit: Prevents FCPs from running in Field Controllers.

Clear Auto Inhibit: Allows FCPs to run (if there are no active Event programs).

Clear Display Messages: Clears controller error and alarm displays (such as Power Outage, etc.).

Clear All Events: Erases all System Events in all controllers.

Get Controller Activity Log: Retrieves contents of each controller's activity log

(successful retrieval erases log in controller, and adds to running log in computer).
Stop Irrigation: Stops irrigation that is currently running, but does not inhibit future irrigation (another station could come on a minute later).
Suspend Irrigation: Stops all irrigation until resumed by command. Irrigation will resume where it should be in real time, meaning events which would have occurred during the Suspend will be missed, and watering will still end at originally scheduled time.
Cancel Suspend: Cancels the Suspend above, allowing watering to resume.
Rain Shutdown: Cancels irrigation permanently, until resumed by your command. Controllers will show Rain Shutdown in their displays after this is sent.
Restore Auto Operations: Cancels Rain Shutdown and allows Automatic Irrigation to run normally.
Set Mute: tells all controllers to be quiet (inhibits automatic communications) for diagnostic purposes.
Un-Mute: Allows controllers to communicate automatically again.

The Global FC commands do not permit any direct irrigation start commands, since they would go to all controllers at once. See "Single FC" commands to start irrigation from the computer immediately.

As soon as you click one of the commands, the Tx (transmit) and Rx (receive) lights should begin blinking, showing the actual communications. The lower half of the Comm Center will show the progress of each Global command through the list of controllers.
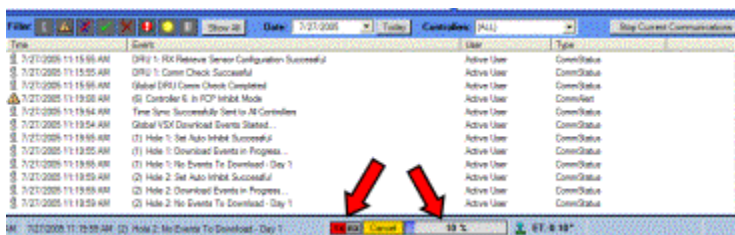
The lower left corner of the Surveyor window (to the left of the Tx and Rx arrow lights) will also show the status of commands issued from Global FC.

Single FC Commands

Single FC Commands

These commands are similar to those under Global FC, but only apply to the controller you clicked on the list. If no controller is highlighted in the list, no Single FC commands can be sent.
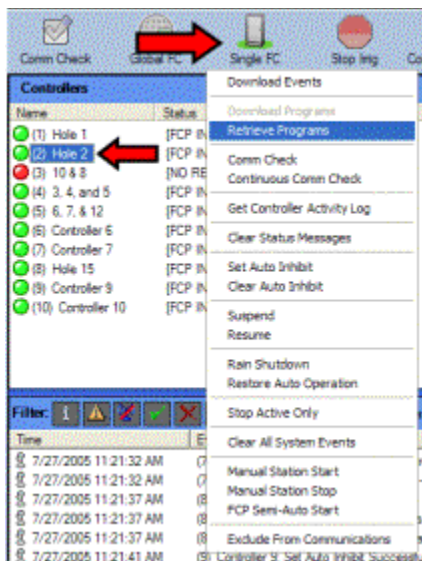
Shortcut: All "Single FC" commands can also be accessed by right-clicking directly on the controller you want to command. The same list of choices will drop-down, for the controller you right-clicked.
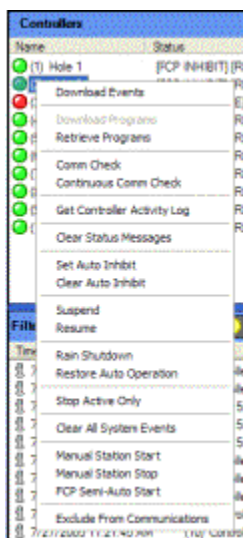
Download Events: Send Event System Program to the selected Field Controller (only active with Event System Program selected). Useful if a single controller missed the download of events for comm or other reasons.

Download Programs: Send FCP programs to the selected Field Controller (only active with FCP System Program selected).

Retrieve Programs: Retrieve FCP programs from the Field Controller to view or save.

Comm Check: Checks communications with the selected controller and updates status info.

Continuous Comm Check: As above but runs continuously for up to 2 hours, for diagnostic purposes.

Set Auto Inhibit: Prevents FCPs from running in the Field Controller.

Clear Auto Inhibit: Allows FCPs to run (if there are no active Event programs).

Clear Display Messages: Clears controller error and alarm displays (such as Power Outage, etc.).

Clear All Events: Erases all System Events in the controller.

Get Controller Activity Log: Retrieves contents of the controller's activity log (successful retrieval erases log in controller, and adds to running log in computer).

Stop Irrigation: Stops irrigation that is currently running, but does not inhibit future irrigation (another station could come on a minute later).

Suspend: Stops all irrigation at the controller until resumed by command. Irrigation will resume where it should be in real time, meaning events which would have occurred during the Suspend will be missed, and watering will still end at originally scheduled time.

Resume: Cancels the Suspend above, allowing watering to resume.

Rain Shutdown: Cancels irrigation permanently, until resumed by your command.

Cancel Rain Shutdown: Cancels Rain Shutdown and allows Automatic Irrigation to happen normally.

Manual Station Start: This allows you to command one or more stations at the selected controller to run immediately. This command will cause the Manual Stations Start window to appear:
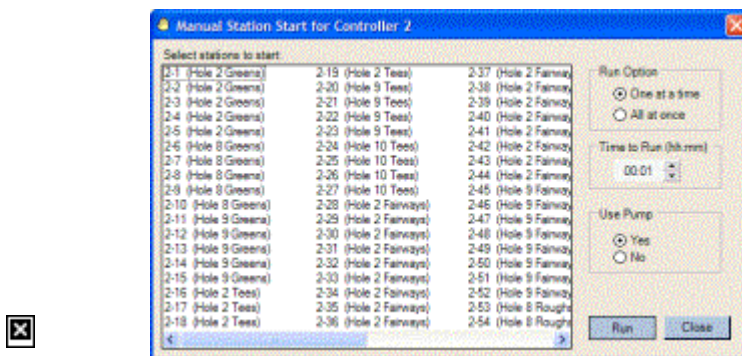
The window will display a list of all stations available on the controller for manual activation.

Select the stations to start by clicking to highlight them. You can use the usual tricks to select multiple stations: hold down the Control (Ctrl) key on your keyboard while clicking multiple stations, hold down Shift to select all the stations between two points, click and drag a rectangle around multiple stations, etc.
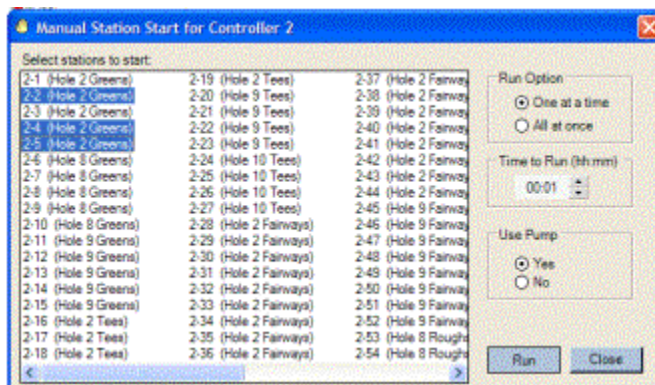
On the right side, choose whether to start the stations you have selected One at a Time, or All at Once. "One At a Time" is generally the best choice.
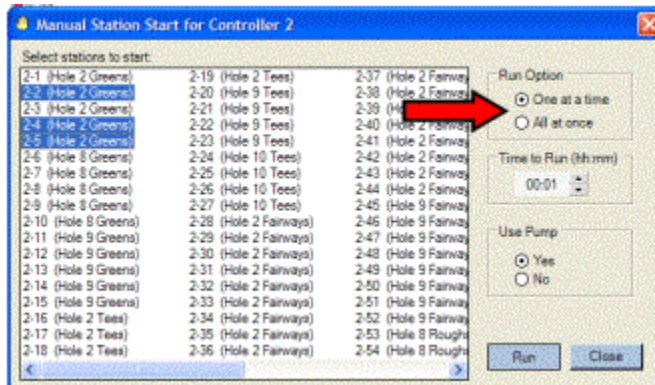
Caution: do not start more stations at once than the controller and the water supply can support. Most controllers will protect themselves from electrical overload, but starting too many stations at once may cause an unacceptable pressure drop in the piping to maintain uniformity at the sprinklers.

Set the Time for each station to Run. Manual Starts from this screen apply the same run time to all stations. However, you can start a station or stations for a given run time with one command, and then start others (for different run times) with a new command.

"Use Pump (Yes/No)" only applies if you are using the controller's on board Pump/Master Valve output to switch a pump on and off with a relay. This does not directly issue commands to pump stations. Many modern pumps and pump stations do not require commands from the controllers to turn on and off, because they automatically sense the demand when you turn stations on.
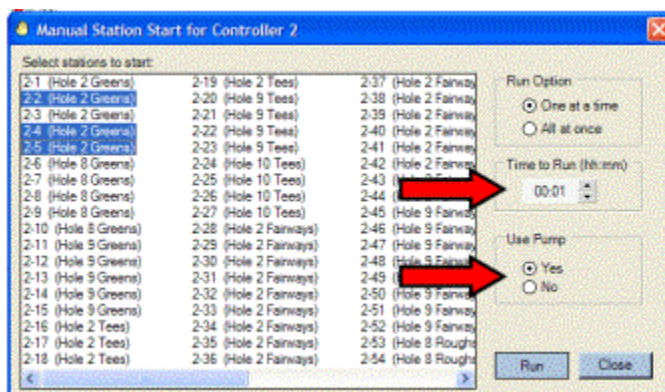
When you have set the choices above, click the Run button and the Manual Station Start command will be sent to the field. Confirmation will appear in the lower half of the Comm Center window and the lower left corner of the Surveyor screen.

Manual Station Stop:

Manual Stop command allows you to designate stations to stop, immediately. This works like the Manual Start window, in reverse.
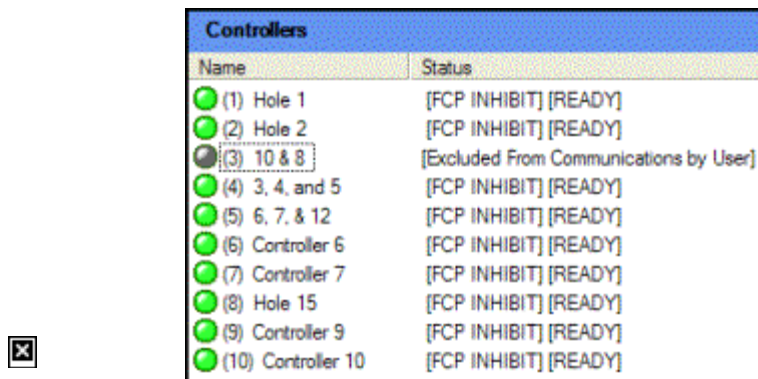
Select the controller on which you want to stop stations, then use the Single FC commands to select Manual Station Stop. The Manual Station Stop window will appear.
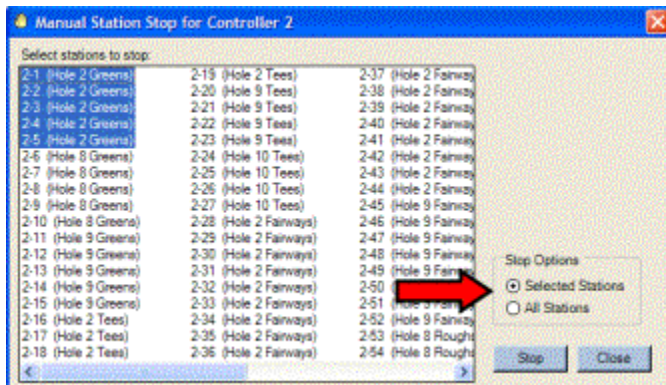
This lists all stations in the controller. Select any station, or group of stations, or Click the All Stations option, and then click the Stop button. The central will communicate to the controller and the stations will be stopped.
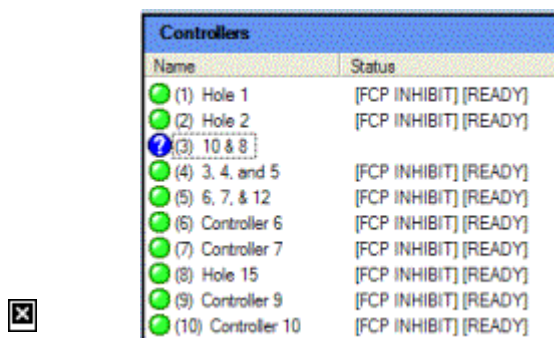
Exclude from Communications: This will set a controller to be ignored by communications. If a controller has a known communications issue, or has been deliberately taken off-line for maintenance reasons, you can de-activate it with this command. When you choose Exclude from Communications for a single field controller, the LED indicator will turn gray.

