

ID-2000
INSTRUCTION MANUAL

REVISION: 1/94

CAMPBELL SCIENTIFIC, INC.

PREFACE

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Campbell Scientific, Inc. provides technical support on the use of ID-2000 with data collected with Campbell Scientific dataloggers.

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[illegible]

INTRODUCTION

ID-2000 is a graphical data analysis software package that is completely mouse driven, making analysis of data fast and simple. ID-2000 allows data to be displayed in three ways: strip chart format, a simple X-Y graph, and a multi-plot X-Y graph. In any of these formats, the mouse can be used to zoom in on areas of particular interest. All parameters including derivatives and integrals are available for plotting. ID-2000 also allows you to create custom "calculated" parameters based upon equations that you enter. The equation may consist of any available parameters and standard mathematical functions. All plots are available with three levels of data smoothing. ID-2000 is capable of plotting data from multiple files on the same graph. This feature is excellent for data trending analysis.

Data files that are not in ID-2000 format can be converted by using special conversion programs. ID-2000 purchased from Campbell Scientific includes a conversion program for Campbell Scientific comma delimited data files (page 1-4). Import functions are incorporated into ID-2000 for converting data files from other popular software applications such as Lotus 1-2-3, Microsoft Excel, LabTech Notebook, and many other types of ASCII files. For more information on converting data files see the DATA CONVERSION section of this manual.

INSTALLATION

ID-2000 is designed to be run from your hard disk. Other mass storage media may be used provided there is a minimum of 2 MB of space available. It is not recommended to run ID-2000 from a floppy disk due to its extremely slow disk access compared to a hard disk.

ID-2000 is distributed on high density floppy diskettes in an archived format. A setup program is provided which will transfer and unarchive ID-2000 automatically. (Low density media is also available upon request.)

HARD DISK INSTALLATION PROCEDURES

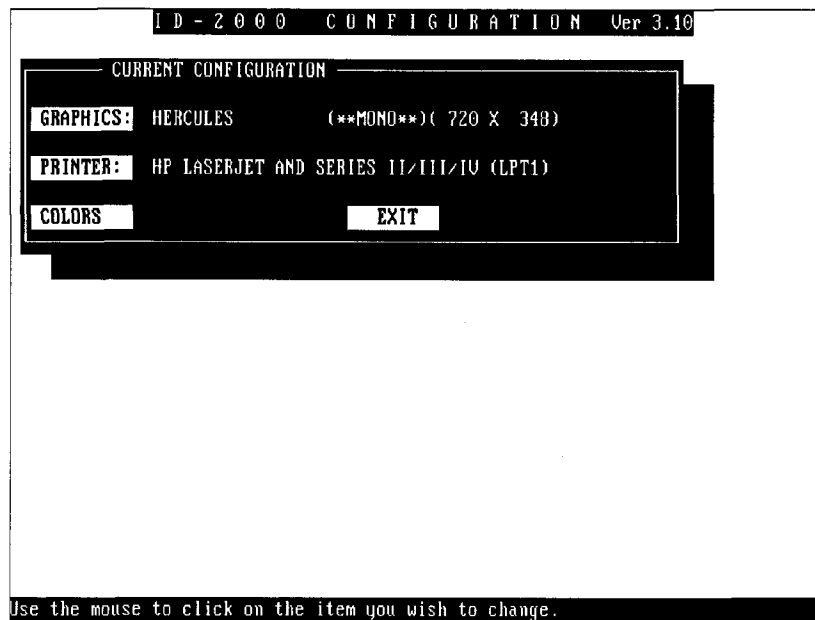
Place the ID-2000 diskette into drive 'A:' of the computer. At the A:\> prompt, type "IDSETUP" which will start the installation process. You will be asked the name of the directory where you wish to place the ID-2000 files. The installation program will default to drive 'C:' and sub-directory \ID2000\. You can change the drive as well as the directory by typing in the appropriate path. If you enter a sub-directory that does not exist, one will be created for you. After the installation program has finished, you will return to the DOS prompt in the directory where ID-2000 was installed. To run ID-2000 simply type "ID2000" at the DOS prompt.

CONFIGURE

You can configure ID-2000 for the specific graphics card, printer, and mouse drivers that correspond to your computer system. In addition, screen colors may also be changed. You must configure ID-2000 for the proper graphic and printer drivers before you plot out a

graph on the screen or a printer. Initially ID-2000 defaults the configuration to an HP LaserJet printer, Microsoft compatible mouse, and VGA/EGA/MONO graphics depending upon what ID-2000 autodetects in your computer.

The configuration may be changed through the CONFIGURE function in the Graph Setup screen or from the DOS prompt by typing "CONFIG". ID-2000 must be configured for your system before any plots are attempted or unexpected results could occur.



ID-2000 CONFIGURATION

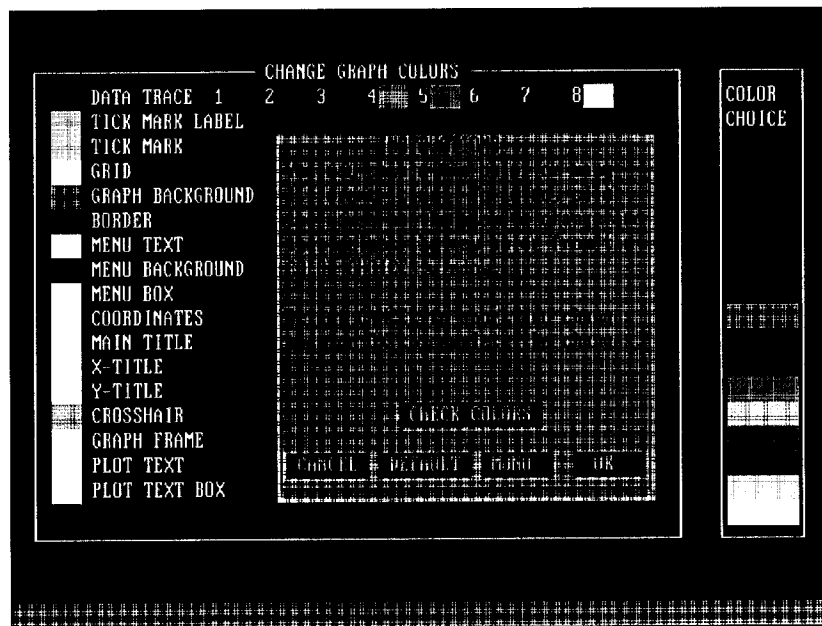
The configuration menu will display the current configuration for ID-2000. To change any of the current settings, click on the item you wish to change. The instruction box on the right will then display a list of drivers from which to choose. You can use the scroll bars, located on the right side of the box, to view more options. The current driver that is configured will be highlighted. To select a new driver, click the mouse on the desired driver. This will cause the highlight bar to move to the driver you chose. Then click on "OK" to update the item with the driver you selected. If you have made a mistake, select "CANCEL" to return the item to its previous driver.

NOTE: Currently the Microsoft Mouse and compatibles are the only mice supported by ID-2000.

The Colors selection contains color settings for all the items displayed on the Graphic screen. There are many different items on the Graphic screen for which you may select a color. After choosing the Colors selection, a screen will be displayed with all of these items and their current color assignments. To change a color setting, select the item desired by clicking the mouse on it. (The item selected will be shown at the bottom of the screen). Then use the mouse to select one of the colors located in the color choice box. Return to the main

configuration screen by clicking on "OK" or "CANCEL". Clicking on "DEFAULT" will reset the color settings to standard ID-2000 settings. You may select "MONO" to force all colors to a monochrome setting. This is advantageous for portable computers with gray scale displays. You may select conflicting colors such as data trace colors that are the same as the graph background. To check if you have selected conflicting colors, click the mouse on "CHECK COLORS". A window will pop up listing any conflicts.

New graphic and printer drivers are frequently added to ID-2000. If your specific hardware is not directly supported you may be able to select one that your hardware emulates. For example, many laser printers can use the HP LaserJet driver. There are also generic graphic



COLOR SELECTION

drivers such as VESA and IBM Adapter Interface that may be compatible with your particular graphics card.

NOTE: You will not be able to change the color settings for a monochrome display.

To exit the configuration function, click on "EXIT". A box will appear asking if you would like to save your changes. Selecting "YES" will save your changes while "NO" will cause all parameter settings to be reset to their initial settings.

IMPORTING CAMPBELL SCIENTIFIC FILES

For efficient, fast graphing, ID-2000 converts data files to a special binary format. It does this by copying and converting the original data file into another file. This way, the original data file is left completely intact which is, of course, good data management practice. Once a converted file is created, it can be used over and over again. Since files created with Campbell Scientific dataloggers have a very versatile array structure (they can be programmed to have the date and time information appear anywhere in the array, or not at all) it is nearly impossible for a graphing package to determine the scan rate. Campbell Scientific data files can also contain data collected at entirely different rates intermixed within the same file. These different rates are identified by unique array ID numbers. It is necessary to separate these arrays into different groups for meaningful graphing. This can be done by first processing the data file with SPLIT, which is part of the Campbell Scientific PC208 software package. However, with the utility that is part of ID-2000, it is not necessary to first use SPLIT as that function is an integral part of the ID-2000 package.

STEP BY STEP FILE IMPORT PROCEDURE

- Create a comma delimited data file with the CR10, 21X, or CR7. The file may contain several different array IDs. The U_IMPORT program will sort them out as needed.
- From the DOS prompt, type "ID2000". From the ID-2000 FUNCTION MENU select FILE MENU by pointing with the mouse and clicking the left mouse button. You will then see the FILE MENU.
- Click on IMPORT A FILE. You will then see the IMPORT DATA FILE MENU. Click on the USER CONVERSION PROGRAM.
- From the SELECT FILE TO CONVERT MENU choose the file you wish to use. You may either double click on the file name or single click and then click on OK.
- You now see a box that contains the path and file name you selected. You may change it by typing over it or accept it by clicking on OK.
- After a brief moment you will see a box titled AVAILABLE ARRAY IDS. You may use the up and down keys on your computer keyboard or the mouse to select the array you wish to extract. Click on OK.
- You will then see a box with 3 columns. The top of the box is titled SELECT 'YEAR' PARAMETER. If you have not previously used the file name you are currently working with, the first column will contain the names ELEM_1, ELEM_2, etc. The second and third columns will contain data extracted from the first 2 arrays of the data file. This data is displayed to make it easier for you to identify the parameters asked for in the subsequent steps. If you recognize the parameter that contains the YEAR data, select it by clicking on it and then click on OK. You may

accomplish the same thing by double clicking on the selection. If the YEAR data is not contained in the data file, then double click on NONE. If NONE is selected, you will see a box that contains the best guess for the YEAR. If the guess is not correct, you may type in the YEAR you want. In either case, click on OK.

- The column box heading is now SELECT 'JULIAN' PARAMETER. If you recognize which element contains the day of the year data, double click on it. Otherwise select NONE and follow the same procedure as above.
- The column box is now headed with SELECT 'HHMM' PARAMETER. If you recognize which element contains the HHMM data, double click on it. Otherwise select NONE and enter the time corresponding to the first data point.
- The column box is now headed SELECT 'SECONDS' PARAMETER. Select the seconds data from the list or select NONE. If NONE is selected, enter the seconds corresponding to the first data point - usually 0.0.
- The next box asks for the data rate containing the best guess the program was able to make. You may overwrite the guess if necessary.
- The next box allows you to write in any file comments you wish to make. You may leave this box empty if you desire. Click on OK when finished.
- You now see a box with six columns of labels. You may edit these label names to something more meaningful to you. You cannot use spaces in the label and the label must not begin with a number. However, numbers can follow the first character. If you enter something illegal, you will be informed and asked to reenter the label. If, later on, you use the same file name, you will not have to reenter these labels again. After editing the labels to your satisfaction, press the F10 key on your computer keyboard.
- A bar on the bottom of the screen shows the progress of the conversion. If it is successful, you will be advised and then presented with the SELECT FILE TO CONVERT box. Unless you wish to convert another data file, click on CANCEL. and you will be returned to the ID-2000 menu.
- From the ID-2000 menu, click on the PRIMARY FILE phrase and then select the file you just created. To see only files with the .ID2 extension, enter *.ID2 in the File Name box. Once you have done this, you won't have to do it again for subsequent ID-2000 sessions.
- You may now proceed as outlined in the rest of the ID-2000 manual.

1. The first line of the document is a header line.

2. The second line of the document is a header line.

3. The third line of the document is a header line.

4. The fourth line of the document is a header line.

5. The fifth line of the document is a header line.

6. The sixth line of the document is a header line.

7. The seventh line of the document is a header line.

8. The eighth line of the document is a header line.

9. The ninth line of the document is a header line.

10. The tenth line of the document is a header line.

11. The eleventh line of the document is a header line.

12. The twelfth line of the document is a header line.

13. The thirteenth line of the document is a header line.

GRAPH SETUP

This screen is the primary screen used for the setup of graphs and is normally the first screen that appears when you begin ID-2000. It is divided into four basic sections; Parameter List, Standard Parameters, Channel Selection, and Functions.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS d(P)/dt I(P)dt
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9	CHAN_15	CHAN_21	CHAN_27	
CHAN_4	CHAN_10	CHAN_16	CHAN_22	CHAN_28	
CHAN_5	CHAN_11	CHAN_17	CHAN_23	CHAN_29	

	DATA FILE	X PARAMETER	Y PARAMETER	SCALING		SMOOTH	
				X	Y	X	Y
1	48CHAN	SECONDS	CHAN_0	AUTO	AUTO	OFF	OFF
2	48CHAN	SECONDS	CHAN_1	AUTO	AUTO	OFF	OFF
3	48CHAN	SECONDS	CHAN_2	AUTO	AUTO	OFF	OFF
4	48CHAN	SECONDS	CHAN_3	AUTO	AUTO	OFF	OFF
5	48CHAN	SECONDS	CHAN_4	AUTO	AUTO	OFF	OFF
6	48CHAN	SECONDS	CHAN_5	AUTO	AUTO	OFF	OFF
7	48CHAN	SECONDS	CHAN_6	AUTO	AUTO	OFF	OFF
8	48CHAN	SECONDS	CHAN_7	AUTO	AUTO	OFF	OFF

PRIMARY FILE: 48chan.dat		TEST TIME: 12/31/69 15:32:52	
SCANRATE: 1.00	LENGTH: 00:04:18 (258.00 sec.)		
GRAPH TITLE: This is simulated data using 48 differen ...			
PLOT TYPE: X-Y	STRIP CHART	MULTI-PLOT	

FUNCTIONS
MAKE GRAPH
PLAY FILE
EDIT SCALES
FILE MENU
PRINT MENU
CONFIGURE
PREFERENCES
CALC UTIL
DOS UTIL
ABOUT ID-2000
DOS SHELL
HELP
EXIT <Esc>

GRAPH SETUP SCREEN

PARAMETER LIST

At the top of the Graph Setup screen is a window with a list of all the parameter names in the data file. The parameters to be plotted are selected from this window by using the mouse. At the bottom of this window is a scroll bar with arrows at each end. If there are more parameter names than can fit in the window, use the scroll bar to scroll horizontally so that all parameters can be seen. ID-2000 will allow up to 512 parameters in a data file.

