

Section Two - FLOWCOM 32 SOFTWARE

SYSTEM REQUIREMENTS

FLOWCOM 32 was written for the Windows Operating System. It will not operate on Windows 3.X but will operate on all versions of Windows 95 or higher. The minimum system requirements for a computer using this software are a Pentium processor, 256 meg's of RAM, and a USB or serial port. This manual is written with the assumption that the user is familiar with common Windows operating conventions.

CAUTION: The computer should never be connected to the SPIDR during the boot-up process.

INSTALLATION

Installation from Web Site Download

At DRC's website (www.spidr.com) it is possible to download the latest version of our FLOWCOM 32 SPIDR communication software. To do this, simply follow these steps:

- 1) On the DRC homepage, click on "Downloads" in the left-hand menu bar. This will bring the user to DRC's software downloading page.
- 2) Click on the "Download Software" hyperlink.
- 3) Click on the "Download Flowcom" hyperlink. The user may then choose the option of a single file or two files sized to fit two 3 1/2" floppy disks.
- 4) Run FLOW32.EXE to unzip the FLOWCOM 32 installation files into a temporary directory. One of these files should be called "SETUP.EXE"
- 5) Run SETUP.EXE to begin installing FLOWCOM 32.

Installation from Floppies

Before beginning the installation process from floppies, close all open programs on your computer. Insert disc 1 into the A: drive of your

computer and select RUN from the Windows START menu. From the "Run" window, click the "Browse" button, select the "A" drive and click "SETUP.EXE". This will initiate the "Install" process during which you will be prompted for disc 2. The FLOWCOM software will be installed in a directory named "SPIDR".

Installation from CD

Before beginning the installation process from CD, close all open programs on your computer. Insert the CD-Rom into your computer and select RUN from the Windows START menu. From the "Run" window, click the "Browse" button, select the CD drive and click "SETUP.EXE". This will initiate the "Install" process. The FLOWCOM software will be installed in a directory named "SPIDR".

SPIDR COMMUNICATION

Many computers, especially laptops, no longer come with serial (RS-232) communication ports and only offer USB ports. The SPIDR EM is capable of communicating by either serial or USB port and is therefore supplied with both serial and USB communication cables. Although the SPIDR end of each cable is identical, the computer end is unique for each cable type. Information about the operational characteristics and procedures for each communication method is presented below.

RS-232

The maximum length of the serial cable is limited to 200 feet. However, as cable length increases from the standard 10 foot length, the communication speed (baud rate) must be reduced from the standard rate of 115,000. As a rule, any cable length over 75 feet should have the data transfer speed reduced to 9,600 baud. Baud rate is set from the FLOWCOM main menu screen as described in Section 2-7 under Options.

USB

The maximum length of a USB cable is 16 ft. USB repeater cables are available for communication of longer distances. These repeater cables are not compatible with some laptops. USB data transfer rates are 5-10

times faster than RS-232 and when communicating by USB, all power comes from the PC including power to the SPIDR.

There are a few differences in procedure between Serial and USB communication which must be followed.

- Do not start FLOWCOM until SPIDR connected**
- Do not disconnect SPIDR until FLOWCOM closed.**
- Select highest numbered comm. port when checking ports.**

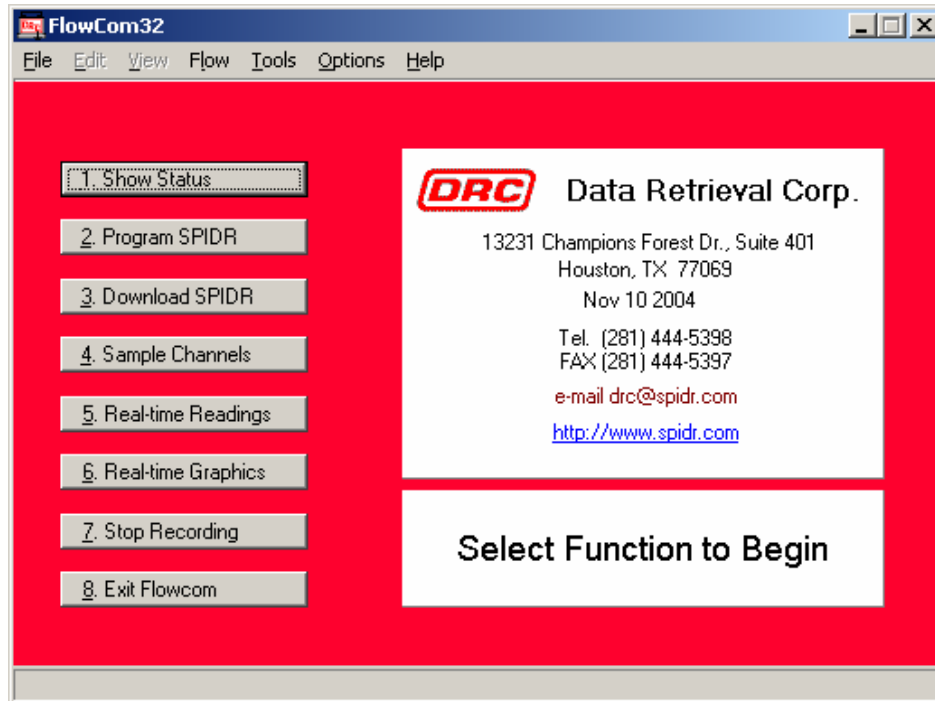
The SPIDR must be treated like any other USB device. Connecting and disconnecting to the PC must follow a standard procedure.

