

Q-Tracker™

Temporary Sewer Flow Monitoring System
Data Analysis Software

Installation & Operation Manual



BadgerMeter, Inc.

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1.0 Introduction & General Description

1.1 Scope of this Manual

This manual provides complete instructions and reference information for using the Q-Tracker™ Windows™ data analysis software in connection with the Q-Tracker temporary sewer flow monitor. In the manual, this software will sometimes be referred to simply as the “program”.

If you are already prepared to begin, you do not have to read any further here. Go directly to Section 2 for a summary of procedures, and refer to subsequent sections as necessary for further details.

The Q-Tracker program runs only under Microsoft® Windows™. Therefore in order to understand this manual and use the program, you must be familiar with Windows and the computer involved. This manual does not provide any instructions in using Windows or computers.

There is another user’s manual which provides instructions for using the Q-Tracker flow monitor. That manual also explains another program, one which runs under DOS™ without Windows. No instructions are provided in this manual on the flow monitor or Q-Tracker DOS, other than a brief introduction.

The Q-Tracker program is designed to be mostly self-explanatory. If you are familiar with the Q-Tracker and have used other Windows-based programs, you could teach yourself how to use this program simply by experimenting with it. This manual is provided to ease the learning process, help avoid troublesome mistakes such as accidentally erasing or changing valuable data files, and help you obtain full benefit of all the program’s features.

Like other software packages, Q-Tracker is improved from time to time, and upgraded versions are issued. This manual was written for Version 1.08 of the program. However, it is intended to apply to a number of future versions of the program. When necessary, Badger Meter issues release notes explaining program changes.

1.2 General Description of the Q-Tracker Software

The Main purpose of the program is to help engineers analyze and interpret flow data collected by Q-Tracker monitors. These periodic measurements are for a survey of the hydraulic performance of an existing underground sewer network. For such a survey, a number of monitors are installed at carefully selected points. They accumulate flow measurement data over a period of weeks or months. The flow data is retrieved from the monitors periodically, perhaps weekly, by operators equipped with small portable computers. An operator temporarily connects a computer to a flow monitor with a cable between

serial data ports. The computer is also used for setting up and calibrating the monitor. For these purposes of data retrieval, setup, and calibration, Badger provides DOS software used in the portable computers.

Q-Tracker software, in turn, is intended to run on a desktop computer in an engineering office. Data collected by the portable computers are transferred to the desktop computer via diskettes or other means. There, the data is analyzed in connection with the hydraulic survey project, using the Q-Tracker software explained in this manual.

The program provides three main analysis tools:

- A. *Spreadsheets* in which data from one or more stations can be manipulated,
- B. *Colored graphs of several types*, showing data selected from one or more columns in a spreadsheet. Graphs, in turn, can be incorporated into preformatted tabular reports, and
- C. *Preformatted tabular reports* of data retrieved from particular flow monitoring stations.

Spreadsheets, graphs, and reports that you have prepared can be sent to either a color or monochrome printer. They can be stored as files on disk for later review or for transfer to other computers.

Besides being used in the office for purposes such as these, Q-Tracker Windows also provides the same functions as the DOS program. It can be used in the place of DOS, for setting up and calibrating Q-Tracker monitors and retrieving flow data from them. These meter communication capabilities are provided as a convenience for users who happen to have portable computers equipped with Microsoft Windows and a suitable cursor pointing device such as a trackball. These features also allow you to communicate with Q-Tracker units using Q-Tracker Windows on the office computer. Thus you can use the office computer to setup and calibrate Q-Trackers before taking them into the field for installation. You can also retrieve data from Q-Trackers that have been removed from service and returned to the office.

1.3 Hardware and Operating System Requirements

For running Q-Tracker, it is recommended that you use equipment with the capabilities listed below. You might get by with less, but you will not achieve full benefit of all the program’s features. For questions on equipment compatibility, consult the factory.

- IBM PC/AT-compatible computer with 386 or better CPU, running at 25 megahertz or faster
- 4 megabytes or more of RAM
- 10 megabytes or more of available fixed-disk storage

- An available serial (COMM) port if you wish to communicate with Q-Tracker flow monitors using this computer
- Microsoft™ Windows, Version 3.1 or Windows™ 95
- A mouse or equivalent cursor pointing device suitable for working in Windows, such as a trackball
- A color monitor, Super VGA, 0.28-mm dot pitch or better, screen size 7 inches or larger

- A color graphic printer such as laser or ink-jet, and a suitable printer driver installed in the Windows system

1.4 Factory Technical Assistance

Customers who have questions beyond what is covered in this manual may obtain technical assistance from Badger Meter, Inc. In Tulsa by telephoning the toll free number 1-800-226-FLOW (3569).

2.0 Installation and Quick Start Guide

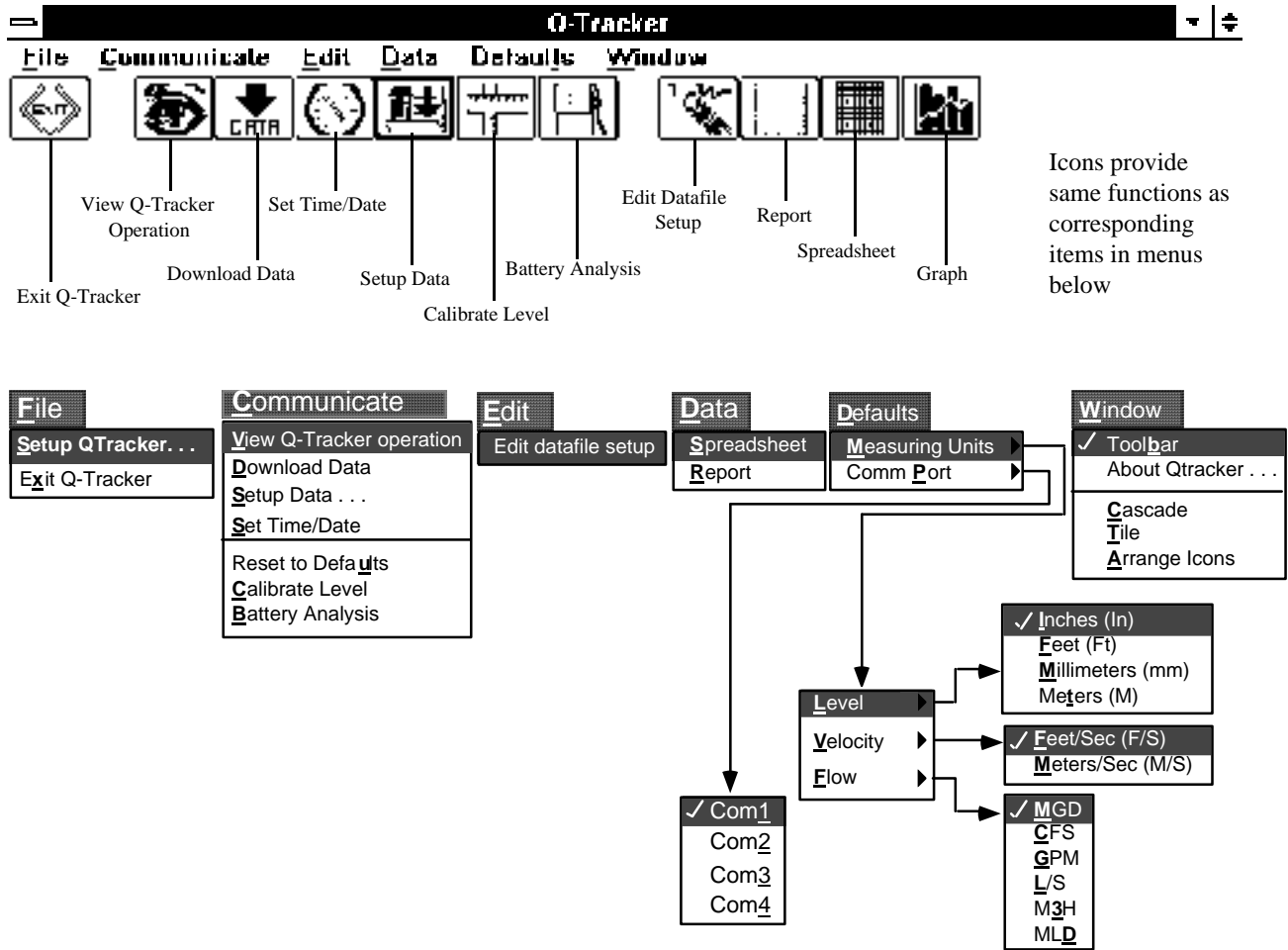
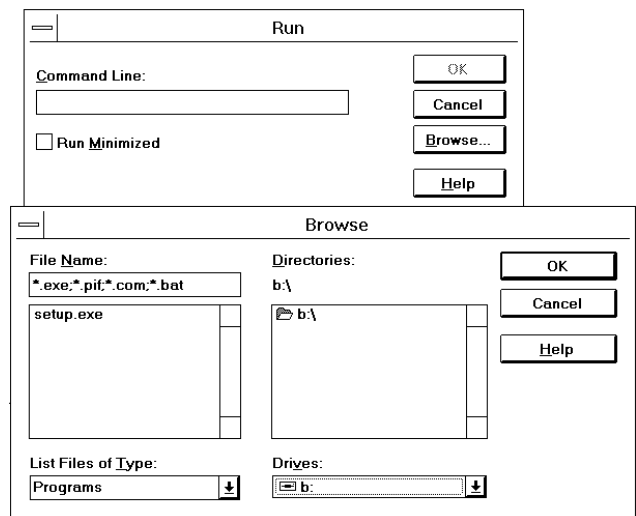


Figure 2-1
Opening Menu Bar and Icon Tool Bar, showing menus pulled down from the menu bar

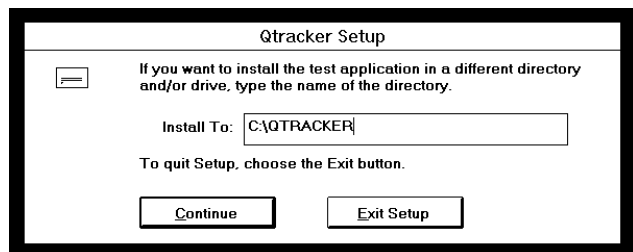
2.1 Installing Q-Tracker in the Computer

Q-Tracker is normally provided to users on three 3-inch, high-density (1.4-megabyte) diskettes labeled Disk 1, Disk 2, and Disk 3. It is assumed that Windows 3.1 is running. Q-Tracker is installed (setup) like other typical Windows applications as follows:

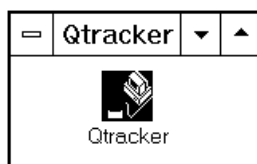
- Insert Disk 1 into the appropriate drive (Drive B, for example purposes).
- In the Program Manager window pull down the File menu, and choose Run.
- In the Run window enter the drive and program name, B:SETUP, in the Command Line box. **Do not select "run Minimized"**. Press the Enter key, or click on the OK button to start the setup program.
- A window will give you the opportunity to specify a directory on the hard disk where you want the main Q-Tracker application program to be stored. This program is called QTRAKWIN.EXE.



Unless you key in another directory here, QTRAKWIN.EXE will be put in a directory called QTRACKER on the fixed disk from which Windows is operated (assumed here to be Drive C). In any case, the QTRACKER directory will be created on that disk. This is where Q-Tracker will automatically store flow data retrieved from Q-Tracker monitors, as well as any setup data files that are created.



E. After setup is complete, you will find the Q-Tracker application icon in a newly created program group called Qtracker, shown below.



2.2 Navigating in Q-Tracker

Like any other Microsoft Windows application, Q-Tracker is started by double-clicking on the application icon. You may exit the program by clicking on the Exit icon in the tool bar or by choosing Exit Q-Tracker in the File menu at the opening menu bar. The basic procedures are as in other Windows applications. Within the program, windows can typically be moved, sized, minimized, maximized, restored, and closed.

The remainder of Section 2 consists of a quick start guide. Here you will find brief explanations of the bare essentials for using Q-Tracker. For more details, refer to appropriate other sections of the manual.

To follow the quick start guide, you will have to understand how to navigate in Q-Tracker, meaning find your way from one menu to another. The row of menu names found at the top of the screen, above the icon tool bar, is called a menu bar (Figure 2-1). A menu is a list of options that appears when you select its name in the menu bar. Selecting a menu is commonly called pulling it down, and menus are sometimes called “pull-downs”. The icon tool bar remains the same, regardless of which menu bar is displayed.

When you are using Q-Tracker, it is always operating in one of four modes. Each mode has its own menu bar, consisting of a different list of menus, as follows:

- A. *The opening mode.* The menu bar for this mode comes up when you start the program, and whenever you close all windows of the following types. Six opening menus are listed in the bar (Figure 2-1). See Section 3 for more details.
- B. *The spreadsheet mode.* The menu bar for this mode comes up whenever a spreadsheet window is active. Obtain a spreadsheet window (one spreadsheet per window) by choosing Spreadsheet in the Data menu at the opening menu bar, or by clicking on the Spreadsheet icon in the tool bar. Five spreadsheet menus are listed in the bar. See Section 4 for more details.
- C. *The graph mode.* The menu bar for this mode comes up whenever a graph window is active. Obtain a graph window (one graph per window) by choosing Graph Selected Data in the Graph menu at the spreadsheet menu bar, or by clicking on the Graph icon in the tool bar. Five graph menus are listed in the bar. See Section 5 for more details.
- D. *The report mode.* The menu bar for this mode comes up whenever a report window is active. Obtain a report window (Figure 2-1) by pulling down the Data menu at the opening menu bar and choosing Report, or by clicking on the Report icon in the tool bar. Four report menus are listed in the bar. See Section 6 for more details.

You can have windows of all three types at the same time. You can have more than one spreadsheet window and graph window, but only one report window. However, as in other Windows applications, only one window will be active at a given time. The active window is one you have selected by clicking anywhere in it. You can also select windows by other means, including the list in the Window menu in each menu bar.

To get back to the opening menu bar, you have to close all spreadsheet, graph, and report windows.

2.3 Transferring Data Files from Field Computers to the Office Computer

The files in question are Setup Data files and Flow Data files. The typical procedure is to use a diskette drive as the default drive in the field computer. Thus as data files are created, they are stored on diskettes. Take the diskettes to the office computer and copy the files onto its hard disk. Put each file in the QTRACKER directory and in the same subdirectory where it was stored in the field computer. The name of this subdirectory will be the study name. A typical directory path in the office computer might be C:\QTRACKER\SOUTH1.

Of course, the field computer can put files on its hard disk instead of diskettes. In that case, use DOS (or

Windows, if you have it) to copy the files to diskettes for transfer to the office computer. If the data will fill up more than one disk, you may wish to use the DOS BACKUP and RESTORE commands instead of the COPY command.

If you are equipped to transfer files directly from the field computer hard disk to the office computer hard disk, you might prefer to do that instead. One possible method is to use appropriate communications software and a cable between serial data ports. Modems may be included if the distance is more than a few feet. Another possible method is to transfer files via a local area network.

2.4 Creating and Manipulating Spreadsheets

- A. *Measurement units* for flow data are selected before obtaining a window in which to view the data. To review and change units for level, velocity, and flow, pull down the Defaults menu in the opening menu bar, and choose Measuring Units.
- B. *Open a window with an empty spreadsheet:* Click on the Spreadsheet icon in the tool bar, or pull down the Data menu at the opening menu bar and choose Spreadsheet. The opening menu bar changes to the spreadsheet menu bar. You can open additional spreadsheets by choosing New in the File menu at the spreadsheet menu bar. The windows are numbered: Spreadsheet 1, Spreadsheet 2, etc.
- C. *Time averaging of flow data* is done when the flow data file is opened. Before opening a file, you may select daily, hourly, or no averaging by choosing Averaging in the Options menu at the spreadsheet menu bar.
- D. *Put flow data into the active spreadsheet* by choosing "Open Datafile" or "Open Datafile (Start/Stop)" in the File menu at the spreadsheet menu bar. The Start/Stop option lets you select a range of data instead of reporting the entire data file. If you want to stop insertion of a long file, choose Close Datafile in the same pull-down. Insertion starts on the line you have selected by clicking on a cell. You can perform multiple insertions into one spreadsheet, provided that all the data inserted are from the same study and location.
- E. *Editing and calculations:* Double-click on any cell (little number box) in the report, then use conventional Windows text editing techniques in that cell. Select cells, groups of cells, and groups of lines by clicking and dragging, then use the Edit menu at the report menu bar to cut, copy, and paste (within certain limits). You can select entire columns by clicking in the header (top label) of the column. You can label

columns, paste data from one spreadsheet into another, and setup automatic calculations among columns within a line. See Section 4 for more details.

- F. *Designing spreadsheet formats:* In the Options menu, you can select type fonts, column widths, and colors for the active spreadsheet at any time. These format choices remain applicable to future spreadsheets having the same window number (Spreadsheet 1, Spreadsheet 2, etc.).
- G. *Storing and retrieving a spreadsheet:* Use the Save, Save As, and Load commands in the File menu at the spreadsheet menu bar.
- H. *Printing a spreadsheet:* Use the Print command in the File menu at the spreadsheet menu bar.