Surveyor will not attempt to check communications or download FCPs and Event programs to a controller in this Excluded state. All communications from the controller will be ignored.

To restored communications, access the Single FC commands again (either right-click on the controller, or highlight it and click the down arrow next to the Single FC icon), and click Allow Communications. The LED will change into the ? symbol until the next communications, and the status LED will then display green or red normally.

 Stop Irrigation (Emergency Shutdown)

Stop Irrigation (Emergency Shutdown)

The Stop Irrigation button performs immediate stops to all currently active irrigation from the controllers, whether automatic, semi-auto, manual, or other.

There are three choices from the Stop drop-down menu: Suspend, Resume, and Stop Active Only.
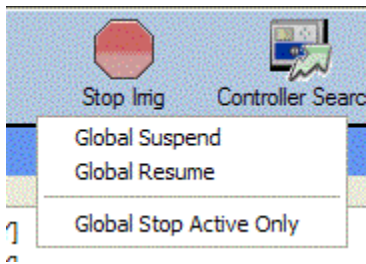
For most purposes, Suspend is the better option. Suspend will stop all irrigation until you send the Resume command. This is ideal for emergency situations, because once it is sent there will not be any further automatic irrigation.

Suspend is a soft shutdown, meaning that controllers are not all shut off at once. To prevent severe water hammer, the controllers are shut off at 3 second intervals (plus any communications and valve-closing delays).

"Stop Active Only" terminates actively running stations, but does not inhibit any further stations from running. If another station is scheduled to start a few seconds after the Stop Active Only command is sent, that station will start normally (and so will any others). This command only shuts off stations that are running at the moment it is sent.

When controllers are Suspended, their status LED in the Comm Center shows an exclamation point [!] in the LED, and the message next to the controller shows "Suspended".

To resume irrigation, send the Resume command (available from the Stop sign drop-down menu, or the Global FC commands).
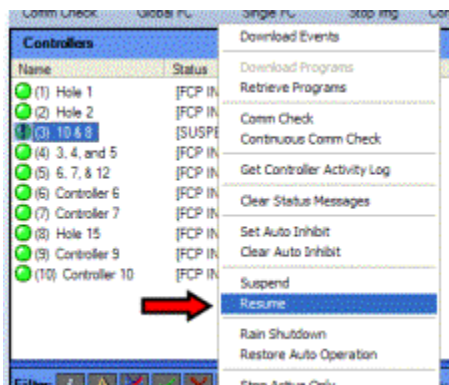
If you sent a Stop Active Only command, it is not necessary to Resume. This command only terminated active stations, and future events will occur normally.

Controller Search: Locates controllers with addresses in their facepacks. This is described more fully in the Setting Up section, and is usually used when starting up a new system. It is also useful for rebuilding a system in rare cases of disaster recovery (see Database Maintenance).
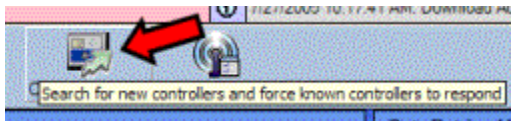
Comm Settings button: This actually links to another screen, where primary Communications are set up.

Data Retrieval Units: This section of the Communications Center screen shows status and information for any Data Retrieval units you have installed and configured (see also Data Retrieval).

Each Data Retrieval unit is shown in tree-view style, with the + or – signs to display further information about them. The LED indicator light also shows status of the units, just as with field controllers.
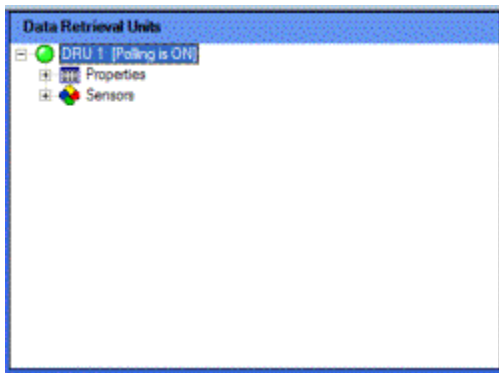
If you click the + sign next to a Data Retrieval unit, it will expand to show Properties of the selected unit, and the Sensor status for all connected sensors.
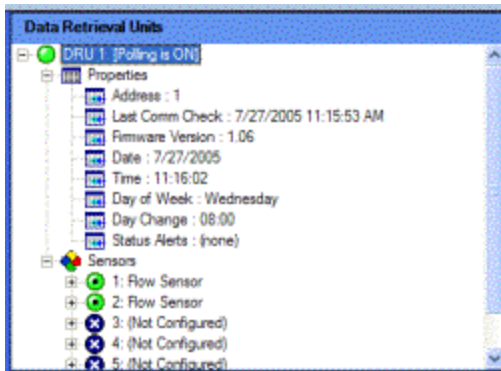
The Properties items are of general interest, and show information about the Data Retrieval unit itself. The Sensor status readings will show current sensor information, if polling is enabled. You can also enable and disable Alarm Monitoring by right-clicking sensor here (see Data Retrieval section).

Gif

The lower half of the Comm Center shows recent communications events. These events can be filtered with the buttons to show only certain types of events in which you may be interested.
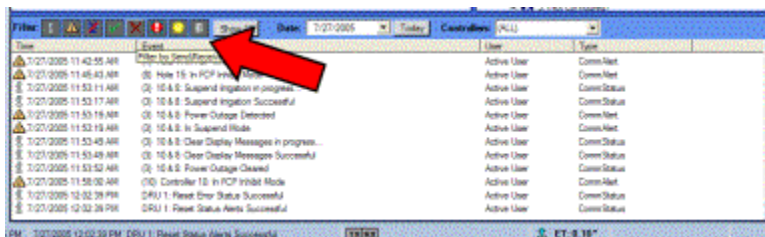
Each type of event is identified with an icon, and there is a filter button which corresponds to each of them. Clicking a filter button will show only messages of a certain type, and will hide the rest. You can click more than one filter button to see various types of messages:

Status: Shows normal communications activity.
Comm Alerts: Shows changes in controller status.
Comm Errors: Shows failed communications including unsuccessful comm checks.
Successful Send/Receive: Logs successful downloads of irrigation events to controllers.
Failed Send/Receive: Logs failed download attempts.
Alarms Triggered: Shows active alarms at controllers.
Alarms Cleared or Overridden: Shows operator override of alarm shutdowns, or alarms which have cleared.
Database Status: Dunno.

You can also filter communications events for a certain date, and/or just for a certain controller, with drop-down selections.
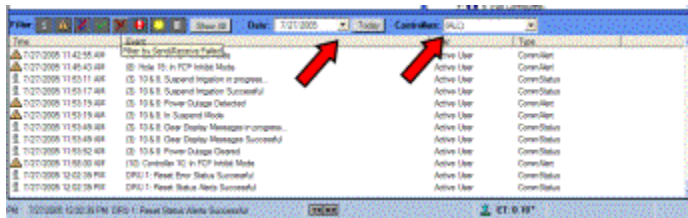
 Task Scheduler

Task Scheduler

Task Scheduler is an automated calendar that can pop-up reminder notes, or perform specific tasks (including loading, processing, and downloading System Programs), at prescheduled times. You can schedule automatic Task Scheduler functions hours, days, or even years in advance.
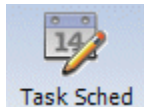
Click the Task Scheduler icon on the toolbar to go the Task Scheduler.
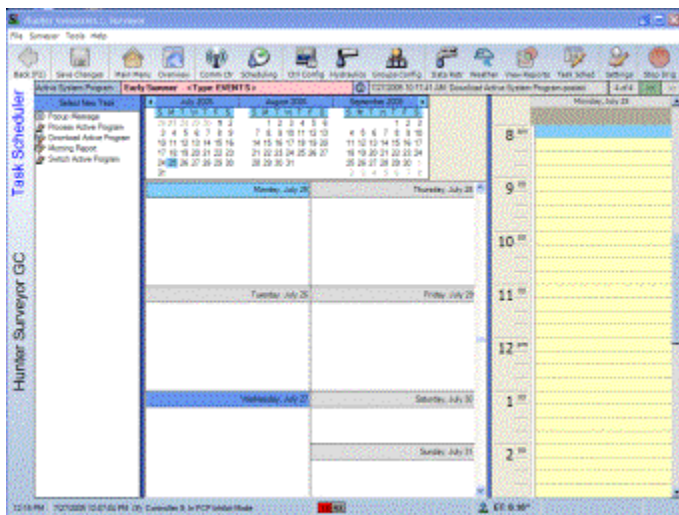
The calendars across the top of the Task Scheduler screen should include the current month, with today's date highlighted. If not, you can move the calendars backwards and forwards in time with the left and right arrow buttons.

The Task Scheduler gets its time and date information from the computer's operating system. If time or date appear to be incorrect, verify that the Windows clock is set correctly.
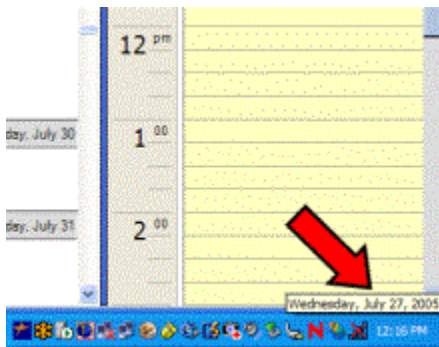
Task Scheduler displays a "weekly" view below the calendars, with the header for today's date highlighted. You can select a different day by clicking in its box.

The white space for each day, below each header, shows any tasks already scheduled for that day in a highlighted bar. To the right is an hourly view for the selected day, showing scheduled tasks by hour.
On the far left is a list of tasks that Surveyor can schedule.

Task Scheduler functions include:
Pop-up Messages (reminders).
Process Active Program (applies to Event-based System Programs only).
Download Active Program (can apply to either Event or FCP System Programs).
Morning Report (applies to all System Programs).
Switch Active Program (switch from one saved System Program to another, automatically).

⊠ Pop-up Messages

⊠ System Program functions in Task Scheduler

⊠ To schedule a Process Active Program task

⊠ Download Active Program automatically with Task Scheduler

⊠ Switch Active Program

⊠ Schedule the Morning Report

⊠ To Schedule a Morning Report in Task Scheduler

Pop-up Messages

A pop-up message can be set as a reminder in the future of events or appointments, either for one-time occurences, or on a regular pattern.

Pop-up messages will only appear if Surveyor is actively running on the computer.

To create a pop-up message, first click Pop-up Message on the left, in the Select
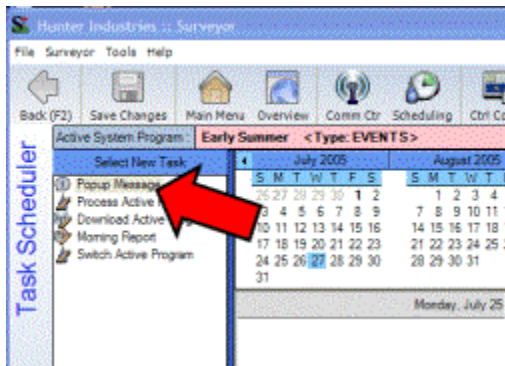
New Task column.

Then, double-click either the day (center screen) or the nearest time slot in the right-hand, hourly view. The New Message Task window will appear.

You can fill in a different Task Name, if you wish. This is the name that will actually appear in miniature on the day view, that describes the event. Otherwise, the event will appear as "Popup Message".
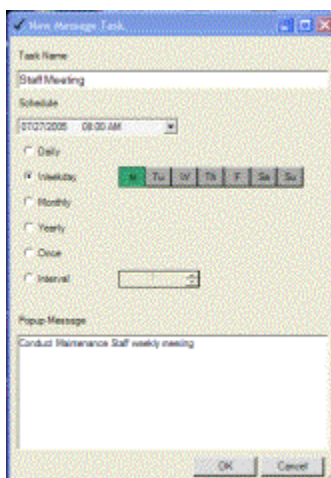
If you double-clicked a day, the scheduled time will default to that morning.

If you double-clicked a time slot in the hour view, the closest 15-minute time segment will be shown.

In either case, you can change the time at which the event will occur by clicking in the hour, minutes, and AM/PM field individually, and either typing a new time, or using the up and down arrow keys on the keyboard to change the setting.

Underneath the time setting you can select an Interval schedule, for messages (or events) that recur on a regular basis. The default selection is "Once", meaning the message will not automatically repeat. However, you can select one of the other options for reminders that repeat on a regular basis.

For example, if you have a staff meeting every week at a certain time, you can click the "Weekday" button. This will cause the Days of Week schedule buttons to become active, and you can select the day (click the day(s) of week) for the meeting.

Your pop-up message will appear at the selected time, on the selected day(s), of every week.

Daily will cause the message to recur each day.

Weekday allows you to specify a specific day or days of the week, on which the message will recur.

Monthly will cause the message to occur once each month on the selected date (if the date, such as the 31st, does not occur in some months, it will occur on the last closest day of the month).

Yearly will cause the message to occur annually on the selected date.

Once causes the message to occur on a one time basis with no recurrences.