- a. Connect SPIDR to computer with USB Cable.
- b. The screen should show a box saying "Found New Hardware SPIDR!!!"
- c. After a pause it will then flash screens saying "Installing"

You are now ready to start the FLOWCOM communication program. If you do not have this program installed on your computer, it may be downloaded from the DRC website at www.spidr.com as described in Section 2 of this manual. After starting FLOWCOM, click on OPTIONS in the top menu bar of the Main Menu screen and then click on "COM PORTS" and select the highest number Com Port shown.

MAIN MENU

When activating the FC32 program for the first time you will be prompted to select a serial port by a drop-down menu. This is usually port 1, however, if the port is incorrectly chosen, it can be changed from the OPTIONS selection on the Main Menu. The Main Menu Screen is shown below.



The default color scheme that appears on the Main Menu may be changed by double clicking the left mouse button anywhere on the color that is to be changed. A color palette will appear allowing selection of an alternative color scheme. The color of the menu bar and the numbered buttons can not be changed.

Menu Bar Options

File

There are two types of files generated and used by the FC32 program. They have the extensions "DLD" and "MK2" and are created when the **SPIDR** is downloaded. These files will have the same name with the exception of the extension. As a protection against the loss of accidental loss of data, the DLD file may not be edited but the MK2 file may be.

The "File" option on the top menu bar produces a drop-down menu with the same choices that appear in most Windows programs. The exception is the "Make Delta Time File" option. This option is used to generate an ASCII file (extension ASC) with Column 1 being delta time in fractional hours and Column 2 pressure. If external transducers were used, they would appear in Columns 3 and 4. The "Make Text File" option generates an ASCII file with the extension "TXT". This file contains the data displayed in the same format shown in the FC32 "View Data" window and can be read by Word or Excel.

Edit

The "Edit" option will be grayed out if a data file has not been loaded. Selecting the "Edit" option produces a drop-down menu showing several data editing functions available. These very useful and powerful functions are described in detail later in this section of the manual.

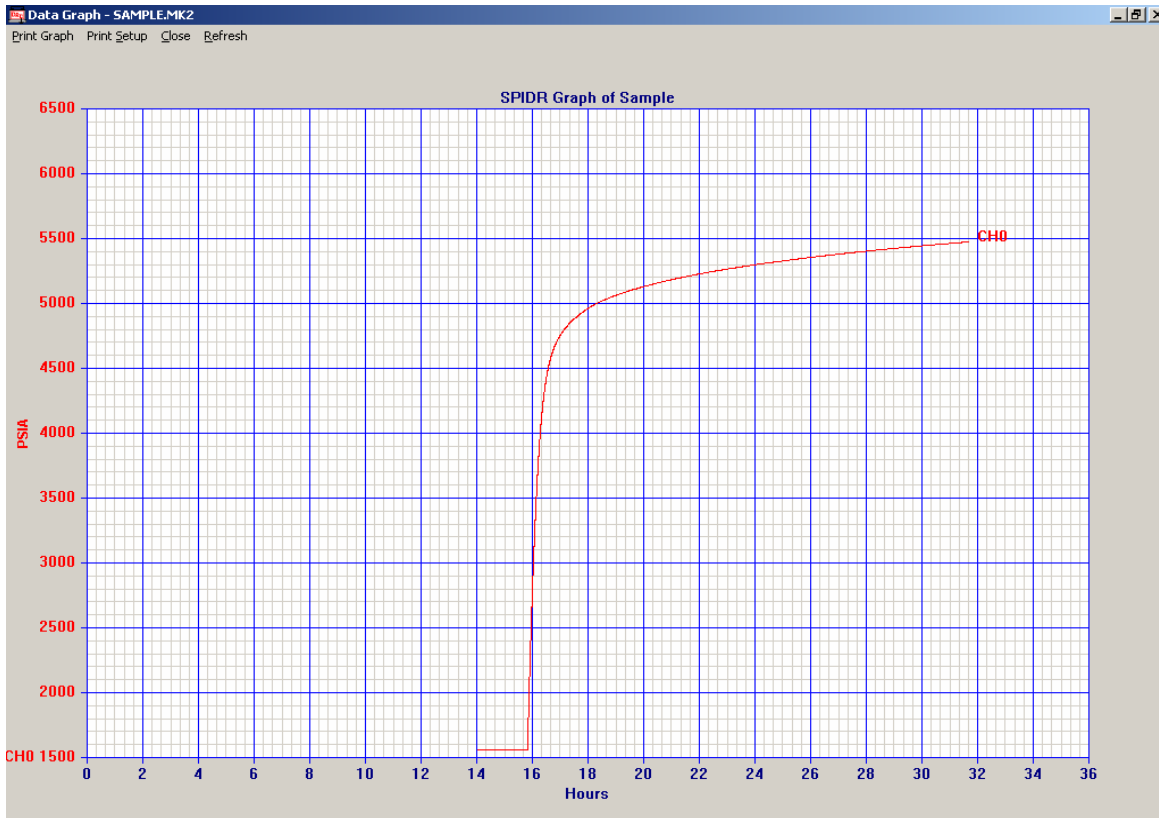
View

The "View" options will be grayed out if a data file has not been loaded. With a file loaded, selecting this option will show a drop-down menu with the choices "View Data" and "View Graph (Sensors)". Immediately after loading a data file, the data screen appears as shown below.