2.5 Generating Graphs

2.5.1 Basic Concepts

A Q-Tracker graph is a visual representation of data in one or more columns of a Q-Tracker spreadsheet. Each column of numbers that you select in the spreadsheet (or a selected group of lines within a column) becomes a plot in the graph. Thus, to create a graph, you must first work up a spreadsheet (Section 2.4). The horizontal X axis represents the dates and times at which flow measurements were taken, shown in the far left column of the spreadsheet. The vertical Y axis represents numerical values in other spreadsheet columns, such as inches of water level or cubic feet per second. A graph consists of one or more plots from the same spreadsheet, all on the same axis and all of the same selected type. Each plot in a graph is identified by color and (for black-and-white reproduction) by pattern. Each graph has its own numbered window. You can create more than one graph from a spreadsheet. Graph 1 does not necessarily correspond to Spreadsheet 1, etc.

2.5.2 Basic Procedures

- A. *Select data to be plotted:* Click on a column header in the spreadsheet to select all values in that column. (Selected values are highlighted by black background.) Click and drag within a column to select a group of values. Click and drag across columns or column headers to select a group of columns.
- B. *Open a graph window* by clicking on the Graph icon in the tool bar or on the Graph menu at the spreadsheet menu bar.
- C. *Select graph details* by experimenting with the pull-down menus in the graph menu bar. Look at the control Panel selected in the View menu. Try the various options available through the Type menu and the Options menu. These format choices remain applicable to future graphs having the same window number (Graph 1, Graph 2, etc.).

- D. *Storing and retrieving a graph:* Use the Save and Load commands in the File menu at the graph menu bar.
- E. *Printing a graph:* Use the Print command in the File menu at the graph menu bar.
- F. *Generating more than one graph:* Open another graph window with the New Graph command in the File menu at the Graph menu bar. When you generate a graph, it goes into the most recently selected graph window.

2.6 Creating Preformatted Flow Reports

- A. *Measurement units* for flow data are selected before obtaining a window in which to view the data. To review and change units for level, velocity, and flow, pull down the Defaults menu in the opening menu bar, and choose Measuring Units.
- B. *Open the Report Manager window:* Click on the Report icon in the tool bar, or choose Report in the Data menu at the main menu bar.
- C. *Time averaging of flow data* is selected in the Report Manager window under the Report Type area. The choices are: no average, 15 minute average, hourly average and daily average. The Custom reports choice under the Report Type give access to custom reports from the Report Library. This is explained in more detail in Section 6.
- D. *Generate a report* by clicking on the Data File name button and then selecting the data file from the file selection window. The Report window will appear and the report will be displayed as it is being generated.
- E. *Printing a report* is accomplished by clicking on the Print icon at the bottom of the Report window. A print window will appear allowing the user to select the pages to be printed.
- F. *A report can be saved for exporting in another format.* Click on the Suitcase icon and the export window will appear. Select the format desired from the list. See Section 6 for a detailed explanation.

2.7 Interacting With a Q-Tracker Unit

2.7.1 Connection and Preparation

- A. Connect an appropriate cable between a serial data port on the office computer and the Q-Tracker's interrogator communication cable.
- B. Pull down the Defaults menu at the opening menu bar and choose Comm Port, then choose the port where the cable is connected.
- C. You may also wish to look at the measuring units presently in effect and select others instead by choosing Measurements in the Defaults menu at the opening menu bar. However, you

can change these units later, as necessary, whenever you like.

2.7.2 Viewing Q-Tracker Unit Operation

Click on the human eye icon in the tool bar, or use the Communicate menu at the opening menu bar and choose View Q-Tracker Operation. The Q-Tracker wakes up and starts feeding real-time measurement data to a window on your screen. Readings are updated at intervals of about one second.

2.7.3 Viewing Setup Data in the Q-Tracker Unit

Click on the Setup Data icon in the tool bar, or use the Communicate menu at the opening menu bar and choose Setup Data. A Setup Data window appears. In the Setup Data Window, click on the Get button. Q-Tracker communicates with the Q-Tracker unit and shows you the present setup data.

2.7.4 Changing Setup Data in the Q-Tracker Unit

You can do this in any of three different ways. You will be reminded that changing setup data in the unit also erases stored flow data, so you can stop to avoid erasing the stored data.

- A. Get the existing setup data from the Q-Tracker unit as explained in Section 2.7.3, make changes in the various boxes in the Setup Data window, and click on the Send button in that window. Then to save a copy of the changed setup data file in the computer, click on the Save button in the Setup Data window.
- B. You can modify an existing setup data file stored in the computer and send it to the Q-Tracker unit. In the File menu at the opening menu bar, choose Setup Qtracker, then select a stored file using the Fileopen window. A Setup Data window appears identical to the Setup Data window in Section 2.7.3. Click on the Open button. The Fileopen window appears. Select the setup file to be modified. After changing any of this data, click the Send button to put it into effect I the Q-Tracker unit. Click the Save button to save the revised setup data as a file in the computer. If you have changed the study name or site ID, the revised data goes into a new setup data file under that designation, instead of replacing the old file. (If the study name is a new one, a new subdirectory is created for it.)
- C. You can create a new setup data file from scratch. In the File menu at the opening menu bar, choose Setup Qtracker or click on the Setup Data icon. A Setup Data window as in Step B above appears, but with all the boxes blank. Fill then in, then continue as explained for changing an existing file in Step B.

2.7.5 Retrieving (Downloading) Measurement Data

Retrieval of data from a Q-Tracker unit is called download. You may download all of the data stored in memory, or only the data stored since the last time data was downloaded. Click on the Download Data icon in the tool bar, or pull down the Communicate menu at the opening menu bar and choose Download Data. When using the Download Data icon, a box will appear giving you a choice of a Full Download or Since Last Time. A Download window appears, giving you the opportunity to select the disk where the retrieved data will be stored. There are also two buttons for downloading the data, the 'Full Download' button or the 'Since last Time' button. All flow data in the Q-Tracker unit is copied to a file on the selected disk. It goes in a directory called QTRACKER and a subdirectory of the same name as the study (according to setup data in the Q-Tracker unit). The file is given a Filename consisting of the date and hour, with an extension consisting of the "at" sign @ and the site number. The flow data file also contains the setup data that was in effect

when the measurements were taken. (You can change some of the setup data in a data file later, using the Edit menu.) You will be given an opportunity to erase all flow data in the Q-Tracker unit after the downloading has been completed.

2.7.6 Calibrating the Level Sensor

The ultrasonic velocity sensor never requires calibration, but the hydrostatic level sensor does. For information about sensor calibration and other aspects of the Q-Tracker flow monitor, see the Installation and Operation Manual.

It is assumed that you have connected an appropriate cable between a serial data port on the computer and the Q-Tracker's interrogator communication cable. To use the Q-Tracker program for calibrating the level sensor, click on the Calibrate icon in the tool bar, or choose Calibrate Level in the Communicate menu at the opening menu bar. This brings up the Sensor Calibration window. Instructions in the window will steer you through setting the sensor zero and span.

3.0 The Opening Menus and Q-Tracker Interaction

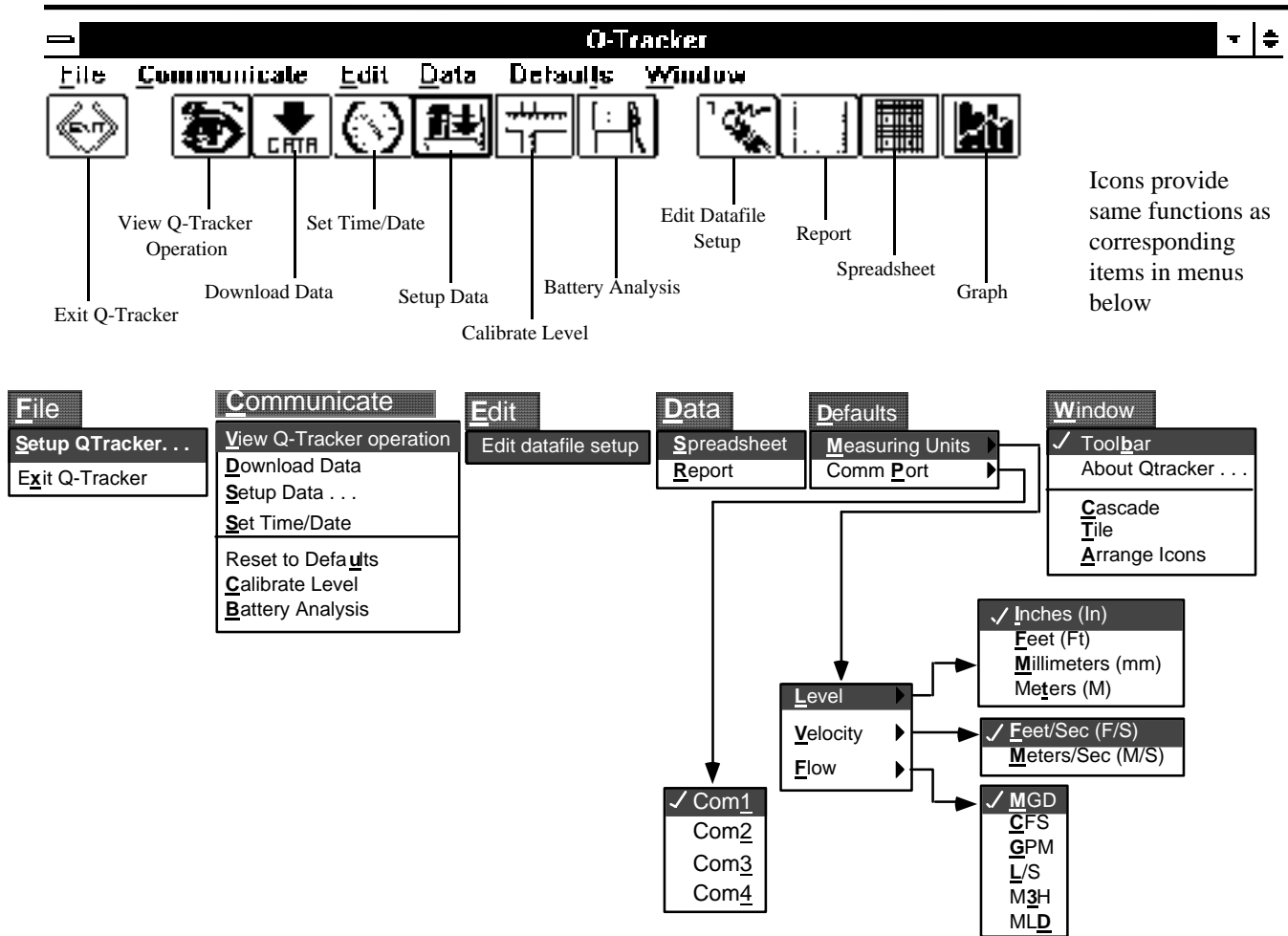


FIGURE 3-1
Open menu bar and icon tool bar, showing menus pulled down from the menu bar

TABLE 3-1. Functions of Items in the Opening Menus

Menu	Item	Section	Function
File	View Q-Tracker Operation	3.3.1....	Create a new setup data file to program a Q-Tracker for a specific site
	Exit Q-Tracker.....	3.3.2....	Exit the Q-Tracker program
Communicate	View Q-Tracker Operation	3.4.1....	Monitor operation of a Q-Tracker instrument connected to the computer
	Download Data.....	3.4.2....	Retrieve all stored flow data from the Q-Tracker
	Setup Data.....	3.4.3....	Load or retrieve a setup data file into/from the Q-Tracker
	Set Time/Date	3.4.4....	Set the calendar and clock in the Q-Tracker
	Reset to Defaults.....	3.4.5....	Reset the Q-Tracker to factory default setup data
	Calibrate Level	3.4.6....	Calibrate the zero and span of the level sensor
Edit	Battery Analysis.....	3.4.7....	Display Q-Tracker battery voltage and approximate remaining battery life
	Edit Datafile Setup.....	3.5.....	Change parameters in a flow data file for calculations from measurements
Data	Spreadsheet.....	3.6.1....	Activate a spreadsheet window to insert a flow data file
	Report	3.6.2....	Activate the report window to create a preformatted report from flow data
	Graph Icon	3.6.3....	Activate a graph from data selected on a spreadsheet
Defaults	Measuring Units	3.7.1....	Change level, velocity, and flow units in reports, spreadsheets, & graphs
	Comm Port.....	3.7.2....	Select serial port on computer for connecting with a Q-Tracker monitor
Window	Toolbar	3.8.....	Activate or deactivate the icon tool bar
	About Qtracker	3.8.....	Provides information about program
	Cascade.....	3.8.....	Arrange open windows in cascade format as other Windows applications
	Tile.....	3.8.....	Arrange open windows in tile format as in other Windows applications
	Arrange Icons	3.8.....	Automatically arrange visible Windows icons

3.1 Introduction

This Section 3 of the manual provides detailed explanations of Q-Tracker operations in the opening mode (Section 2.2). These are functions available through the opening menu bar and icon tool bar. Most of the opening menu functions pertain to on-line interaction with a Q-Tracker flow monitor. This includes getting flow data and setup data from the instrument as well as sending setup and calibration data to it.

Refer to Section 2.2 for an introduction to the menu structure by which Q-Tracker is used.

Refer to Section 2.3 for an introduction to transfer of setup data files and flow data files from field computers to the office computer.

Refer to Section 2.7 for an introduction to the use of Q-Tracker in field computers for communicating with Q-Tracker monitors.

Refer to Figure 3-1 for the names of the icons and a list of all pull-down menus available from the opening menu bar.

Refer to Table 3-1 for a summary of the functions of the icons and menu items.

3.2 Using the Tool Bar Instead of Menus

As you will see in Figure 3-1, the icons in the tool bar duplicate some, but not all, of the functions in the opening menus. In addition, there is one icon, called Graph, that duplicates a function called Graph Selected Data in the Spreadsheet menus (Figure 5-1). Clicking on an icon has the same effect as choosing the item of that name in a menu.

If you want to provide more work space in the display, you can hide the tool bar and get along without it. To toggle it on or off, choose Toolbar in the Window menu.

The tool bar has two useful purposes. First, clicking on an icon can be faster and more convenient than pulling down a menu and choosing an item. Second, you can perform functions from the opening menus while working on a spreadsheet or graph, without having to get back to the opening menu bar. For instance, suppose you are busy in a spreadsheet and graph when someone brings in a Q-Tracker unit for checking the battery and resetting the clock. You don't have to save your work, close those windows, get to the opening menu bar, use the Communicate menu, then load your spreadsheet and graph again. Instead, just hook up the Q-Tracker to the computer and use the Battery Analysis and Set Time/Date icons.

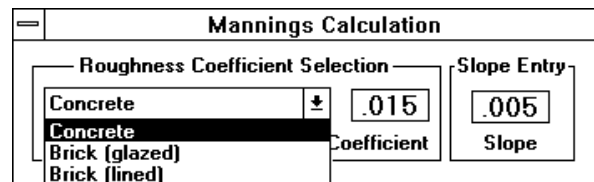
3.3 The File Menu and the Setup File Window

3.3.1 "Setup Qtracker"

This command is used to create a new Setup Data file for programming the Q-Tracker. It calls up the Setup

Data window with default entries shown in Figure 3-2, Page 13. The Setup Data icon (see Figure 3-1) can also be used to bring up the Setup Data window, except the New button must be clicked on to enter a new Setup Data file. The application types available for selection are listed in the illustration. Selecting an application type here determines the kind of flow calculations Q-Tracker will make for this site (or whether it will report only level or velocity readings). Velocity default, level offset, velocity Kfactor, silt depth, recording interval, and rainfall counter are explained in the Q-Tracker Installation and Operation Manual.

When Circular Mannings or Rectangular Mannings has been chosen as the application type, the Mannings Calculation window (shown below) appears for your entry of the necessary parameters. Selecting one of the common conduit materials automatically inserts a typical coefficient for that material or you may enter the value. A slope value must also be entered.



When you have finished entering the desired information in the Setup Data window (and Mannings Calculation window, if applicable), you may transfer (upload) this data directly to a Q-Tracker connected to the computer. Do this by clicking on the "Send" button in the Setup File window. The procedure from at point is as described in Section 3.4.3, except that you don't get a file-selection dialog box.

To save the setup data you have finished entering in the Setup Data window (and associated Mannings Calculation window), click on the "Save" button in that window. Q-Tracker stores the file in the QTRACKER directory on the disk where the Q-Tracker program QTRACKER.EXE is stored. (See Section 2.1-D.) The file goes into a subdirectory having the same name as the study name in the window. If there is no directory by that name, Q-Tracker creates one. The filename also is the study name, with an extension consisting of an ampersand (&) followed by the site identification (ID) in the window. **CAUTION: If there is already a setup file by that name on the disk, it gets overwritten by the new one.**

3.3.2 "Exit Q-Tracker"

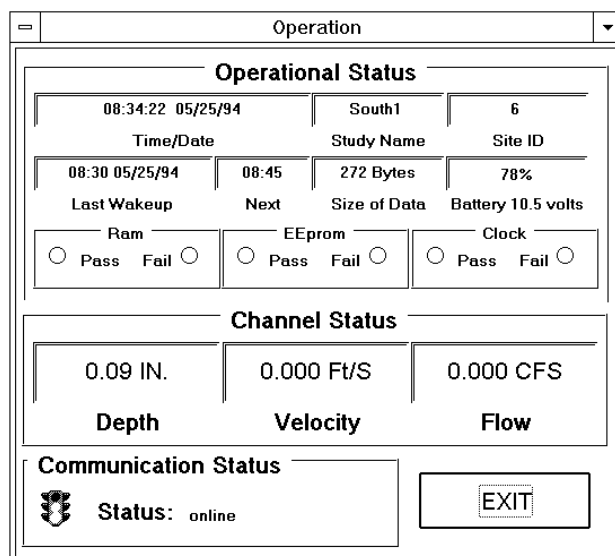
This command has the same effect as the Exit icon in the tool bar (Figure 3-1). You can also exit the Q-Tracker program by common Windows application methods: double -

click on the Control Menu box, or choose Close in the control menu after clicking on the Control-Menu box, or press the Alternate and F4 keys.