STANDARD PARAMETERS

To the right of the parameter list window is a smaller box with the parameters "SCANRATE", "SCAN_NO", "TIME", "d(P)/dt", and "I(P)dt" listed.

"SCANRATE" may be selected as either an X or Y axis parameter and will plot the rate at which data was recorded. Similarly, "SCAN_NO" will plot the actual reading number of each data point from 0 to the number of readings in the data file. These two standard parameters are useful when needing to look at very fine detail in the data involving how fast the data was actually recorded.

The "TIME" parameter is perhaps the most commonly used standard parameter and is used for plotting parameters versus time. This parameter plots time data and can only be used as an X axis parameter. You may display time using the SECONDS parameter as either total seconds or clock time, HH:MM:SS. Time may be displayed relative to the beginning of the data file, actual time of day corresponding to the time when the data was recorded, or relative to a user-defined zero reference point.

The "d(P)/dT" parameter is used to calculate the derivative of a parameter and can only be used as a Y axis parameter. This feature is very beneficial when looking at data involving distance movements or velocity. The derivative of a distance parameter will produce the velocity of that motion. The derivative of a velocity such as speed will allow you to plot acceleration. Depending upon the data you are plotting, you may wish to use the SMOOTH feature in ID-2000. (See the "Tricks, Tips, and Traps" chapter for additional discussion on derivatives.)

The "I(P)dt" is used to calculate the integral of a parameter and can only be used as a Y axis parameter. The integral is commonly referred to as the "area under the curve". If you plot the integral of a parameter, the values plotted will represent the cumulative area under the curve at any given point in time.

CHANNEL SELECTION

In the main area of the screen are the channel selection options. Virtually all items can be changed by clicking the mouse on that item except for TIME OF TEST, SCANRATE, and LENGTH OF TEST which are obtained from the data file and are displayed for your convenience only. ID-2000 allows you to setup a maximum of eight graphs. Each graph is numbered 1 through 8 on the left side of the screen. Depending upon what type of plot you select, one or more of these graphs will be displayed on the graphics screen. In the case of a STRIP CHART type plot, each graph is referred to as a strip. For a MULTI-PLOT type plot the graphs are referred to as data traces. For each of the eight graphs you may turn it on or off, select what data file is to be used, select the X axis parameter, the Y axis parameter, automatic or manual scaling, and a level of data smoothing.

GRAPH # ON/OFF

Each graph can be turned on or off by clicking on the graph number with the mouse. Graphs which are turned on will have their respective number highlighted. Graphs will be plotted in order, but do not have to be consecutive. If you turned on graph 5 followed by graph 8 and finally graph 2 -- the result would be a plot of graphs 2, 5, and 8, in that order.

DATA FILE

One of the powerful features in ID-2000 is called "file overlay". A primary file and multiple secondary files may be selected for plotting. This allows you to look at data trending for the same parameter over multiple data files. Each of the 8 graphs

default to the primary file, however, you may select a secondary file for each which will plot the data from that particular file instead of the primary file. Clicking on the data file for a particular graph will allow you to select a new secondary file. Only ID-2000 compatible files may be selected. If a graph has the same file as the primary file, it will automatically be changed when a new primary file is selected.

X PARAMETER

To select an X axis parameter, click the mouse on the X axis parameter of the graph you want to change. The parameter will flash and a prompt at the bottom of the screen will be displayed instructing you to pick the new X axis parameter. Select the new X axis parameter by moving the mouse into the parameter list area, and clicking on the desired new parameter. That parameter will then replace the old X axis parameter in the channel selection area.

NOTE: If you are plotting STRIP CHART or MULTI-PLOT type plots with more than one graph you must use the same X axis parameter for all.

Y PARAMETER

To select a different Y axis parameter, follow the same steps as in selecting a different X axis parameter. For a derivative or integral of a parameter, select $d(P)/dt$ or $I(P)dt$ followed by the parameter you wish to use.

SCALING

Autoscaling is the default setting for all graphs. Autoscaling will scale a graph so that all data points will fit in the plot. You may select autoscaling (AUTO) or manual scaling (MAN) for both X and Y parameters. By clicking on the word "AUTO" or "MAN", you may toggle the scaling setting. For entering your own scaling limits, please refer to the EDIT SCALES section of this manual.

The scaling setting also affects how the "ZOOM" and "PAN" functions operate. If "AUTO" is selected and "TIME" or "SCAN_NO" is selected for the X-axis parameter, any resulting plots with the "ZOOM" and "PAN" functions will also be autoscaled. Please refer to the ZOOM and PAN sections in the Graphic Screen chapter for additional information.

SMOOTH

Three levels of data smoothing are available for the X and Y axis. The Y axis smoothing is independent for each strip. The X axis smoothing must be the same for all strips. Smoothing is selected by moving the mouse cursor to the SMOOTH column for the appropriate graph and toggling through the choices by clicking the mouse button. The choices for smoothing are "OFF", "SM", "MED", and "LG".

The smoothing function plots a running average of the previous and subsequent 3, 7, or 11 data points respectively.

NOTE: If smoothing has been selected, the word "SMOOTHING" will briefly be displayed in the upper left corner of the Graphic screen as the plot is being created.

GRAPH TITLE

A title may be added to a plot if desired and will be displayed at the top of the plot. To enter or change the plot title, click the mouse on "GRAPH TITLE:". You may enter up to 3 lines for the title. To clear the title line, press <Ctrl><Backspace>. Press <Enter> when you have completed entering the title. The title will appear in the upper left corner on the displayed plot. When printed the title will be centered at the top of the plot. If you enter more characters than can be displayed on the Graph Setup screen, a portion of the title will be displayed with "..." at the end of it. However the entire title will be displayed on the plot.

FILE , TIME OF TEST, SCANRATE, and LENGTH OF TEST

These areas indicate the name of the primary file currently being analyzed, the time the file was created, at what scanrate the data was taken, and the length of the file in seconds.

You may change the primary file by using a shortcut method and clicking the mouse on the primary file name instead of using the FILE function described later in this chapter. This will allow you to select a new primary file in the same manner as if you had used the LOAD PRIMARY FILE option in the FILE function.

PLOT TYPE

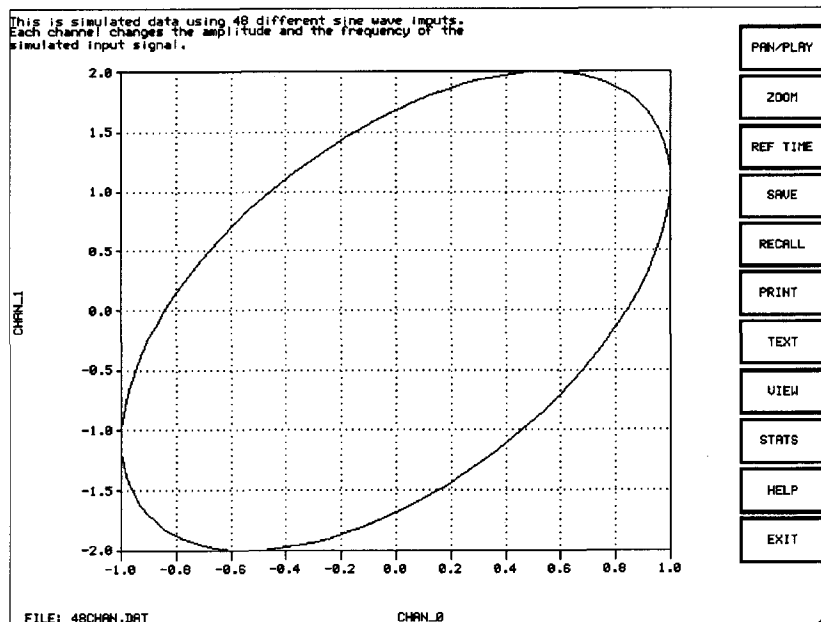
Near the bottom of the Graph Setup screen are the plot types with the currently selected plot type being highlighted. There are three types of plots available: X-Y, STRIP CHART, and MULTI-PLOT. To select one of these plot types simply click the mouse on the type of plot desired.

X-Y

The X-Y format will plot any parameter against any other parameter. If you have turned on more than one graph only the first one will be plotted.

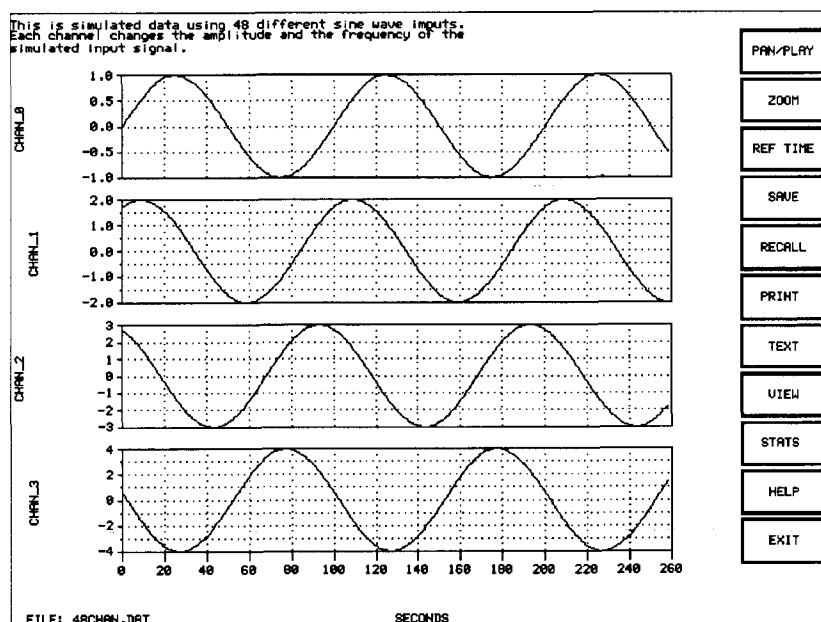
STRIP CHART

The strip chart format will plot several graphs in a "strip chart" style. Each graph will be plotted on its own individual Y axis strip with the X axis for all strips being the same. The X axis parameter used for all strips will be the



X-Y GRAPH

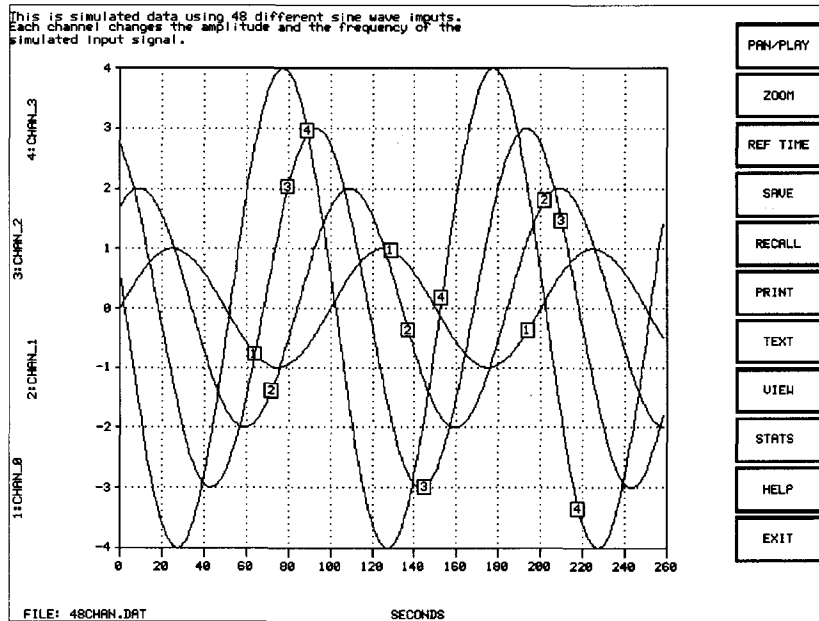
X axis parameter selected for the first graph. Normally SECONDS is used for the X axis parameter in STRIP CHART type plots although a different parameter may be selected. If only one graph is turned on it may appear to be an X-Y plot with SECONDS as the X axis parameter. The only difference will be in the method of zooming since it is actually a single strip STRIP CHART.



STRIP-CHART GRAPH

MULTI-PLOT

The multi-plot format will plot multiple data traces on a single X-Y axis. The plot will be autoscaled to match the parameter(s) with the highest and lowest scale. Like the STRIP CHART, the X axis of the first graph turned on will be used for the plot.



MULTI-PLOT GRAPH

FUNCTIONS

The lower right portion of the screen has a window labeled "FUNCTIONS". This window contains the functions "MAKE GRAPH", "PLAY FILE", "EDIT SCALES", "FILE", "PRINT MENU", "CONFIGURE", "PREFERENCES", "CALC UTIL", "DOS UTIL", "ABOUT ID-2000", "DOS SHELL", "HELP", and "EXIT". To initiate any of these functions click the mouse on the command desired.

MAKE GRAPH

Selecting the MAKE GRAPH function will create a plot using the options selected in the Graph Setup screen.

PLAY FILE

The PLAY FILE function creates a plot, automatically zooms in on the beginning of the file, and then continually pans until the end of the file is reached. For more information on playing a file refer to the Graphic Screen chapter.

EDIT SCALES

The EDIT SCALES function will bring up the Scaling screen which will allow you to set up manual scaling values and adjust the T-START and T-STOP values. Please refer to the EDIT SCALES section of this manual for more information.

FILE MENU

Selecting the FILE MENU function displays a menu with five options: "Change Primary File", "Import a File", "Export a File", "View Info on Primary File", and "View Info on Other Files".