Record	Reading	Date	Time	WHP
				PSIA
1	325	11/30/2003	14:03:09	1,558.35
2	326	11/30/2003	14:04:39	1,558.42
3	327	11/30/2003	14:06:09	1,558.36
4	328	11/30/2003	14:07:39	1,558.48
5	329	11/30/2003	14:09:09	1,558.62
6	330	11/30/2003	14:10:39	1,558.55
7	331	11/30/2003	14:12:09	1,558.60
8	332	11/30/2003	14:13:39	1,558.47
9	333	11/30/2003	14:15:09	1,558.55
10	334	11/30/2003	14:16:39	1,558.53

Wellname: Exxon State #	Serial Number: 3015	Records: 1553
Started on: Sun, 11/30/2003 14:03:09	Sample Window: 2.00 PSIA	
Ended on: Mon, 12/1/2003 07:42:39	Sample Rate: 00:00:03	

Clicking the “View” option in the top menu bar opens a drop down menu that will allow the user to graph the data file. The two options for graphing are “View Graph (Sensors)” and “View Graph (Flow)”. The Sensors graph option is always available and when selected, will plot the pressure data as well as any information recorded by the external transducers. The graph data option can also be accessed by right-clicking with the cursor located in the data in the window and selecting “Graph Records” from the menu. The Flow graph is only available if Flowcom has calculated flow rates and cumulative production using either differential pressure or turbine meter counts from an external transducer connected to the **SPIDR**. The graph window appears below.



The menu bar at the top of the window provides the user with the options of printing the graph, setting the printer type, closing the window or refreshing the graph window. The refresh option is used to redraw the graph after data editing options are exercised. Right clicking on this window will generate a drop-down menu providing the user with the same menu bar options available from the Main Menu window and View Data window.

Flow

The "Flow" option allows calculation of gas flow rates through an orifice plate using AGA3 standards. The drop-down menu provides the choices of "Manual Flow Calculation" and "Calculate Flow Column" and "Calculate Cum. Production". The manual option allows calculation of a flow rate for a single set of conditions. The "Calculate Flow Column" option requires a data file in memory which includes a column of measured pressure drops (d/p in inches of water). If such a file has not been loaded, the second choice is grayed out. Selecting the "Manual Flow Calculation" option will bring up the following window.

Manual Flow Calculation Data

Constant Value (psig)

Differential Pressure (in H2O)

Flowing Temperature (F)

Specific Gravity of Gas

Orifice Diameter (inch)

Internal Pipe Diameter (inch)

Tap
 Flange Tap
 Pipe Tap

Flow Rate (Mcf/d)
2657.01

After entering values in each of the fields and specifying whether Flange Tap or Pipe Tap, the flow is calculated by clicking on the "Calculate Flow" button.

If the file contains a column with measured values of differential pressure, selecting "Calculate Flow Column" will produce the window shown below.

Data Input for Flow Calculation

Specific Gravity of Gas

Orifice Diameter (inch)

Internal Pipe Diameter (inch)

Temperature
 Source
 Constant Value (F)

Pressure
 Source
 Constant Value (psig)

Tap
 Flange Tap
 Pipe Tap

Records
 From
 to

After entering values for gas gravity, orifice diameter and pipe diameter; the user either enters constant values for line temperature and pressure or specifies that an external transducer has been connected to the SPIDR and the measured variable has been recorded on Channel 1and/or Channel 2. The user then specifies the data range for which the flow is to be calculated.

Flowcom can also generate cumulative production for rates recorded by a turbine meter. To do this select the third option from the "Flow" drop down menu labeled, "Calculate Cum. Production". Upon selecting this function, Flowcom will generate an additional column of data consisting of cumulative production. This data may be plotted using the "View Graph (Flow)" option from the "View" menu.

Tools

Selecting "Tools" will produce a drop-down menu that includes the same options as the buttons on the face of the Main Menu.

Options

Selecting "Options" will produce a drop-down menu with two items, "Com Port" and "Parameters". Selecting "Com Port" will show the ports available on your computer and highlight the port that has been selected. Ports that already in use will appear grayed out. The active port may be changed by selecting one of the other ports.

Choosing "Parameters" opens a window that gives the user options for pressure units, communication speed, and file characteristics. Pressure may be displayed as Bara (1 Bar = 0.0689 PSI) or PSIA. The "Destination" option should always be set to MK2. The default value for the "Download Baud" rate is 115,200. Some computers, especially older laptops, may have problems at that rate as evidenced by impossible dates, times, and/or pressure values appearing in the data file. Should this occur, reduce the baud rate and repeat the download.

Help

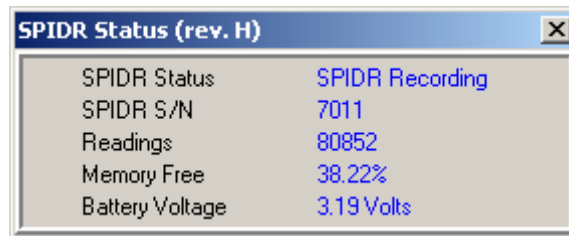
Selecting "Help" will produce a single item drop-down menu labeled "About". Selecting "About" will generate a screen showing the version

number of the program as well as the DRC phone number and the DRC web site link.