Interval allows you to specify that the message will occur every x number of days, regardless of date.

After selecting the time, date, and interval (if necessary), type any text you want to appear in the pop-up reminder, such as "Staff Meeting". This is what will actually be shown when the message pops up at the specified time.
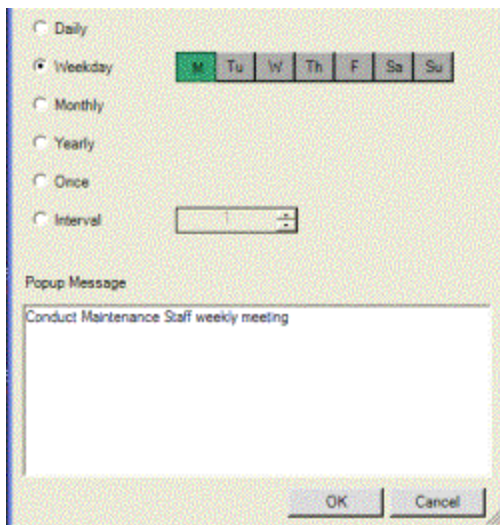
Once a pop-up message has been scheduled, a bar with the event will appear in each day box where it is scheduled to occur. Events that are scheduled to repeat at intervals are indicated with a circular arrow icon.
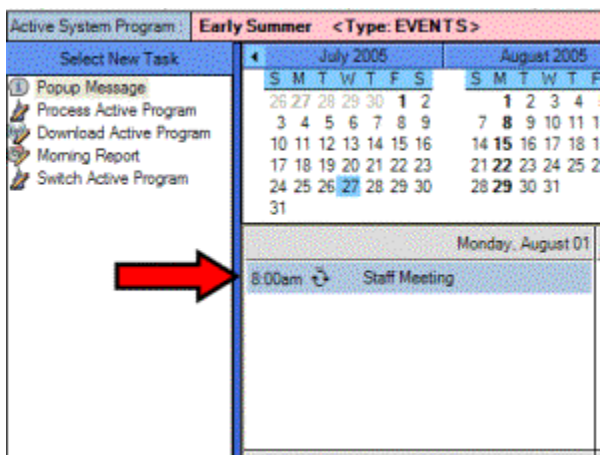
You can also edit or delete any pop-up message before it occurs, by locating the message bar on the day in question, and double-clicking it. The Message Task window will appear, and you can change the text, or click the Delete button.
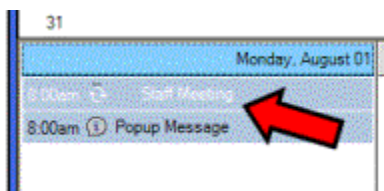
☒   System Program functions in Task Scheduler

System Program functions in Task Scheduler

There are 3 System Program functions available from Task Scheduler, and they

may be programmed to execute in succession.

Process Active Program applies only to Event-based System Programs, and should be scheduled every day on which you want an Event-based System Program to irrigate. "Processing" occurs when the computer takes the latest irrigation changes, and flow optimizes them to run within the water window. This is the same function as clicking the Process tab from the Scheduling screen (see Scheduling, Processing).

By setting an automatic Process Active Program task each day, you will only have to tell Surveyor where you want to make changes to the irrigation. Surveyor will automatically process those changes at your preset time of day, so that you do not have to remember to do this.

Whenever you set an automated Process Active Program task, you will want to follow it with a Download Active Program task. This insures that the most recently optimized information is automatically sent to the field.

Be sure to leave adequate time for Processing and Downloading before irrigation begins (the start time of the water window)!

[x] To schedule a Process Active Program task

To schedule a Process Active Program task

First, click Process Active Program on the left, in the Select New Task column.
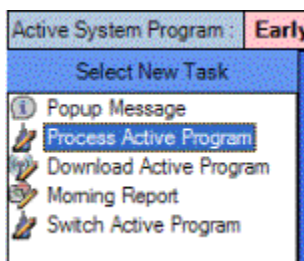
Then, double-click either the day (center screen). or the nearest time slot in the right-hand hourly view. The New Task window will appear.
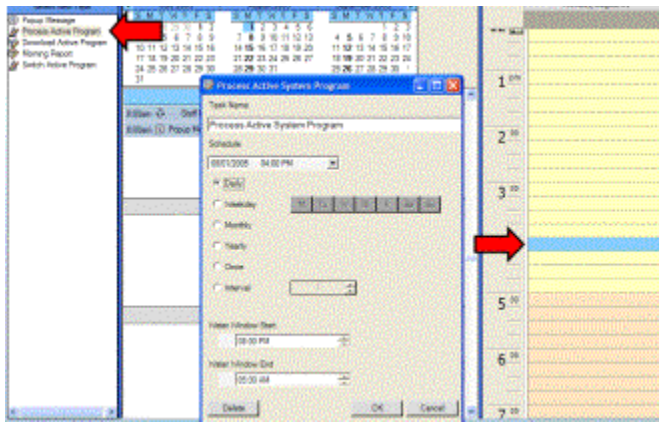
You can fill in a different Task Name, if you wish. This is the name that will actually appear in miniature on the day view, that describes the event. Otherwise, the event will appear as "Process Active System Program".

If you double-clicked a day, the scheduled time will default to that morning.
If you double-clicked a time slot in the hour view, the closest 15-minute time segment will be shown.
In either case, you can change the time at which the event will occur by clicking in the hour, minutes, and AM/PM field individually, and either typing a new time, or using the up and down arrow keys on the keyboard to change the setting.

Underneath the time setting you can select an Interval schedule. The default selection is "Once", but Processing should normally be set to Daily.

Check box for Download function?

Set the Water Window Start and/or Stop times. The Process function will try to fit all irrigation events into the window you define. You are only required to set one (Start or Stop), and you can click the square button to turn off either a Start or a Stop time (the button will turn red when one of the times has been turned off).
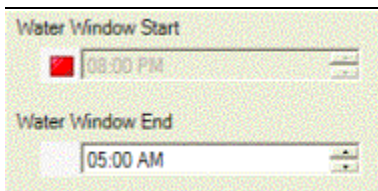
It is not advisable to set both Start and Stop times, unless you are absolutely certain that all irrigation has time to occur within the times set.
Remember, the task will occur automatically, so if some events do not fit into the Water Window and you are not there to correct them, they will be missed.

 Download Active Program automatically with Task Scheduler

Download Active Program automatically with Task Scheduler

You can automatically select either Event programs or FCP programs to be downloaded, at any time and date. To create a Download task, first click Download Active Program on the left, in the Select New Task column.

The key word is "Active". This function downloads whichever System Program happens to be active in Surveyor at the time of the task. If you tend to switch System Programs frequently, ensure that the correct System Program will be active before the download event occurs.

Then, double-click either the day (center screen) or the nearest time slot in the right-hand hourly view. The Schedule Task window will appear.
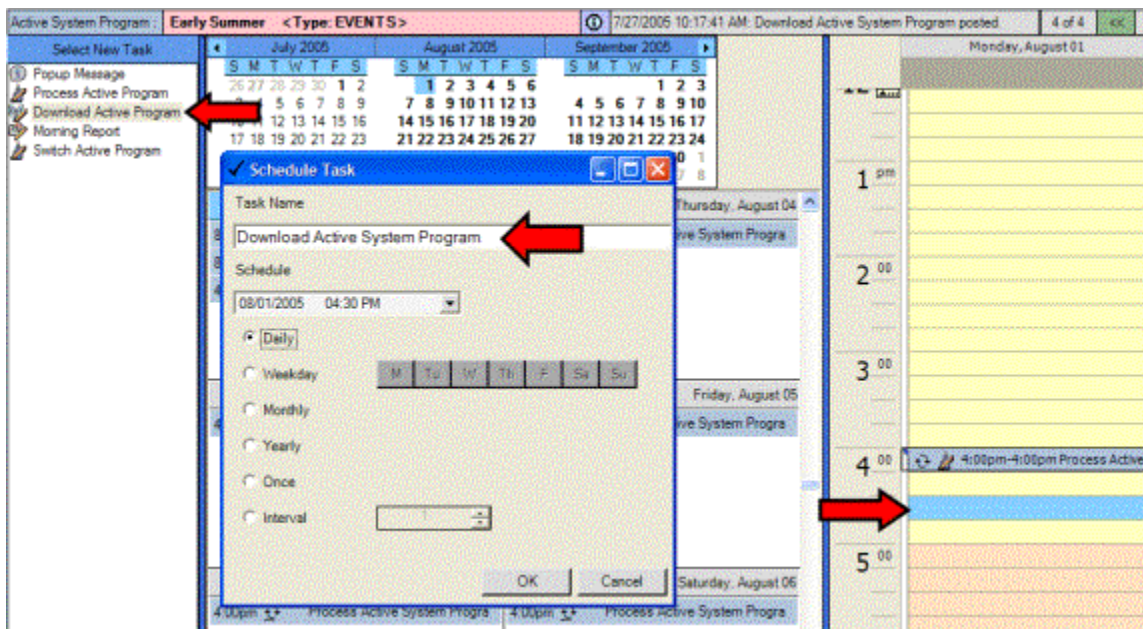
You can fill in a different Task Name, if you wish. This is the name that will actually appear in miniature on the day view, that describes the event. Otherwise, the event will appear as "Download Active System Program".

If you double-clicked a day, the scheduled time will default to that morning.
If you double-clicked a time slot in the hour view, the closest 15-minute time segment will be shown.
In either case, you can change the time at which the event will occur by clicking in the hour, minutes, and AM/PM field individually, and either typing a new time, or using the up and down arrow keys on the keyboard to change the setting.

Downloading should be scheduled at least one hour before irrigation is scheduled to begin. Be sure to leave adequate time for Downloading before

the start time of the water window! A large system in a busy area may take quite a while to download, in some cases. Your communications event histories (see Comm Center) will give you a good indication of how long complete downloads take in your particular system.

Underneath the time setting you can select an Interval schedule. The default selection is "Once", but Processing should normally be set to Daily.

This is especially necessary if Process Active Program has been set to Daily. A Processed System Program will not have any effect until it is Downloaded.

As these events are created, you will see a new bar appear on each day for each scheduled task. If they are Daily, you should see a Process and a Download bar on each day of the calendar.
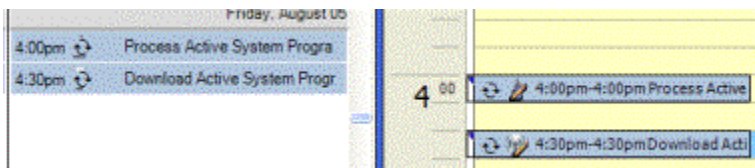
You can edit the time, or delete the function, of any Process or Download event by double-clicking the task on the calendar day, and changing the time or clicking the Delete button.

☒ Switch Active Program

Switch Active Program

This powerful option allows you to automatically load a different saved System Program at a specified time in the future. It would normally be followed by a separate Process task (if it is an Event-based System Program) and a Download task (for either type of System Program).

The Switch Active Program task can allow you to schedule a completely different System Program for irrigation to be called up, processed, and downloaded at any time and date in the future. It would also allow you to run more than one System Program in a single night, if you wished.

Example: You run a flow-optimized Event-based System Program for most, or all, Management Groups between 9:30 PM and 3:30 AM. Then, you want a specific FCP-based sequence of irrigation to run on each Green. Solution: have Task Scheduler Switch and Download the FCP System Program at 3:45 AM, after the Event-based System Program has completed.

To create a Switch Active Program task, first click Switch Active Program in the Select New Task list. Then, double-click the day or time slot within a day when you

want the System Program to switch. The Schedule Task window will appear.
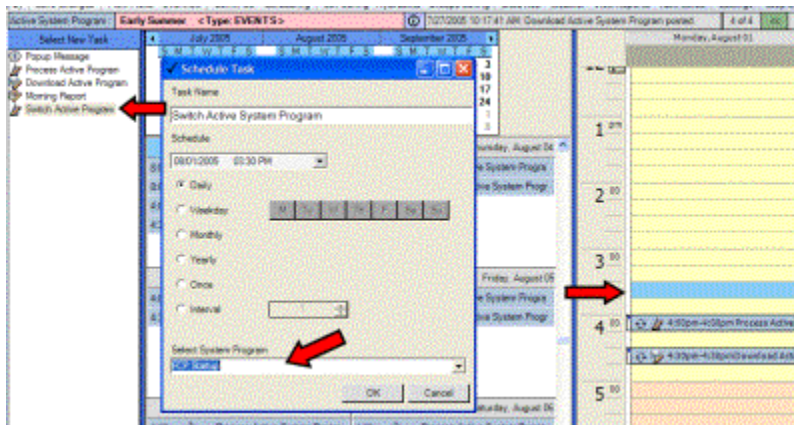
Type over the task name "New Task", and replace it with the name of the System Program you are switching to (this way, you will see at a glance on your calendar when the switch will occur).

Set the date and time for the Switch.

Insure that the previous System Program has adequate time to finish, before switching the System Program! As soon as the new System Program is sent to the field, the previous program will be terminated!

Select whether you want the Switch to recur at any intervals, or if this is a one-time event.