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS $d(P)/dt$ $I(P)dt$
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9	CHAN_15	CHAN_21	CHAN_27	
CHAN_4	CHAN_10	CHAN_16	CHAN_22	CHAN_28	
CHAN_5	CHAN_11	CHAN_17	CHAN_23	CHAN_29	

DATA	X	Y	SCALING	SMOOTH	FUNCTIONS
FILE	PARAMETER	PARAMETER	X	Y	
1 48CHAN	SECOND	FILE MENU	OFF	OFF	MAKE GRAPH
2 48CHAN	SECOND	LOAD A NEW PRIMARY FILE	OFF	OFF	PLAY FILE
3 48CHAN	SECOND	IMPORT A FILE	OFF	OFF	EDIT SCALES
4 48CHAN	SECOND	EXPORT PRIMARY FILE	OFF	OFF	FILE MENU
5 48CHAN	SECOND	INFO FOR PRIMARY FILE	OFF	OFF	PRINT MENU
6 48CHAN	SECOND	INFO FOR OTHER FILES	OFF	OFF	CONFIGURE
7 48CHAN	SECOND	EXIT	OFF	OFF	PREFERENCES
8 48CHAN	SECOND		OFF	OFF	CALC UTIL

PRIMARY FILE: 48chan.dat	TEST TIME: 12/31/69 15:32:52
SCANRATE: 1.00	LENGTH: 00:04:18 (258.00 sec.)
GRAPH TITLE: This is simulated data using 48 differen ...	
PLOT TYPE: X-Y	STRIP CHART MULTI-PLOT

EXIT <Esc>

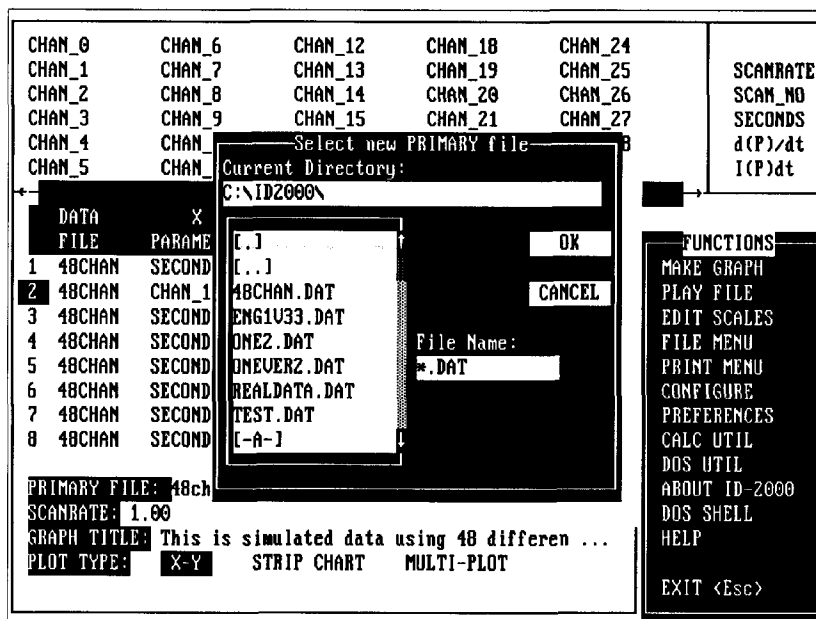
FILE FUNCTION

CHANGE PRIMARY FILE

Because ID-2000 supports file overlays, primary and secondary files may be selected for plotting. The primary file is used for all graphs and parameters as a default unless specific secondary files are chosen for individual graphs. All file selections are done in the same manner.

File selection begins with a window being displayed in the center of the screen. The left portion of the window contains a list of files in the current directory that match the default file specification "*.DAT". You may change the file specification by clicking the mouse on the area under "File Spec:" and typing in the new specification.

You may change directories and/or drives by clicking on the one desired in the file list. Directories are displayed with square brackets, "[]", around them. To move back one directory level, select the "[.]" directory. All available drives are found at the end of the file list. To select an item, click



SELECT DATA FILE

the mouse on it and then click on "OK". (You may also double click on an item to avoid having to click on "OK" after making your selection.) The scroll bar on the right edge of the file list will allow you to scroll through the complete list of files, directories, and drives.

IMPORT A FILE

ID-2000 allows you to import several kinds of data files. These types include: ASCII text, comma separated variables(CSV) used primarily by Microsoft Excel, Lotus 1-2-3 files (PRN), and older versions of ID-2000 data files. (Although older versions of ID-2000 data files work with ID-2000 v3.2, some features such as calculated parameters and reference time will not work unless the file is converted to a v3.2 format).

To import a file from an ASCII, CSV, or PRN format, the file must be in a "by- scan" format. That is, each line in the file must contain one data point for each parameter. If parameter names do not immediately precede the first scan of data, default names will be used. You may edit these names during the import process. Parameter names may use any combination of letters, numbers, and underscores but must begin with a letter. Spaces are not allowed in a parameter name.

To begin the import process, you must first select the file you wish to import. This is done just like all the other file selection items. In the window that follows you will be asked several questions about the new file.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHA					NO
CHA					S
CHA					t
CHA					
1	ORIGINAL FILE NAME: C:\ID2000\ID.TXT				
2	NEW FILE NAME: C:\ID2000\ID2.DAT				
3	COMMENTS: <div></div>				
4					
5	TEST DATE (MM-DD-YY): 4-17-93				
6	TEST TIME (HH:MM:SS): 12:00:00				
7	SCAN RATE: 1.000000				
8	USE DOUBLE PRECISION NUMBER <input checked="" type="checkbox"/>				
PRI	OK				CANCEL
SCA					
GRAPH					
PLOT TYPE: X-Y STRIP CHART MULTI-PLOT					
EXIT <Esc>					

IMPORTING A FILE

EXPORT PRIMARY FILE

This function will allow you to convert ID-2000 data files into ASCII text files. Once selected this function will convert the primary data file into an ASCII file with an extension of ".TXT", ".CSV", or "RPT". Two formats are available: REPORT which is in a "by channel" format and COLUMN which is in a "by scan" format.

"By channel" means that all of the data for a single channel is in a paragraph format and is followed by all the data for the next channel and so on. "By scan" means that a single reading for each channel is followed by the next reading for each channel and so on.

The COLUMN format is similar to a spreadsheet "PRN" or "CSV" format and allows you to specify the column width and delimiter to be used. The REPORT format automatically adds a time parameter to the ASCII file, where the COLUMN format gives you the option of having it added.

The COLUMN format produces a ".TXT" or ".CSV" file depending upon the delimiter selected. The REPORT format produces a ".RPT" file.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS d(P)/dt I(P)dt
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9			CHAN_27	
CHAN_4	CHAN_10			CHAN_28	
CHAN_5	CHAN_11			CHAN_29	

DATA		X	
FILE	PARAMETER		
1 48CHAN	SECONDS		
2 48CHAN	CHAN_1		
3 48CHAN	SECONDS		
4 48CHAN	SECONDS		
5 48CHAN	SECONDS		
6 48CHAN	SECONDS		
7 48CHAN	SECONDS		
8 48CHAN	SECONDS		

EXPORT FILE FORMAT	
() ASCII REPORT	
(*) ASCII COLUMN	
() ID2000 FILE	
OPTIONS	
(*) INCLUDE TIME	
(15) COLUMN WIDTH	
(SPACE) DELIMITER	
() PARTIAL FILE EXPORT	
EXPORT	CANCEL

SMOOTH	X	Y
OFF	OFF	OFF
OFF	OFF	OFF
OFF	OFF	OFF
OFF	OFF	OFF
OFF	OFF	OFF
OFF	OFF	OFF
OFF	OFF	OFF
OFF	OFF	OFF

FUNCTIONS	
MAKE GRAPH	
PLAY FILE	
EDIT SCALES	
FILE MENU	
PRINT MENU	
CONFIGURE	
PREFERENCES	
CALC UTIL	
DOS UTIL	
ABOUT ID 2000	
DOS SHELL	
HELP	
EXIT <Esc>	

PRIMARY FILE: 48chan.d
 SCANRATE: 1.00 LENG
 GRAPH TITLE: This is simulated data using 48 differen ...
 PLOT TYPE: X-Y STRIP CHART MULTI-PLOT

15:32:52

EXPORT DATA FILE

VIEW INFO ON PRIMARY FILE

In each ID-2000 data file is a header section that contains various information such as comments, file type, time of test, number of parameters, etc. Selecting this function produces a window with all the information displayed for the primary file.

FILE INFORMATION FOR 48chan.dat		
COMMENTS: This is simulated data using 48 different sine wave inputs. Each channel changes the amplitude and the frequency of the simulated input signal.		
FILE TYPE	= 3	
BEGINNING OF TEST	= 15:32:52	December 31, 1969
NUMBER OF RECORDED PARAMETERS	= 48	
NUMBER OF CALCULATED PARAMETERS	= 0	
NUMBER OF SCANS	= 259	
SCANRATE	= 1.00 scans/second	
REFERENCE TIME	= 75.231857	
EVENT MARKERS = NONE		
PARAMETER INFORMATION		
NAME	MIN VALUE	MAX VALUE

RINT- NDEX	ACK-E IT	
PLOT TYPE: X-Y	STRIP CHART	MULTI-PLOT
		EXIT <Esc>

FILE INFORMATION

VIEW INFO ON OTHER FILES

This function will let you view the information on files other than the primary file. You will be required to select the file you wish to view.

PRINT MENU

The Print menu allows you to do two types of printing. The PRINT GRAPH function simply takes the information used in the Graph Setup to automatically create a plot and print it without displaying it. The BATCH PRINT will print all of the saved plots. See the Graphic Screen chapter for more information on saving plots.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS d(P)/dt I(P)dt
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9	CHAN_15	CHAN_21	CHAN_27	
CHAN_4	CHAN_10	CHAN_16	CHAN_22	CHAN_28	
CHAN_5	CHAN_11	CHAN_17	CHAN_23	CHAN_29	

DATA	X	Y	SCALING	SMOOTH	FUNCTIONS
FILE	PARAMETER	PARAMETER	X	Y	
1 48CHAN	SECONDS	CHA	PRINT	AUTO OFF OFF	MAKE GRAPH
2 48CHAN	CHAN_1	CHA	BATCH PRINT	TO OFF OFF	PLAY FILE
3 48CHAN	SECONDS	CHA	PRINT GRAPH	TO OFF OFF	EDIT SCALES
4 48CHAN	SECONDS	CHA	EXIT	TO OFF OFF	FILE MENU
5 48CHAN	SECONDS	CHA		TO OFF OFF	PRINT MENU
6 48CHAN	SECONDS	CHAN_		TO OFF OFF	CONFIGURE
7 48CHAN	SECONDS	CHAN_6	AUTO AUTO	OFF OFF	PREFERENCES
8 48CHAN	SECONDS	CHAN_7	AUTO AUTO	OFF OFF	CALC UTIL

PRIMARY FILE: 48chan.dat TEST TIME: 12/31/69 15:32:52
SCANRATE: 1.00 LENGTH: 00:04:18 (258.00 sec.)
GRAPH TITLE: This is simulated data using 48 differen ...
PLOT TYPE: X-Y STRIP CHART MULTI-PLOT

EXIT <Esc>

PRINTING A FILE

PRINT GRAPH

This option actually performs two functions. First it will provide you with the ability to print a graph without creating it on the screen. It will also allow you to spread out a graph over several pages. After PRINT GRAPH has been selected you will be asked the resolution and number of seconds to be displayed on each page.

BATCH PRINT

This function allows hardcopy prints to be made of all the previously saved graphs. Prior to selecting the BATCH PRINT function, you must create each graph you wish to print and SAVE it. A maximum of 8 graphs may be saved. When the BATCH PRINT function is selected, you may be asked to select a printer resolution depending upon the printer driver for which you configured ID-2000. The printing process will then immediately begin with the

<p style="text-align: center;">AUTO PRINT MENU</p> <p>The printer driver loaded is LASERJET.PRT.</p> <p>1. 75 DPI 2. 100 DPI 3. 150 DPI 4. 300 DPI</p> <p>Which resolution do you wish to use (1 - 4)? 1</p> <p>Press <ESC> to abort batch printing.</p>
--

PRINTER SETTINGS

first saved graph and continue until the last graph has been printed. You may abort any graph that is being printed by pressing <Ctrl><Break>.

CONFIGURE

Selecting the CONFIGURE function will run the ID-2000 configuration program. See the section in the beginning of this manual for more information on configuring ID-2000.

PREFERENCES

The PREFERENCES menu allows you to adjust various settings that affect how ID-2000 plots data. Among these settings are how time is displayed, whether actual or reference time is used, and whether to display various markers.

TIME FORMAT

There are three different formats you may use for displaying time - SSS.S, HH:MM:SS.S, and time of day. If SSS.S is selected time will be displayed as total seconds from the beginning of the file. Choosing either HH:MM:SS.S or time of day will display time as "Clock" time. The difference between these last two is in the beginning time value. HH:MM:SS.s begins at 0:00:00.0 whereas the other begins at the time of day when the data was recorded.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS d(P)/dt I(P)dt
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9	CHAN_15	CHAN_21	CHAN_27	
CHAN_4	CHAN_10	CHAN_16	CHAN_22	CHAN_28	
CHAN_5	CHAN_11	CHAN_17	CHAN_23	CHAN_29	

DATA		X		SMOOTH		FUNCTIONS	
FILE	PARAMETER			X	Y		
1 48CHAN	SECOND	(*)	TIME: SSS.SS	TO	OFF	OFF	MAKE GRAPH
2 48CHAN	CHAN_1	()	TIME: HH:MM:SS.S	TO	OFF	OFF	PLAY FILE
3 48CHAN	SECOND	()	TIME: TIME OF DAY	TO	OFF	OFF	EDIT SCALES
4 48CHAN	SECOND	()	REFERENCE TIME	TO	OFF	OFF	FILE MENU
5 48CHAN	SECOND	()	QUICK GRAPH	TO	OFF	OFF	PRINT MENU
6 48CHAN	SECOND	()	SCATTER GRAPH	TO	OFF	OFF	CONFIGURE
7 48CHAN	SECOND	(*)	EVENT MARKERS	TO	OFF	OFF	PREFERENCES
8 48CHAN	SECOND	()	MULTI-PLOT MARKERS	TO	OFF	OFF	CALC UTIL
PRIMARY FILE: 48ch		EXIT		69 15:32:52		DOS UTIL	
SCANRATE: 1.00				sec.)		ABOUT ID-2000	
GRAPH TITLE: This				fferen ...		DOS SHELL	
PLOT TYPE: X-Y						HELP	
						EXIT <Esc>	

PREFERENCE SETTINGS

REFERENCE TIME

One of the powerful features in ID-2000 is the capability to overlay data from different files. In order to plot a graph with an X axis of TIME you must be able to synchronize the multiple files in time. Turning on Reference Time allows you to plot data versus time by using a reference time instead of actual time.