Main Menu Buttons


Show Status

To check the status of a SPIDR, it must be first connected to the serial port of the computer. After clicking "Show Status", if the SPIDR is not connected or communicating properly, a window will appear saying, "SPIDR Not Found". If the unit is communicating properly, the following window appears.



SPIDR Status (rev. H)	
SPIDR Status	SPIDR Recording
SPIDR S/N	7011
Readings	80852
Memory Free	38.22%
Battery Voltage	3.19 Volts

Clicking on this screen will provide the expanded Status Display shown below.



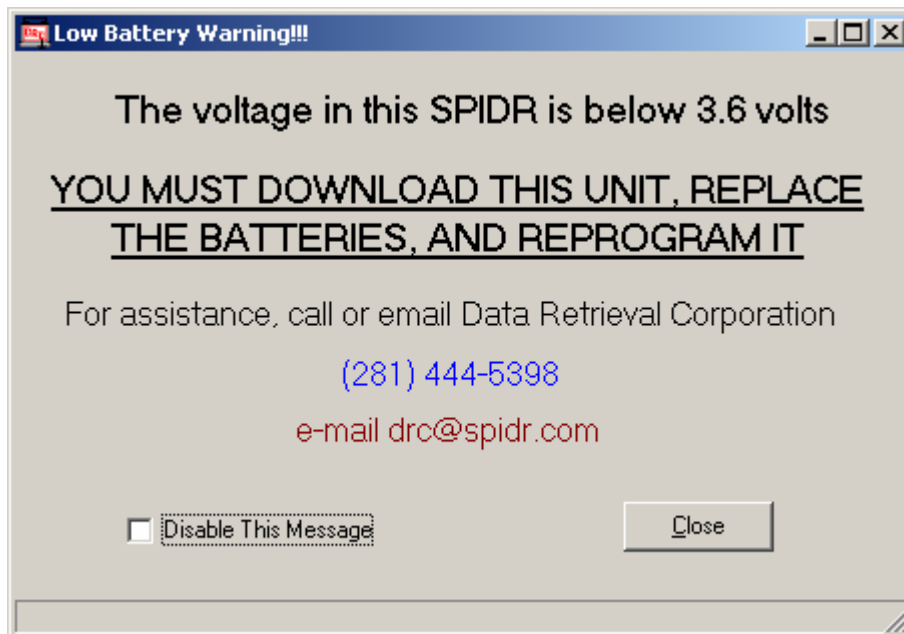
SPIDR Status (rev. H)			
SPIDR Status	SPIDR Recording	Well Name	TEST
SPIDR S/N	7011	Sample Rate	00:00:02
Readings	80852	Sample Window	0.01 PSI
Memory Free	38.22%	Max. Interval	00:01:00
Battery Voltage	3.19 Volts		
	SPIDR TIME	LAST RECORDED	START
Date	November 15, 2004	November 15, 2004	November 11, 2004
Time	09:47:05	09:47:01	16:58:18
Channel 1	Active	Channel 2	Active
XDCR type	Pressure	XDCR type	Temperature
Range Min	0.00	Range Min	50.00
Range Max	1000.00	Range Max	250.00
	LABEL	MINIMUM	MAXIMUM
Channel 0	WHP	14.62	15.94
Channel 1	Channel 1	-333.15	-332.64
Channel 2	Channel 2	-16.63	-16.53

This screen may be printed by right clicking the mouse and selecting the "Print Status" option. The top pane of the Status window indicates if the SPIDR is recording, stopped or programmed. It also shows the well name, the serial number of the SPIDR, the number of readings that have been stored in memory and the percent of Memory Free. Other important information are the battery voltage, sample rate, sample window and the maximum time interval between samples.

The second pane displays the time and date in the SPIDR clock at the moment when the status was read. Also shown in this pane are the dates and times when the SPIDR took its first and last readings.

The third pane in the Status window shows if external transducers have been connected and their properties. The bottom pane shows the maximum and minimum recorded values for each active channel.

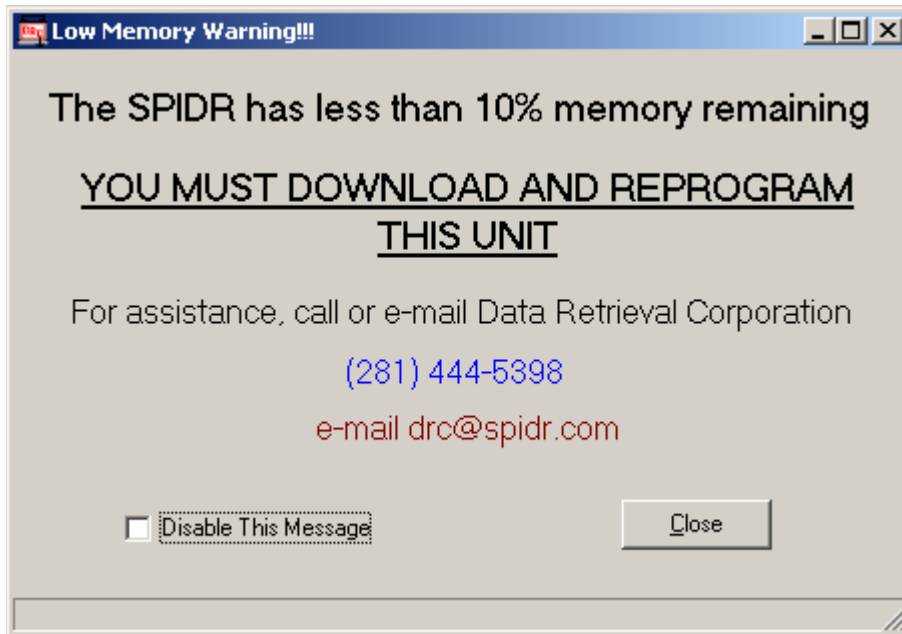
When checking status, If the battery voltage is less than 3.6 volts, the following warning screen will appear asking that the SPIDR be downloaded and the batteries replaced.