3.4 The Communicate Menu

3.4.1 “View Q-Tracker Operation”

This command has the same effect as the icon with the same name in the tool bar (Figure 3-1). Q-Tracker immediately wakes up the Q-Tracker monitor connected to the computer. (Connection is described in Section 2.7.1.) Real-time measurements appear in an Operation window as follows, updated at intervals of about one second:



The Communication Status panel in the window, reports stages in the process of establishing communication with the Q-Tracker unit. This should be completed within a few seconds. If Q-Tracker does not get a normal and reliable response from the monitor, you will be notified in the Communication Status panel.

Measurement units in the display are the ones currently in effect for all Q-Tracker operations. You may change these units at any time by selecting Measurements in the Defaults menu.

The Q-Tracker unit remains awake until you break the communication by closing the window. (Use that window’s Control-Menu box or the Exit button.) Then it returns to its normal cycle of battery-conserving sleep interrupted by brief awake periods.

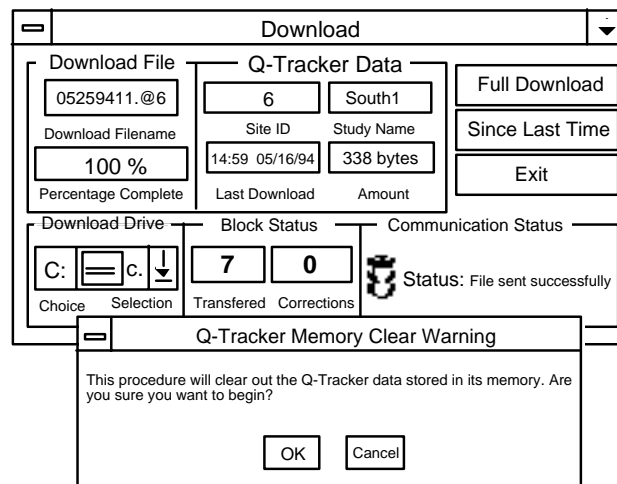
3.4.2 “Download Data”

This command has the same effect as the icon by that name in the tool bar (Figure 3-1). The purpose is to

retrieve all the flow measurement data stored in a Q-Tracker monitor connected to the computer and store it as a file in the computer. This file also contains the setup data that was in effect when the measurements were taken. You can change some of the setup data in a flow data file later, using the Edit menu (Section 3.5).

When the Download window appears, you may select the disk drive where the new data file will be stored. On that disk, the file is placed in a directory called QTRACKER. It goes in a subdirectory having the same name as the study according to the setup data in the Q-Tracker unit. The file is given a filename consisting of the date and hour, with an extension consisting of the “at” sign @ followed by the site ID number.

Click on the ‘Full Download’ or ‘Since last Time’ button to begin the downloading of the data. Selecting the Full Download button downloads all the data stored in RAM. Selecting the Since last Time button downloads all the data stored since the last download. Events in e downloading process are reported in the window. Upon successful completion, a “Memory Clear Warning” dialog box appears as shown below:



Clicking on the OK button clears accumulated flow data from the Q-Tracker monitor’s memory. Clicking on the Cancel button leaves the stored data in the monitor for the time being. The monitor remains awake until you make this choice.

3.4.3 “Setup Data”

This command is to transfer an existing setup file from storage on disk to a Q-Tracker unit connected to the computer, or get the Setup Data from a Q-Tracker. Clicking on the Setup Data icon will accomplish the same.

APPLICATION TYPES

Level measurement only

Level and velocity measurement only

Flow calculations:

- Velocity times area, circular pipe
- Velocity times area, rectangular pipe
- Mannings method, circular pipe
- Mannings method, rectangular pipe
- Parshall flume 3 to 96 inches
- Trapezoidal flume, 12 to 120 inches
- Manhole flume, 6 to 12 inches
- Leopold Lagco flume, 8 to 48 inches
- V-notch weir, 30 to 90 degrees
- Contracted weir, 18 to 96 inches

The image shows two windows from a software application. The top window is titled "Setup Data" and contains various input fields and buttons. The fields include "Site Description", "Study Name" (set to "default"), "Pipe Diameter" (0.00), "Velocity Default" (0.20), "Depth Offset" (0.25), "Silt Depth" (0.00), "Velocity Kfactor" (1.000), and "Site ID" (00). There are also sections for "Recording Interval" (Main: 5, Alternate: 1, %: 50) and "Rainfall" (1 count = XXXXX INCHES of, 0.00). The "Application Type" is set to "Q-V x A (Circular)" and "Communication Status" is "offline". Buttons on the right include "New", "Open", "Save", "Get", "Send", and "Exit".

The bottom window is titled "Mannings Calculation" and has two sections: "Roughness Coefficient Selection" with a dropdown menu and a "Coefficient" input field, and "Slope Entry" with a "Slope" input field. The dropdown menu is currently set to "Various Materials".

FIGURE 3-2. Setup Data Window

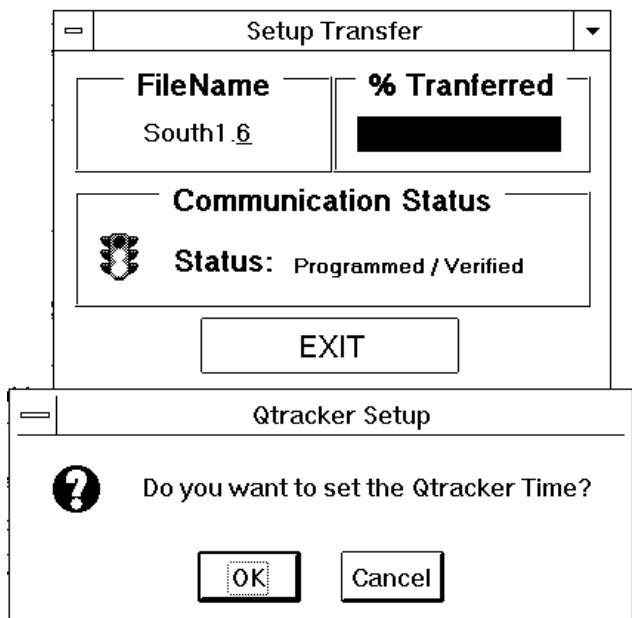
Activating this command causes the Setup Data window to open as shown in Figure 3-2. To open an existing Setup Data file click on the Open button. The Fileopen window will appear as shown below. Choose the file you wish to transfer, using common Windows application methods. The Setup Data window will return with the data from the selected file.

The image shows a dialog box titled "Setup data Transfer Warning". It contains a question mark icon and the following text: "Sending the setup data to the Q-Tracker will clear the logged data. If this data is important first download the data from the Q-Tracker and then transfer the setup data. If you want to continue to transfer the setup data select OK else select Cancel." At the bottom are "OK" and "Cancel" buttons.

The image shows a "Fileopen" dialog box. The "File Name:" field contains "*.&*" and the "Directories:" field shows "c:\qtracker\south1". The file list contains "south1.&6" and "south1.&7". The "List Files of Type:" is set to "Setup files (*.&*)" and the "Drives:" field shows "c:". There are "OK" and "Cancel" buttons and a "Read Only" checkbox.

Next, the Setup Transfer window appears, showing you the progress of the transfer and ending as shown below with an opportunity to reset the Q-Tracker clock.

To send the Setup Data file to the Q-Tracker, click on the Send button. You will be warned that the transfer will erase all measurement data stored in the Q-Tracker.

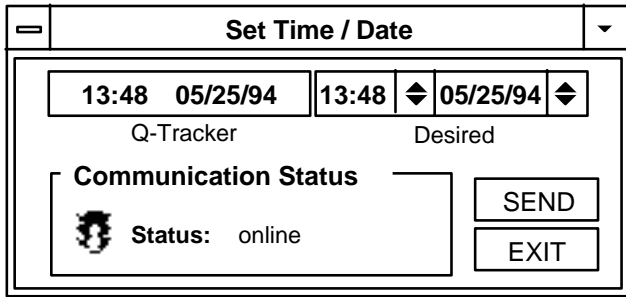


If you click on the OK button at this point, you next get a Set Time/Date window; see the following Section 3.4.4 for instructions.

To retrieve the Setup Data file from the Q-Tracker, click on the Get button. In the Communications Status box there will be an indication that communication is being made with the Q-Tracker. The Setup Data from the Q-Tracker will be inserted into the data boxes.

3.4.4 “Set Time/Date”

This command has the same effect as the icon having the same name in the tool bar (Figure 3-1). The Set Time/Date window appears as shown below.

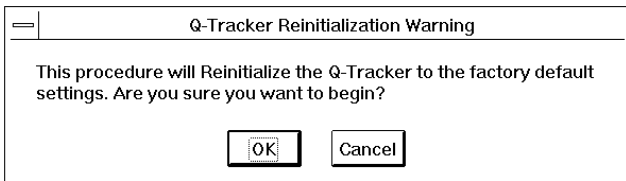


The Desired time and date box shows values from the computer’s clock and calendar circuit as of the moment this window appears. You may change these numbers to whatever you desire. So long as this window remains open, the Q-Tracker time and date box is updated at frequent intervals. Click on the Send button to put the new desired time and date into effect in the Q-Tracker.

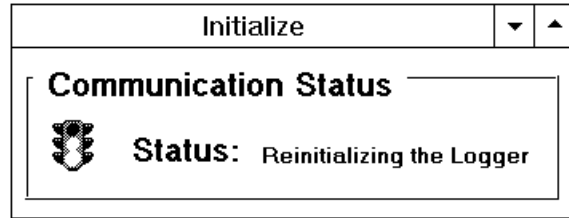
3.4.5 “Reset to Defaults”

There is no icon in the tool bar corresponding to this command. The purpose is to reset or reinitialize the microprocessor electronics in the Q-Tracker unit connected to the computer. All flow data and setup data in the Q-Tracker unit are erased. (However, the clock and calendar circuitry is separate and is not reset.) The unit starts operating again with setup data consisting of standard default values permanently programmed into a ROM (read-only memory) at the factory. This can sometimes cure malfunctions in execution of the microprocessor’s internal program. Also, restoring the Q-Tracker to a standard condition can sometimes be helpful in troubleshooting.

Before carrying out the reset command, Q-Tracker gives you the warning below. You may wish to retrieve and save the Q-Tracker unit’s flow data and setup data before continuing (Sections 3.4.2 and 3.4.3).



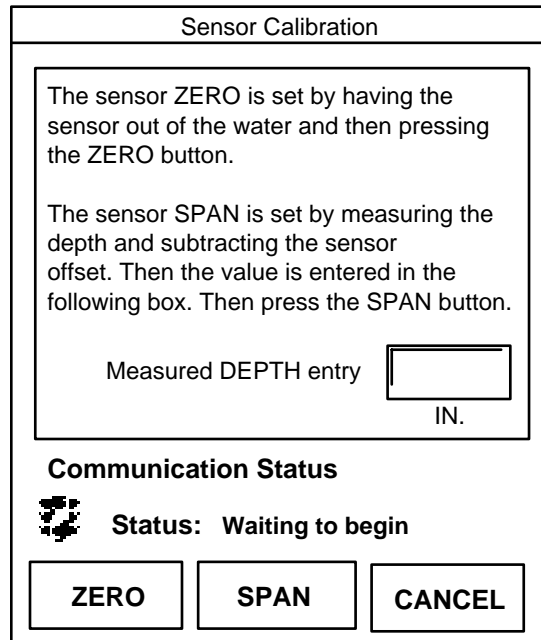
If you click on the OK button, the reset is done immediately, indicated by the following window which appears on your screen for a brief period:



3.4.6 “Calibrate Level”

This command has the same effect as the icon by the same name in the tool bar (Figure 3-1). The purpose is to calibrate the zero and span of the level sensor for a Q-Tracker monitor connected to the computer. (The ultrasonic velocity sensor never requires calibration.) The level sensor actually detects water pressure. The depth down to the pressure port on the probe unit is then calculated from the measured pressure. It is best to do both zero and span calibrations rather than one or the other. This requires removing the probe from service and providing water in a suitable container such as a barrel or large bucket. This command calls up the Sensor Calibration window.

Do the zero calibration first. Place the probe unit in a normal horizontal position, out of water, stationary and free of vibration. Click on the Zero button. The Q-Tracker wakes up and the progress of the procedure is displayed in the Communication Status panel. This will take about 30 seconds.



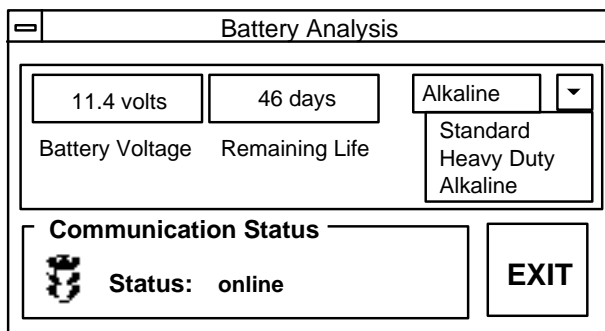
For the span calibration, place the probe unit in a normal horizontal position, stationary and free of vibration, submerged in still water at a suitable depth. For typical installations, the recommended depth is approximately half the diameter of the pipe or channel. However, it must

not be less than 10 inches. Measure the depth from the water surface down to the pressure slot on the probe. The slot is 0.25 inch above the bottom of the sensor. This quarter inch is the level offset that is supposed to be included in the setup data in the Q-Tracker. For example, if the water is 12 inches deep and the probe is lying flat on the horizontal bottom, the depth to the pressure slot is 11.75 inches. Key this value into the box in the Sensor Calibration window, using measuring units shown under the box (inches, feet, millimeters, or meters). You can change the units at any time with the Defaults menu (Section 3.7). Click on the Span button to start the calibration. Once again, the Q-Tracker wakes up and the progress of the procedure is displayed in the Communication Status panel. This will take about 30 seconds.

After successful calibration of zero and span, leave the probe in the water and verify proper operation of the sensor as follows: Click on the “View Q-Tracker Operation” icon (Section 3.4.1) and observe the level reading. It should be 0.25 inch greater than the calibration span you keyed in. If not, make sure the setup data in the Q-Tracker includes a proper level offset of 0.25 inch. Move the probe to a different measured depth if you like. Take the probe out of the water and hold it level in the air. Each time, after a few seconds for sensor stabilization and data transmission, the display should read within 0.2 inch of the actual depth to the bottom of the probe.

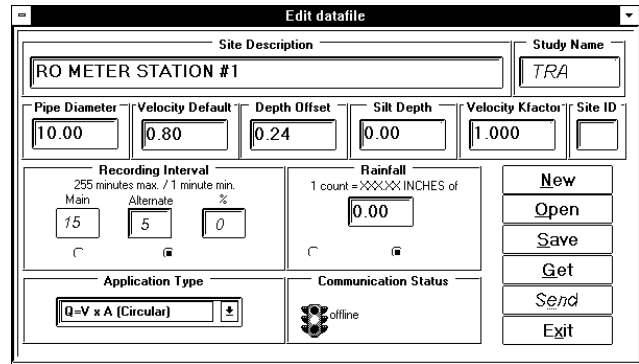
3.4.7 “Battery Analysis”

This command has the same effect as the icon by the same name in the tool bar (Figure 3-1). Q-Tracker wakes up the Q-Tracker unit connected to the computer and keeps it awake while displaying the battery voltage and remaining life in the Battery Analysis window below. The remaining life is an approximate projection based on measured voltage and the type batteries being used, assuming typical temperatures and typical Q-Tracker duty cycles. If you know the type of the batteries in the Q-Tracker unit, select that type in the window. This battery type selection is not part of the setup data file, so it is not automatically changed. For a proper projection of remaining life, you must verify the battery type for each Q-Tracker unit you connect with.



3.5 The Edit Menu

As you will see in Figure 3-1, this menu consists of only one item called Edit Datafile Setup. This command has the same effect as the icon by the same name in the tool bar. The purpose is to change certain setup data items in a flow data file stored in the computer. After using a File Selection dialog box (Section 3.4.3) to choose the data file, an Edit Data window appears (including a Mannings Calculation window if applicable) as follows:



Items that you are not allowed to change are shown in a lighter shade: study name, site ID, the three recording interval values, and enabling or disabling of the alternate interval and rainfall counter. All other items can be changed after the fact without affecting the accuracy of the measurements and the name of the data file. The changeable items are site description, pipe diameter, velocity default, level offset, silt depth, application type, velocity K factor and if the Mannings method is selected, the roughness coefficient and conduit slope.

After making the desired corrections, save the revised data file by clicking on the Save button. The Send button in this window is disabled. The edited file overwrites the original one.

Here is why you are allowed to make these changes after the flow measurements are recorded. When a flow data file is created upon downloading from a Q-Tracker unit, it contains all the setup data that was in effect during measurement. However, the measurements in the data file are simply raw numbers proportional to measured velocity and hydrostatic pressure. Whenever you open a data file into a report or spreadsheet, the desired values are calculated from the raw measurements. These calculations take into account the measurement units presently in effect in Q-Tracker. They also use certain setup parameters in the flow data file. These consist of all the setup parameters above which are allowed to be changed after the fact (except the site description, which is merely a convenience.