In order to use the reference time feature, you must select a reference point that corresponds to "0.0" seconds for each data file. Data prior to that point will be considered to have negative time and points following have positive time. This technique allows you to synchronize multiple data files so that you can perform data trending. For information on setting the 0.0 reference point refer to the Graphic Screen chapter.

QUICK GRAPH

Normally every data point will be plotted when a graph is created. However, on very long tests with many data points it may take longer than desired to produce a plot of the entire test. Under some circumstances it may be desirable not to plot all of the data points initially and only plot every other point or even every 100th point. The QUICK GRAPH option is used primarily to allow the user to quickly put up a representative section of data for a particular parameter in order to determine if further investigation is warranted. If the user enables QUICK GRAPH, approximately four evenly dispersed data points will be plotted for every pixel of screen resolution. It is important to recognize that important data may not be displayed on the screen with the QUICK GRAPH option and it should therefore be used with

discretion. The QUICK GRAPH feature can also be turned on and off from the Graphic screen. To enable/disable QUICK GRAPH click the mouse on the menu item. It is enabled if a '*' is displayed to the left of the QUICK GRAPH menu item.

SCATTER GRAPH

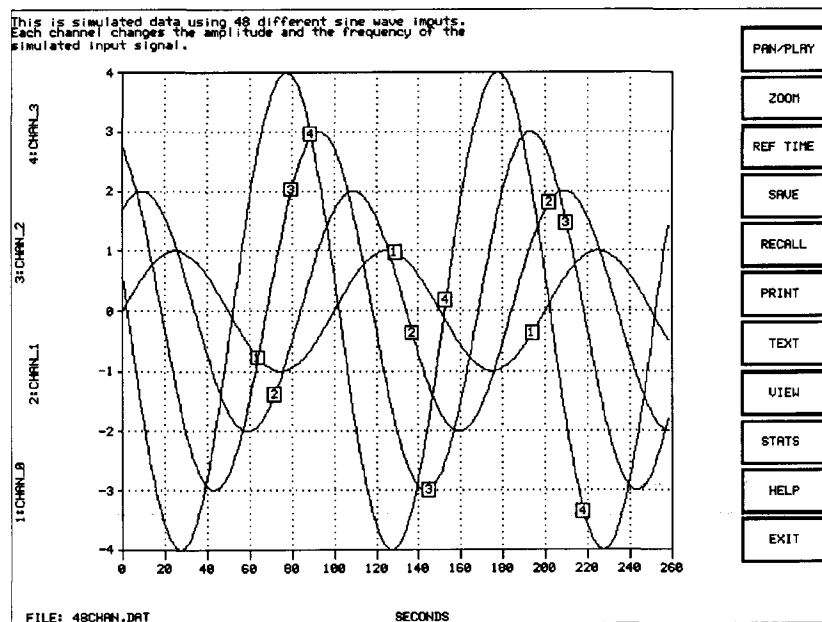
By default, ID-2000 draws lines between data points. By enabling the SCATTER GRAPH feature ID-2000 will just plot points and not draw lines between them. SCATTER GRAPH may also be turned on and off from the Graphic Screen

EVENT MARKERS

If the data file being analyzed includes event marker information, you may display it by enabling this function. Event markers are displayed as a tick mark on the top of each strip or graph. Event markers may also be turned on or off from the Graphic Screen.

MULTI-PLOT MARKERS

Multi-Plots overlay multiple data traces on a single graph. It is easy to distinguish the different traces on a color monitor since each is assigned a unique color. However, on mono systems and non-color printers it can



MULTI-PLOT MARKERS

become very confusing with multiple data traces on top of each other and all of them the same color. ID-2000 provides a function that you can enable or

disable that will mark each data trace. If enabled, each data trace will be marked in periodic locations with the number of the trace and a box around the number. The marker number corresponds to the number of the trace and is also included on the Y axis parameter label. You may also enable or disable the markers on the Graphic Screen under the VIEW function button.

CALC UTIL

ID-2000 allows you to add "calculated" parameters to any data file. A calculated parameter works just like any other parameter with regard to graphing, selection, etc. You may create a calculated parameter by choosing a unique parameter name and entering an algebraic equation which will be used to calculate the data values. You may use any existing parameters in the equation along with many functions such as ABS(), SIN(), COS(), etc. For more information see the CALCULATED PARAMETERS chapter.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS d(P)/dt I(P)dt
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9	CHAN_15	CHAN_21	CHAN_27	
CHAN_4	CHAN_10	CHAN_16	CHAN_22	CHAN_28	
CHAN_5	CHAN_11	CHAN_17	CHAN_23	CHAN_29	

DATA	X	Y	SCALING	SMOOTH	FUNCTIONS
FILE	PARAMETER	PARAMETER	X Y	X Y	

Enter the equation for AVERAGE. You may use () + - * / ^ and any ID-2000 functions. (Functions are listed in the manual and HELP file.)

AVERAGE = (CHAN_0+CHAN_1+CHAN_2+CHAN_3+CHAN_4+CHAN_5+CHAN_6)/7

COPY FROM PRIMARY FILE COPY FROM OTHER FILE CANCEL OK

PLOT TYPE: X-Y STRIP CHART MULTI-PLOT EXIT <Esc>

SAMPLE CALCULATED PARAMETER

DOS UTIL

The DOS utilities function will automatically run the program FILEUTIL.EXE. It performs basic DOS functions using the mouse and/or keyboard. The functions that FILEUTIL can perform are: Copy, Delete, Rename, and View File. The FILEUTIL program also has an on-line help screen for instructions on how to use each of its functions.

F1 - CHANGE DIRECTORY
F2 - FILE SELECTION
F3 - DELETE FILE(S)
F4 - COPY FILE(S)
F5 - RENAME FILE
F6 - VIEW FILE
ESC- EXIT

C:\ID2000*.*

NAME	TYPE	SIZE	DATE	TIME
NEWS		729480	04/17/93	12:00 PM
08142	ASC	35840	04/17/93	12:00 PM
DEBUG	BAT	162	04/17/93	12:00 PM
ID2000	BAT	322	04/17/93	12:00 PM
NEWNAME	BAT	1676	04/17/93	12:00 PM
RUN	BAT	163	04/17/93	12:00 PM
ASC2ID	C	50064	04/17/93	12:00 PM
CONFIG	C	77656	04/20/93	02:59 PM
CP	C	52864	04/29/93	07:39 PM
DEMO	C	20487	04/17/93	12:00 PM
DEMO_CFG	C	33984	04/17/93	12:00 PM
DEMO_INS	C	1737	04/17/93	12:00 PM
EDITSCAL	C	14761	04/26/93	12:24 PM
EXPORT	C	10064	04/17/93	12:00 PM
FILEUTIL	C	37588	04/29/93	07:25 PM
GCONFIG	C	7268	04/17/93	12:00 PM
GINIT	C	8055	04/17/93	12:00 PM
GMENU	C	41619	04/20/93	01:37 PM
GPAN	C	25057	04/20/93	02:19 PM
GRAPH1	C	13365	04/20/93	04:12 PM

No. selected = 0 Total bytes = 0

Interface Design File Utility Ver. 1.02
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DOS UTILITIES

ABOUT ID-2000

This function produces a window in the middle of the Graph Setup screen with the current version number, serial number, available resources, graphics driver, and printer driver.

CHAN_0
CHAN_10

SCANRATE
SCAN_NO
SECONDS
d(P)/dt
(P)dt

DATA
FILE

1	00
2	00
3	00
4	00
5	00
6	00
7	00
8	00

PRIMARY
SCANRATE
GRAPH TI
PLOT TYPE:

ID - 2000
(c) 1989-1993 by Interface Design

Version 3.20
S/N: UNREGISTERED

AVAILABLE RESOURCES
RAM: 147 Kbytes
DISK: 113.1 Mbytes (21%)
EXPANDED MEMORY: NONE
EXTENDED MEMORY: 2702 Kbytes
GRAPHICS: HERCULES (**MUNU**)(720 X 340)
PRINTER: HP LASERJET AND SERIES II/III/IV

OK

ONS
PH
E
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J
NU
E
CES
L
-2000
L

EXIT <Esc>

ABOUT ID-2000

DOS SHELL

You may temporarily exit to DOS by using the DOS SHELL function. After selecting this function a DOS prompt will appear. You may perform all normal DOS functions. When you are ready to return to ID-2000 just type "EXIT" at the prompt.

NOTE: Do not attempt to return to ID-2000 by typing "ID-2000". ID-2000 remains active in memory, therefore attempting this would result in trying to run two copies of ID-2000 simultaneously. Always type "EXIT" when you wish to return to ID-2000.

HELP

Selecting this function will give you on-line help for all of ID-2000 features. The Help feature is fully indexed providing quick access to specific items of interest.

ESC - EXIT

Selecting this function will end the program and return to DOS. In the event you accidentally select this option, you will be required to confirm that you really want to exit to DOS.

EDIT SCALES

Normally ID-2000 autoscales plots so that all data will fit inside the graph. Some situations may arise where it would be advantageous to force the X axis and/or Y axis to specific values despite the actual data. ID-2000 allows you to turn off autoscaling for the X and/or Y axes so you may enter the min and max values you prefer.

ID-2000 goes one step further and allows you to control what section of data is plotted. Let's consider a data file with 10,000 seconds of data. If you know that you are only interested in the data between 8,000 and 8,100 seconds you can tell ID-2000 to only plot data for that period. The T-start and T-stop values are used to specify at what points to start and stop reading data.

The Edit Scales window can be accessed by the function EDIT SCALES found in the Graph Setup screen. It lists the T-start and T-stop times, min/max X parameter values, and min/max Y parameter values for each graph regardless of whether or not it is turned on. To change these values use the mouse to click on the value to be changed and enter the new value. To clear the entry field, press <Ctrl><Backspace>. After the new value has been entered press <Enter>.

	STRIP	T-START	T-STOP	XMIN	XMAX	YMIN	YMAX
CHA	1	0.0000	258.0000	0.0000	258.0000	-1.0000	1.0000
CHA	2	0.0000	258.0000	0.0000	258.0000	-8.9981	8.9981
CHA	3	0.0000	258.0000	0.0000	258.0000	-2.9998	2.9998
CHA	4	0.0000	258.0000	0.0000	258.0000	-3.9995	3.9995
CHA	5	0.0000	258.0000	0.0000	258.0000	-29.9880	29.9880
CHA	6	0.0000	258.0000	0.0000	258.0000	-5.9979	5.9979
CHA	7	0.0000	258.0000	0.0000	258.0000	-6.9966	6.9966
CHA	8	0.0000	258.0000	0.0000	258.0000	-7.9974	7.9974

SAVE DEFAULT NOTE: MIN/MAX used only for MANUAL scaling CANCEL

1	48							
2	48CHAN	SECONDS	CHAN_8	AUTO	AUTO	OFF	OFF	
3	48CHAN	SECONDS	CHAN_2	AUTO	AUTO	OFF	OFF	
4	48CHAN	SECONDS	CHAN_3	AUTO	AUTO	OFF	OFF	
5	48CHAN	SECONDS	CHAN_29	AUTO	AUTO	OFF	OFF	
6	48CHAN	SECONDS	CHAN_5	AUTO	AUTO	OFF	OFF	
7	48CHAN	SECONDS	CHAN_6	AUTO	AUTO	OFF	OFF	
8	48CHAN	SECONDS	CHAN_7	AUTO	AUTO	OFF	OFF	

PRIMARY FILE: 48CHAN.DAT TEST TIME: 12/31/69 15:32:52
 SCANRATE: 1.00 LENGTH: 00:04:18 (258.00 sec.)
 GRAPH TITLE: This is simulated data using 48 differen ...
 PLOT TYPE: X-Y STRIP CHART MULTI-PLOT

PLAY FILE
 EDIT SCALES
 FILE MENU
 PRINT MENU
 CONFIGURE
 PREFERENCES
 CALC UTIL
 DOS UTIL
 ABOUT ID 2000
 DOS SHELL
 HELP
 EXIT <Esc>

EDIT SCALES

T-START/T-STOP

By default a graph will plot data for the entire length of a test. You may change this default by selecting a T-START (time start) and/or a T-STOP (time stop). This will cause only the data from T-START to T-STOP to be plotted. If the X axis parameter is SECONDS, T-START and T-STOP will perform the same function as X-MIN and X-MAX. You do not have to select "MANUAL SCALING" in order to edit T-START or T-STOP.

XMIN/XMAX

You must toggle autoscaling off for the channel you wish to manually scale before entering the Edit Scales screen to make changes to this parameter. Changing these values will allow you to set a specific min and max value for the X axis scale. If the X axis parameter is SECONDS, use the T-START/T-STOP function to change the X axis scale.

YMIN/YMAX

This function works like XMIN/XMAX and applies to the scale values for the Y axis.

FUNCTION BOXES

Near the bottom of the Edit Scales window are three function boxes labeled SAVE, DEFAULT, and CANCEL. These are selected by clicking on the appropriate box with the mouse.

SAVE

Selecting the SAVE function box will save the changes you have made and return you to the Graph Setup screen.

DEFAULT

This function updates the Edit Scales screen with autoscale information. The T-start values will be changed to 0.0 and T-stop to the maximum time for the data file selected on each strip. Min/max values for X and Y parameters will be changed to the autoscale values for the entire file.

CANCEL

Selecting this function will erase all changes made in the Edit Scale window and will return to the Graph Setup screen.

CALCULATED PARAMETERS

Calculated parameters are created by a user defined equation and the resulting data added to the ID-2000 data file. The equations may contain other parameters, other calculated parameters, or standard mathematical functions. Besides the normal mathematical operators these equations may use functions such as ABS(), SIN(), COS(), etc. All equations are saved with the data file which allows you to review or edit the equations at a later time. Once a calculated parameter is added to a data file it is treated like a normal parameter. The only difference is that calculated parameters may be deleted from the data file while the original data can never be changed. All calculated parameters are displayed in the parameter list in reverse video to distinguish them from the original parameters.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS d(P)/dt I(P)dt
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9	CHAN_15	CHAN_21	CHAN_27	
CHAN_4	CHAN_10	CHAN_16	CHAN_22	CHAN_28	
CHAN_5	CHAN_11	CHAN_17	CHAN_23	CHAN_29	
+-----+					

CALCULATED PARAMETERS

Calculated parameters may only be added to ID-2000 data files that are Version 3.0 or later. If the primary data file is older than Version 3.0 you will be asked if you want ID-2000 to automatically convert it for you prior to adding calculated parameters.