It is important to note that after installing new batteries, the unit must be immediately programmed. Failure to do so will result in premature battery

failure. This screen must be acknowledged before the mini-Status screen will appear.

Likewise, if the memory free in the SPIDR is less than 10%, the following low memory screen will appear.



Program SPIDR

If a SPIDR is already recording, it will be necessary to stop it before it is possible to program the unit. Attempting to program a recording SPIDR will generate a window prompting the user to stop recording and download the data. The following window will then appear after selecting the Program SPIDR button.

WARNING: Programming the SPIDR erases any data stored in memory.

The user begins by entering a well name. Use the mouse or Tab down to the next field which is "CH0 Name". CH0 is the reading from the SPIDR's internal pressure transducer. The default name is WHP; the user may enter a different name. The sample rate is entered as the number of seconds between samples. The pressure window is entered in PSI with the smallest value being 0 PSI . The pressure units may be changed to Bar from the Main Menu window by selection "Options" and then "Parameters" and selecting "Bar".

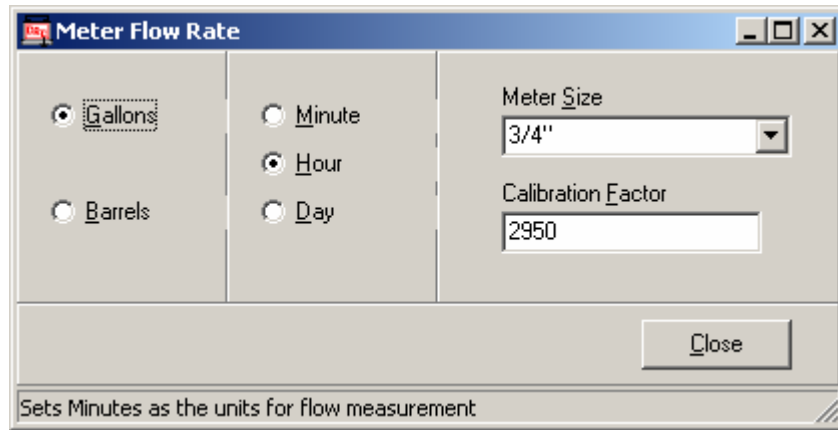
The SPIDR utilizes Intelligent Sampling which accepts or rejects new samples based on the user specified change (Pressure Window) between samples. Although the SPIDR samples at the same fixed sample rate from beginning to end of a test, the samples are only stored if they differ from the last saved value by the specified Pressure Window. However, at no time will the SPIDR skip more than 29 consecutive readings without storing the 30th. If the Pressure Window is set to zero, every sample is stored regardless of change. The sampling rate and pressure window greatly affect the rate at which the SPIDR memory fills. Here are some suggested programming rates:

Test Duration	Sample Rate (secs)	Pressure Window (PSI)
≤1 week	2	1
1 – 3 weeks	3	3
≥1 month	5	5

The next two fields are used to set the date and the time in the SPIDR's clock. If the small box next to the label "Use System Time" is checked, the SPIDR clock and calendar will be set to the same time and date as the computer used to program the SPIDR. If it is necessary to use a different time and date, un-click the "Use System Time" box which will make the time and date fields accessible. Unchecking "Use System Time" is typically only used when the SPIDR is being sent to another time zone, or the programming computer's internal clock is in error. Clicking the small arrow next to the date field will pop-up a calendar from which the user may select the desired date. The user then sets the desired time taking care to use 24 hour military time. The SPIDR may be started immediately by clicking "Start Now" box. If the user wishes to program the SPIDR to wake up at a specified date and time in the future, uncheck the "Start Now" box and enter the date and time in the fields adjacent to the "Start Now" box.

If external transducers are to be used, first click the "Channel 1 Active" box. If a sample interval of one second was selected, a warning will appear saying "Programmed Interval must be two seconds or more for external transducers". If the sample interval is greater than two seconds, click the small arrow to the right of the field labeled "Pressure". A window will appear providing choices for pressure, temperature, d/p cell or turbine flow meter transducers. Depending on the selection of transducer, the Minimum and Maximum fields will automatically change to the default values for the type of transducer selected. It may be necessary to change these default values if the span of the selected transducer is different from the default value. After selecting the transducer type, the user may enter a label in the next field in place of the default label, "Channel 1". If a second external transducer is to be used, the procedure is repeated.