For instance, after downloading a flow data file, suppose you realize that an error has been made in setup

data in the Q-Tracker unit. The pipe diameter is actually 18 inches instead of 12 inches, and the silt depth is three inches instead of zero. You can correct the mistake with the Edit Datafile Setup command described here. The next time you open the data file in a report or spreadsheet, it will be correct.

3.6 The Data Menu and the Graph Icon

3.6.1 “Spreadsheet”

This command puts Q-Tracker out of the opening mode and into the spreadsheet mode. A blank spreadsheet window appears, and the menu bar changes from the opening menus (Figure 3-1) to the spreadsheet menus (Figure 4-1). For further operations from that point, see Section 4.

The Spreadsheet icon in the tool bar (Figure 3-1) has the same effect as the Spreadsheet command, but only when Q-Tracker is in the opening mode. In spreadsheet mode, the Spreadsheet icon has no effect. And in graph mode, the Spreadsheet icon switches to the spreadsheet mode, reactivating the most recently activated spreadsheet window on the screen. If there is no spreadsheet window already on the screen, a blank one appears.

3.6.2 “Report”

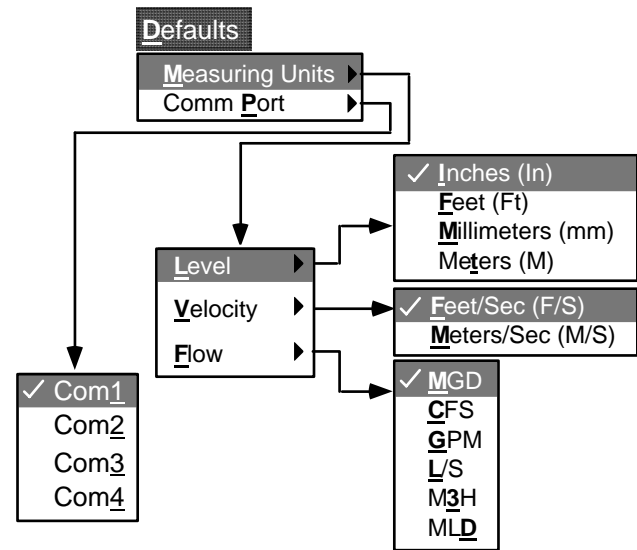
This command puts Q-Tracker out of the opening mode and into the report mode. The Report Manager window appears. The Report icon in the tool bar (Figure 3-1) has the same effect as the report command. For further operations from that point, see Section 6.

The Report icon in the tool bar (Figure 3-1) has the same effect as the Report command, but only when Q-Tracker is in the opening mode. In Report mode, the Report icon has no effect, and in Spreadsheet or Graph mode, the Report icon switches to the Report mode. If there is a Report window which has not been closed, it is reactivated. If there is no Report window already on the screen, a blank one appears.

3.6.3 The Graph Icon

The Graph icon in the tool bar (Figure 3-1) has the same effect as the Graph command in the Spreadsheet menu bar (Figure 4-1, Section 4-6). Clicking this icon puts Q-Tracker into Graph mode, described in Section 5.

3.7 The Defaults Menu



3.7.1 “Measuring Units”

This command calls up the branching menu tree shown in Figure 3-1 and above.

Check marks in the level, velocity, and flow menus show which units are presently in effect for all Q-Tracker operations. You may change the units at any time by clicking on the ones you desire. Any spreadsheets, graphs, and reports created *after* that point use the newly chosen units. But any spreadsheets, graphs, and reports that have been saved as files in the computer are not changed. They keep the units which were in effect when they were created.

3.7.2 “Comm Port”

This command calls up the communications port selection menu shown in Figure 3-1 and above. You may connect Q-Tracker units to any or all of the listed serial communication ports which are available on your computer. A check mark indicates which port is presently selected. This is the port Q-Tracker will use the next time you try to communicate with a Q-Tracker unit. When you connect a Q-Tracker unit to your computer, you must find out which port you are using, and select that one in the communications port menu.

3.8 The Window Menu

This menu is a standard one for Microsoft Windows applications. The commands in the menu should be familiar ones for Windows users. They are briefly explained in Table 3-1.

4.0 Spreadsheets

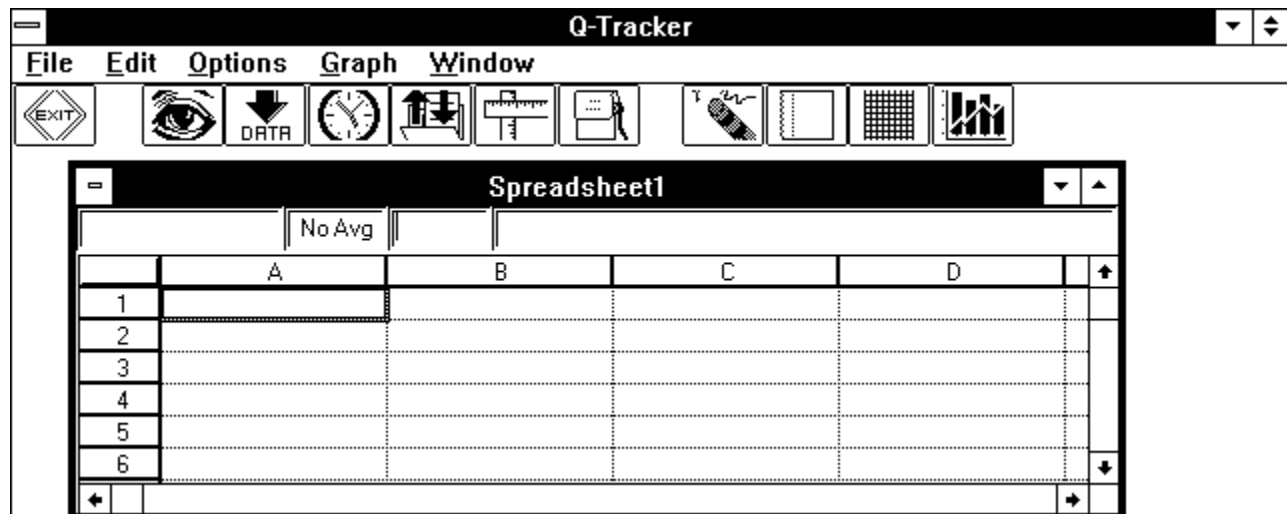


FIGURE 4-1
The spreadsheet menu bar appears when a spreadsheet window is active.

TABLE 4-1. Functions of Items in the Spreadsheet Menus

Menu	Item	Section	Function
File	Open Datafile	4.3.1 ...	Insert a flow data file into a spreadsheet form
	Open Datafile (Start/Stop)....	4.3.2 ...	Same as Open Datafile, but allowing selection of time period from the file
	Close Datafile.....	4.3.3 ...	Stop inserting a flow data file into a spreadsheet form before completion
	New	4.3.4 ...	Open another spreadsheet window
	Load	4.3.5 ...	Display a previously created and saved spreadsheet in the active window
	Save	4.3.6 ...	Save the active spreadsheet, using same filename as last one saved
	Save As	4.3.7 ...	Save active spreadsheet (regular, comma or tab-delimited), specify filename
	Print	4.3.8 ...	Print the active spreadsheet
	Exit Spreadsheet.....	4.3.9 ...	Return to opening mode
Edit	Cut.....	4.4.1 ...	Remove selected part of active spreadsheet and copy to spreadsheet clipboard
	Copy	4.4.2 ...	Copy selected text from active spreadsheet to spreadsheet clipboard
	Paste	4.4.3 ...	Paste text from spreadsheet clipboard into selected part of active spreadsheet
	Clear Data.....	4.4.4 ...	Erase all measurement data from active spreadsheet, leaving headers, etc.
	Clear All	4.4.5 ...	Erase nearly everything from the active spreadsheet
	Change Cell Values.....	4.4.6 ...	Change numerical value of cells
	Change Column Headers.....	4.4.6 ...	Change column headers
Options	Automatic Calculations	4.4.7 ...	Inserting equations in spreadsheet columns
	Averaging	4.5.1 ...	Choose time averaging interval before opening data file to spreadsheet
	Fonts	4.5.2 ...	Choose font (type style and size) for the active spreadsheet
	Column Width.....	4.5.3 ...	Set width of selected column in the active spreadsheet
Graph	Colors	4.5.4 ...	Choose background and foreground (text) colors for active spreadsheet
	Graph Selected Data.....	4.6	Go to graph mode and graph selected data in active spreadsheet
Window	Toolbar	4.7	Activate or deactivate the icon tool bar
	Clipboard.....	4.7	Activate the Microsoft Windows clipboard viewer
	Cascade	4.7	Arrange open windows in cascade format as other Windows applications
	Tile	4.7	Arrange open windows in tile format as in other Windows applications
	Arrange Icons	4.7	Automatically arrange visible Windows icons
	List of Existing Windows.....	4.7	Activate desired window as though you had clicked on it

	Date/Time	IN.	Ft/S	CFS	Total Rainfall	F	G
1	10/21/93 14:00	3.13	1.4198	0.207	1.11		
2	10/21/93 15:00	3.28	1.4081	0.219			
3	10/21/93 16:00	3.34	1.4292	0.228			
4	10/21/93 17:00	3.38	1.3888	0.225			
5	10/21/93 18:00	3.42	1.3648	0.225			
6	10/21/93 19:00	3.14	1.2958	0.190			
7	10/21/93 20:00	3.48	1.3913	0.235			
8	10/21/93 21:00	3.52	1.4611	0.251			
9	10/21/93 22:00	3.33	1.3056	0.207			
10	10/21/93 23:00	3.60	1.3355	0.236			
11	10/22/93 00:00	3.12	1.2107	0.176			
12	10/22/93 01:00	2.68	1.0255	0.121			
13	10/22/93 02:00	2.43	0.8849	0.091			
14	10/22/93 03:00	2.25	0.8469	0.078			

FIGURE 4-2.
The beginning of a typical spreadsheet with hourly averaging

4.1 Introduction

This Section 4 of the manual provides detailed explanations of Q-Tracker Window operations in the spreadsheet mode (Section 2.2). These are functions available through the Spreadsheet menu bar. The other three sets of menus (Opening, Graph, and Report menu bars) are explained in Sections 3, 5, and 6 of the manual. Most of the Spreadsheet menu functions pertain to creating, modifying, saving, retrieving, and printing spreadsheets containing flow data from Q-Tracker monitors.

To get into the spreadsheet mode, see Section 3.6.1.

Refer to Section 2.2 for an introduction the menu structure by which Q-Tracker is used.

Refer to Section 2.5 for an introduction to Q-Tracker spreadsheets.

Refer to Section 6.1 for a discussion of the difference between spreadsheets and preformatted reports.

4.2 Spreadsheet File Formats: Regular Versus Comma and Tab Delimited

Q-Tracker saves (stores) spreadsheets on disks in any of three file formats. Each uses a different filename extension as follows:

.SPR extension: A special format used only by Q-Tracker. This is the normal file format for saving spreadsheets for use by Q-Tracker. The file includes not only column headings and data, but also

setup data from the source flow data file, type style and size, colors, column widths, and formulas for computing certain columns from others.

.CSV extension: Comma-separated variable, also called comma-delimited fields. Standard ASCII characters with commas between data files on each line, for importing data into certain spreadsheet and database programs. Only column headings and data are included—no setup data, etc.

.TSV extension: Tab-separated variables, also called tab-delimited fields. Standard ASCII characters like .CSV above, but with tab characters between data fields on each line rather than commas. Only column headings and data are included—no setup data, etc. Some spreadsheet and database programs import this format instead of .CSV format.

4.3 The File Menu

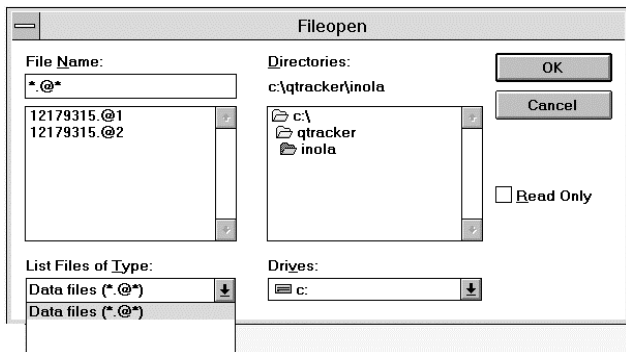
4.3.1 “Open Datafile”, Spreadsheet Windows, and Spreadsheet Layout

This command works much like the Open Data command in the report mode. Use it to get an entire flow data file from a disk, displaying it in the active spreadsheet window. If there is already a spreadsheet in the window, it will be replaced with the new one, although that is not a recommended practice.

When a spreadsheet window is opened, it retains the averaging period, fonts, column widths, and colors

that were in effect the last time the spreadsheet with that number was closed. That may have happened in the current Q-Tracker session, or in a previous session. The averaging period that will be used is displayed in the top bar of the spreadsheet window. This may be a different averaging selection than in other spreadsheet windows. You may wish to change the averaging period before opening the desired spreadsheet (Section 4.5.1). Once a file is opened, the averaging period and the measuring units cannot be changed.

On choosing the Open Datafile command, a file selection dialog box appears which is typical of Microsoft Windows applications. The appropriate file type is already selected (extensions beginning with @:).



As soon as you choose a data file from a disk, Q-Tracker starts working on inserting it into the spreadsheet. If the file is a long one, there will be a noticeable delay while the word “Inserting” flashes on and off in the status box in the top bar of the window (see Figure 4-2). The word “Calculating” briefly appears, then “Complete”. Before completion, you may stop the insertion process by choosing the Close Datafile command described in the following section. After completion, the status box is used for other purposes.

Other boxes in the top bar of a spreadsheet window show the filename of the flow data file, the time averaging in effect for this spreadsheet, the studyname, the site identification number (ID), and the beginning and ending times and dates for the data in the spreadsheet.

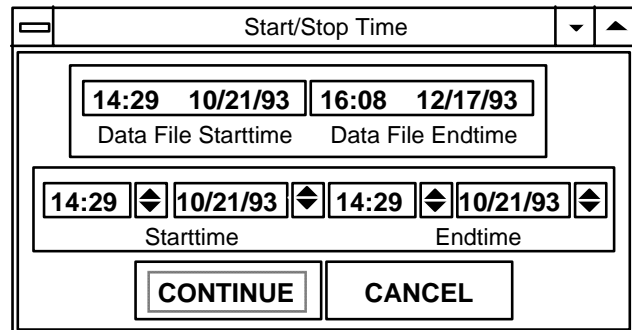
As seen in Figure 4-2, a typical spreadsheet initially has columns for date and time together, level, velocity, and volumetric flow rate. In addition, if the rainfall contact counter was enabled in the Q-Tracker setup, there is a rainfall column. Rainfall units are the same as for the level column. Eleven columns are available, labeled A through K when the spreadsheet is blank. Each line is numbered in a header column at the far left. The data lines are not interrupted by setup information and daily summaries as in a report (Figure 6-2).

The volumetric flow column is calculated by a formula established according to the application type in the setup data contained in the flow data file. Inputs for the calculation include variable data in one or more preceding columns as well as constants in the setup data file. For more about calculated columns, including calculations you can design, see Section 4.4.7.

4.3.2 “Open Datafile (Start/Stop)”

This command has the same effect as the Open Datafile command in the preceding section, except that you are allowed to display a desired certain section of data from the file rather than the entire file. This is useful if you only need to look at data from a relatively short time period. You don’t have to wait for the whole file to be inserted, and you don’t have to scroll a long way down to find the data you want. However, Q-Tracker searches through the file for the selected period at the same speed it inserts spreadsheet data. Therefore if you specify a period near the closing end of the file, it will take just as long to insert it as if the entire file were inserted.

After choosing the file, a Start/Stop Time window as shown below appears. The upper panel shows the beginning and ending times and dates for the data in the file. Change the values in the lower Starttime and Endtime boxes to the ones you desire. Click on Continue to begin opening the file in the spreadsheet. If you specify a period which is not entirely covered by the data, or if you specify an end time that is before the start time, an appropriate warning box will appear.



4.3.3 “Close Datafile”

This command has no effect except while Q-Tracker is carrying out an “Open Datafile” command or an “Open Datafile (Start/Stop)” command. The purpose is to help you save time by halting the insertion of an excessively long file, when you don’t need the entire file.

When you use the Close Datafile command during insertion of a file, the incomplete data that Q-Tracker has already inserted remains in the spreadsheet. This consists of the date/time, level, velocity, and rainfall columns, down to the last line inserted before you closed the file.

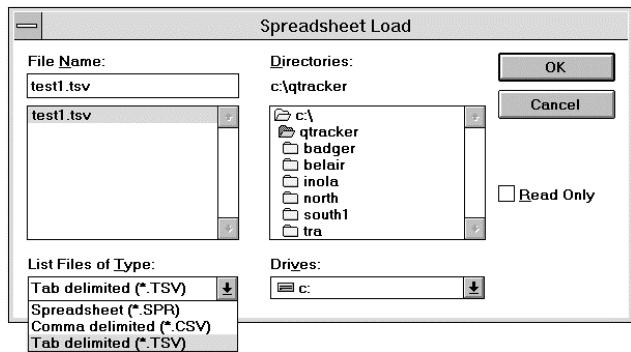
Then within a very brief time, the volumetric flow column is calculated down to the closing date and time.

4.3.4 “New”

This command opens another spreadsheet window. The new window is assigned the lowest available number. For example, if you already have Spreadsheet 3 open and no other, the New command brings up Spreadsheet 1. The newly opened spreadsheet window is blank. It retains the selections of averaging period, fonts, column widths, and colors that were in effect the last time it was closed, in the current Q-Tracker session, or a previous session.