You may view the equations used to make the calculated parameters in one of two ways. The first method is to select CALC UTIL from the Graph Setup screen and then select DISPLAY CALCULATED PARAMETERS. This will display the entire list of calculated parameters followed by their corresponding equations for the Primary data file. The second method is to use the FILE function in the Graph Setup screen followed by INFO FOR PRIMARY FILE or INFO FOR SECONDARY FILE. This will display all the information related to a file including the calculated parameters and their equations.

The CALC UTIL menu contains two other functions: "ADD A PARAMETER" and "DEL/EDIT A PARAMETER". Both functions utilize the same equation entry routines. If you wish to add a

calculated parameter you will be required to first enter a name for it. To edit an existing parameter you will be asked to select it from the parameter list.

ENTERING A NAME

Calculated parameter names use the same rules as parameter names. Only letters, numbers, and the underscore can be used. Spaces are not allowed and names cannot start with a number. The calculated parameter's name must not be the same as any other parameter or calculated parameter in the file. In addition it may not be the same as one of the mathematical function names used to create calculated parameters. After you have entered the name you wish to use for the new calculated parameter, it will be checked to make sure it is a valid name. If the name is in some way invalid, you will be notified and asked to enter another name.

ENTERING AN EQUATION

Equations for a calculated parameter may use parameters, calculated parameters, and mathematical functions. Equations may use the standard math operators: + - * / ^ () or the mathematical functions listed below. Equations must not exceed 180 characters in length. After entering an equation ID-2000 will check it for errors. If no errors are found ID-2000 will add the calculated parameter to the primary data file. If errors such as 'division by zero' or 'argument too large' occur during the calculation of a calculated parameter, a message will be displayed at the end of the process. Should such an error occur, a value of -99999999.0 will be substituted for the values that could not be calculated.

CHAN_0	CHAN_6	CHAN_12	CHAN_18	CHAN_24	SCANRATE SCAN_NO SECONDS d(P)/dt I(P)dt
CHAN_1	CHAN_7	CHAN_13	CHAN_19	CHAN_25	
CHAN_2	CHAN_8	CHAN_14	CHAN_20	CHAN_26	
CHAN_3	CHAN_9	CHAN_15	CHAN_21	CHAN_27	
CHAN_4	CHAN_10	CHAN_16	CHAN_22	CHAN_28	
CHAN_5	CHAN_11	CHAN_17	CHAN_23	CHAN_29	

DATA	X	Y	SCALING	SMOOTH	FUNCTIONS
FILE	PARAMETER	PARAMETER	X Y	X Y	

Enter the equation for AVERAGE. You may use () + - * / ^ and any ID-2000 functions. (Functions are listed in the manual and HELP file.)

AVERAGE = (CHAN_0+CHAN_1+CHAN_2+CHAN_3+CHAN_4+CHAN_5+CHAN_6)/7

COPY FROM PRIMARY FILE COPY FROM OTHER FILE CANCEL OK

PLOT TYPE: X-Y STRIP CHART MULTI-PLOT EXIT <Esc>

ADD A CALCULATED PARAMETER

MATHEMATICAL FUNCTIONS

Mathematical functions can be used in the equation of a calculated parameter. Mathematical functions have the form of:

function name(argument)

where the function name is immediately followed by a left parenthesis and no spaces. The argument may consist of any combination of parameters, operands and/or other functions. The argument must always be followed by a matching right parenthesis. The following is a list of mathematical functions you may use when entering a calculated parameter:

ABS(n)

Finds the absolute value for n.

ACOS(n)

Calculates the arccosine of n where n must be a value less than 1.0 and greater than -1.0.

ASIN(n)

Calculates the arcsine of n where n must be a value less than 1.0 and greater than -1.0.

ATAN(n)

Calculates the arctangent of n.

COS(n)

Calculates the cosine of n where n must be a value less than 134219000.0 and greater than -134219000.0

COSH(n)

Calculates the hyperbolic cosine of n where n must be a value less than 712 and greater than -712.

LOG(n)

Calculates the log base 10 of n where n must be a value greater than 0.0.

LN(n)

Calculates the natural log of n where n must be a value greater than 0.0.

SIN(n)

Calculates the sine of n where n must be a value less than 134219000.0 and greater than -134219000.0.

SINH(n)

Calculates the hyperbolic sine of n where n must be a value less than 712 and greater than -712.

TAN(n)

Calculates the tangent of n where n must be a value less than 134219000.0 and greater than -134219000.0

TANH(n)

Calculates the hyperbolic tangent of n.

EDIT/DELETE A CALCULATED PARAMETER

After selecting the EDIT/DEL A CALCULATE from the CALC UTIL menu you will be instructed to select a calculated parameter from the parameter list. The calculated parameter that you select will be displayed in a window along with the equation used to make the calculated parameter. You may then make one of three changes to this calculated parameter: change the name, change the equation, or delete the calculated parameter from the data file.

CHANGING THE NAME

Changing the name of a calculated parameter is done by selecting the NAME option and then typing in the new name. The rules are the same for changing the name as they are for adding a calculated parameter. If the new name is invalid, an error message will appear and you will be asked to reenter the name. If the new name is the same as the old name, the window will remain open. If the new name is valid, ID-2000 will automatically update the data file.

DELETING A CALCULATED PARAMETER

If you select the DELETE option, ID-2000 will ask if you are sure you want to delete it before deleting the calculated parameter. Once deleted there is no way to retrieve the calculated parameter.

CHAN_24	CHAN_30	CHAN_36	CHAN_42	AVERAGE	SCANRATE
CHAN_25	CHAN_31	CHAN_37	CHAN_43		SCAN_NO
CHAN_26	CHAN_32	CHAN_38	CHAN_44		SECONDS
CHAN_27	CHAN_33	CHAN_39	CHAN_45		d(P)/dt
CHAN_28	CHAN_34	CHAN_40	CHAN_46		I(P)dt
CHAN_29	CHAN_35	CHAN_41	CHAN_47		

DATA	X	Y	SCALING	SMOOTH	FUNCTIONS
FILE	PARAMETER	PARAMETER	X Y	X Y	

EDIT / DELETE CALCULATED PARAMETER

AVERAGE = (CHAN_0+CHAN_1+CHAN_2)/3

CHANGE NAME CHANGE EQUATION DELETE ABORT

PLOT TYPE:	X-Y	STRIP CHART	MULTI PLOT	EXIT <Esc>
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EDIT A CALCULATED PARAMETER

NOTE: You may only delete a calculated parameter. The original parameters in the file cannot be changed or deleted.

CHANGING THE EQUATION

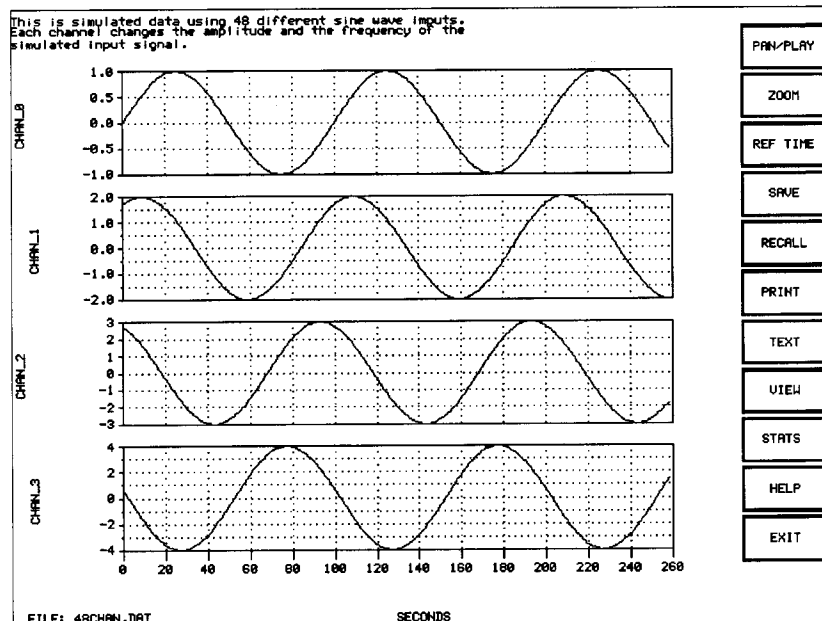
To change the equation for a calculated parameter, select the EQUATION option and type in the new equation. The equation will be checked and if there are no errors the new data calculated from the new equation will be added to the data file. The same rules apply for changing an equation as they do for adding one.

GRAPHIC SCREEN

The Graphic screen consists of two sections: the PLOT AREA which occupies most of the screen and the FUNCTION BOXES on the right side of the screen.

PLOT AREA

The plot area contains many items including the main plot title, coordinates, file name, X and Y axes labels, and the graph(s).



SAMPLE GRAPHICS SCREEN

Y-AXIS LABEL(S)

The Y axis labels are located in the margin to the left of the plot area. Y axis labels for X-Y and Strip Chart type plots are adjacent to their respective data traces. For Multi-Plot type plots the Y axis labels are color coded to match their respective data traces.

X-AXIS LABEL

The label for the X axis is in the center of the margin below the plot area. Remember, there can only be one X axis parameter for multi-plots and strip charts.

GRAPH TITLE

The graph title, if one was entered on the Graph Setup screen, will be displayed in the upper left corner of the margin.

FILE NAME

The file name is displayed in the lower left corner of the margin. This is the name of the primary data file which is being used.

CROSSHAIRS/ARROW

The crosshairs will move around the screen in correlation to movements of the mouse. If the crosshairs move outside of a graph they become an arrow which is used for selecting the function boxes in the margin to the right of the plot area.

COORDINATES

As the crosshairs move inside a graph their coordinates are displayed in the top right corner of the margin. The coordinates will be labeled to coincide with the X and Y parameters of the graph in which the crosshairs are located. The label will change as the crosshairs are moved to another graph. It is important to remember that the coordinates are for the intersection of the crosshairs. Additional coordinates may also be displayed indicating the value of the data trace and delta values. Each will be labeled "DATA" for the data trace coordinate and "DELTA" for the delta coordinates. For more information on additional coordinates please refer to the TRACK ON/OFF or DELTA ON/OFF sections later in this chapter.

GRAPHIC SCREEN FUNCTION BOXES

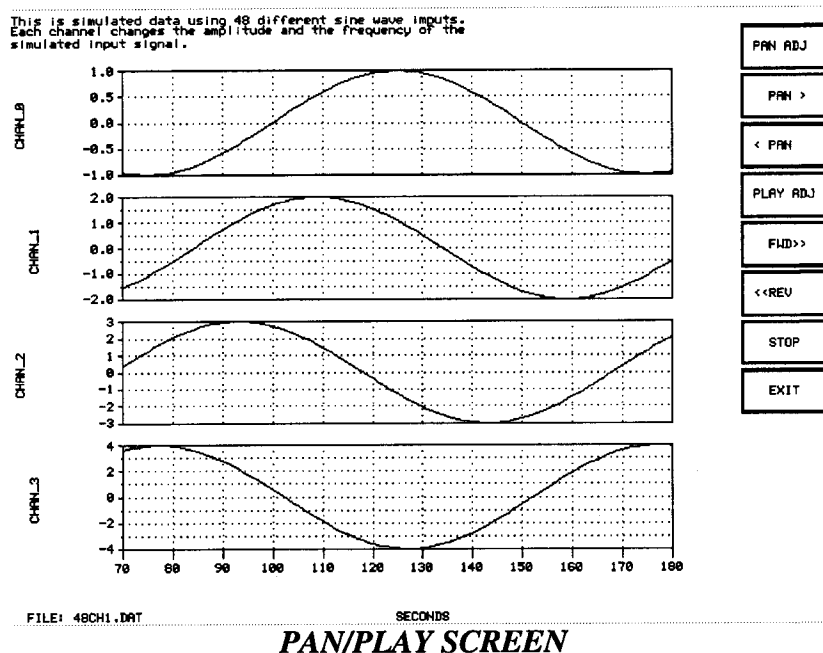
In the margin to the right of the plot area are menu boxes containing function labels. To select one of these functions, move the mouse cursor to the desired box and click the mouse button.

PAN/PLAY

The PAN and PLAY functions are similar. They allow you to move a "window" through which you view a portion of data. The "window" always shows data for the same amount of time, however, it may be shifted forward or backward through the file.

The PAN function shifts this "window" by a preset amount. You may Pan in either direction.

The PLAY function is similar to the PAN function except the "window" continuously shifts forward or backward until it comes to the end or beginning of the data file. This results in you being able to watch a type of "movie" of your data.



PAN

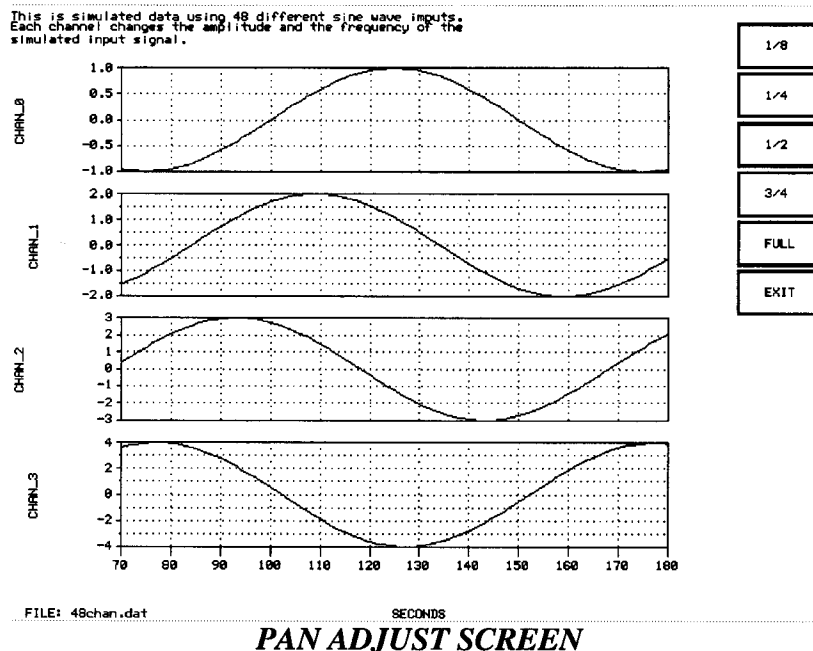
Typically panning is utilized after you have "zoomed in" on an area of interest. If you want to see data that is off the plot to the right select the "PAN>" button. To view data to the left of the plot use the "<PAN" button.