Selecting "Turbine Flow" will cause a second window will appear in which the user specifies the units for rate and time as well as the meter size. This window is shown below:

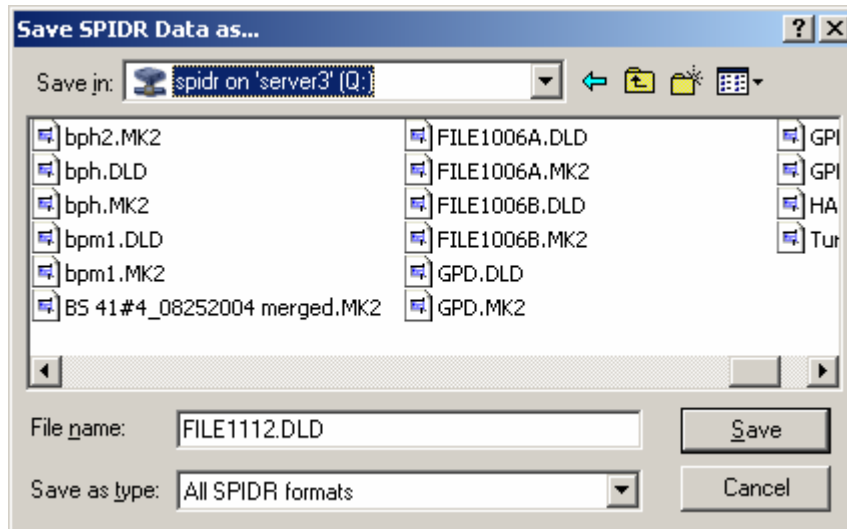


Once the appropriate units and size are selected, the nominal calibration factor for this sized meter will appear in the window. This will likely differ from the calibration factor specific to the meter being used. The user may edit the displayed calibration factor as necessary. The Turbine Flow option may only be selected for Channel 1; it will not work on Channel 2.

After entering all the desired information, the SPIDR is then programmed by clicking the "Program SPIDR" button. After several seconds, during which the program information is sent to the SPIDR, a window will appear saying "SPIDR programmed. Use STATUS command to confirm parameters". It is strongly recommended that this suggestion be followed and if possible, a copy of the status screen be printed and retained.

Download SPIDR

This command is used to download a **copy** of the data acquired by the SPIDR. Downloading does not remove the data from SPIDR memory, it only makes a copy which can be saved to a location specified by the user. Pressing the "Download SPIDR" button will bring up a window saying "Synchronizing Transfer". After a few seconds a save file window will appear as shown below.



A default name will automatically appear in the format FileMMDD.DLD. Simply overwrite the default name with a descriptive name of your own choosing. We recommend the format "XXXXmmdd". The X's represent a four character abbreviation of the well name and "mmdd" represents the day and month the file was downloaded. Do not use an extension; it is automatically appended. Pressing the "Save" button will then automatically save two files, one non-editable file with the extension "DLD" and one editable file with the extension MK2. As a precautionary measure, Flowcom will now allow the user to overwrite an existing DLD file; a different file name must be used. This is done to ensure that no previously recorded data is accidentally lost. As soon as the file save process is complete, the screen shown below will appear. This screen is divided into three sections. The top two rows and the left column comprise the first section, the bottom four rows comprise the second section and the data the third section. The background colors of each of these sections are user selectable by double clicking in those areas. After the download has been completed, the user may graph and edit the data as described in following paragraphs or exit the program.

Record	Reading	Date	Time	WHP	PSIA
1	325	11/30/2003	14:03:09	1,558.35	
2	326	11/30/2003	14:04:39	1,558.42	
3	327	11/30/2003	14:06:09	1,558.36	
4	328	11/30/2003	14:07:39	1,558.48	
5	329	11/30/2003	14:09:09	1,558.62	
6	330	11/30/2003	14:10:39	1,558.55	
7	331	11/30/2003	14:12:09	1,558.60	
8	332	11/30/2003	14:13:39	1,558.47	

Wellname: Sample Serial Number: 3015 Records: 1553

Started on: Sun, 11/30/2003 14:03:09 Sample Window: 2.00 PSIA

Ended on: Mon, 12/1/2003 07:42:39 Sample Rate: 00:00:03

Sample Channels

This button asks the SPIDR to display the values being measured on all active channels. The SPIDR does not have to be programmed or recording for this function to work. Clicking this button results in the following window;

Channel	Reading	Status
Channel 0 (internal)	18.06	Active
Channel 1 (external)	Not Active	Not Active
Channel 2 (external)	Not Active	Not Active