4.3.5 “Load”

This command opens (displays) a previously saved spreadsheet in the active window. A file selection dialog box as shown below appears. The file type box in the lower left corner includes spreadsheet files of all three types (Section 4.2), with .SPR, .CSV, and .TSV filename extensions.



Loading a previously saved spreadsheet is much faster than initially creating a spreadsheet by opening a data file. After you load a spreadsheet file, the filename box in the top bar of the spreadsheet window does not show the name of the spreadsheet file. Instead, it shows the flow data file from which it was derived. However, the title bar at the very top of the window shows the directory path and filename of the spreadsheet file, rather than the number of the spreadsheet window as when a data file is opened into the window. Although the spreadsheet window number is not displayed, it remains the same.

Since a .SPR file includes Options Menu selections (averaging period, font, column widths, and colors), those selections come along when you load the file. They remain in effect for the active window until changed. Conversely, since .CSV and .TSV files do not include option information, loading a file of either type does not change the options currently in effect for the active window.

4.3.6 “Save”

This command saves the active spreadsheet, storing it as a file on a disk. The filename and directory path used are the same as the last spreadsheet you previously saved

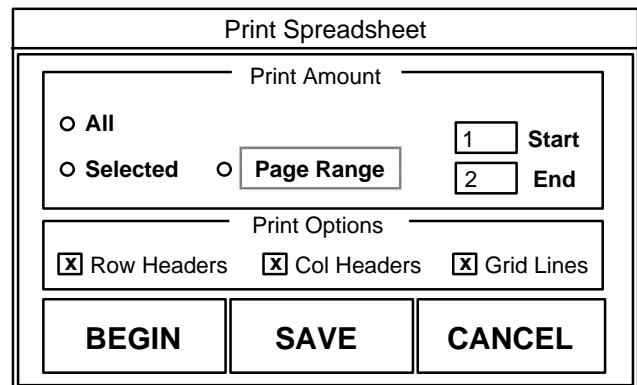
or loaded for that window in this session with Q-Tracker. You are required to specify a filename and directory path, using a file selection dialog box very similar to the one shown in Section 4.3.5. You may specify .SPR, .CSV, or .TSV file format (Section 4.2).

4.3.7 “Save As...”

Like the Save command, this one saves the spreadsheet which is presently in the spreadsheet window, storing it as a file on a disk. However, you are required to specify a filename and directory path, using a file selection dialog box very similar to the one shown in Section 4.3.5. You may specify .SPR, .CSV, or .TSV file format (Section 4.2). After saving, the status box in the top bar of the window displays “Saved” until changed. The newly specified filename and directory path appear in the window title bar. Now if you choose the Save command, this spreadsheet will be saved to the new filename and path.

4.3.8 “Print”

This command sends the active spreadsheet to the printer which is presently selected as the default printer for Windows applications. A Print Spreadsheet window as shown below appears. You may choose to print the entire spreadsheet, a group of lines or columns you have selected by clicking and dragging before choosing this command, or a range of pages. You may also choose whether or not to include row headers, column headers, and grid lines. Click the Begin button to start printing. The Save button saves the choices you have made in the Print Spreadsheet window, offering them as defaults the next time you use the Print command.



Q-Tracker does not provide an opportunity to change the default printer selection and setup. You must do that before choosing this command. Use Windows tools such as the Options menu in the Print Manager window, or the Printers window in the Control Panel.

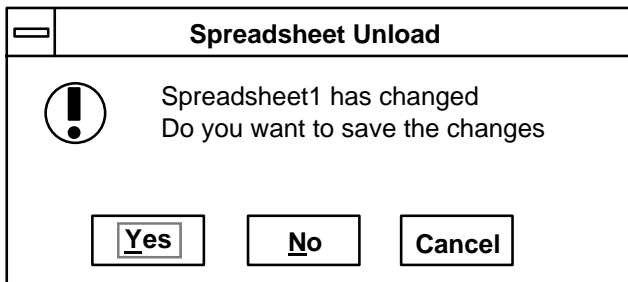
Depending on the options you chose, the printed spreadsheet can look almost exactly like what you selected in the spreadsheet window, except that it is automatically broken up into sequential pages numbered at the bottom. If you use a color printer, it will attempt to

reproduce the colors on your screen, which have been selected with the Options menu. If your graphic printer is not capable of printing the font seen in the display, it will usually substitute a default font such as Courier, which resembles typewriter print.

4.3.9 “Exit Spreadsheet”

This command is one way to get out of spreadsheet mode and return to opening mode. Another way is to double-click on the control-menu box at the upper left corner of the last remaining spreadsheet window, or pull down the control menu from that box and choose Close.

If you have created or loaded a spreadsheet in the spreadsheet window since the last time you closed it, and you haven’t saved it, a Spreadsheet Unload dialog box shown below appears. This happens even if you have cleared the window. The purpose is to make sure you don’t forget to save changes you have made in an existing spreadsheet that was previously saved and loaded again.



4.4 The Edit Menu

4.4.1 “Cut”, and Selecting Cells

This command works essentially the same in displayed Q-Tracker spreadsheets as in other Microsoft Windows applications, but only on cells. A cell is a place for a number in the array of rows and columns, as shown in Figure 4-2. Click the cursor on a cell to select that cell, in Figure 4-2. Click the cursor on a cell to select that cell, denoted by a heavy rectangular border. Drag the cursor up or down and right or left to select a group of cells as shown below. The cell first selected keeps the rectangular outline, and the rest are shown with colors changed (white on black in this case).

C:\QTRACKER\INOLA\NORTHPLT.SPR								
12179315 @2	No Avg	2.61	Studyname - INOLA		Site Id - 2	Date 14:29 10/21/93 to 16:08 12/17/93		
	Date/Time	IN	FvS	MGD	Total	F	G	
1	10/21/93 14:29	2.67	1.3385	0.101				
2	10/21/93 14:31	2.61	1.2824	0.094	0.04			
3	10/21/93 14:33	3.38	1.4923	0.156	0.03			
4	10/21/93 14:35	3.53	1.4942	0.166	0.43			
5	10/21/93 14:50	3.45	1.4917	0.161	0.61			
6	10/21/93 15:05	3.52	1.5027	0.167				
7	10/21/93 15:00	3.58	1.4813	0.168				
8	10/21/93 15:15	3.29	1.4179	0.143				
9	10/21/93 15:30	2.93	1.2866	0.111				

Instead of selecting a cell, you can select an entire column by clicking on the header (label) at the top of that column. Drag the cursor left or right to select a group of columns as shown below:

C:\QTRACKER\INOLA\NORTHPLT.SPR								
12179315 @2	No Avg	Date/Tim	Studyname - INOLA		Site Id - 2	Date 14:29 10/21/93 to 16:08 12/17/93		
	Date/Time	IN	FvS	MGD	Total	F	G	
1	10/21/93 14:29	2.67	1.3385	0.101				
2	10/21/93 14:31	2.61	1.2824	0.094	0.04			
3	10/21/93 14:33	3.38	1.4923	0.156	0.03			
4	10/21/93 14:35	3.53	1.4942	0.166	0.43			
5	10/21/93 14:50	3.45	1.4917	0.161	0.61			
6	10/21/93 15:05	3.52	1.5027	0.167				
7	10/21/93 15:00	3.58	1.4813	0.168				
8	10/21/93 15:15	3.29	1.4179	0.143				
9	10/21/93 15:30	2.93	1.2866	0.111				

Similarly, you can select an entire row by clicking on the header (row number) at the left end of that row. Drag the cursor up or down to select a group of rows as shown below:

C:\QTRACKER\INOLA\NORTHPLT.SPR								
12179315 @2	No Avg	Studyname - INOLA		Site Id - 2	Date 14:29 10/21/93 to 16:08 12/17/93			
	Date/Time	IN	FvS	MGD	Total	F	G	
1	10/21/93 14:29	2.67	1.3385	0.101				
2	10/21/93 14:31	2.61	1.2824	0.094	0.04			
3	10/21/93 14:33	3.38	1.4923	0.156	0.03			
4	10/21/93 14:35	3.53	1.4942	0.166	0.43			
5	10/21/93 14:50	3.45	1.4917	0.161	0.61			
6	10/21/93 15:05	3.52	1.5027	0.167				
7	10/21/93 15:00	3.58	1.4813	0.168				
8	10/21/93 15:15	3.29	1.4179	0.143				
9	10/21/93 15:30	2.93	1.2866	0.111				

When you have selected a cell, or group of cells, choose the Cut command. The selected cells are cleared, leaving them blank. The contents of the cut cells are placed on a special Q-Tracker spreadsheet clipboard for possible pasting later. This is not the Microsoft Windows clipboard, although it operates in a very similar manner. You cannot exchange data among those three separate clipboards. Any column headers that may be included with the selected group of cells are not cut from the spreadsheet, but they are copied to the spreadsheet clipboard. Row headers are neither cut nor copied.

4.4.2 “Copy”

Like the Cut command in the preceding section, the Copy command works essentially the same in displayed Q-Tracker spreadsheets as in other Microsoft Windows applications, but only on cells. The cell, or cells, you have selected, as explained above (including column headers, if any), are copied to the spreadsheet clipboard (see preceding section) without being erased from the spreadsheet.

Table 4-2. Volumetric Flow Calculations Used by Q-Tracker (Section 4.4.7)

Method Specified in Setup Data = flow (level, velocity)

Circular Velocity times Area = circ_vxa (level, velocity, pipe id, silt depth)

Circular Mannings = circ_mannings (level, pipe id, silt depth, slope, roughness)

Be sure to include the underline character _ where specified in a function name.

For each variable listed in parentheses, substitute either a numerical value or a column number followed by the pound sign, such as b# for the value in Column B on the same line of the spreadsheet.

4.4.3 “Paste”

Like the preceding two commands, this one is much the same as the corresponding command in other Microsoft Windows applications operating only on cells (and column headers to a certain extent). Whatever has been copied to the spreadsheet clipboard (Section 4.4.1) with a Cut or Copy command is pasted into the displayed spreadsheet at the location you have selected with the cursor. The newly pasted cells overwrite and replace existing cells. Generally, for the command to work properly, you should first highlight a block running at least as many cells horizontally and vertically as the block that has been cut or copied.

You can paste cells that have been cut or copied from an entirely different spreadsheet—even an entire spreadsheet. This is a useful way to combine multiple flow data files into one spreadsheet. It is even possible to paste a group of lines from a spreadsheet for one site into a spreadsheet for another site. However, be careful in copying and pasting data from one spreadsheet to another. For instance, make sure the measuring units are the same in both spreadsheets, and that the rows are in proper order as to date and time. If there are inconsistencies in the composite result, Q-Tracker will not be able to make graphs from the spreadsheet.

When pasting, it is best to keep using the first four or five columns for their original purposes when a flow data file was opened in the spreadsheet. That is, keep using Column A for the date and time, Column B for level, Column C for velocity, Column D for volumetric flow rate, and Column E for rainfall (if selected in setup).

Furthermore, within a group of rows, keep using Columns B, C, and D for one site (the same Q-Tracker).

Once you have copied and pasted a calculated column, the calculation formula remains in the new column even if you clear or overwrite the data there. This applies both to the volumetric flow column and calculations you specify (Section 4.4.7). The automatic calculation will be triggered by certain actions such as switching back and forth between modes.

4.4.4 “Clear Data”

This command erases the contents of all cells in the active spreadsheet window. Row and column headers remain as before. So do the formulas for calculated columns (Section 4.4.7). Averaging period, fonts, column width, and colors remain as previously selected for the spreadsheet window.

4.4.5 “Clear All”

This command erases nearly everything in the spreadsheet window, including column headers as well as formulas for calculated columns (Section 4.4.7). Averaging period, fonts, column width, and colors remain as previously selected for the spreadsheet window.

4.4.6 Changing Cell Values and Column Headers

- A. *Changing a cell value:* The recommended method is to use the status box. Select the cell you want to change, and its numerical value is repeated in the status box. Click there to get a cursor, and make whatever changes you want. Pressing the Enter key puts the new value into

effect in the selected cell. If that column is used in calculating another column, the calculated column's value on that line is automatically updated to reflect the change you made. For instance, changing the level value also changes the volumetric flow value in that line. If the cell was a calculated one (Section 4.4.7), the new number takes the place of the formula for this cell, and it will no longer be a calculated cell.

- B. *Changing a column header:* Select a whole column by clicking on its header, and the header is repeated in the status box. Click in the status box and make whatever changes you want. Pressing the Enter key puts the new header into effect for the selected column.

4.4.7 Automatic Calculations for Selected Cells

The name “spreadsheet” becomes a reality when you use it to make automatic calculations among columns. Q-Tracker can do that within a given row, meaning a given measurement time and date. In other words, you can put in an algebraic equation for calculating cells in a given column from cells in other columns in the same rows. Actually, what you put in is the right side of an equation, more properly called a formula. The formula can include functions predefined within Q-Tracker for flow calculations such as Mannings and rectangular weirs. You can use different definitions for different rows within a column—perhaps normal velocity-times-area for flow in certain time periods and Mannings for other periods.

The following is the general procedure for putting in a formula for a group of cells within a column. This will typically be an empty column, but you can overwrite cells in a column.

- A. Select (click on) one of the cells to which the formula will apply. A heavy border around the cell shows it has been selected.
- B. Type in the formula, starting with an Equal Sign (=). If this is already a calculated column, the formula presently in effect will appear in the cell and the status box; you can overwrite it. Your formula will probably be longer than the cell, but that's okay; the cell acts as an automatically moving window on the formula. Use conventional algebraic notation, with an asterisk (*) for multiplication, slash (/) for division, plus sign (+) for addition, and hyphen (-) for subtraction. Use parentheses and nests of parentheses for grouping. For cell values from other columns, use the column header letter followed by the pound sign, such as b# for level and c# for velocity. For predefined flow functions, see Table 5-2. For example, suppose you want Column G to be the sum of Column D and Column F. Then in a selected cell in Column G, you would type =d#+f#.

- C. When you have typed in your formula, press the Enter key. The formula disappears, and the calculated value for that cell appears in the cell and in the status box.
- D. With the same cell still selected, press the Equal Sign key again (=). The formula appears again in the cell, and this time in the status box also.
- E. In the Edit Menu, choose the Copy command. This copies the formula from the status box to the Q-Tracker clipboard.
- F. Select the cell or group of cells to which you want to apply the new formula. Then in the Edit menu, choose the Paste command. It is as though you had typed the same formula in all the selected cells as in the first one. The resulting calculated values appear in all the selected cells.

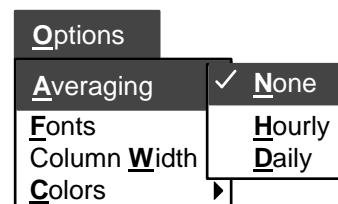
When you wish to find out whether the value in a given cell has been automatically calculated, select that cell and press the Equals Sign key. If a formula is in effect for that cell, it appears in the cell and in the status box. At that point, you can change the formula for that cell and put it into effect with the Enter key.

The calculation formula remains in effect for the column, even if you use the Cut or Clear Data commands. It can be cleared only by the Clear All command, by replacement of individual cell values (Section 4.4.6-A), or by repeating the procedure above to replace the formula with one consisting only of the Equal sign.

4.5 The Options Menu

4.5.1 “Averaging”

Use this command to select the type of time averaging which will be applied the next time you open a flow data file into the presently selected spreadsheet window. The averaging presently in effect is indicated by a check mark as shown below. To make another choice, click on it.



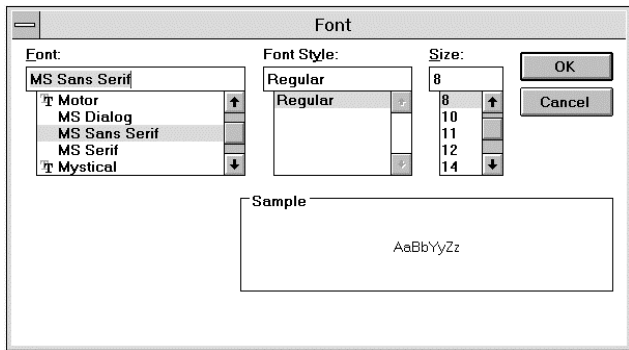
“None” means every measurement is inserted as a separate row (line) of data. Hourly averaging produces the arithmetic mean of all measurements within each clock hour, for a given column of the spreadsheet. For example, the resulting average row labeled 15:00 contains averages of all measurements made between 3:00 p.m. and 4:00 p.m. Similarly, daily averaging produces the arithmetic mean of all measurements made during the designated day, beginning and ending at midnight. No weighting of

individual measurements is required in computing the averages, because the interval between measurements is constant.

The averaging period you select will remain in effect for the spreadsheet window which is presently active until it is changed by the Averaging command or by loading a saved >SPR spreadsheet having another averaging period.

4.5.2 “Fonts”

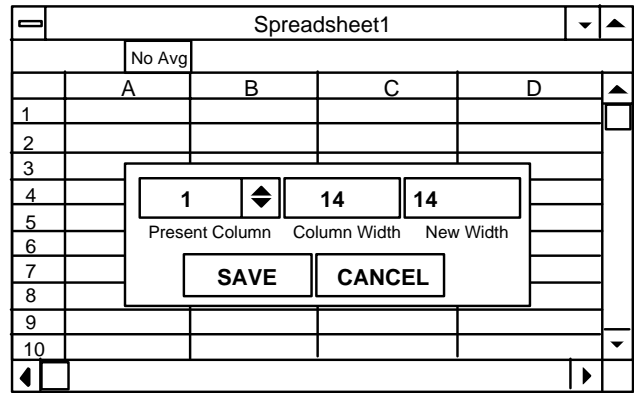
This command calls up the Font Selection dialog box shown below. The type font presently selected for the active spreadsheet window is highlighted. The factory default font is highlighted in the example below: MS Sans Serif Regular 8 point. All fonts installed in your Microsoft Windows configuration are available to Q-Tracker.