Let's say you have a data file with a total length of 100 seconds. You have zoomed in on an area between 60 and 70 seconds to look at some interesting data. You decide that now you need to look at data from 70 to 80 seconds. You could redraw the entire file and then zoom in on the area from 70 to 80 seconds or you could simply select the "PAN>" button. Your plot maintains a delta of 5 seconds but shifts forward to display data from 70 to 80 instead of 60 to 70.

Panning provides a shortcut method for viewing data through a small window and shifting that window forward or backward through the file. (Panning is only available if the X parameter is SECONDS or SCAN_NO).

You may control how far the window shifts every time you pan. This is accomplished with the PAN ADJ button. The choices are 1/8, 1/4, 1/2, 3/4, and FULL. Selecting FULL will shift the plot by the full delta X amount. In the previous example this would be 10 seconds. Selecting 1/2 would shift it by 1/2 the delta X or 5 seconds.

Use the PAN ADJ to customize your panning needs.



PLAY

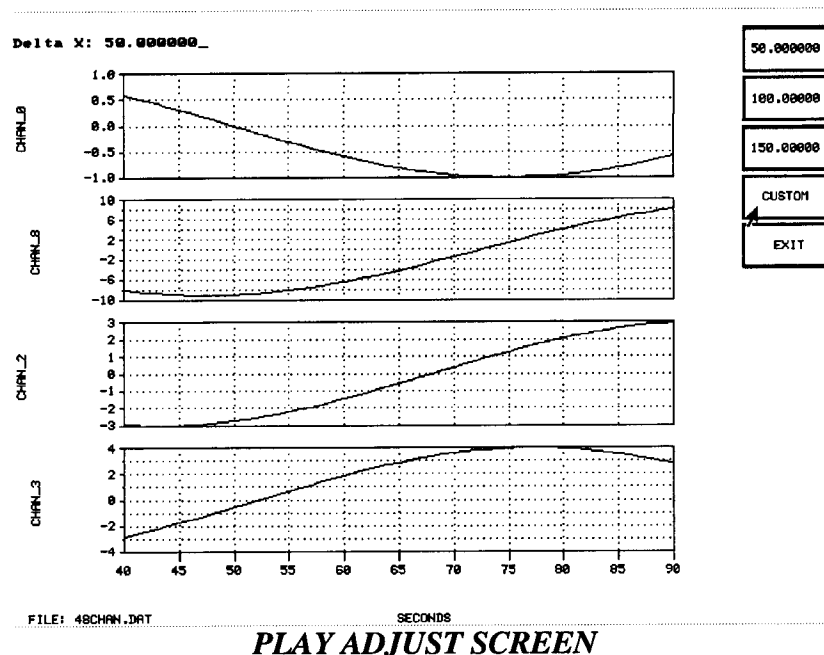
Using the PLAY function is similar to continuously panning a file. When you select "FWD>>" or "<<REV", the current plot will automatically zoom to a specified delta X and begin panning forward or backward through the file until the beginning or end is reached.

To enhance the PLAY performance the grid lines are eliminated and the Y axis scaling is temporarily changed to the min and max for the entire file.

You can control how far the "FWD>>" and "<<REV" functions zoom in before it starts playing the file. This is done through the PLAY ADJ button. You may specify the delta X desired which will be used during the initial zoom. A CUSTOM button is provided so that you may enter specific amounts for delta X.

Note: Remember that if you specify large delta X values the playing performance will decrease.

Once you begin playing a file you may stop it by selecting the STOP button.



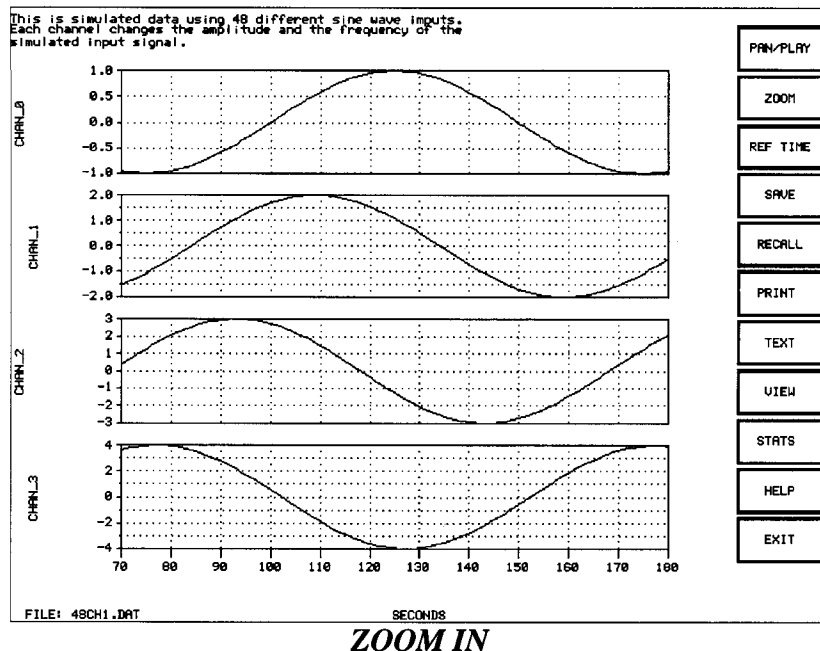
ZOOM

One of the most important features in ID-2000 is the ZOOM function. Often small subtleties in data are overlooked simply because they cannot be distinguished on large plots. ID-2000 supports "INFINITE ZOOM" which allows you to repeatedly zoom in on sections of interest until only two data points remain.

ZOOM IN

Selecting this function will allow you to zoom in on an area of interest. To zoom in on an X-Y or Multi-Plot you will simply draw a box around the area you wish to view. To do this place the crosshairs at the location desired for the first corner of the box and click the mouse button. As you now move the mouse you will be altering the size of a box on the screen. Move the mouse so that the area you want to zoom is inside the box and click the mouse button again. The plot will then be redrawn with new scales that match the plot area you have defined. Note that in some cases the new plot area may not be exactly the same as what you have chosen. This is because some scaling adjustments are done to ensure that the axis tick marks are in convenient increments. If there is some reason these dimensions are not acceptable, try manual scaling using the Graph Setup screen.

When zooming in the Strip Chart mode you will not be drawing a box but instead will be defining a range on the X axis using a vertical crosshair. As you move the mouse, the vertical crosshair will move. Place the crosshair on the left side of the range you desire and click the mouse button. Then move the crosshair to the right side of the range you desire and click the



mouse button again. If autoscaling was enabled in the Graph Setup screen and "SECONDS" or "SCAN_NO" is used as the X-axis parameter, the Y axes will be autoscaled according to the data values in the selected range of time.

ENLARGE

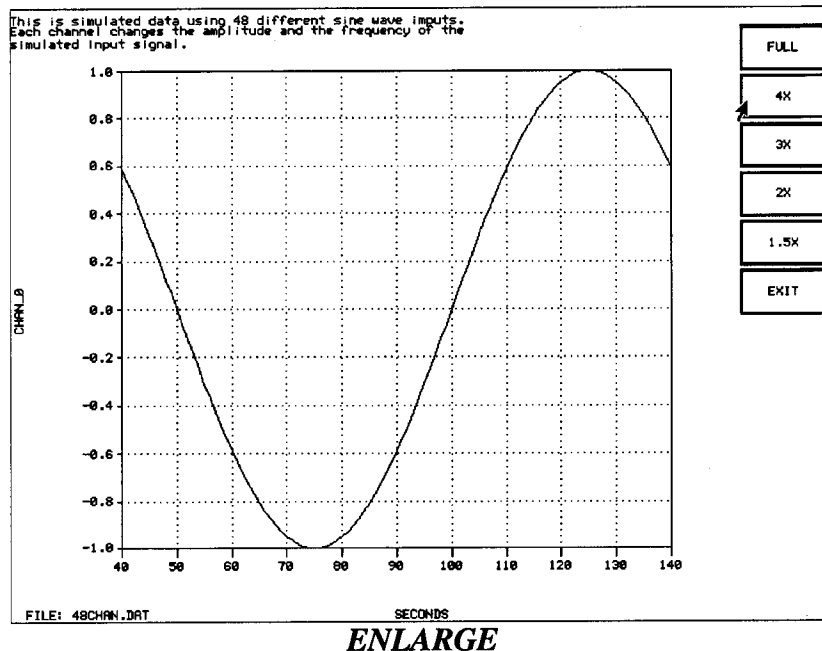
The ENLARGE function will display another list of function boxes which will allow you to enlarge a plot after you have zoomed in on it.

FULL

FULL will enlarge the plot to its original size, regardless of how much the plot is currently zoomed. This function redraws the plot using the settings from the Graph Setup screen, therefore if you are plotting a large file which takes a long time to redraw, it will be considerably faster to SAVE the initial plot before zooming so that you may RECALL it when you want to go back to full size. Please refer to the Save and Recall sections later in this chapter.

4X, 3X, 2X, and 1.5X

Selecting one of these boxes will enlarge the zoomed plot by the factor indicated. If you select a factor which would enlarge the plot beyond the original size, the action will be the same as the FULL function.



ENLARGE

PREVIOUS

The PREVIOUS function will zoom to the settings of the last zoom you made.

EXIT

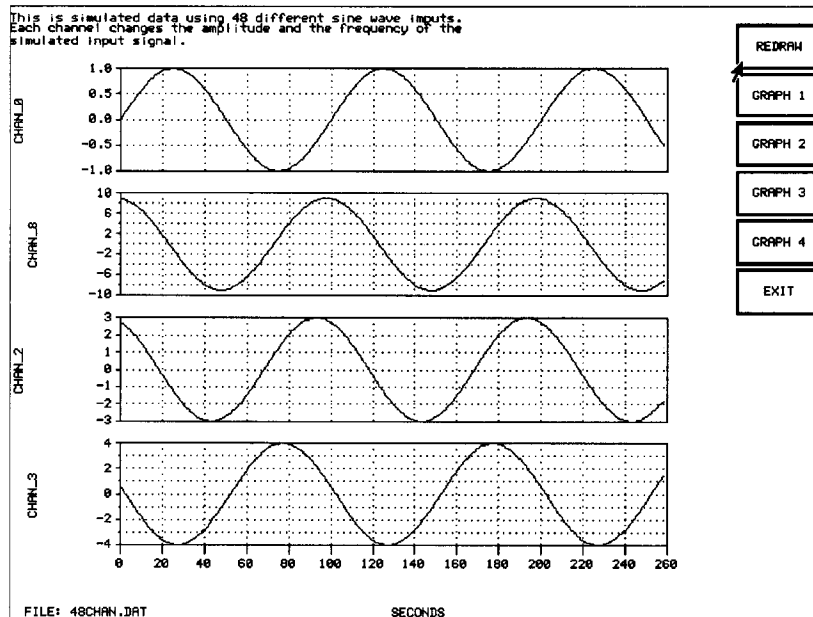
Clicking on the EXIT menu box or pressing <Esc> will restore the previous menu boxes to the right margin, without enlarging the plot.

REF TIME

This function is used for enabling ID-2000 to synchronize multiple data files to be plotted versus a common time parameter. The REF TIME function allows you to select where you want the 0.0 reference time to be placed. You should place this point at the exact location that you wish all data files to synchronize upon. You may wish to zoom in on the point first to be sure of your placement.

If you have more than one graph displayed you will be asked to select the graph for which you will be setting the reference time. To set the reference time use the mouse to move the vertical crosshair to the location that will correspond to 0.0 and click the mouse. This will set a reference time of 0.0 at that specific location. Time prior to that point will be negative and following it will be positive.

You only need to set a reference time once for a file. The location of the 0.0 time is written to the file.



SET REFERENCE TIME

If you created the plot with the Reference Time option enabled you may redraw the graph to see the results of changing the reference time location. This may be done by selecting the REDRAW function box.

SAVE

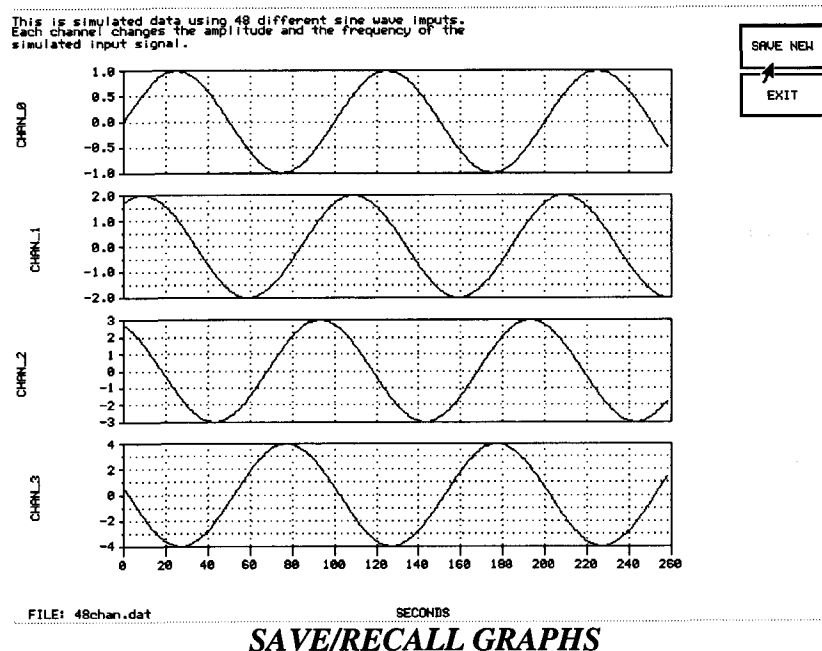
Selecting the SAVE function will bring up a new set of function boxes which will allow you to save the current plot (with text notes and leaders) to disk. The plot can then be recalled at a later time without having to redraw it. This is faster than redrawing a plot since the coordinates for each point on the data trace need not be recalculated. Instead of redrawing the graph(s), the entire screen display is recalled from the disk. It will also allow you to use the BATCH PRINT function which is found on the Graph Setup screen. A maximum of 8 plots may be saved.