Select the System Program you wish to switch to, by clicking the down arrow next to the name of the currently active System Program. This will display a list of all saved System Programs, and you can click on the one you want to switch to at the specified time. Click OK when finished, and the Switch task will appear in the calendar.
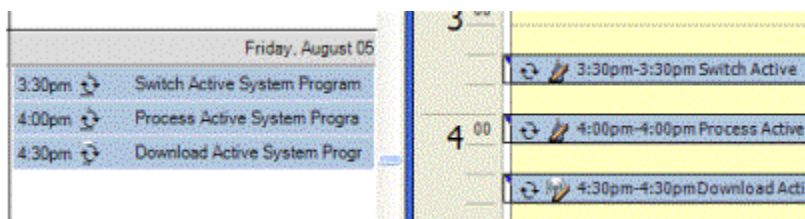
Make sure you also allow enough time to download the new System Program. You will learn from experience how long it takes to download your particular system, which depends on many factors.

Schedule the Morning Report

Schedule the Morning Report

The Task Scheduler can also schedule a Morning Report each morning, so that when you arrive in your office you will have an immediate, printable summary of anything unexpected which occurred during the last Water Window.

If you schedule a Morning Report, Surveyor will automatically retrieve the Controller Activity Log from all controllers at the specified time. Surveyor will then analyze the returned data (which includes all normal controller activity, as well as alerts and alarms), and filter and organize the information for you.

 To Schedule a Morning Report in Task Scheduler

To Schedule a Morning Report in Task Scheduler

Click Morning Report in the Select New Task section, upper left.
Double click in the hourly view on the right, at a good time to retrieve the report. Ideally this is right after irrigation is completed, but early in the day.
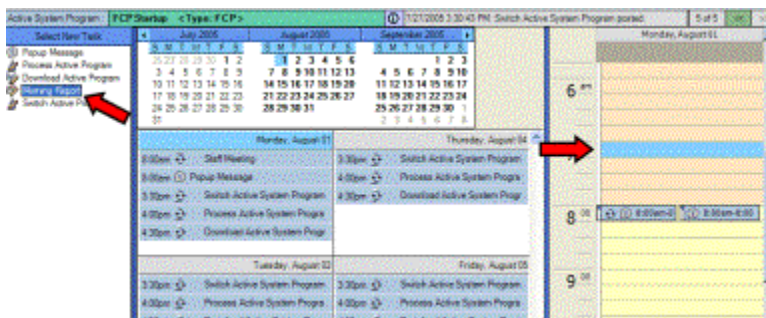
The Schedule Task window will appear, with Compile Morning Report entered in the task name.
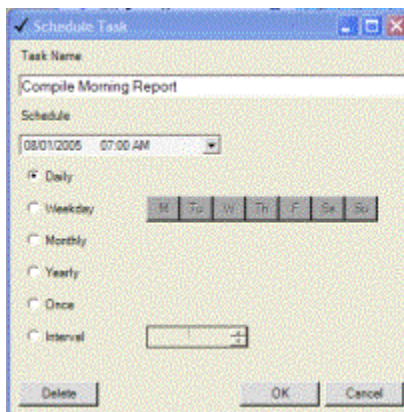
"Daily" is a good choice for the Morning Report. Among other reasons, retrieving the Activity Logs from the controllers once per day empties them out on a regular basis. This reduces communications time, and reduces the risk that the memory in the controller will "fill up" and begin overwriting older events.

When the Morning Report task is created, it will appear in the calendar view like

other tasks.
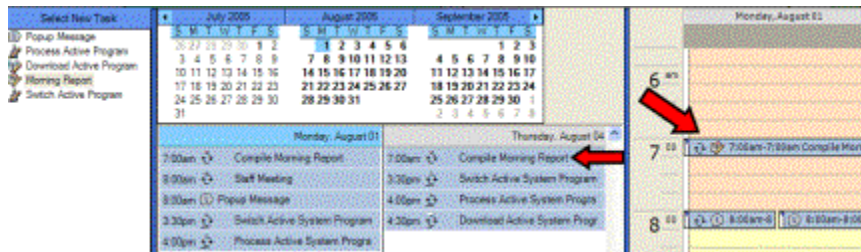
The Morning Report presents only items which may require your attention, including Overloads, Fuse alarms, Power Outages, sensor or weather shutdowns, and communications failures. You can print the report immediately if there are large numbers of incidents.

You can also request the Morning Report at any time, even if you don't schedule an automatic report throught the Task Scheduler (however, you may need to retrieve updated Controller Activity Logs to insure that the report is up to date). To request a Morning Report on demand, click the toolbar icon "Reports" and select the Morning Report. You may be asked whether you want to update the Controller Activity Logs.

☒ Reports

Reports

Click the View Reports button on the Surveyor tool bar to view the Reports menu.

Reports available are accessed through large folder icons.
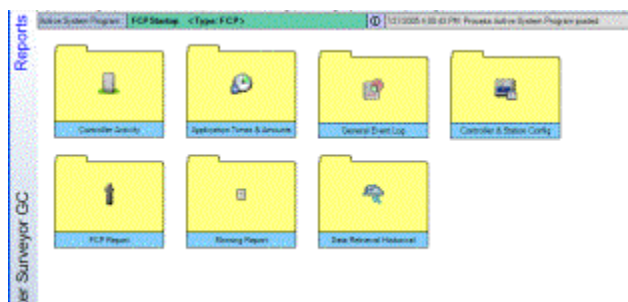
☒ Types of Reports

☒ General Report Features

 Reports Toolbar

 Using the Reports

 Application Times and Amounts

 Report Options

 Controller Activity

 Understanding the Controller Activity Report

 Morning Report

 Automatic Scheduling of the Morning Report

 FCP Report

 Controller Configuration Report

 Event Log

Types of Reports

Application Times and Amounts: These are "future" events, meaning the processed Event-based System Program that will run at the next water window.
FCP Report: Summary of Field Controller Programs with details.
Controller Activity: Unfiltered controller report logs show actual events retrieved from each field controller.
Data Retrieval Historical: Water and Rain histories by sensor from selected Data Retrieval devices.
Event Log: Running log of significant activity in the system and at the computer.
Morning Report: Filtered summary of Controller Activity and other logs (including Data Retrieval and Weather station alarms) showing only incidents and exceptions to normal operations.
Controller Configuration Report: Pre-formatted report by controller of stations, heads, and other data, which can be printed and placed inside the door of the controller for local reference.

 General Report Features

General Report Features

Click any folder icon to go to a particular type of report. The report will open in a Report Viewer, which will be printer-ready. You are not required to print the report, but it is presented as it would look on paper.

Most reports have several features in common.
A specialized Report toolbar, Report Options, and Page Forward and Page Back buttons are in all or most reports.
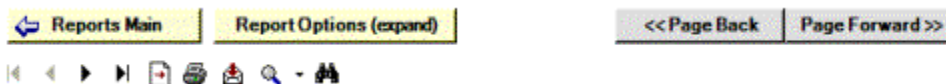
Report Options: This will allow you to customize the report, for a combination of time frames or event types that you may be interested in. These options may vary, depending on the type of report you select. They allow you to filter and sort by certain characteristics and select a historical range of interest.

Reports Main: This button goes back to the Report selection screen, and works like a "Back" button, just for the Report functions.

☒ Reports Toolbar

Reports Toolbar

There is a toolbar just for reports, just above the Report viewing area. These buttons will help to navigate through the pages of a report, search for items in the report, and even export the report for other programs (such as Excel, Word, Adobe Acrobat, or rich text).

Page: The arrows allow you to move forward or backward a page at a time.

Page, First or Last: The arrow-and-line button moves to the first or last page of the report.
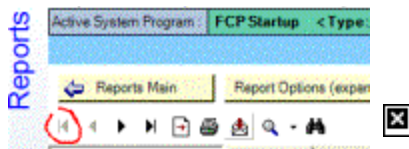
Page, Go To: The page-and-arrow button lets you specify a specific page to go to.
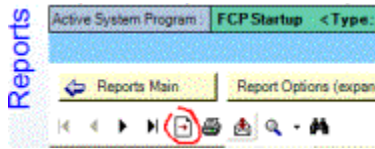
Print: The printer button calls up your print window, so you can print the whole report, or specify certain pages to print. The printer window itself is not a Surveyor function and will vary, depending upon your printer configuration.
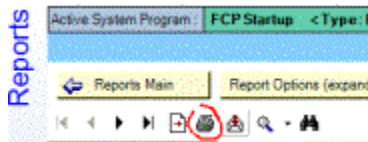
The total number of pages is displayed in the bottom center of the Surveyor window. Some reports are very large, and you should check this total page count before sending to your printer!
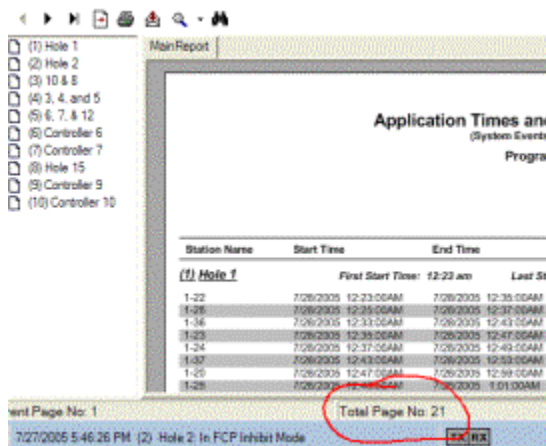
Export: The envelope-and-arrow button allows you to export the report data to a file, suitable for opening in other programs. This is especially useful for performing analysis functions on data in spreadsheet programs.
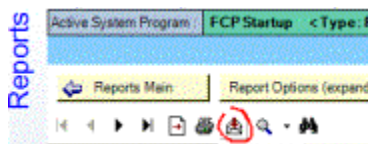
When you click the Export button, the Export Report window opens and offers several important options.
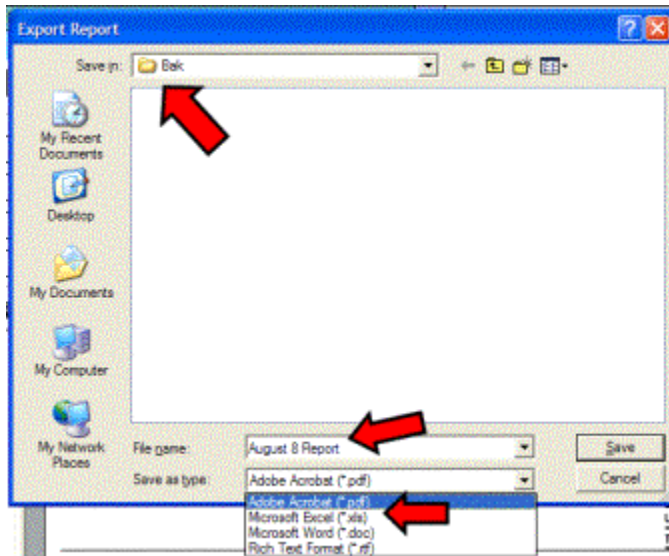
- You must type a name for the report.
- You can also choose a different location for the report (Save in). The default location is in the Surveyor\Bak directory, where backup files are also kept. You can click the drop-down arrow and choose any other location on your computer.
- You can also select one of several types of file formats in which to save the Export. One of the most useful is the ".xls" format, because this will allow you to open the report in Microsoft Excel. You can then perform custom reporting, graphs, formulas, and many other advanced functions on the data in the Surveyor report.
- There are also formats for Adobe Acrobat, Microsoft Word, and "rich text" format, which keeps most of the formatting but enables many other programs to open the report.
- If you Filter and Sort a report prior to Exporting, it will be exported in the filtered and sorted state. This can save a lot of work in Excel if you plan to chart certain types of information.

Zoom: The magnifying glass allows you to zoom the report for easier viewing (click the down arrow next to it to specify the zoom range).
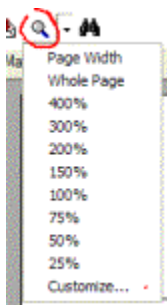
Search: The binocular button is a search function, which will let you search the report for any text string. The search is case sensitive, meaning there is a

difference between searching for "hole 3 Greens" and "Hole 3 greens".
Capitalization, spelling, and hyphens must be exactly the same as the item you are searching for. If more than one occurrence of the Search word exists, click Find Next to step through each occurrence of the word in the report.
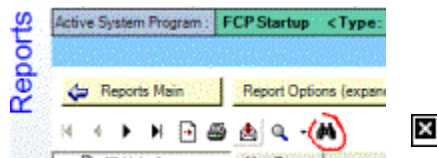
 Using the Reports

Using the Reports

 Application Times and Amounts

Application Times and Amounts

Application Times and Amounts shows the results of a processed Event-based System Program. This is an item-by-item list of the irrigation that is going to run this evening, after the downloaded events are sent to the controllers.

The App Times and Amounts report is only visible after Event-based System Programs have been Processed. Also, this report is only applicable to Event System Programs… if the system is subsequently switched to an FCP System Program, these events no longer apply. FCP System Programs are not summarized in this report.