You may choose another font, and it will be applied to the presently active spreadsheet window. It will remain in effect for that window until changed by the Fonts command or by loading a saved .SPR spreadsheet having a different font.

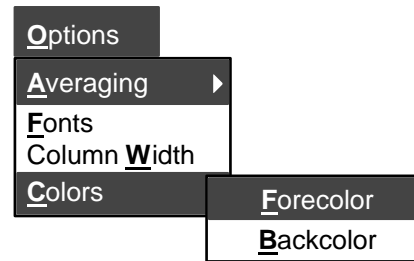
4.5.3 “Column Width”

This command calls up the Column Width Selection box shown in the following column. In the Present Column box, select the column whose width you want to change. Columns are identified by number instead of letter: 1 means A, 2 means B, etc. The present width of that column is shown in the Column Width box, in units of 1/12 inch when printed. In other words, a column 12 units wide will be one inch wide when printed. Enter the width you desire in the New Width box. To put your selection into effect, click on the Save button. To change the width of another column, repeat this process.



4.5.4 “Colors”

This command pulls down another menu from which to choose the active spreadsheet’s forecolor or backcolor for review and changing if desired. Forecolor means text, and backcolor means background.



In either case, a Color window appears. You can choose one of 48 predefined basic colors or one of 16 custom colors which you can create. The custom color boxes initially contain factory default colors consisting of shades of gray. To create a custom color of your own, click on the “Define Custom Colors...” button near the bottom of the Color window. The window extends to display tools for defining color.

Select one of the 16 custom color boxes to be changed to the desired color. Then manipulate the color tools to get the desired color in the sample box labeled Color/Solid. The left side of this box shows the actual color as nearly as your computer can approximate it. The right side shows the nearest solid, unblended color. When you have finished defining a custom color with these tools, click on the “Add to Custom Colors” button, and the custom color box you previously selected changes to the newly defined color. Then click OK, and the selected color (one of the 48 basic colors, or one of the 16 custom colors) is applied to the forecolor or backcolor for the active spreadsheet. The spreadsheet window will keep the selected colors, even to later Q-Tracker sessions, until changed by the Colors command or by loading a saved .SPR spreadsheet having different colors.

4.6 The Graph Menu and Graph Icon

This menu consists of one command, called Graph Selected Data. It puts Q-Tracker into graph mode. The menu bar changes from the spreadsheet menus (Figure 4-1) to the graph menus (Figure 5-1). If one or more graph windows are already open, the most recently selected one is activated. If there is no graph window already open, one is opened. If cells in one or more columns of the active spreadsheet are highlighted when this command is chosen, a graph is created in the most recently selected graph window (Section 2.6). For further operations from that point, see Section 5.

The Graph icon in the tool bar (Figure 3-1) has the same effect as the Graph Selected Data command. In report mode, the Graph icon has the same effect. If some cells are highlighted in a spreadsheet, even though that spreadsheet window is not presently active, a graph is created. In graph mode, however, the Graph icon has no effect.

4.7 The Window Menu

Like the Window menu at each of the other Q-Tracker menu bars, this is a common standard feature for Microsoft Windows applications. The commands in the menu are familiar ones for Windows users. They are briefly explained in Table 4-1.

5.0 Graphs

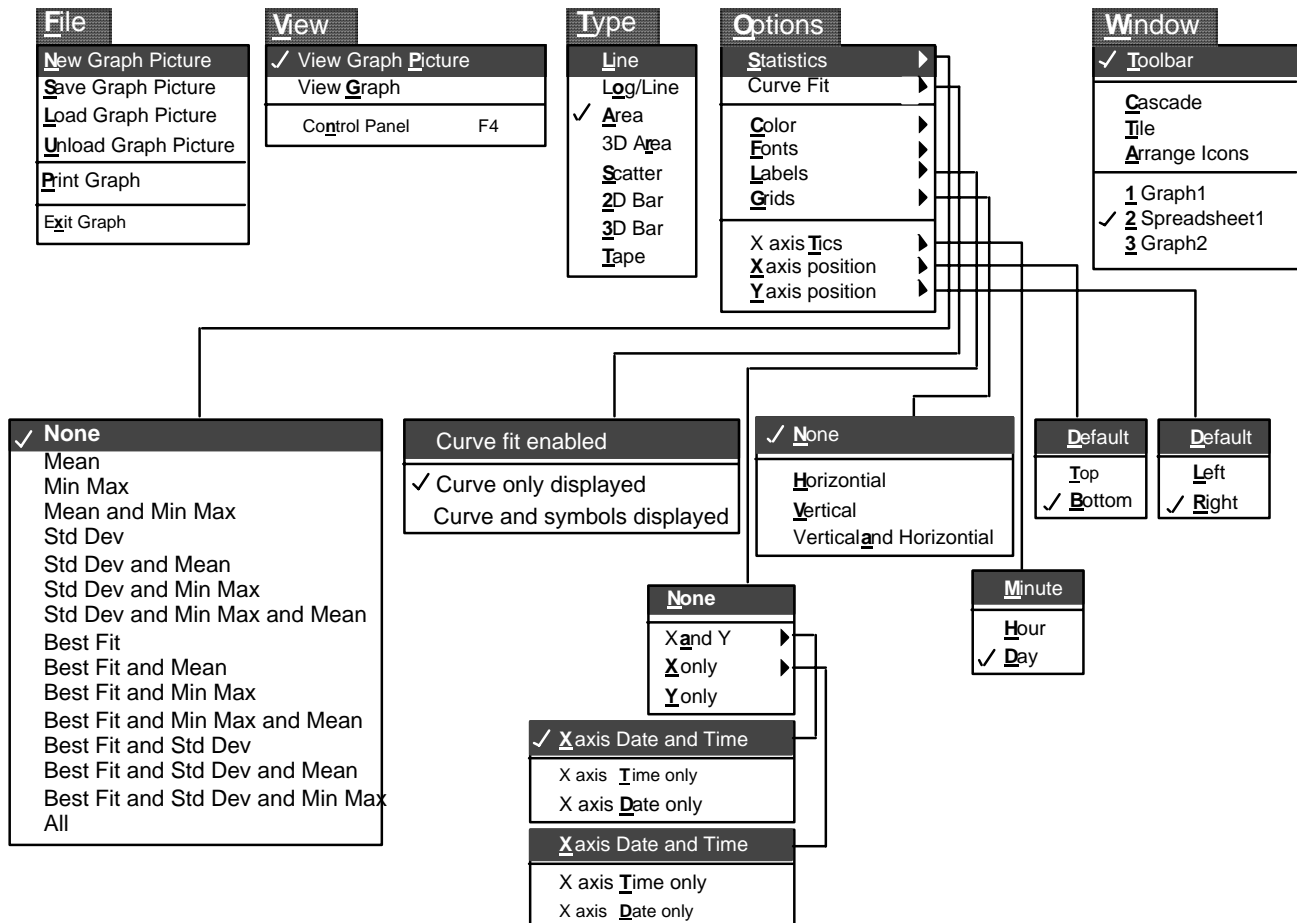
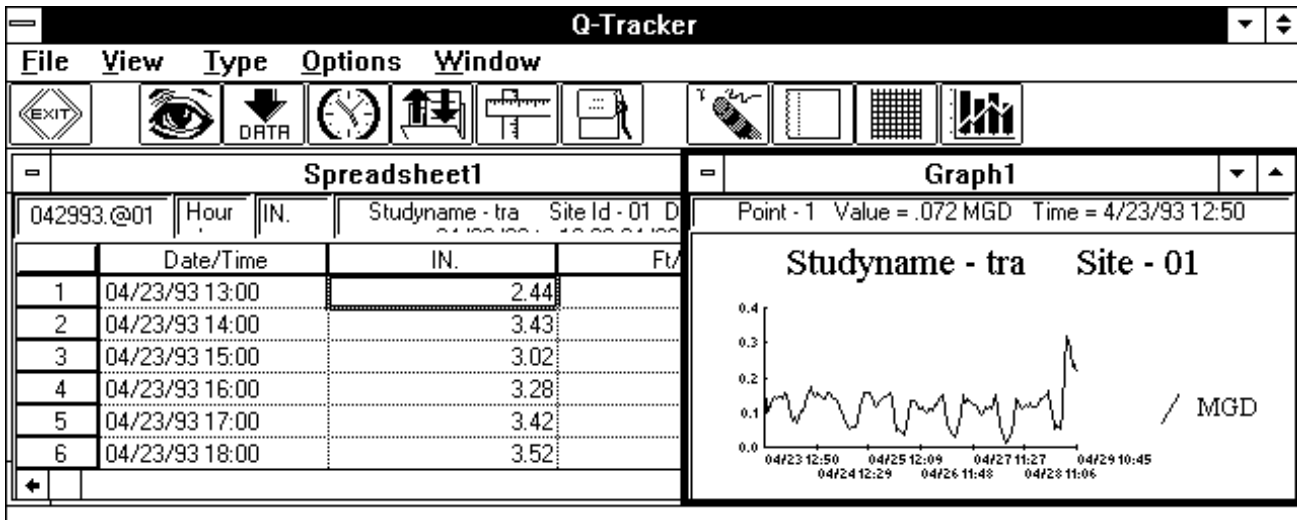


FIGURE 5-1

The graph menu bar appears when a graph window is active. Menus pulled down from the bar are shown.

TABLE 5-1. Functions of Items in the Graph Menus

Menu	Item	Section	Function
File	New Graph.....	5.3.1..	Open another graph window
	Save Graph Picture	5.3.2..	Save active graph as a .BMP (bit-mapped) file
	Load Graph Picture.....	5.3.3..	Display a stored .BMP image file in the active window
	Unload Graph Picture	5.3.4..	Remove a previously loaded .BMP image file in the active window
	Print Graph.....	5.3.5..	Print the active graph window
	Exit Graph.....	5.3.6..	Return to opening mode
View	View Graph Picture.....	5.4.1..	Enable or disable display of a .BMP image loaded into the active window
	View Graph.....	5.4.2..	Enable or disable display of a Q-Tracker graph in the active window
	Control Panel	5.4.3..	Select plotted colors, y-axis scale, and captions, and read graph points
Type	Type	5.5.....	Select type of plot: line, log/line, area, 3D area, scatter, 2D bar, 3D bar, tape
Options	Statistics	5.6.1..	Select type of statistical analysis for the active graph
	Curve Fit	5.6.2..	For scatter plots, enable or disable curve-fitting & display of curve and points
	Color	5.6.3..	Choose background and foreground (axes & captions) colors for active graph
	Fonts.....	5.6.4..	Choose font (type style and size) for the active graph
	Labels.....	5.6.5..	Select numeric labels for x and y axes
	Grids.....	5.6.6..	Turn grid lines on and off for x and y axes
	X Axis Ticks	5.6.7..	Choose x-axis ticks every minute, hour, or day
	X Axis Position	5.6.8..	Choose top or bottom location for x axis
	Y Axis Position	5.6.9..	Choose left or right location of y axis
Window	Toolbar.....	5.7.....	Activate or deactivate the icon tool bar
	Clipboard.....	5.7.....	Activate the Microsoft Windows clipboard viewer
	Cascade	5.7.....	Arrange open windows in cascade format as other Windows applications
	Tile	5.7.....	Arrange open windows in tile format as in other Windows applications
	Arrange Icons.....	5.7.....	Automatically arrange visible Windows icons
	List of Existing Windows	5.7.....	Activate desired window as though you had clicked on it

5.1 Introduction

This Section 5 of the manual provides detailed explanations of Q-Tracker functions available through the graph menu bar. The other three sets of menus (opening, spreadsheet, and report menu bars) are explained in Sections 3, 4, and 6. Most of the Graph menu functions pertain to creating, modifying, saving, retrieving, and printing graphs containing flow data from Q-Tracker monitors.

Refer to Section 2.2 for an introduction to the menu structure by which Q-Tracker is used.

Refer to Section 2.6 for an introduction to Q-Tracker graphs.

Refer to Figure 5-1 and Table 5-1 for an overview of graph menus.

Refer to Figure 5-2 for an illustration of features discussed in this Section 5.

5.2 General Facts About Graph Mode

5.2.1 Generating Graphs

For basic concepts, see Section 2.6. To generate a graph, select the desired cells in a spreadsheet and choose

the Graph icon. The Graph icon is equivalent to the “Graph Selected Data” command in the Graph menu at the Spreadsheet menu bar. Loading a previously generated and saved graph is a different operation, described in Section 5.3.3.

You don’t have to be in spreadsheet mode when you choose the Graph icon. However, a spreadsheet must be open, and two or more cells must be selected at the moment. You may select cells in any column other than Column A, the Date/Time column. You must select at least two rows in the spreadsheet.

The selected cells may be one or more *entire* columns, or they may be a group of cells comprising *part of* one or more columns. Each column (whole or part) gives rise to a separate plot in the graph. Since multiple columns can be selected only if they are all adjacent to one another, you cannot graph Columns B and D together without also graphing Column C.

If a graph window is not already open when you choose the Graph icon, Graph Window Number 1 will appear. If one graph window is already open, the graph

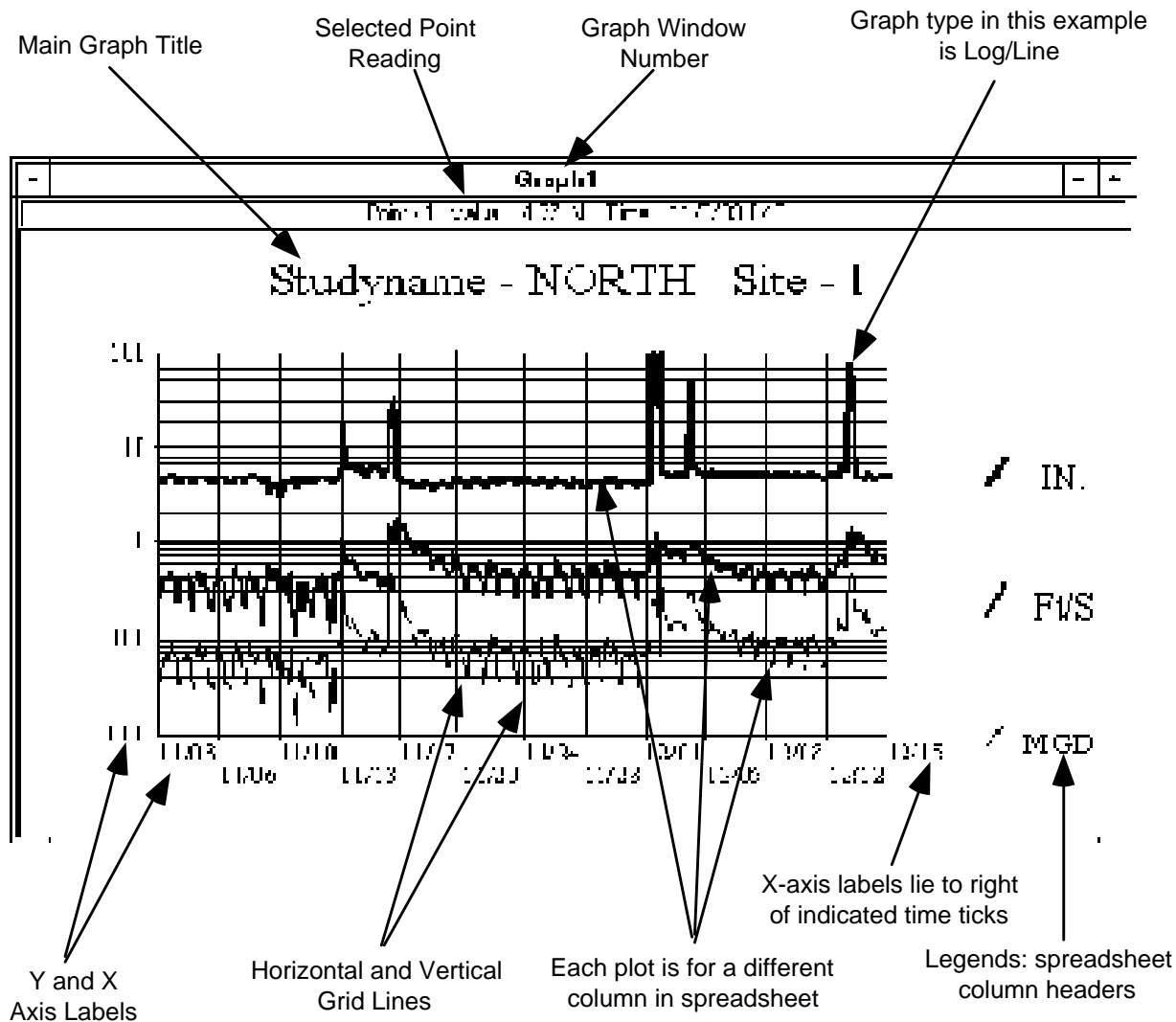


FIGURE 5-2
Features of a typical Q-Tracker graph

will appear in it. If more than one graph window is already open, the new graph will go in the one that is active, or (if not in graph mode) that was most *recently* active. As soon as the graph is generated, the corresponding spreadsheet cells are no longer selected.