After selecting this function you may select SAVE NEW which will save the current plot as the next saved plot (1 through 8). You may overwrite a previously saved plot, if any, by selecting SAVE x where 'x' is the number of the plot you wish to overwrite.

NOTE: Once a new data file is selected all of the saved plots will be deleted.

RECALL

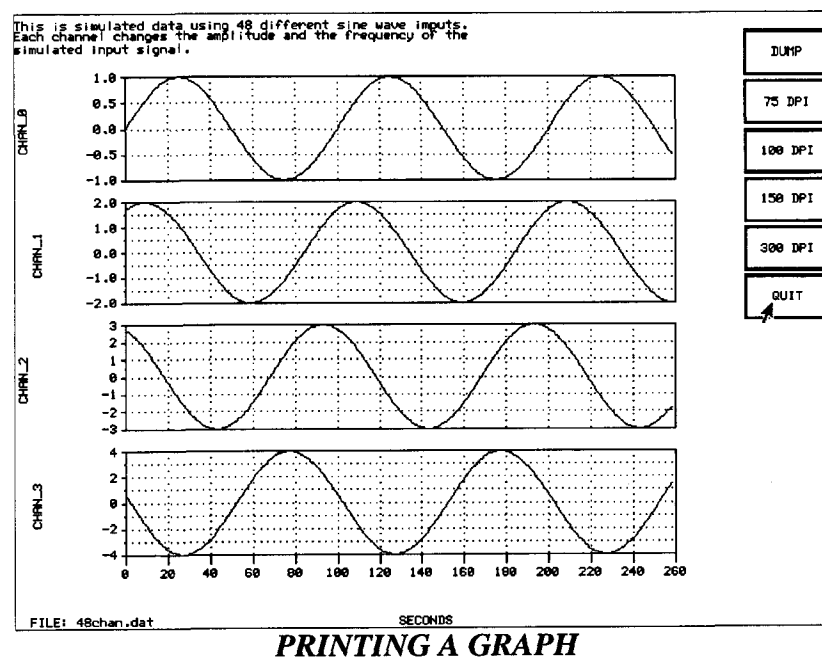
The RECALL function will allow you to recall previously saved plots to the screen. After selecting RECALL, a list of previously saved plots (numbered from 1 to a maximum of 8) will be displayed on the screen. Use the mouse to select any one of



the saved plots or EXIT to restore the previous function boxes. If no plots have been saved this function will not be active.

PRINT

Selecting this function will display a list of several print options in function boxes.



DUMP

The DUMP option will cause a "graphics screen dump" to the printer. This will normally be the fastest way to get a hard copy printout of the current plot although the quality of the printout may be less than the quality produced by selecting the DPI resolutions. The DPI option actually redraws the current plot in memory or on disk so that it will produce a full page at the specified DPI resolution when printed.

DPI Options

These options allow you to select different printer resolution in Dots Per Inch (DPI) depending upon which printer is configured. The major advantage in selecting a DPI resolution instead of using the DUMP option is that a plot can be printed on a full sheet of paper and at a higher resolution. This is accomplished by re-creating the plot on an artificial screen that is the exact resolution needed to produce a full size plot at the selected DPI resolution on paper. Extended memory (XMS) or expanded memory (EMS) will automatically be used if available. To determine if XMS or EMS is available select ABOUT ID-2000 from the graph setup screen.

Note that higher resolutions will take considerably more time to print than will lower resolutions. It is suggested that you try using lower resolutions before trying the higher resolutions.

Some resolutions may not be supported by your printer or may require additional memory to be installed in your printer.

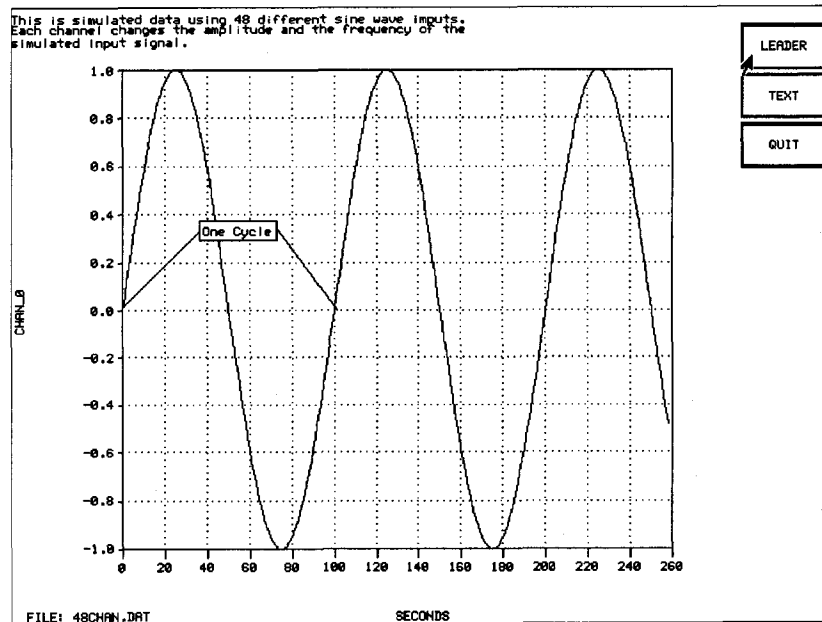
ID-2000 will utilize XMS or EMS at specified DPI resolutions. Use of XMS or EMS significantly reduces printing times.

TEXT

Selecting the TEXT function box will display another list of function boxes which will allow you to add text notes and leaders to the plot currently on the screen. Once you have added your text notes and leaders, you should print or save the plot. Zooming, enlarging, or leaving the screen for any reason will eliminate any previously entered text notes or leaders.

LEADER

The LEADER function will allow you to place a leader line from any note you have made to any point on the plot. To place a leader click the LEADER box with the mouse. This will cause the crosshairs to appear in the middle of the plot area. Move the crosshairs to where you want the leader line to start and click the mouse button. Then move the crosshairs to where you



TEXT AND LEADERS

want the line to end and click the mouse button again. To draw another line you must select LEADER again.

TEXT

Selecting the TEXT function will display a message in the upper left corner of the screen instructing you to enter text. After you have typed your text, press <Enter>. Your note (in a text box) will appear in the center of the plot area. Move the text box with the mouse until it is where you want it, then click the mouse button. This will place the note and box on the plot and return the crosshairs to the screen.

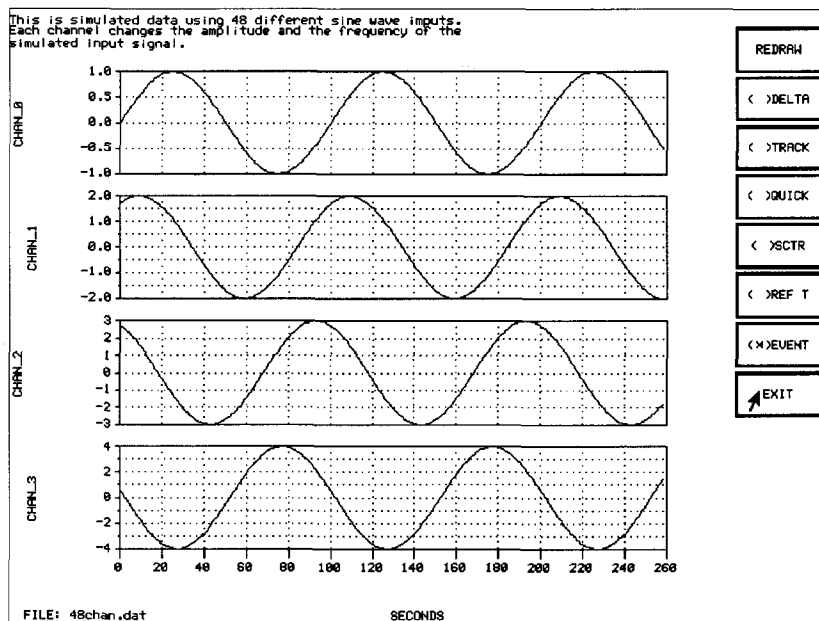
When printing with one of the DPI resolutions, a text note and its surrounding box may increase in size. This is due to differences between the screen resolution and printing resolution. This may produce an overlap or space between text notes placed end to end or directly above one another. If you encounter this problem with the DPI resolution selected you may wish to try a different DPI setting. Text notes and the surrounding boxes are anchored at the lower left corner which should always remain at their original location. This is the preferred leader attachment point.

QUIT

Selecting this option will restore the previous set of function boxes.

VIEW

The VIEW function allows you to customize how coordinates are displayed, how the data is drawn, and whether various markers should be displayed.



VIEW

REDRAW

The REDRAW function, as its name implies, recreates the current graph. This may be useful if working with multiple data files using the reference time option or if you wish to erase plot notes or leaders.

DELTA ON/OFF

The DELTA ON/OFF function toggles the delta coordinates on or off. They appear in the same upper right hand corner as the crosshair coordinates. Delta coordinates are simply delta X and Y values relative to a user defined anchor point. The primary advantage of viewing delta coordinates is the capability of looking at signal rise times, engine start times, or other items that would require the subtraction of one coordinate from another.

Once turned on, the default anchor point is set at 0.0, 0.0 on all graphs. Depending upon the current scales, the anchor point may be outside of the plotting area and not visible. A rubber band line will be displayed on the screen with one end connected to the anchor point and the other to the crosshairs. To set a new anchor point move the crosshairs to the desired location and click the mouse. The delta coordinates will then be displayed relative to your new anchor point.

TRACK ON/OFF

Selecting the TRACK ON/OFF function will toggle the data tracking mode. The tracking mode may only be used for plots where the X axis is SECONDS. When turned on, the track feature will display an additional Y coordinate at the top right corner of the screen. This coordinate is the actual data value for the Y parameter at the time corresponding to the location of the vertical crosshair. This allows you to see exact data values at any point in time. These values are read from the data file on the hard disk. Therefore, large data files may slow down the movement of the crosshairs.

NOTE: Data which has been plotted using the smooth feature will not match the displayed data values. Data tracking displays the actual data - not smoothed data.

QUICK, SCTR, REF-T, EVENT, and MARK

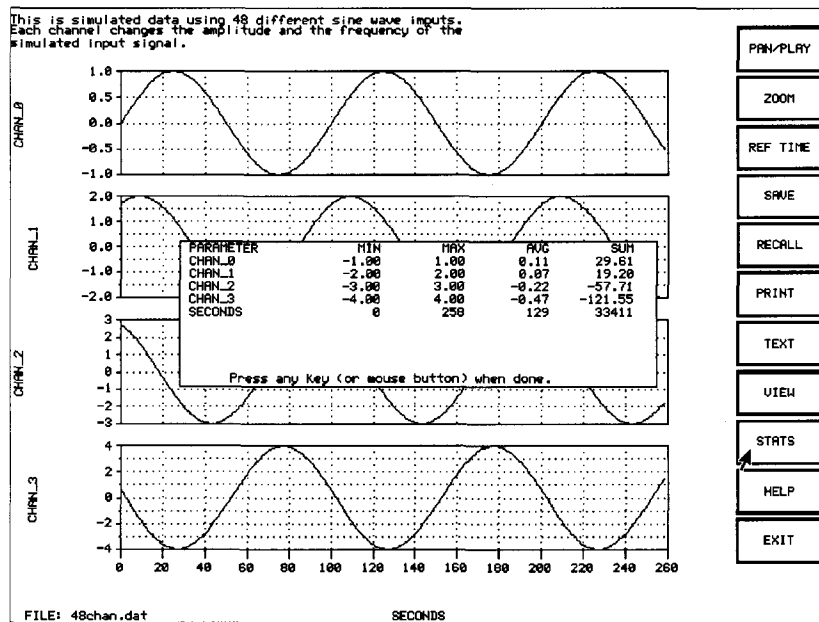
These functions allow you to toggle on and off the QUICKGRAPH, SCATTER GRAPH, EVENT MARKERS, and MULTI-PLOT MARKERS features.

The initial settings for these features are made in the PREFERENCES menu on the SETUP GRAPH screen.

STATS

ID-2000 can provide statistical information on data files in several ways. Overall file mins and maxs can be obtained through the file information features in the GRAPH SETUP. This STATS function provides additional information on the data that was actually plotted. If you are only plotting a small portion of the data file, only the actual data that appears on the graph is used to calculate statistics. These statistics are displayed in a window in the center of the screen. The min, max, average, and sum are displayed for all X and Y parameters plotted. The sum statistic calculates the "area under the curve"

NOTE: Only the data plotted is used to calculate the statistics.



GRAPH STATISTICS

EXIT

Selecting the EXIT function will return you to the Graph Setup screen. If you have zoomed or made text notes, these will be lost. Pressing <Esc> will produce the same result.

IMPORTING and EXPORTING

IMPORTING DATA

ID-2000 is capable of importing ASCII delimited files by converting them into an ID-2000 formatted file. The original ASCII file is not altered. The ASCII files must be in a columnar format with data for one parameter in a single column followed by data for the next parameter in the adjacent column. This is also commonly referred to as a "spread-sheet" type format. The columns may be separated by spaces, tabs, or commas. Common examples of this type of format are files from applications such as Microsoft Excel and Lotus 1-2-3. The following is an example of a columnar file:

PARAM1	PARAM2	PARAM3	PARAM4
1.0	2.0	3.0	4.0
1.1	2.1	3.1	4.1
1.2	2.2	3.2	4.2
1.3	2.3	3.3	4.3
1.4	2.4	3.4	4.4
1.5	2.5	3.5	4.5
1.6	2.6	3.6	4.6
1.7	2.7	3.7	4.7
1.8	2.8	3.8	4.8
1.9	2.9	3.9	4.9

The data for PARAM1 is all in the first column while the data for PARAM2, PARAM3, and PARAM4 are in columns 2, 3, and 4 respectively.

Your file does not have to include parameter names, however, if it does make sure that they are on the row immediately before the first scan of data. Parameter names will be defaulted to CHAN_0, CHAN_1, etc. if names are not found in the file. You may edit the names later in the import process if desired.