Top right, there is a quick summary of total statistics for the entire System Program.

The individual controllers are displayed in a tree-view to the left of the report, and if you click a controller, the report jumps to the page showing the activity for that controller.

🗙 Report Options

Report Options

You can Sort and Filter reports with the Report Options field. Click the Report Options button to view all sort and filter options.

After changing any report option, click the Refresh Reports button to regenerate the report with your changes.
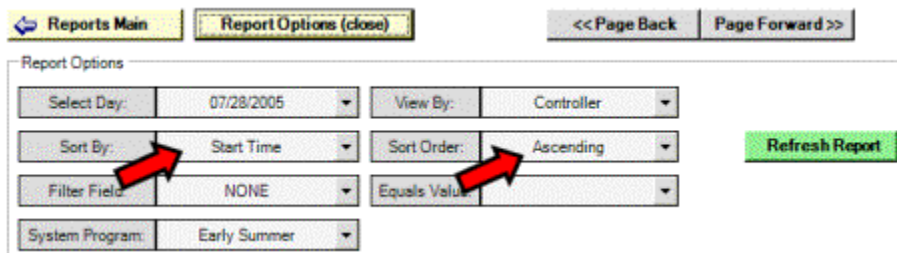
Select Day allows you to view earlier reports, in history. Click the down arrow and choose a day from the calendar. However, if no events were processed for that day, you will only see a blank report.

"Sort By" and "Filter Field" both require 2 fields to be set, for successful

use.

Sort By allows you to order the report by one of the column values. Specify the column you want to use for the sort, and the Sort Order in which you want them sorted. In the example, the report will be sorted by Start Time, in Ascending order (from earliest to last).

Click Refresh Report, to implement the Sort.

Filter Field tells the report to only show certain types of events. Choose the type of filter you want in the Filter Field, and then which of the values you want to see. The following report will filter by Management Groups, and show only those which include Fairways.

Click Refresh Report, to implement the Filter.

Sort By and Filter Fields can be used at the same time. Using the settings in the previous examples, sorted by Start Time in Ascending order and looking only at the Management Group "Fairways", here is the beginning of the sorted, filtered report.

System Program lets you run a report on a different system program (if you want to keep your current one active).

☒ Controller Activity

Controller Activity

The Controller Activity report displays retrieved controller activity logs from all controllers in the system. The reports are archived, or stored, in the computer's memory. Each time you retrieve Controller Activity logs, they are added to this archive. This allows you to search through controller log histories for particular events.
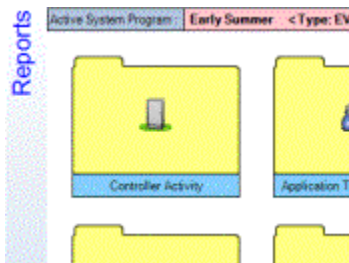
The report will open with the last retrieved data, if there is any for that date.

If no Activity Logs have been retrieved yet, you have the options of viewing historical data (click Report Options and Select Day Range), or you can click the button for "**Get Latest Controller Activity**". If you are looking for historical events, there is usually no need to get the most recent activity.
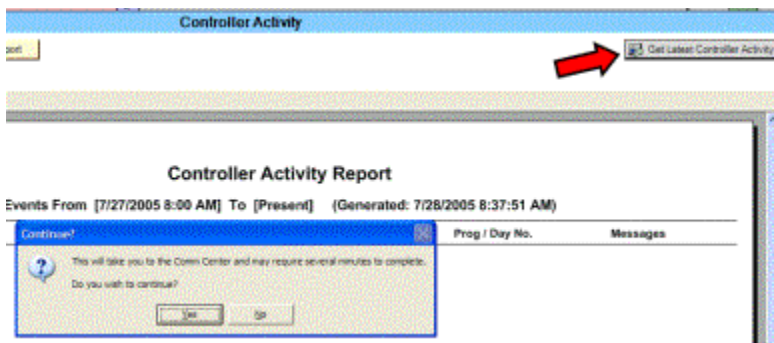
If you click Get Latest Controller Activity, a dialog will appear to confirm that you want Surveyor to automatically go to the Comm Center and begin retrieving reports from each controller.

If you click Yes, the screen will switch to the Comm Center, and Surveyor will begin communicating with all controllers to get the latest recorded data for the report.
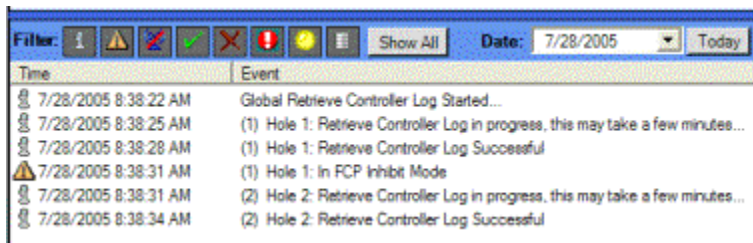
The length of time this takes depends on 1) the number of controllers, 2) the elapsed time, and the number of events, since the last time the logs were retrieved, and 3) the speed of your communications.

Since each controller can record up to 1000 events, retrieving these reports can take several minutes.

Whenever you successfully retrieve a controller activity log from a controller, the controller's recording memory is emptied. The more often you retrieve the reports (once per day is recommended), the faster the process of updating will be, since it only needs to retrieve a single day's worth of events. This process can be automated with the automatic Morning Report function in Task Scheduler (see Task Scheduler section).

When the Comm Center has finished retrieving all Activity Logs, you will need to return to the Controller Activity Report (use the Back button or the F2 shortcut key), and click View Report again to refresh the report.

Controller Activity Reports are continuously updated, and new results are added to the end of the report. In effect there is one very large report beginning with the earliest event in your history, through the most recent. Using the report function to look at a certain day range simply views that portion of the report, but the entire system history is contained in one large, continuous file.
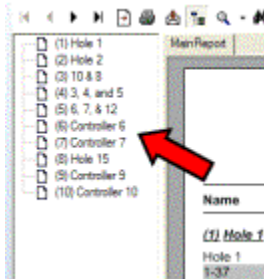
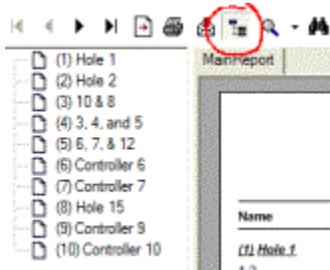 Understanding the Controller Activity Report

Understanding the Controller Activity Report

The report lists all the events in each controller's on-board activity log.

In the upper left is a report menu by controller. You can click any controller listed there to jump to its section of the report.

The Controller Activity report has an extra button on the report toolbar, which lets you turn the controller page menu off (making a bigger viewing area for the report).

The report itself is organized into rows (for each event) and columns (for different types of information about the events).

Controller Activity Report

Events From [7/26/2005 8:00 AM] To [Present]   (Generated: 7/28/2005 8:40:06 AM)

Name	Start Time	Run Time	Type of Event	Pump	Prog / Day No.	Messages
(1) Hole 1						
Hole 1	7/26/2005 9:00:56AM	0:00	Controller Status	No	0	Auto Inhibit Set
1-37	7/26/2005 11:15:00PM	10:00	Auto System Event	Yes	1	Normal Operation
1-14	7/26/2005 11:24:00PM	12:00	Auto System Event	Yes	1	Normal Operation
1-36	7/26/2005 11:25:00PM	10:00	Auto System Event	Yes	1	Normal Operation
1-18	7/26/2005 11:25:00PM	12:00	Auto System Event	Yes	1	Normal Operation
1-38	7/26/2005 11:35:00PM	10:00	Auto System Event	Yes	1	Normal Operation
1-13	7/26/2005 11:36:00PM	20:00	Auto System Event	Yes	1	Normal Operation
1-17	7/26/2005 11:37:00PM	12:00	Auto System Event	Yes	1	Normal Operation
1-16	7/26/2005 11:49:00PM	12:00	Auto System Event	Yes	1	Normal Operation
1-12	7/26/2005 11:56:00PM	12:00	Auto System Event	Yes	1	Normal Operation
1-26	7/27/2005 12:01:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-15	7/27/2005 12:08:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-27	7/27/2005 12:13:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-28	7/27/2005 12:20:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-29	7/27/2005 12:25:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-25	7/27/2005 12:32:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-60	7/27/2005 12:35:00AM	15:00	Auto System Event	Yes	1	Normal Operation
1-30	7/27/2005 12:37:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-24	7/27/2005 12:44:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-21	7/27/2005 12:49:00AM	12:00	Auto System Event	Yes	1	Normal Operation
1-59	7/27/2005 12:50:00AM	15:00	Auto System Event	Yes	1	Normal Operation
1-20	7/27/2005 1:01:00AM	12:00	Auto System Event	Yes	1	Normal Operation

Total Page No. 15   Zoom Factor: Page Width

Name indicates the controller or station causing the event. Some events are not associated with any particular station, and are listed with the controller's name, instead. Station events are by station name.

Start Time shows when the event began occurring.

Run Time will indicate the station run time, if applicable. Controller events will show 0:00 in run time.

Type of Event shows either a) the reason a station event has occurred, or b) the fact that it is a controller message, shown as "Status" or "Controller Status".

If it is a station event, the Type shows why the station was running:

> **Auto System Even**t: The station was running as part of an Event mode System Program (Prog/Day column shows which ET Day was running).
> **FCP Automatic**: Station running in FCP Automatic Program (the Prog/Day No. column shows which Program ran the station).
> **FCP Semi-Automatic**: Station was in a Program that was Semi-Auto started (Prog/Day shows Program number).
> **Preset**: Preset program was started (Prog/Day shows Preset number).
> **Manual System Event**: Station was started manually from Surveyor software.
> **Manual Seq (local)**: Manual sequential start from keypad.
> **Manual Simul**. **(local)**: Manual simultaneous start from keypad.
> **MR Block Start**: Maintenance Radio start of a Block.
> **Single Station MR**: Maintenance Radio used to start single station.
> **Cycle Delay**: Delay in effect between multiple cycles of an FCP.
> **Controller Status**: Item is a controller message, not related to specific station or program.

Pump: Indicates whether controller Pump output was activated in conjunction with the event.

Prog/Day No.: Shows which Program (in FCP mode), Preset, or ET Day (in Event mode) caused the event.

Messages: Important information related to the event, especially Status messages. Station and Program activations usually receive the message, "Normal Operation", meaning they responded correctly to whatever started them.

Controller Status messages report what was going on at the controller level. If irrigation is stopped, paused, or suspended for some reason, the message will indicate why. Certain controller conditions, such as Overloads, Power Outages, Fuse trouble, are reported here.

In this report, you can see that station 1-2 ran for 3 minutes at 10:11, because it was started by a Maintenance Radio command.

Controller Activity Report

Events From [7/28/2005 8:00 AM] To [Present]   (Generated: 7/28/2005 10:59:51 AM)

Name	Start Time	Run Time	Type of Event	Pump	Prog / Day No.	Messages
(1) Hole 1						
1-2	10:11:18AM	3:	Single Station MR	Yes	0	Normal Operation
1-2	7/28/2005 10:11:57AM	3:00	Single Station MR	Yes	0	Normal Operation
Hole 1	7/28/2005 10:15:58AM	0:00	Controller Status	No	0	Auto Inhibit Cleared
1-4	7/28/2005 10:16:56AM	10:38	FCP Semi-Automatic	Yes	1	Normal Operation
Hole 1	7/28/2005 10:27:35AM	0:00	Controller Status	No	0	System Paused
1-4	7/28/2005 10:27:35AM	0:00	FCP Semi-Automatic	Yes	1	Normal Operation
Hole 1	7/28/2005 10:27:54AM	0:00	Controller Status	No	0	Pause Cleared
1-4	7/28/2005 10:27:54AM	1:22	FCP Semi-Automatic	Yes	1	Normal Operation
1-1	7/28/2005 10:33:55AM	1:00	MR Block Start	Yes	0	Normal Operation
1-2	7/28/2005 10:33:56AM	1:00	MR Block Start	Yes	0	Normal Operation
1-3	7/28/2005 10:33:57AM	1:00	MR Block Start	Yes	0	Normal Operation
1-4	7/28/2005 10:33:58AM	1:00	MR Block Start	Yes	0	Normal Operation
1-5	7/28/2005 10:33:59AM	1:00	MR Block Start	Yes	0	Normal Operation

(1) Hole 1 Event Count: 13

At 10:27 there was a Controller Status message, showing that irrigation was Paused. The Pause was Cleared at 10:27 (although someone started an FCP semi-automatically between the two events!).

In the following report, a syringe Preset (preset No. 1) was started at 10:18 on controller 2 (Hole 2). The report shows each station running in turn, all operated by the Preset. Then, someone used Maintenance Radio to start a Block at 10:26. On Controller 3, various stations were missed, because the controller had been Suspended.