You can have as many as five plots (five spreadsheet columns) in a single graph. The minimum number of spreadsheet lines that can be included varies according to the number of plots.

To read a plot with perfect accuracy, click on one of the data points. The X and Y value and point number appear in the information bar immediately below the uppermost window title bar. (See Figure 5-2.) Point numbers for each plot do not correspond with line numbers in the spreadsheet. They begin with 1 at the far left side of the

graph. This point reading feature is not available in Log/Line, Area, or 3D Area type graphs.

5.2.2 Graph Characteristics

As seen in Figure 5-2, the main title of a newly generated graph automatically consists of the study name and site ID number associated with the source spreadsheet. The left title, for the Y axis, is blank. Other characteristics (bottom title, plot type, colors, fonts, etc.) are the same as when that graph window was last used. You can change all these characteristics with the Control Panel command and the Type and Options menus. All characteristics except the main title and left title carry over to the next time this graph window is used.

5.2.3 Distorting Image Proportions

The horizontal and vertical proportions of a graph

and a loaded image (Section 5.3.3) are automatically adjusted to the shape of the window. If the graph window is maximized, of course, its shape is determined by that of the monitor screen. When the Window is in its normal “restored” condition, you can change its shape and size as in any other Microsoft Windows application. This is done by dragging a border or corner with the cursor. In this way, you can make a graph or loaded image tall and slim or short and wide.

The type (letters and numbers) in a *generated* graph is never distorted, but its size changes to fit the graph. However, the type in a *saved* and *loaded* graph (Section 5.3.3) does get distorted along with the graph.

If you save or print the window (Sections 5.3.2 and 5.3.5), the saved or printed image has the shape you see on your screen, however distorted it may be. As a result, for instance, if you save a generated graph while the window is short and wide, and if you then load the saved file in a more normally-shaped window, the image will be stretched vertically.

5.2.4 Generating More Than One Graph

You can display more than one generated graph at the same time in different windows. When you want an additional graph window, use the New Graph command (Section 5.3.1). To activate a graph or spreadsheet window you need, you may use cascade or tile arrangement in the Window menu, and simply click in the desired window. Or, you may choose the desired window from the list in the Window menu. Select the spreadsheet cells you want to graph next, activate the graph window you want to see, and click the Graph icon.

5.2.5 Suggestions For Using Graph Mode

There are limits to the amount of data that can be presented in one graph and in one plot. Plotting every measurement without averaging can be useful for checking the amount of scatter and related statistical purposes. However, many days of non-averaged data will overload the program’s graph capabilities. For graphing long periods, use hourly or daily averaging (Options menu in Spreadsheet mode, Section 4.5.1).

To find the presentation that provides the most meaningful view of the data, experiment with various combinations of averaging periods and graph type (Type menu). For instance, a logarithmic graph can be useful in presenting two or more plots whose average values differ by factors greater than about five.

5.3 The File Menu

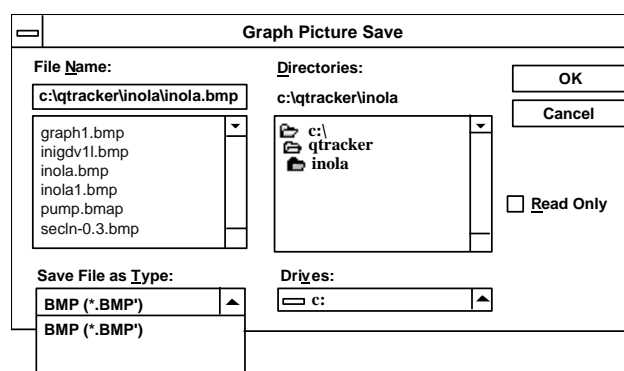
5.3.1 “New Graph”

This command opens another graph window. The

new window is assigned the lowest available number. For example, if you already have Graph 1 and Graph 4 open and no other, the New Graph command brings up Graph 2. The newly opened graph window is blank. Graphs generated from spreadsheets in this window will retain the same menu selections (Control Panel, Type, and Options) that were in effect the last time this window was closed in the current Q-Tracker session or a previous session. The number of graph windows allowable depends on the amount of computer memory available to the Q-Tracker program.

5.3.2 “Save Graph Picture”

This command saves the image displayed in e active graph window, storing it as a bit-mapped .BMP file on a disk. You are required to specify a filename and directory path, using a file selection dialog box.



After saving, what is displayed in the window is still the same image as before, *not* the saved image. If you started with a generated graph, you still have the generated graph, not the bit-mapped image that was saved as a file.

If the active window is displaying both a generated graph and a loaded picture (following section) superimposed on each other, the entire composite image will be saved. However, the quality of the previously saved portion of the combined image may be noticeably degraded. The shape of the saved image in terms of horizontal and vertical proportions is what you see on the screen (Section 5.2.3).

5.3.3 “Load Graph Picture”

This command retrieves a bit-mapped .BMP image from storage and displays it in the active graph window. The image is usually a Q-Tracker graph generated from a spreadsheet, which has been stored with the Save Graph Picture command. However, it may be any compatible .BMP image file produced by another program—perhaps a scanned photograph of a flow study site. The image file is selected with a Graph Picture Load dialog box which resembles the Graph Picture Save box shown in the preceding section. After the image is loaded into an *empty*

window, the file name and directory path of the image file is displayed in the information bar in the place of the point value readout.

A graph window can simultaneously contain one generated graph and one bit-mapped image. The generated graph is produced by Q-Tracker from a spreadsheet, and the image is loaded from a .BMP file. You can display either or both of these two objects, using the View Graph Picture and View Graph commands in the View menu. (See Sections 5.4.1 and 5.4.2) The information bar displays the point value readout for the generated graph instead of the filename and path for the loaded image. This happens even if only the loaded image is displayed at the moment. Even when not displayed, both objects are still in the window and can be turned on or off. If the generated graph is turned off, you can still get point value readings from it by searching for plot points with the cursor.

If you load an image into a window that already has a loaded image, the new image overwrites and replaces the old one.

Control Panel, Type, and Options do not work on a loaded graph image. A loaded Q-Tracker graph looks almost exactly like the generated original, but *it is only an image, not the real thing*. If the active graph window does not contain a generated graph, the menu selections above are not available; neither is the Copy to Clipboard command.

Q-Tracker automatically scales (adjusts the size of) the entire loaded image to fit the active window in both the horizontal and vertical directions. If the proportions of the original image are different from those of the window, the image will be uniformly distorted by stretching or compressing. (See Section 5.2.3.) Distortion is especially noticeable in the case of a scanned photograph image. You may restore the original shape of the image by changing the shape of the window as in any Microsoft Windows application. (Click and drag on an edge or corner of the window.)

You can use the Load Graph Picture command to insert an illustration into a suitable blank area of a graph, such as a corner. For instance, you may want to incorporate your company logotype. To do so, you must first prepare a .BMP image having the same proportions as the graph, using a suitable graphics program. This image should be featureless (blank) except for the logo, to avoid interfering with the visibility of the graph. Put the logo at the position in the image where you want it to appear in the graph.

5.3.4 “Unload Graph Picture”

If the active graph window contains a loaded picture (see preceding section), this command removes it.

5.3.5 “Print Graph”

This command sends the contents of the active graph window to the printer which is presently selected as the default printer for Windows applications. Whatever you see in the window is printed. This may include both a generated spreadsheet (Section 5.2.1) and a loaded picture (Section 5.3.3) as a superimposed composite. The shape of the printed image in terms of horizontal and vertical proportions is what you see on the screen (Section 5.2.3). Printing takes place immediately, signified by the momentary Graphics Server window.

Q-Tracker does not provide an opportunity to change the default printer selection and setup. You must do that before choosing this command. Use Microsoft Windows tools such as the Options menu in the Print Manager window, or the Printers window in the Control Panel.

The resolution or smoothness of the printed image of a *loaded picture*, whether it is a saved Q-Tracker graph or other image, will duplicate that seen on the monitor screen. Curved and diagonal lines and edges will probably have a noticeable stair step appearance. However, a *generated graph* prints with much high resolution, looking as smooth and sharp as the printer can make it.

If you use a color printer, it will attempt to reproduce the colors on your screen, which have been selected with the Control Panel (Section 5.4.4) and the Options menu (Section 5.6). If your graphic printer is not capable of printing the font seen in the display, it will usually substitute a default font such as Courier, which resembles typewriter print.

5.3.6 “Exit Graph”

This command is one way to get out of graph mode and return to opening mode. Another way is to double-click on the control menu box at the upper left corner of the last remaining graph window, or pull down the control menu from that box and choose Close.

If you have made any changes in a generated graph or loaded image, but have not saved the result (Section 5.3.2), a Graph Unload dialog box shown on the following page appears. This happens even if the only change was to reshape the window, and even if you have cleared the window. The purpose is to make sure you don't forget to save any changes that you may want to keep.

If you click the Yes button, it is as though you had

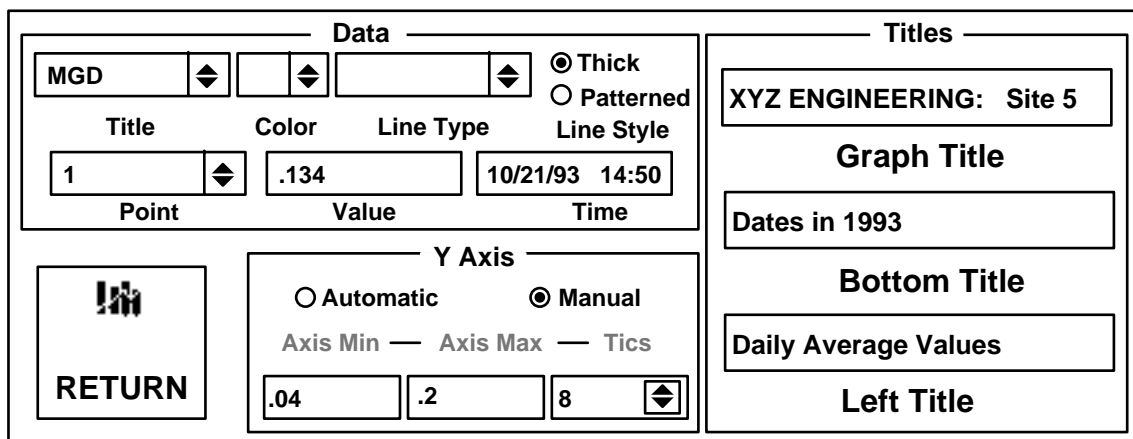
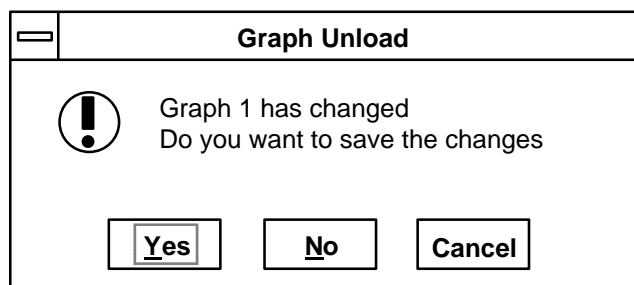


Figure 5-3
The Graph Control Panel



5.4.3 “Control Panel”

This command is available only when you have a generated graph in the active window. It calls up the graph control panel shown in Figure 5.3.

In the top part of the Data box in the control panel, you may select the color and texture of each plot. In the Title window, click the up or down arrow to select the plot you wish to design, identified by its header in the spreadsheet. In the color window, click the up or down arrow to select a color for that plot. Next to the Line Type window, select either a “thick” line (meaning a solid line) or a “patterned” line. Then in the Line Type window, click the Up or Down arrow to select one of four line thickness’ or line patterns. A short sample of the selected pattern is shown in the window. Patterns of dots and dashes make multiple plots more readily distinguishable from one another when printed in black and white. If the graph has more than one plot, select another and repeat this process.

chosen the Save Graph Picture command (Section 5.3.2). You are required to select, or key in, a filename and path in a Graph Picture Save dialog box. This reminder procedure is repeated for all graph windows having changes that have not yet been saved. Finally, Q-Tracker returns to the Opening mode.

5.4 The View Menu

5.4.1 “View Graph Picture”

This command is available only if the active window has a loaded image (Section 5.3.3). If there is no such image, the command in the menu is displayed in faint gray type. A check mark by this command indicates the loaded image is presently visible. Choosing this command turns the image and the check mark on or off. Whenever you load an image, it is visible until you turn it off.

5.4.2 “View Graph”

This command is available only if the active window has a generated graph (Section 5.2.1). If there is no such graph, the command in the menu is displayed in faint gray type. A check mark by this command indicates the graph is presently visible. Choosing this command turns the graph and the check mark on or off. Whenever you generate a graph, it is visible until you turn it off.

In the bottom part of the Data box, you will find a readout of data points in the plot selected above. This method is more closely controlled than clicking on a plot in the graph window and reading values in the information bar. Furthermore, you can change the value of the selected point by keying in whatever you want. It is a way to edit in graph mode instead of editing the spreadsheet. The spreadsheet is not affected.

In the Y Axis box in the control panel, you can select either automatic or manual scaling of the vertical Y axis. (However, manual scaling is not available if you have chosen log/line presentation in the Type menu, Section 5.5.) For manual scaling, key in the values you want for the minimum (bottom end) and maximum (top end) of

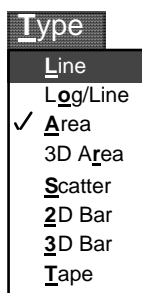
the Y axis. Also use the up and down arrows to select the number of ticks you want along this axis. To get the right number of ticks, decide on the interval you want between ticks, and divide that into the difference between minimum and maximum values. For example, suppose the bottom value is 0.2, the top end reads 1.0, and you want a tick every 0.1 unit along the axis. Thus 1.0 minus 0.2 equals 0.8, and dividing that by the interval of 0.1 gives 8 ticks.

In the Titles box, there are windows for keying in the main graph title above, the bottom title for the horizontal X axis, and the left title for the vertical Y axis. (The left title remains at the left even if you choose the right side for the Y axis position in the Options menu, Section 5.6.9.) When the graph is first generated, the graph title is automatically the study name and site ID as shown in Figure 5-2. Furthermore, there is no left title, and the bottom title is whatever was in effect the last time this graph window was used. Each title can consist of as many as 40 characters. Type fonts and colors are selected in the Options menu (Section 5.6). To edit an existing bottom title, you must first delete the portion you want to change.

When you click on the Return button, any changes you have made are immediately put into effect in the active graph window.

5.5 The Type Menu

In this menu, choose one of the eight listed types of graph presentation for the active window. The type which is presently in effect is identified by a check mark.

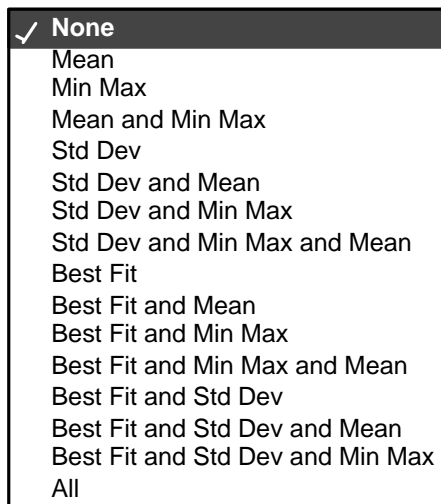


5.6 The Options Menu

5.6.1 "Statistics"

This command calls up a menu which is available only when you have chosen the Line or Scatter presentation in the Type menu (Section 5.5).

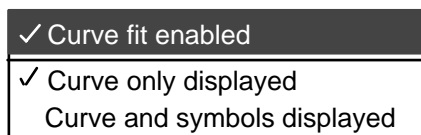
You may choose one of these sixteen different combinations of the features listed. They are applied to the Y values of all the data points in each plot of the active graph.



- A. *Mean*: The arithmetic mean or average of all the points, shown as a horizontal line across the graph.
- B. *Minimum and Maximum*: The highest and lowest of all the points, shown as two horizontal lines across the graph.
- C. *Standard Deviation*: An indication of how widely the data points are scattered away from the mean. This is the square root of the arithmetic average of the squares of the deviations of all points from the mean. It is shown as two horizontal lines lying one standard deviation above and below the mean.
- D. *Best Fit*: A straight line, usually slanting, drawn so as to minimize the sum of the deviations of all the points from it. That is, the line comes as close as possible to as many points as possible.

5.6.2 "Curve Fit"

This command calls up a menu which is available only when you have chosen the Scatter presentation in the Type menu (Section 5.5):



If you enable curve-fitting (indicated by a check mark), Q-Tracker calculates a gently curved line which minimizes the sum of the deviations of all the points from it. (That is, the curve comes as close as possible to as many points as possible.) The menu allows you to display either the curve alone or both the curve and the scattered data points. A second check mark indicates the choice currently in effect.

5.6.3 "Color"

This command calls up the graph color box. Use it

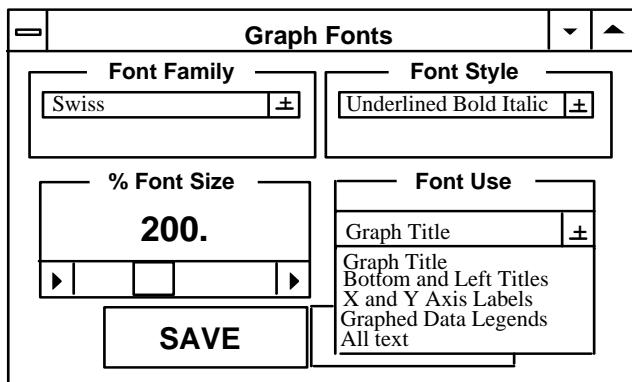
to choose the foreground color and the background color for the active graph.