Buttons: Update, Close

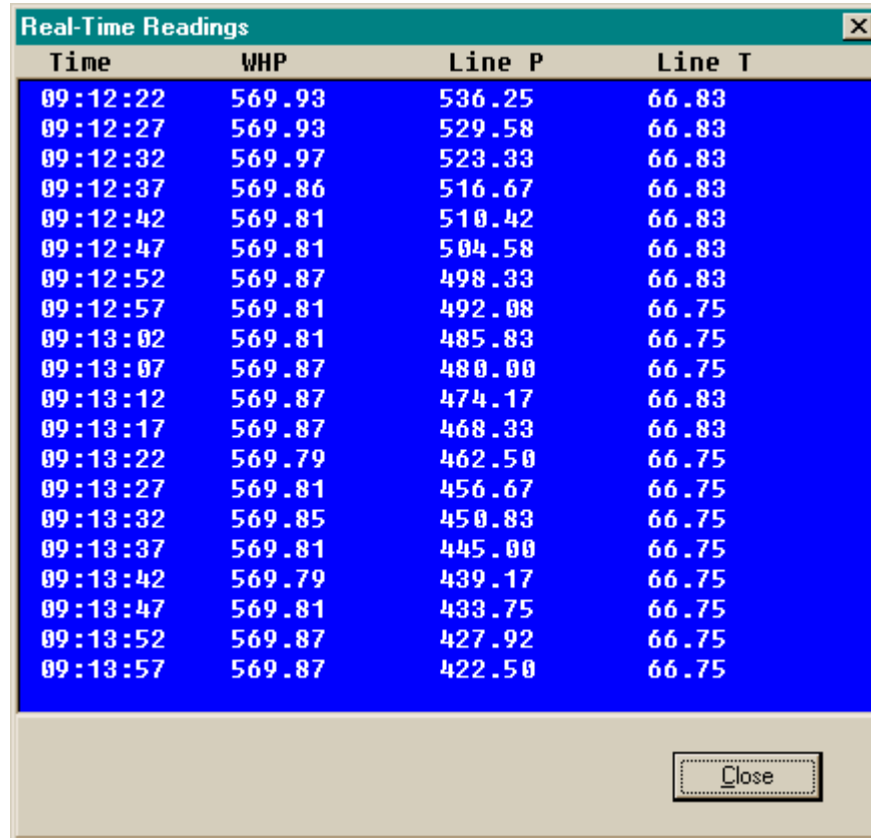
To refresh the displayed values, click the "Update" button. To exit this window, click the "Close" button.

Real-time Readings

"Real-time Readings" asks the SPIDR to display the readings being measured on all active channels as they occur. Each set of readings is

accompanied by the time. A sample of the Real Time Readings Window appears below.

WARNING: Battery usage is accelerated during Real-time Readings.