(2) Hole 2						
Hole 2	7/28/2005 10:14:04AM	0:00	Controller Status	No	0	Stop Irrigation
Hole 2	7/28/2005 10:16:00AM	0:00	Controller Status	No	0	Auto Inhibit Cleared
2-1	7/28/2005 10:18:32AM	3:00	Preset	No	1	Normal Operation
2-2	7/28/2005 10:18:33AM	3:00	Preset	No	1	Normal Operation
2-3	7/28/2005 10:18:34AM	3:00	Preset	No	1	Normal Operation
2-4	7/28/2005 10:18:35AM	3:00	Preset	No	1	Normal Operation
2-5	7/28/2005 10:18:36AM	3:00	Preset	No	1	Normal Operation
2-1	7/28/2005 10:26:49AM	2:00	MR Block Start	Yes	0	Normal Operation
2-2	7/28/2005 10:26:50AM	2:00	MR Block Start	Yes	0	Normal Operation
2-3	7/28/2005 10:26:51AM	2:00	MR Block Start	Yes	0	Normal Operation
2-4	7/28/2005 10:26:52AM	2:00	MR Block Start	Yes	0	Normal Operation
2-5	7/28/2005 10:26:53AM	2:00	MR Block Start	Yes	0	Normal Operation

(2) Hole 2 Event Count: 12

(3) 10 & 8						
3-44	7/28/2005 9:15:00AM	10:00	Auto System Event	Yes	1	Station Missed (Suspend)
3-42	7/28/2005 9:19:00AM	10:00	Auto System Event	Yes	1	Station Missed (Suspend)
3-34	7/28/2005 9:19:00AM	10:00	Auto System Event	Yes	1	Station Missed (Suspend)

| Hunter Industries :: Surveyor | Events From [7/28/2005 8:00 AM] To [Present]   (Generated: 7/28/2005 10:59:51 AM) | Page 1 of 5 |

Click **Report Options** to sort and filter this report for the type of information you want. When you have made your selections, click the Refresh Report button for the updated view. For a detailed explanation, see Report Options, under the Application Times & Amounts report.

This is how the Controller Activity log tracks events in the real world. It can be a

rich source of information, especially when troubleshooting large systems after irrigation has finished during the night.
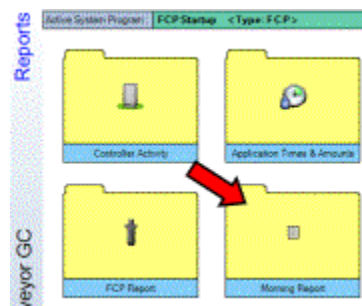
It can also be overwhelming due to the sheer mass of data. The Morning Report filters the Controller Activity Logs and presents only unusual or missed events.

 Morning Report

Morning Report

The Morning Report is designed to be a "heads-up" report for the superintendent of a large system, showing only items that are abnormal, and possibly in need of repair or attention. The Morning Report is basically a filtered summary of the Controller Activity Logs plus any communications failures or Data Retrieval events, and it will generally require an up-to-date Activity Log before it can display problems. It can also be configured to run automatically at a pre-scheduled time in Task Scheduler.

The Morning Report summarizes Controller and Data Retreival alerts, then Controller Status and Missed watering. Not everything listed in the report is a malfunction, but may be the result of different systems working normally.

If a Data Retrieval sensor alarm causes a system shutdown, for example, irrigation will be missed, and the report tells you about this.

The Morning Report may also be sorted, filtered, exported, and printed. See Report Options for a detailed explanation of these features.

☒ Automatic Scheduling of the Morning Report

Automatic Scheduling of the Morning Report

Despite the name, the Morning Report can be run at any time, and can be scheduled to run automatically at any time of day.

If the Morning Report is scheduled in Task Scheduler, it will automatically retrieve Controller Activity Logs first, then summarize them in the report. The ideal time to schedule this is immediately after the main irrigation has completed, usually early in the morning (see Task Scheduler, Morning Report).

If you start a Morning Report manually by clicking on the report icon, it will open with a summary of the period since the last system Time of Day change (see Settings, Schedule Setup).

☒ FCP Report

FCP Report
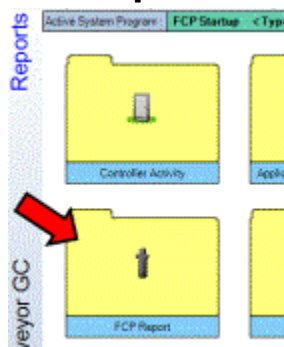
The Field Controller Program (FCP) Report is available whenever you have created and saved FCPs in a System Program.
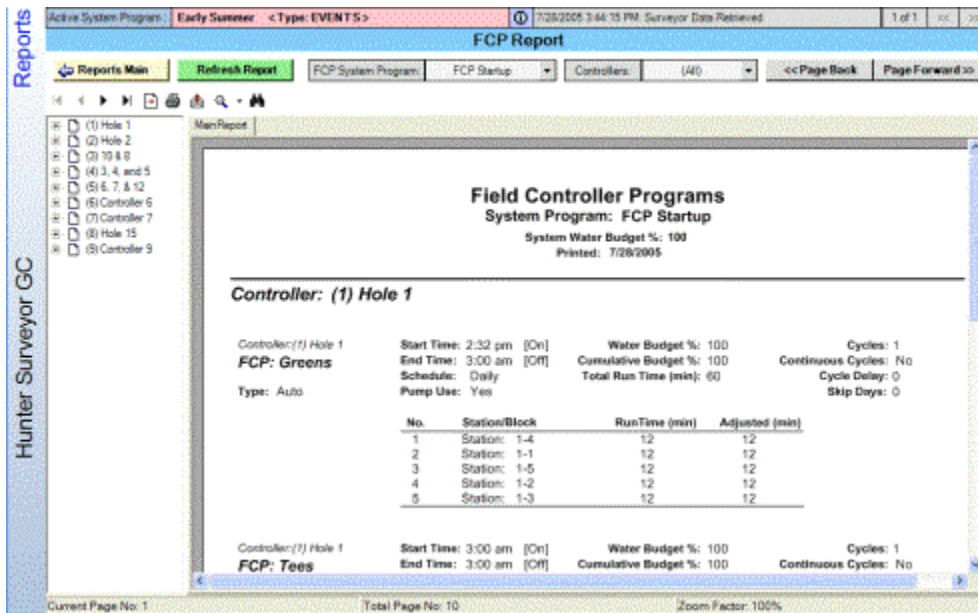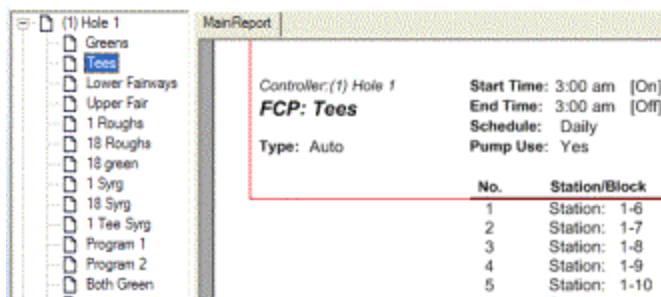
This report has the same general navigation and other features as the other reports. There is no separate Report Options button, because the only options are already at the top of the screen: Select a different System Program, if you wish (it will automatically show the active System Program). You also have the option of generating the report for the entire system (Controllers: ALL) or use the drop down arrow to select a specific controller.

The FCP Report is always organized by controller, and you can jump to a specific controller with the tree-view on the left. Click a controller name to go to that page.
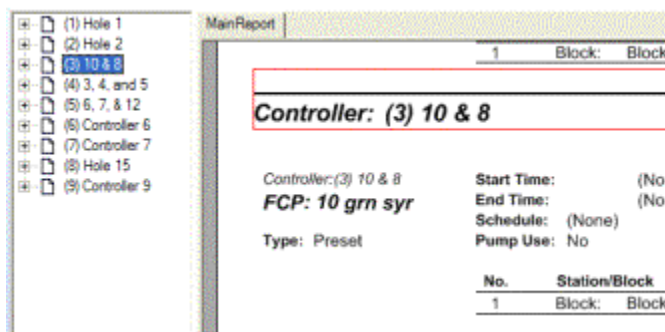
Click the + sign next to a controller, to jump to a specific FCP or Preset program within that controller.

Print-outs of these reports can be included in a binder, and/or included inside the door of the controllers.
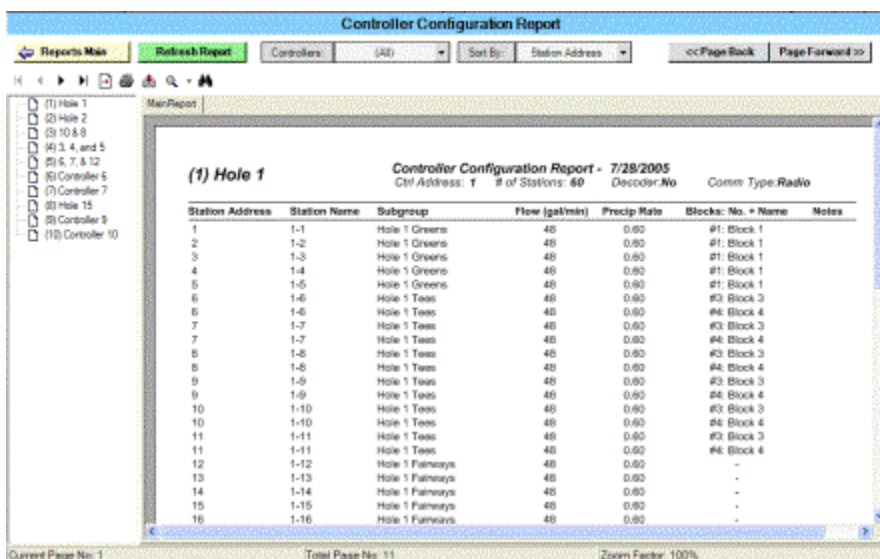
 Controller Configuration Report

Controller Configuration Report
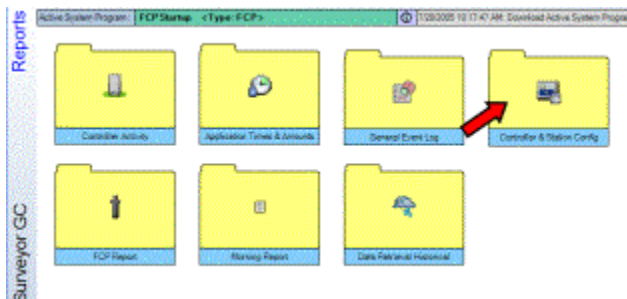
This also reports by controller, but includes the hardware information for all devices connected to a specific controller. This is also an excellent report to print out, laminate, and include inside each individual field controller. The information in this report rarely changes after setup, but can be very useful in the field.

This report is also organized to fit on one page per controller, at least up to 60 stations. Decoder controllers may require a two-page report (per controller) due to

their high station count.

You can use the Notes field to write in decoder serial numbers after the report is printed. Surveyor has no awareness of decoder serial numbers, and you cannot type directly in the Report viewer.

Event Log

Event Log
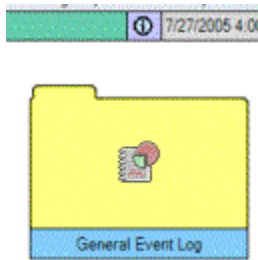
The Event Log shows a running account of significant occurrences in your overall system. These can include downloads, retrieves, communications failures, and Data Retrieval alarms.

Like the other reports, the Report Options allow you to custom sort, filter, and export the report.
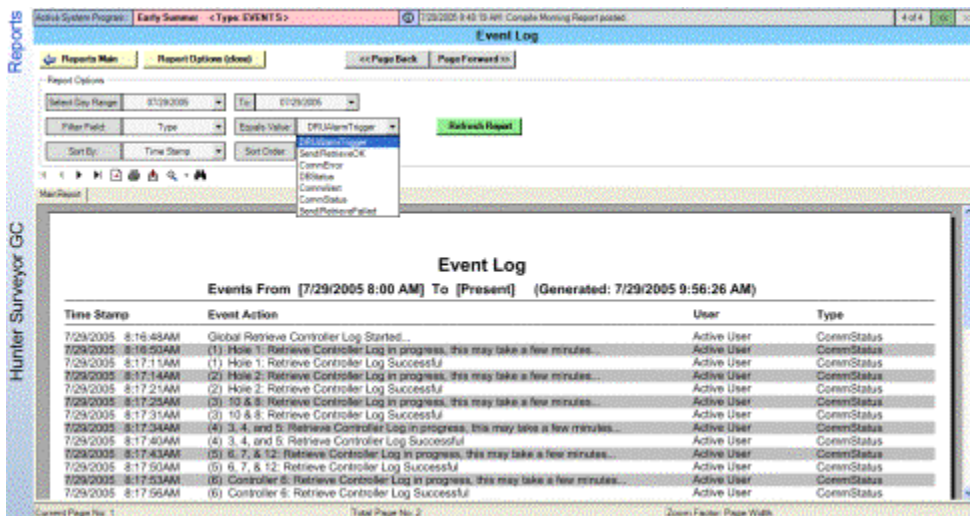
Data Retrieval

Data Retrieval

Data Retrieval Units are communicating devices which monitor actual sensors in the

field, and transmit their data back to Surveyor. The Data Retrieval screen is only used if you have a Hunter Data Retrieval Unit (DRU) installed in your system.