The foreground color is applied to the axes, grids, ticks, axis labels, titles, and legends. The background is everything else, both inside and outside the actual graph or grid area. However, an additional background color is automatically created for 3D Area, 3D Bar, and Tape presentations. In these cases, the background within the grid is generally the *complement* of the selected background color. The complement of a color is its opposite on a color wheel.

Clicking on the “Save” button immediately puts your color selections into effect in the active graph. Clicking the “Exit” button cancels your changes and reverts to the colors you had before choosing this command.

5.6.4 “Fonts”

This command calls up the Graph Fonts window shown below. Use it to choose type font characteristics for the active graph:



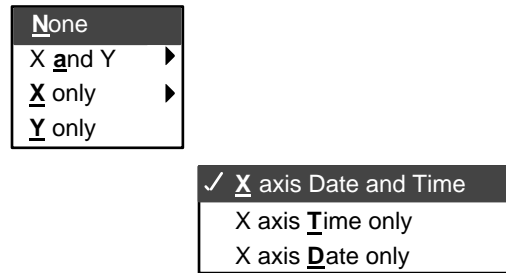
Each of the four text items listed in the Font usage window is separately specified: main graph title, bottom and left titles, X and Y axis labels, and graphed data legends. See Figure 5-2 for the locations of these items. Titles are created with the Control Panel (Section 5.4.3), and labels are specified with the Labels command (Section 5.6.5). Legends are automatically generated from spreadsheet headers.

Three fonts provided with Q-Tracker are available in the Font Family window above: Swiss (Gothic or Sans-Serif), Roman, and Modern (typewriter style). You may select various combinations of italic, bold, and underlined in the Font Style window. Q-Tracker automatically applies some interlocks and overrides to your choices of font size. For instance, the axis labels are not allowed to be much larger than the space between ticks.

Clicking on the “Save” button immediately puts your font selections into effect in the active graph. Clicking the “Cancel” button cancels your changes and reverts to the choices you had before.

5.6.5 “Labels”

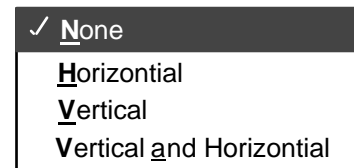
This command calls up a sequence of menus shown in Figure 5-1 and below.



First, you may choose whether you want number labels for the X axis, the Y axis, or both. Then if you have chosen X axis labels, you may choose what kind of labels you want there: time, date, or both. A check mark indicates the choice which is currently in effect.

5.6.6 “Grids”

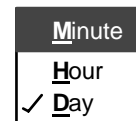
This command calls up the menu shown below. Use it to choose whether or not you want grid lines on the active graph, and if so, whether you want horizontal or vertical lines or both. A check mark indicates the choice which is currently in effect.



There will generally be one grid line for each tick mark you have specified. X axis ticks are chosen with the “X Axis Ticks” command that follows this one in the Options menu. Y axis ticks are chosen in the Control Panel (Section 5.4.3). If you have chosen log/line presentation in the Type menu (Section 5.5), there will be one grid line for each decade (0.01, 0.1, 1.0, 10, etc.) and one for each tenth of a decade (2, 3, 4, 5, 6, 7, 8, 9, etc.).

5.6.7 “X Axis Ticks”

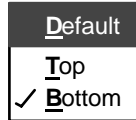
This command calls up the menu shown below.



Use this menu to choose the interval at which tick marks appear along the horizontal X axis in the active graph. A check mark indicates the choice which is currently in effect.

5.6.8 “X Axis Position”

This command calls up the menu shown below. Use it to choose whether you want the X axis ticks and number labels to be located at the top or at the bottom of the active graph. A check mark indicates the choice which is currently in effect:

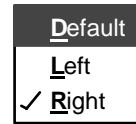


In most cases, the customary location is at the bottom. The 3D Area, 3D Bar, and Tape presentation types (Section 5.5) are designed for bottom location of the X axis.

5.6.9 “Y Axis Position”

This command calls up the menu as shown in the next column. Use it to choose whether you want the Y

axis ticks and number labels to be located at the left or at the right of the active graph. A check mark indicates the choice which is currently in effect.



In most cases, the customary location is at the left. The 3 D Area, 3D Bar, and Tape presentation types (Section 5.5) are designed for left location of the X axis.

5.7 The Window Menu

Like the Window menu at each of the other Q-Tracker menu bars, this is a common standard feature for Microsoft Windows applications. The commands in the menu are familiar ones for Windows users. They are briefly explained in Table 5-1.

6.0 Preformatted Reports

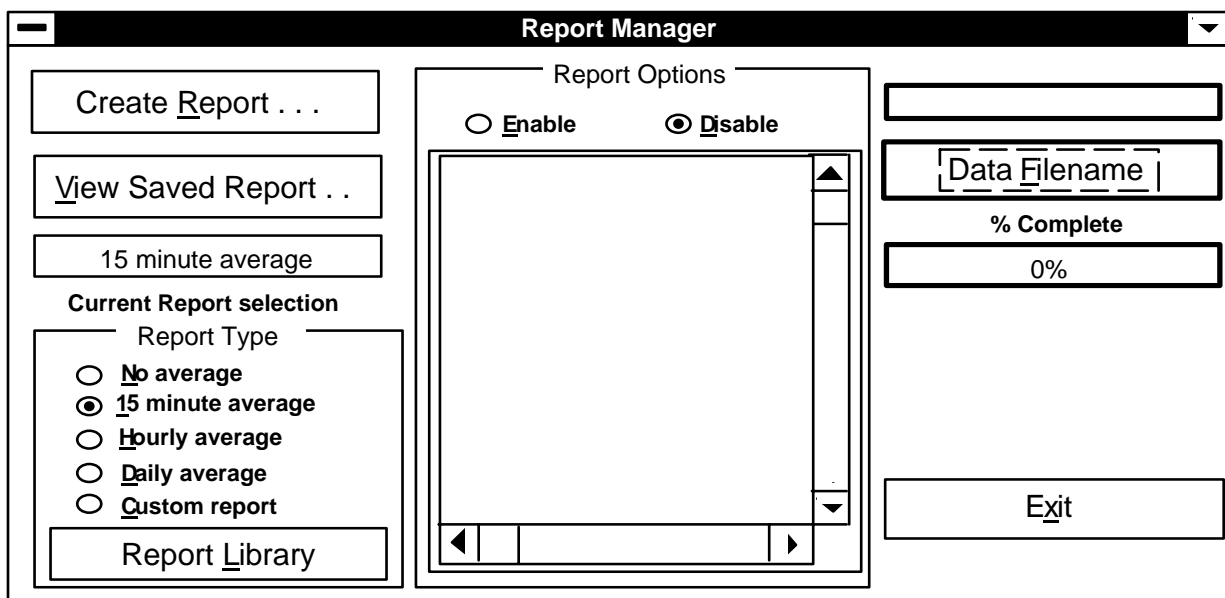


FIGURE 6-1.
Report Manager Window

6.1 Introduction

This Section 6 of the manual provides detailed explanations of Q-Tracker operations in the report mode (Section 2.2). The other three sets of menus (Opening, Spreadsheet, and Graph menu bars) are explained in Sections 3, 4, and 5 of the manual. To get into the report mode, see Section 3.6.2.

Whenever you want to display or print a flow data file, you first have to open it in either a report or a spreadsheet. Graphs are created only from spreadsheets, so a spreadsheet is often created merely as an intermediate step in generating a graph.

A report is similar to a spreadsheet in that both present Q-Tracker measurements from a flow data file. Both use tabular formats consisting of rows and columns, with each row representing a time of measurement. The difference is that a report has a summary for each day with minimum, maximum and average values for level, velocity and flow as well as the total flow.

Refer to Section 2.2 for an introduction to the menu structure by which Q-Tracker is used.

Refer to Section 2.4 for an introduction to preformatted reports.

6.2 Report File Format

Q-Tracker converts a downloaded data file into a data base format. A new file is created with the same name as the raw data file except the extension identifier '@' for the raw data file name is 11209410.@07, the new data base file name will be 112094.d07. Reports are then generated from the data base. There are three standard types of reports: no average, hourly average, and daily average. Generated reports can be saved for future review in the Q-Tracker report format or can be saved in several different formats for exporting for use in other programs. This will be explained in more detail later in this section.

6.3 The Report Manager

To enter into the report mode, click on the Report icon or in the Opening menus select the Data menu then Report. The Report Manager window will appear.

The Report Manager allows the selection of the type of report desired and selection of the data file for which a report is to be made. The Report Type needs to be selected before selecting a data file.

6.3.1 “Report Type”

The Report Type section of the Report Manager selects the type of report that is to be generated. There are five choices: No average; 15 Minute average; Hourly average; Daily average; Custom report. To make a selection click on the desired type of report. The circle will darken for the selected report. All of the report types give daily summaries of date and time of the minimums and maximums of level, velocity and flow and the average flow and daily total.

When Customer report is selected, the Report Library button will become active. Click on the Report Library and the Qtracker Report Directory window will open. There will be six report files listed in the file box; qt15min.rpt, qtrday.rpt, qtrdayg.rpt, qtrevr.rpt, qtrwkly.rpt, and qtrwklyg.rpt. The report files; qt15min.rpt (15 minute average), qtrday.rpt (hourly average), qtrevr.rpt (no average) and qtrwkly.rpt (daily average) are the standard reports listed in the Report Type box. The files qtrday.grpt and qtrwklyg.rpt are the custom reports presently available. These reports are the same as the standard reports except a graph of the flow data is added after the summary of each day.

6.3.2 “Report Options”

This section of the Report Manager allows the user to write a script that selects specific records to be generated into a report from a file data base. For example, a specific time frame of a data file such as records between two dates, or only Saturdays and Sundays, or only records that have flow above a specific flow. The following are scripts that can be entered into the Report Options box:

`{{data.date/time}}>(date(yyyy,mm,dd))` **and**
`{{data.date/time}}<(date(yyyy,mm,dd))`

This script selects all records for a report between the first date and the second date. The date must be in the form as shown; year, month date (1994,06,07). If the date in the script had been 1994,05,30 and 1994,07,01, the report would be from June 1, 1994 to June 30, 1994.

`{{data.date/time}}>(date(yyyy,mm,dd))`

This script selects all records for a report after the date in the script.

`dayofweek {{data.date/time}}=1`

This script selects records for every Sunday in the data file data base. To select more than one day, repeat the script again inserting ‘or’ between the two scripts. For example, to select Sundays and Saturdays the script would be:
`dayofweek {{data.date/time}}=1 or`
`dayofweek {{data.date/time}}=7`

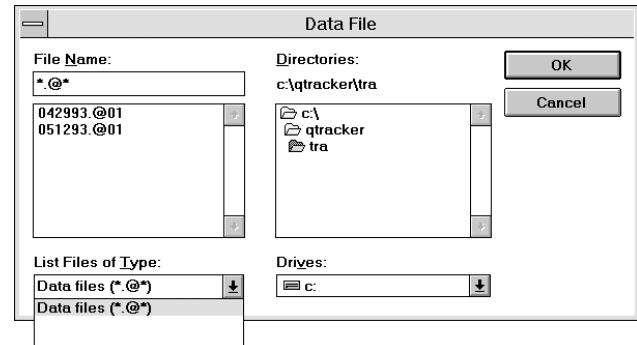
`{{data.flow}}>2`

This script selects all the records that have a flow value above 2. In this example the flow units are in MGD (determined by the setup file in the data file) so only the records with flow over 2 MGD will be in the report. Records can be selected based on level or velocity by substituting velocity or level for flow in the script.

The Report Options must be enabled to work. Click on the Enable to activate the use of the script in the box. To deactivate the Report Options, click on Disable. The script in the box will be saved automatically when closing the Report Manager.

6.3.3 “Data Filename Button”

After selecting the type of report desired, click on the Data Filename button. The Qtracker Datafiles window will appear, which is typical of Windows applications. The appropriate file type is already selected (extensions beginning with @). Select the desired data file from the appropriate subdirectory (study name) under the Qtracker directory. See Section 6.3.6, Report Window, for explanation of the report functions.



6.3.4 “Create Report Button”

This button becomes active after a data file has been selected. This allows the user to change the type of report after a report has already been generated from a data file.

6.3.5 “View Saved Report Button”

This button allows the user to recall a report previously saved. Click on the View Saved Report.. button and the Qtracker Saved Reports window opens. Select the desired report from the files listed in the file box. The report will be regenerated in the Report Window. See Section 6.3.6 for instructions on the Report Window.

6.3.6 “Report Window”

After selecting the data file, the report window appears as shown in Figure 6-2. At the bottom right of the window the total number of records and the percent

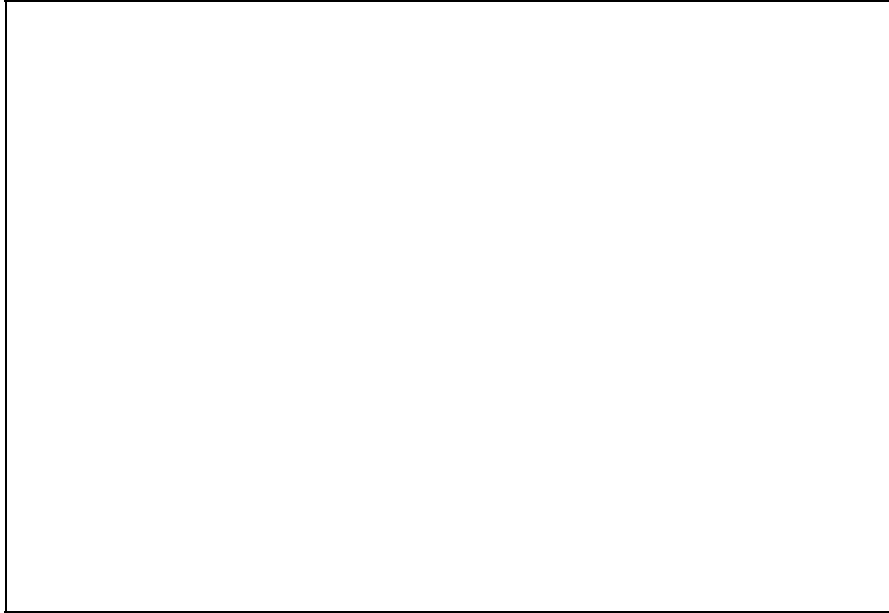


FIGURE 6-2
Example of Typical Report

completion of the search will be shown. Once the search is complete the progress of the structuring of the report will be shown at the bottom left of the window as the pages are completed. There is a Cancel button at the bottom of the window that can be used to stop the data base search or structuring of the report.

Once the report is complete the number of pages and page presently being displayed is shown at the bottom left of the report window. There are arrow buttons to the left and right of the number of pages. The first arrow button to the right, when clicked on, advances through the report one page at a time. The second arrow button to the right, when clicked on, advances to the end of the report. The first arrow button to the left, when clicked on, goes backwards through the report one page at a time. The second arrow button to the left, when clicked on, goes back to the beginning of the report.

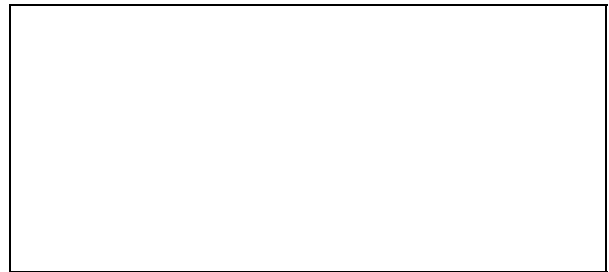
There are four icon buttons at the bottom of the Report Window. The first icon on the left is the View icon, the second icon is the Print icon, the third icon is the Export icon and the fourth icon is the Email icon (which is not operational at this time). Click on these buttons to activate their function.

The View icon allows the zooming in and out of the report. Click on the View icon button and the view zooms out to show the complete page of the report. Click on the View icon button again and the view zooms in.

Click on the View icon button again and the view goes back to the normal view.

The Print icon allows the printing of the report. Click on the Print icon button and the Print window will appear:

The printer currently selected in the Windows Print



Manager is shown. If the printer shown is not the desired printer, cancel the Print window and switch out of Q-Tracker for Windows to the Program Manager and open the Print Manager. Select the desired printer and return to the Q-Tracker program. Select the Print icon again to open the Print window. There is a print range selection where all pages will be printed or only selected pages. If the desire is to print only a select number of pages click on Pages to activate the From and To boxes. The From box will be highlighted. Type the first page to be printed then press the Tab key, or click in the To box and type the last page to be printed. If more than one copy is desired, click in the Copies box and type the number of copies. Press the Enter key or click on the OK button to start the printing operation.

The export icon allows the saving of a report file. Click on the Export icon button and the Export window appears. There are several formats that the report can be converted into for use in other programs. Click on the down arrow next to Format box and the list of choices will



appear. Select the desired format by clicking on it. Press the ENTER key, or click on the OK and the Choose Export File window appears. The File Name box will be highlighted. Type in the desired name for the file. The file will be saved under the qtracker directory unless the user chooses another directory in the Directories box. Press the Enter key or click on the OK button to complete the export.

To quit the report click on the Close button at the bottom of the Report window. To exit out of the Report Manager click on the Exit button.

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6116 E. 15Th Street, P O Box 581390
Tulsa, Oklahoma 74158-1390
(918) 836-8411 FAX: (918) 832-9962