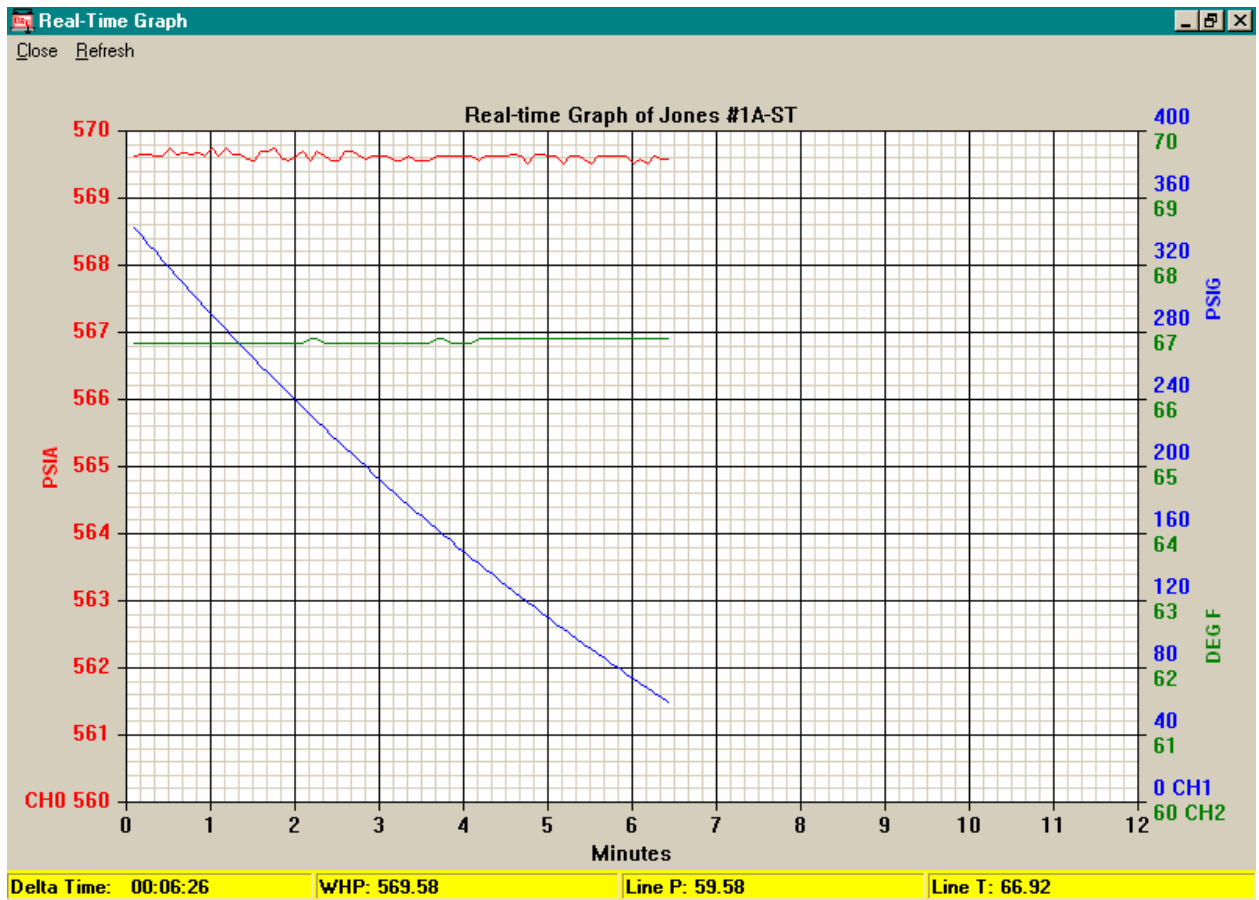


Time	WHP	Line P	Line T
09:12:22	569.93	536.25	66.83
09:12:27	569.93	529.58	66.83
09:12:32	569.97	523.33	66.83
09:12:37	569.86	516.67	66.83
09:12:42	569.81	510.42	66.83
09:12:47	569.81	504.58	66.83
09:12:52	569.87	498.33	66.83
09:12:57	569.81	492.08	66.75
09:13:02	569.81	485.83	66.75
09:13:07	569.87	480.00	66.75
09:13:12	569.87	474.17	66.83
09:13:17	569.87	468.33	66.83
09:13:22	569.79	462.50	66.75
09:13:27	569.81	456.67	66.75
09:13:32	569.85	450.83	66.75
09:13:37	569.81	445.00	66.75
09:13:42	569.79	439.17	66.75
09:13:47	569.81	433.75	66.75
09:13:52	569.87	427.92	66.75
09:13:57	569.87	422.50	66.75

Real-time Graphics

Clicking this button will generate a window displaying a plot of the measured values of all active channels. The pressure reading from the internal transducer will be displayed on the left-hand vertical axis and the scales for active external transducers will be scaled on the right-hand vertical axis. At the bottom of the screen will be displayed the elapsed time since the display was called and the digital values of the active channels as they are measured. The scales for time and the measured variable will automatically re-size to display values exceeding the default graph size. The Real-time Graphics window is shown below.

WARNING: Battery usage is accelerated during Real-time Graphics.



Stop Recording

This button is clicked to stop the SPIDR from recording. It is necessary to stop recording before the SPIDR may be re-programmed. After clicking

this button, the user will be prompted to download the SPIDR. If “yes” is selected, the procedure for downloading and file naming described above is followed. If “no” is selected, the SPIDR can then be re-programmed but any data in memory will be irretrievably lost.

Exit Flowcom

Clicking this button will close the FC32 program.

EDITING DATA

There are several data editing functions built-in into FC32. These may be accessed by clicking “Edit” on the menu bars of the main menu or the data window. The edit functions may also be accessed by right clicking on the data window. The logic of each of the edit functions is described in the following paragraphs. **All editing functions reference the Record number, not the Reading number.**

Delete Records

This function allows the user to delete either a single record or a block of consecutive records. It is important to distinguish between “Reading” and “Record”. “Reading” is the number attached to the sample and is never changed. When a file is edited, the number of records in the file may change but the reading number associated with each remaining sample stays the same.

Must Go Up/Down

These functions were developed for situations in which leaks at the well-head resulted in pressure spikes in the data. This sometimes happens when the shut-in pressure is much higher than the flowing pressure. The leak does not appear until after shut-in. The user first identifies at which Record number in the data file he wishes to invoke the function. The Must Go Up or Must Go Down function is then selected. A window will appear requiring the user to specify the start and end point for the filtering process. The program will then start with at the specified Record and delete any reading which is (less than/more than) the previous reading until it reaches the specified end point.

Filter Less Than/Greater Than

These functions were designed to allow the user to quickly filter irrelevant readings such as atmospheric pressure. It may also be desirable to filter all readings that exceed a certain pressure. Selecting this function results in a window prompting the user to specify the starting and ending record numbers to be covered by this routine. The window also prompts for a "key value" above which or below which readings are deleted.

Condense

The SPIDR can store a maximum of 512,000 samples. Very few programs for well test analysis are capable of processing that many samples. The "Condense" function in FC32 provides the user with an easy way to reduce the number of readings in a file by deleting those readings which do not change significantly from adjacent readings. The user specifies the range over which to condense and then enters a pressure window. The Condense function will start with the first sample in the selected range and compare it to the next sample. If the pressure change is not greater than plus or minus the pressure window, that sample is discarded. This process continues until a sample is found whose change does exceed the pressure window. The newly saved sample then becomes the basis for comparison and the process is repeated until the end of the range is reached. When the "Condense" routine is completed, a window tells the user the number of samples at the start of the "Condense" process and the number at the end of the process and gives the user the option to repeat or reverse the process. The user may then enter a new pressure window, either larger or smaller than the original pressure window depending on whether the "Condense" process resulted in too few or too many samples.

Mow the Lawn

This editing function was developed for the situation in which a data file is extremely noisy as evidenced by a graph of the pressure readings showing a broad band rather than a sharp line. These files are typified by large numbers of readings over a comparatively short time. The logic behind this editing function is to look for and delete the data extremes over a span of samples. For example, if a plot of the data shows a pressure band that is five psi in magnitude, the user might enter a pressure window of 3 psi. Starting with the first sample in the selected range, the program will then look at the next two samples to see if the changes are

greater than 3 psi from the first sample. If both samples are greater than 3 psi different, they are saved. If only the first sample is greater than 3 psi, then that sample is considered a "spike" and it is discarded. The process is repeated until reaching the end of the selected range after which the user will be prompted to condense again. Subsequent condensation can use larger or smaller windows depending in the event the routine over or under reduced the desired effect.

Undo

The "Undo" function is used to reverse any editing function that produces an undesired result. The "Undo" function only works on the last edit.

Jump to record

This edit function permits the user to jump to any record in the file. It should be noted that after each editing operation on a file, the number of records will decrease and the remaining records will be sequentially re-numbered. However, the individual readings will retain their original reading number.