Access Data Retrieval functions from the toolbar icon at the top of the Surveyor screen.

 To configure a Data Retrieval unit

 DRU Setup Checklist

 Configure Data Retrieval

 Configure Ports

 Alarms with Data Retrieval Units
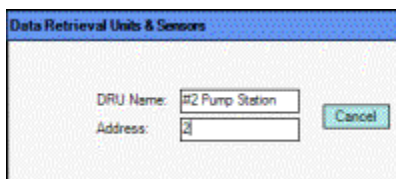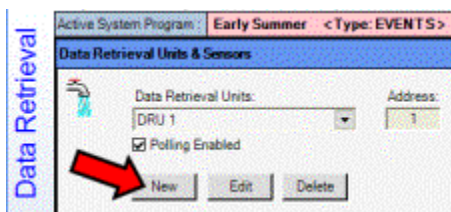
 To configure alarm settings

 Alarm Response

 Viewing, Acknowledging, and Responding to Alarms

To configure a Data Retrieval unit

Click the New button. Blank fields will appear for the new DRU's name and address.

Type a name for the Data Retrieval unit.
Type an address for the new Data Retrieval unit (see DRU addresses).
Click the Save button. The new DRU will now exist in the software, and you can proceed with the sensor configuration.

 DRU Setup Checklist

DRU Setup Checklist
- ❑ Configure Data Retrieval Unit (Data Retrieval screen)
- ❑ Configure Ports (Data Retrieval screen)
- ❑ Set Alarm Conditions and Responses (Data Retrieval screen)
- ❑ Activate Polling (System Settings screen)

 Configure Data Retrieval

Configure Data Retrieval

DRU addresses can be any number from 1 to 16 (there are 16 maximum possible Data Retrieval units per system). Data Retrieval addresses are not the same as controller addresses, so you can have a Controller 1, and a DRU 1. Surveyor will not confuse the two.

Consult the Data Retrieval unit documentation (or the sticker inside the door of the unit) for addressing the hardware in the field.

Give each DRU a unique and descriptive name, if you wish. Otherwise the name will be the DRU address number.

The check box for Polling Enabled should be checked, unless you wish to ignore this DRU for some reason. "Polling" is the process of the computer requesting sensor data from the DRU. The DRU will not volunteer information, and on its own, has no awareness of alarms. Surveyor software will poll the DRU(s) every 15, 30, or 60 seconds for updates on sensor status or readings, if polling is enabled.

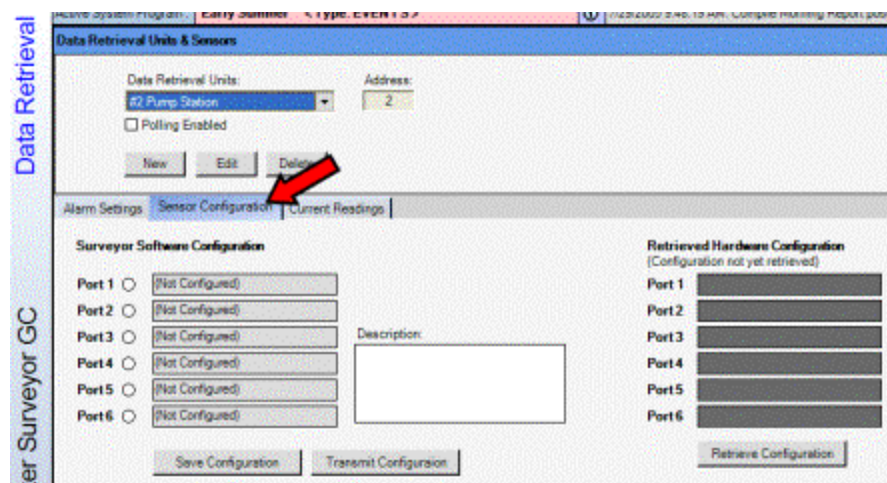***Polling must be enabled for automatic alarm shutdowns to work.***

When the new DRU's name and address have been assigned, click the Save button.

 Configure Ports

Configure Ports

Ports are specific, numbered inputs to the DRU for individual sensors. To configure the Ports, click the Sensor Configuration tab, underneath the name and address fields.

Each DRU has up to 6 Ports available, and you can decide which sensors to connect to each (they show Not Configured until a sensor has been set). The Ports correspond to the physical sensor inputs in the Data Retrieval field hardware.

Different ports can accept different types of sensors. Some are capable of more than one type of sensor. You must assign each sensor to an appropriate port, according to the following possibilities:

Port	Possible Sensor Inputs			
1	Flow (GENDATFL)	Switch closure		
2	Flow (GENDATFL)	Switch closure		
3	Flow (GENDATFL)	Switch closure	Rain (GENDATRC)	
4		Switch closure		Wind Speed (GENDATAN)
5				Analog Wind
6				Wind Direction (GENDATAN)

Only one sensor may be connected to each port.

Click the circle button next to one of the ports to specify its sensor. The sensor field will become active, with a down arrow to the right of the sensor name. Click the arrow to see possible sensor selections for the port.

Click the sensor type that is connected to the port.
Some Flow Sensors require additional information, for the "K factor" and the "Offset" values. **These field will appear, if Flow Sensor is selected**.

The K factor and offset values are required to calibrate the sensor for the size of the pipe in which the actual sensor is installed, so that it can compute flow correctly. Consult the flow sensor manual for correct settings for the pipe in which it will be installed, and enter the settings in the appropriate fields.

Continue until all sensors have been assigned to the correct type of port. Leave unused ports as "Not Configured".

When the port/sensor assignments are correct, click the Save Configuration button under the Port settings.

After you have set up the ports, you will need to send the configuration information to the field, so that the Data Retrieval Unit knows how it is configured. To send Data Retrieval configuration, click the TX (transmit) button. This sends the port/sensor configuration data to the field, so the DRU knows what it is monitoring.

To retrieve information from a DRU which is already configured, click the RX (receive) button. This will bring back the DRU's configuration. This would be useful if you lost all your computer's information, and wanted to recreate the system.

Surveyor will communicate with the DRU and display its current configuration.

Alarms with Data Retrieval Units

Alarms with Data Retrieval Units

Flow sensor alarms can be used to trigger automatic irrigation shutdowns. Each sensor may have a unique response configured in advance. Any sensor detecting

an alarm can: 1) shutdown all irrigation, 2) shut down a list of designated controllers, or 3) notify the computer only, without shutting anything down.

 To configure alarm settings

To configure alarm settings

Click the Alarm Settings tab.

Alarm Monitoring: Click the circle next to any sensor for which you want to set alarm information. Below the sensor list, there is a check box for "Alarm Monitoring". Check this box for any sensor you want to generate alarms.

If the box is not checked, no readings from the sensor will ever generate an alarm.

 Alarm Response

Alarm Response

This area sets what will happen when an alarm is received.

Remember that these settings are for the selected sensor only, and each sensor can have its own response.

Notify Only: Alerts Surveyor, and a red Alarm notification is received on screen. The alarm will be logged and visible in reports, but no shutdowns occur.

System Suspend (all controllers): This will shut down all irrigation on alarm. The shut down is a "Suspend" command, meaning no irrigation will occur, but the controllers will keep track of time. If the alarm is cleared, the irrigation can resume where it "should be" in real time, allowing irrigation to end at the originally scheduled time. Irrigation which should have occurred during the Suspend will be lost. This alarm is visible in reports, and the shutdown will be visible in Controller Activity Logs and Morning Reports. If you select this option, a list of all controllers will be shown, with all boxes checked automatically.

Suspend Selected Controllers: This works like System Suspend, but only applies to selected controllers. On alarm, the selected controllers will be placed in Suspend, but all other controllers will continue to irrigate normally.

If you select this option, a list of all controllers will appear on the right, and you must check the boxes for those controllers you wish to shut down on this alarm. This alarm is visible in reports, and the shutdown will be visible in Controller Activity Logs and Morning Reports for the selected controllers.

All Suspend commands are "soft" shutdowns. They are sent to one controller at a time, to prevent simultaneous valve closings and the risk of massive water hammer.

Clear and Resume: This tells Surveyor when to treat an alarm as "cleared", and also whether to resume irrigation if an alarm clears. If the alarm condition at the sensor goes away, and the sensor remains normal for the delay period specified, the alarm is "cleared". Some delay may be desirable for certain types of sensors, such as wind speed. If winds were gusting, you may want to verify that they have remained calm for a period of time before resuming irrigation, to prevent needless cycling of the pump. Setting a Clear delay of 5 minutes would mean that the sensor must remain in a normal state for at least 5 minutes, before the alarm would be treated as clear and irrigation could resume.
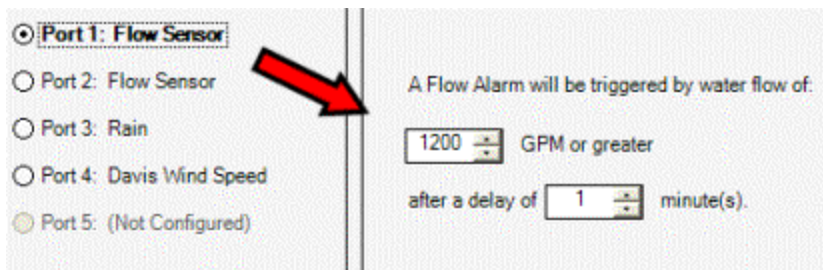

Auto Resume: The check box beneath the Clear setting allows Surveyor to resume irrigation if the condition causing the Suspend shutdown has cleared. If this box is not checked, irrigation will remain off for the rest of the irrigation period after an alarm, even if it has cleared.

Remember that your Response and Clear instructions can be different for each sensor. The settings you make here are only for the sensor selected with the circle button, above. Click each sensor to set its unique Response and Clear instructions.

Defining Alarm Conditions: In the box to the right of the sensor list are the sensor alarm rules, and you must enter the alarm conditions for each sensor there.

Flow Sensors (Ports 1-3): Flow sensors are triggered by a certain level of flow. This is completely independent of what ought to be running. It is an absolute value (in gallons or liters) which indicates a line break or other catastrophic leak event.
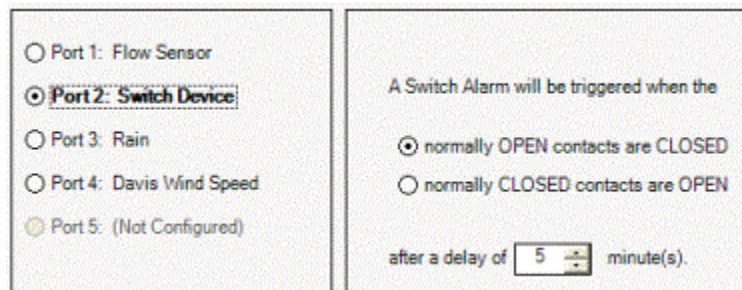
You should enter a value that is safe for normal irrigation, and allow roughly 10% over that amount for normal system flow fluctuations.

You should also specify a delay period. This means that once the alarm value is reached, it must remain at that level for the delay period before Surveyor will treat it as a "real" alarm. A minimum interval of 1 minute is recommended, to prevent false alarms when the system first starts up. If false alarms persist, you may look at increasing the delay period, or raising the flow alarm value, or both.

Switch Devices (Ports 1-4): Switch sensors can be configured as "Normally Open" or "Normally Closed". A Switch Device can be anything which causes a contact to change from one state to another. A perfect example of a Switch Device would be a Hunter Mini-Clik, which is normally closed. When a Mini-Clik gets wet, it causes a contact to open. In a Data Retrieval unit, this would be the "alarm" state, and it could be used to shut down all irrigation.

Select the statement which describes your sensor and alarm condition, and set any delay time (not required) before the condition is treated as an alarm.

Data Retrieval ports are not designed to pass voltage. If you are using a Switch Device to monitor a device or condition with electricity, you must not pass the voltage through the DRU port. Consult the equipment manufacturer or a qualified electrician, or both, to arrange a "dry" contact relay for connection to Data Retrieval.

Rain (Port 3, only): The Hunter GENDATRC rain collector actually measures rainfall and can trigger alarms based on two different conditions: rate of fall (amount within an hour), or total rain in a 24 hour period (determined by the Surveyor time of day change setting).

Click Port 3 on the Alarm Settings tab, if it is configured as a Rain sensor. Enter the values for the amount within an hour, and/or the total amount within a 24 hour period, that you want to trigger any alarms. A delay time is possible here, but probably not desirable.

You can select Resume and set a delay after clearing. The 24-hour accumulation is reset at the system time of day change, however. If the day change occurs during the irrigation water window, and a rain alarm has shutdown irrigation with Resume checked, it is possible that irrigation will run for a period during the rain, until the alarm amount is reached again. See System Settings, Time of Day change.

Rainfall is tracked by Data Retrieval regardless of whether you have set the sensor to alarm, or not. Rain measured by a DRU can be viewed in Data Retrieval historical reports.

Wind Speed (Port 4 only): The Hunter GENDATAN is a combination of two separate sensor outputs for Wind Speed, and Wind Direction. Speed is connected to Port 4, and Direction is connected to Port 6.

Click Port 4 on the Alarm Settings tab, if it is configured as a Wind Speed sensor. Enter the wind speed at which you want alarms to occur. It is wise to set Delays for both Wind Speed shutdowns and Resume, to control for gusty conditions.

You can also combine the Wind Speed alarm with Wind Direction, so that alarm conditions for both sensors must be met before an alarm will occur.

Port 5 is an analog sensor port which is not generally used.

Wind Direction (Port 6): To combine Wind Speed and Wind Direction, you must click the check box under the sensors for Wind Direction Device while you are in the alarm settings for Port 4. The Port 6 **Wind Direction** cannot cause an alarm by

itself, but works to modify the Port 4 Speed alarm.

The Direction setting means the wind must be over the alarm speed, AND from the specified direction, before an alarm will occur.

When you click the check box for Direction on the Port 4 alarm settings, a compass will appear that allows you to set the alarm Direction. You can either type the degrees in the fields, hold down the spin buttons (up and down arrows) and watch the compass change, or you can click and drag the alarm zone on the compass itself. To click and drag, click either of the nodes on the ends of the red "pie" that sets the alarm direction, and release. The pie will follow the cursor as you move around the compass until you click again.

The direction setting means that only wind FROM the red portion of the compass will cause an alarm, and only if it is over the alarm speed.

Remember to set some delay for both alarm and resume on wind sensors, for shifting or gusting winds.

Current Readings tab: Once your Data Retrieval Unit is configured, communicating, and sensors are connected to its ports, you can view the status of the sensors at any time by clicking the Current Readings tab (if polling has been enabled).

Gif

The Current Readings tab displays all sensors configured, and the last known value for each sensor, by port. If polling is enabled, this information should never be more than one minute old.

Underneath the sensor readings, Surveyor will build a real-time graph for Ports 1, 2, and 3 on the selected DRU. The color-coded lines are active when there is flow in the system and polling is enabled. The horizontal bottom of the graph indicates time, and the vertical axis represents the flow amount. This graph only shows very recent history (about 10 minutes worth), and detailed histories are available from the Reports screen.

If the Current Readings show significant flow, and nothing should be running in the field, it may indicate that manual irrigation is taking place, or there is a line break or leak in the piping.

 Viewing, Acknowledging, and Responding to Alarms

Viewing, Acknowledging, and Responding to Alarms

When sensors are being polled by Surveyor and an alarm is detected, a red alarm indicator appears in the bottom border of the Surveyor screen. If any shutdown responses were configured for the sensor, they will be sent to the field immediately.
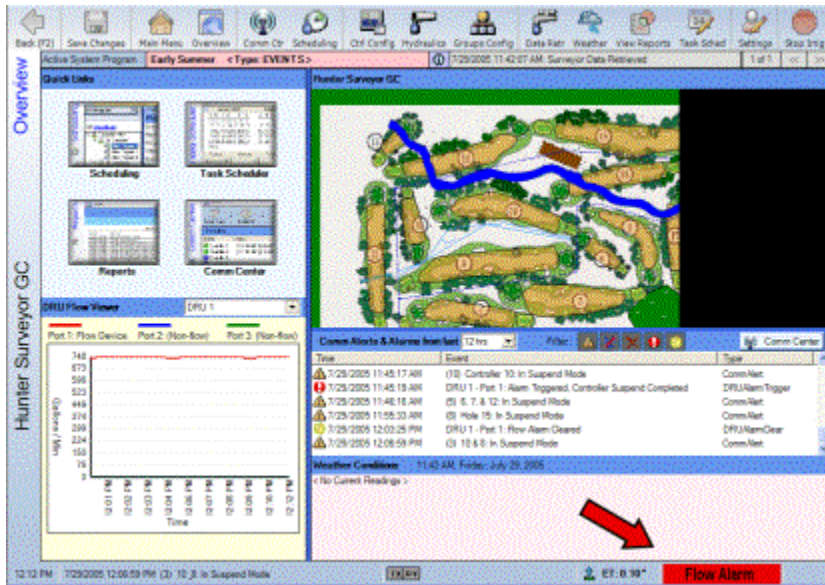

If a Suspend command was triggered by the alarm (based on your Response instructions), the event will also appear in the communications events. The controller status LEDs in the upper left pane of the Comm Center will also include the ! exclamation point, and the text messages next to them should indicate that they are Suspended.
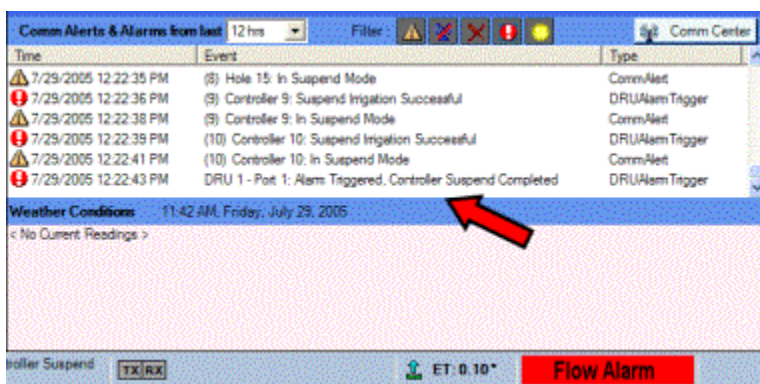

If you click directly on the red alarm indicator, Surveyor will switch to the Comm Center so you can see the exact details of the alarm.
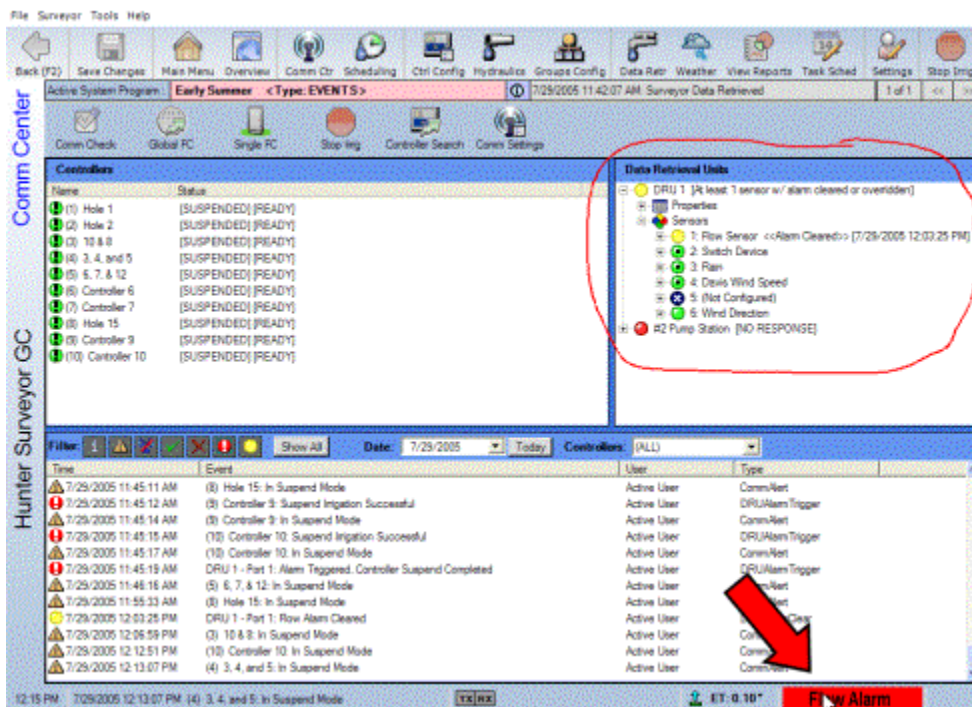
The red alarm indicator will remain on screen until you acknowledge it: right-click on the alarm indicator, and click Acknowledge, to clear the indicator.
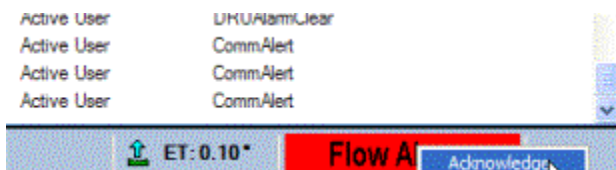
Check the Data Retrieval section of the Comm Center, in the upper right pane. Data Retrieval Units in alarm, and the sensor that caused the alarm, will show a red status LED with an ! exclamation point in the center. The alarmed sensor will show "Alarm Triggered" next to it, with the exact time of the alarm.
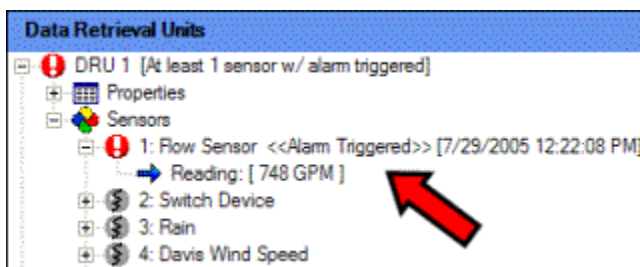
You can right-click on the alarmed sensor in alarm, and select several options from a drop-down menu.
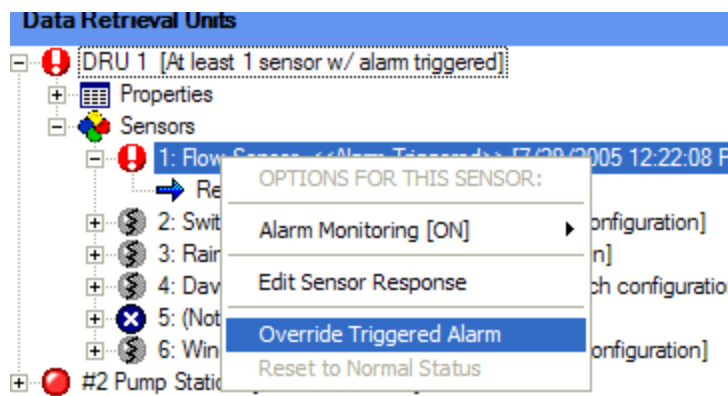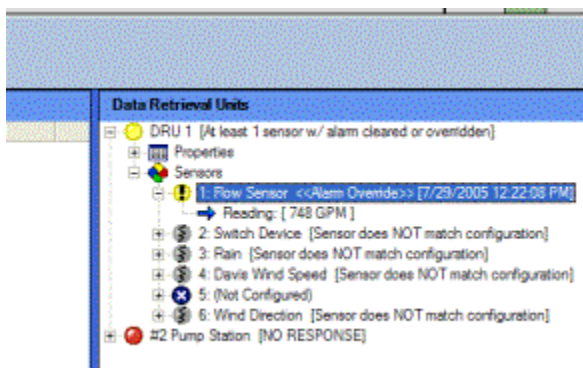
Alarm Monitoring (ON/OFF): This tells Surveyor whether to continue checking this sensor for alarms. Sometimes a sensor continues to generate alarms for physical reasons in the field, but they constitute a nuisance at the central. Turn Alarm Monitoring Off to ignore this sensor.

Edit Sensor Response: Once the sensors have been set up in Data Retrieval, you can change their individual alarm responses from this menu. Choosing this option will take you to the Data Retrieval screen, Alarm Settings tab. However, if a sensor is already in alarm, changing it to a "Notify Only" response will not restart any controllers that were shutdown as a result of the alarm. The response change will only apply to new alarms.

Override Triggered Alarm: The override function allows you to command the controllers to resume irrigating, even if the sensor is still in alarm and was configured to perform a shutdown. **Example**: a rain sensor may have shut down the system after a very short period of rain, and you want to resume irrigating immediately.

Overriding the sensor will change the sensor back to a "cleared" state, and tells the controllers to restart. Overridden alarms have a yellow status light with the ! symbol, and alarm overrides are logged in the communication events with a yellow symbol.

Clicking Override will cause an immediate Resume command to be sent to affected controllers.

Reset to Normal Status: This will turn an Overridden sensor back to green, normal status. This only affects the display and does not restart controllers.
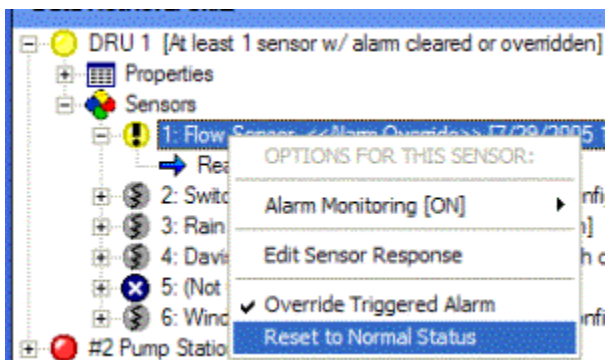
The communications status portion of the Comm Center has a filter button just for sensor alarms. If you click the Alarms Triggered filter, it will display only alarm events. There is also a filter for Alarm Overrides.

 Weather

Weather

 Under Construction.

Under Construction.

 Graphics

Graphics

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More Help and Support

More Help and Support

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