To begin the import process select the FILE MENU function from the GRAPH SETUP screen. Then select the IMPORT A FILE function. You must then select the type of file you wish to import. Typically Microsoft Excel files are "comma separated variable" files that use a file extension of ".CSV". Lotus 1-2-3 files are commonly "printer" files that use a file extension of ".PRN". Files from other applications may use the ".TXT" file extension. The only difference between these three file types is the delimiter character used between the data points. The ".CSV" files use a comma, ".PRN" files use spaces, and ".TXT" files use tabs, spaces, and/or commas. If your file does not use one of these extensions then select any one of the three and enter the name of the file on the file selection screen.

After selecting the file you will be asked to enter various information about the file such as the new ID-2000 file name, any comments you wish to place in the file, starting time and date of the data, what recording rate was used to produce the data file, and whether you wish to use single or double precision data. The ID-2000 file name will be defaulted to the name of the ASCII file with an extension of ".DAT".

After entering the information select the "OK" button to proceed. ID-2000 will then analyze the file to determine the number of parameters and how many scans of data it contains. Your file may also include header information before the data. This information will be skipped over and not included in the ID-2000 file. It is important to understand how the import program works. It reads in a line of data from the file and looks to see if the line begins with a number. If it does then it assumes that this is the first data point and expects the data for the other parameters to follow it on the same line. If one or more of your header lines begins with a numerical value the import function will inadvertently think that the actual data starts there when it actually starts farther down in the file. This will cause the import function to inaccurately process the file. Make sure that any header information in your ASCII file does not begin with a numerical character.

After ID-2000 analyzes the file you may edit the parameter names. Press the F10(COMPLETE) key to proceed.

ID-2000 will then begin converting the file. Status information and estimated remaining conversion time will be displayed throughout the process. When the conversion is complete you will be returned to the GRAPH SETUP screen. You may then select your newly imported file through the LOAD PRIMARY FILE function in the FILE MENU.

ID-2000 provides a second import function called "USER IMPORT". This function allows you to create your own import or conversion program if you have data files that are not in an ASCII type format. ID-2000 will search for a program named "U_IMPORT.EXE" which must be the name of your import program. If it finds a program with that name ID-2000 will execute it and then return when it has completed. This feature eliminates having to exit ID-2000, run your program at the DOS prompt, and then re-start ID-2000. All of this is done for you automatically. The ID-2000 file format is provided in an appendix at the end of this manual. The "U_IMPORT.EXE" file included with copies of ID-2000 purchased from Campbell Scientific converts Campbell Scientific comma delimited data files to ID-2000 file format (Section 1).

EXPORTING DATA

You may export an ID-2000 data file to either an ASCII or other ID-2000 file. The export function is accessed through the FILE MENU function on the GRAPH SETUP screen. There are three basic types of exporting from which you may select: ASCII REPORT, ASCII COLUMN, and ID2000 FILE.

The ASCII REPORT export creates an ASCII file generally with an ".RPT" extension. This format is used to create reports with a listing of the actual numerical values for the data. Header information is placed at the beginning of the file which contains the file name, when it was recorded, number of channels, etc. The time associated with each reading then follows in a paragraph format. After the time data is the data for the first parameter which is also in a paragraph format. The second parameter follows and so on.

You may select the "PARTIAL FILE EXPORT" option to only export a portion of the data file. This option allows you to specify the start and stop times from which to extract data and select which parameters will be exported.

The ASCII COLUMN export creates a spread-sheet type ASCII file which places data for each parameter in columns. This format is essentially the same as the ".CSV", ".PRN", or ".TXT" files which may be imported into ID-2000.

You may select the "PARTIAL FILE EXPORT" option if desired which allows you to select which parameters and what portion of the test to export. You may also select the "INCLUDE TIME" option if you wish time to be one of the parameters in the ASCII file, "COLUMN WIDTH" which forces each column to a specific number of characters, and/or "DELIMITER" which is the character placed between columns.

If the delimiter is set to COMMA the resulting ASCII file will have an extension of ".CSV". If TAB or SPACE is used for the delimiter the resulting ASCII file will have an extension of ".TXT".

ID-2000 DATA FILE FORMAT

The ID-2000 data file format is listed here to assist you in converting any data files you may have to an ID-2000 compatible file. The file structure listed below is in the form of Microsoft C although you can use any programming language you desire as long as it produces the same data file.

There is a header used by ID-2000 that is placed prior to the actual data in the file that provides necessary information such as the number of channels, number of scans, parameter names, etc. There are several options in the header file depending upon whether the data was recorded at a constant or variable rate and whether or not time data is going to be included in the file. The ID-2000 file header is in the following format and begins at the top of the data file:

<i>VARIABLE</i>	<i>TYPE</i>	<i>SIZE</i>	<i>DESCRIPTION</i>
ftype	char[4]	3 + NULL	must contain "ID2" to denote an ID-2000 file
comments	char[61][3]	183 bytes	three strings with any comments for the file
t_over	double	8 bytes	offset time in seconds for ref time. Default to 0.0
testtime	long int	4 bytes	time of test in seconds since 1/1/70 + 5 hours
nochans	int	2 bytes	number of parameters in data file (including calcs)
nocalcs	int	2 bytes	number of calculated parameters in data file
scanrate	double	8 bytes	number of seconds per scan (NOT scans/sec)
noscans	long int	4 bytes	number of data points for each parameter
p[0]	struct CHAN	26 bytes	structure for name, min, max of 1st parameter
p[1]	struct CHAN	26 bytes	structure for name, min, max of 2nd parameter
p[3]	struct CHAN	26 bytes	structure for name, min, max of 3rd parameter
p[4]	struct CHAN	26 bytes	structure for name, min, max of 4th parameter
p[511]	struct CHAN	26 bytes	structure for name, min, max of last parameter
The variables p[0], p[1], ..., p[511] are array elements of a C-Language structure of type CHAN which is as follows:			
<pre> struct CHAN { char name[10]; /* name of the parameter - 9 characters + NULL character */ double min; /* minimum value for this parameter throughout the file */ double max; /* maximum value for this parameter throughout the file */ } </pre>			
rates[200][2]	double	3200 bytes	OPTIONAL: This array is used to hold the rate information regarding the speed at which the data in the file was taken. It only exists if a value of -2 is used for the scanrate variable, otherwise, this array will not appear in the file. If used, the [[0] element contains the scan number associated with the rate change. rates[0][0] must be 0. The [[1] element contains the rate at which subsequent data was taken. rates[0][1] must contain the initial rate at which data was recorded.
time[noscans]	double (or float)	noscans * 8 bytes (or noscans * 4)	data array for holding time data

NOTE: The time array must be the same data type, double or float, as that used for the normal parameter data. **Space for the time array must be provided even if a constant scanrate is used.** See the following discussion for additional information on ID-2000 and time.

There are three methods that ID-2000 can use to allow data to be plotted versus time. The first and most simple is to have the data recorded at a constant rate. In this case there is no additional information in the header file and the value entered for "scanrate" is used to calculate the corresponding time for any given data point. Scanrate is in seconds per scan. If scanrate were set to 0.001 then every channel must have been recorded 1000 times every second.

The second method is to set the scanrate value to -1 which flags ID-2000 that the actual rates used will be included in the header file in a "rates" array. For this method, a 200 x 2 array of doubles is required to hold the rate and scan number information for each different rate. A maximum of 200 rates may be used. The first rate must start at scan 0. All unused rates must be set to 0 also. You must write a 200x2 array in the file even if there is only 1 or 2 rate changes.

The third method is to set the value of scanrate to -2 and include actual time data. If you wish to use actual time data from the file, place it in the "time" array. ID-2000 will read the time from the file just as it would any other parameter from the data file. This may be slightly slower in plotting data than the other two methods since ID-2000 must read the time data instead of calculating it. However, this allows you the most flexibility since you can use data that was recorded at irregular time intervals. The time array must be in the file whether or not it is actually used.

Following the header section is the actual data for all parameters. The format in which data is typically stored when it is recorded does not lend itself to efficient reading and plotting of a particular parameter. This format is referred to as "by scan" which means that data is stored in the following type of format:

LINE 1	Parameter_0	Parameter_1	...	Last Parameter	(1st DATA SCAN)
LINE 2	Parameter_0	Parameter_1	...	Last Parameter	(2nd DATA SCAN)
LINE 3	Parameter_0	Parameter_1	...	Last Parameter	(3rd DATA SCAN)
LINE 4	Parameter_0	Parameter_1	...	Last Parameter	(4th DATA SCAN)
LINE n	Parameter_0	Parameter_1	...	Last Parameter	(LAST DATA SCAN)

The problem with this format is that in order to read the data for only Parameter_0 you must either read the data for all parameters and throw away all but Parameter_0 or seek to the appropriate file location for each scan of Parameter_0 data. Either way is extremely inefficient and time consuming.

ID-2000 utilizes a file format that is more conducive to reading and plotting data for a particular channel. This format is referred to as "by channel" which means that data is stored in the following format:

LINE 1	Scan 0	Scan 1	Scan 2	...	Last Scan	(Parameter_0)
LINE 2	Scan 0	Scan 1	Scan 2	...	Last Scan	(Parameter_1)
LINE 3	Scan 0	Scan 1	Scan 2	...	Last Scan	(Parameter_2)
LINE 4	Scan 0	Scan 1	Scan 2	...	Last Scan	(Parameter_3)
LINE n	Scan 0	Scan 1	Scan 2	...	Last Scan	(Last Parameter)

This format allows the data for a particular channel to be read as one continuous block of data which minimizes disk use and plot time.

Data files normally contain double precision data (type double - 8 bytes). However, you may use single precision data (type float - 4 bytes) which will reduce the data file size as well as numerical accuracy. ID-2000 will accept data files that contain double precision data or single precision data, but NOT a combination of the two. For additional information on C-Language data types refer to a Microsoft C Compiler manual.

ID-2000 has the capability of adding calculated parameters to a data file. Any calculated parameters are placed at the end of the data file. These parameters are handled in the same manner as ordinary parameters except that a string, 81 bytes, containing the equation that created the calculated parameter immediately precedes the actual data.

TIPS, TRICKS, and TRAPS

The following is a list of some of the more commonly asked questions regarding ID-2000 features and procedures. Solutions and hints for each are provided. It is recommended that you look through these questions prior to calling Technical Support to see if your particular question has already been answered.

"When I make a graph I don't see anything on the screen or my computer locks up. What's wrong?"

The primary cause of this symptom is that you do not have ID-2000 configured properly for the graphics card that you are using. From the Graph Setup screen select the CONFIGURE function which will allow you configure ID-2000 for the graphics adapter that you are using.

NOTE: If you have not configured ID-2000 it will attempt to determine what type of video card you are using and select that driver. However, some graphics cards can fool ID-2000 into thinking they are something else and therefore the incorrect driver will be selected. Always configure ID-2000 to tell it exactly what graphics card you are using.

There are also "generic" graphics drivers available in ID-2000 such as VESA, IBM ADAPTER INTERFACE, etc. which you may choose if your graphics card is not directly supported.

"I have a very large data file but I only want to look at a small piece of it and do not want to wait for the entire graph to be displayed. Can I do this?"

Yes, you can. There are two common ways to only display a small portion of a data file. The first method is to go into the EDIT SCALES function in the Graph Setup and enter values for TSTART and TSTOP if you know the starting and stopping points you wish to plot. ID-2000 will only plot data starting at the data point corresponding to TSTART and stop plotting at the data point corresponding to TSTOP. This way you will only see the section of data in which you are interested.

A second method is to plot the entire data file but use the QUICK GRAPH feature which will only plot approximately 4 data points per pixel of screen resolution. The result is that a representation of the data will appear very quickly but many data points will be left out. The QUICK GRAPH feature may be enabled under the PREFERENCES function in the Graph Setup screen. Once you have displayed the entire graph, turn the QUICK GRAPH feature off through the VIEW function on the Graphics Screen. Then you may simply ZOOM in on the area you wish to see. The section of data in which you zoom will be replotted with the QUICK GRAPH feature off.

"I am manually scaling my graphs but the scales are not the same as what I entered in EDIT SCALES. What is wrong?"

It is possible for you to manually scale a graph and ID-2000 not use your exact numbers. The reason this happens is that ID-2000 eliminates non-standard scales. These types of scales have grid intervals of an abnormal number such as 3, 6, 7, 9, etc or scales that would result in partial grids at the top or bottom. ID-2000 uses only intervals that are easy to read such as 1, 2, 5, etc. and always has whole grid intervals at the top and bottom of the plot. For example, let's say you request scales of 3 for the min and 97 for the max. ID-2000 may produce a plot with scales of 0 and 100 in order to eliminate the non-standard scales you requested.

This is different from autoscaling since ID-2000 tries to use the exact scales you enter or ones that are as close as possible. Autoscaling will produce scales necessary to contain all data in the plot. In the previous example of requesting scales of 3 and 97 let's assume that the data actually varied from 12 to 68. Autoscaling would more than likely produce a plot with scales of 10 to 70 instead of what manual scaling would produce.

"What is the I(P)dt function and how does it work?"

The I(P)dt function "integrates" a parameter you select. Integration is commonly thought of as "area under the curve". An example of integration is to determine the distance traveled by using a parameter that represents velocity. Let's say that you have a parameter that represents the velocity of a car in feet/second. You could plot the total number of feet traveled at any point in time by integrating it. Without getting too complicated, think of plotting velocity against time. Now draw small rectangles that are one second wide and go from 0 feet/second up to the velocity for that particular second. If you do that for every second the result would look similar to a bar chart with the bars touching each other. If you add up the areas of each rectangle or bar you would have the distance traveled, or in other words, the integral of velocity.

"How do derivatives work in ID-2000 and why do they look so "noisy"?"

Derivatives are used to determine how fast a parameter is changing. If you plot the derivative of speed you will see acceleration. This is very useful in many types of applications. The values plotted are the amounts of change that occurred for every data point divided by the amount of time between data points, or in more classical terms, $(\Delta Y) / (\Delta X)$.

The reason a derivative graph may look "noisy" is because of the method in which the data was recorded. If the data was recorded using an Analog to Digital Converter, what may look like a smooth curve is actually a series of very small stair steps. If you zoom in very close on any parameter you may be able to see these steps in some of the parameters. When you calculate a derivative of a parameter with all these tiny stair steps the result may not be a smooth line but a shading effect that oscillates between zero and some value.

To reduce this effect and provide a smoother derivative calculation you should select SMOOTH for the graph of the derivative on the Graph Setup screen. There are three levels of smoothing available: SMALL, MEDIUM, and LARGE. You should start with a SMALL level of smoothing and see if that is enough. If the derivative is still not smooth enough, try

increasing the smoothing a level. What happens when data is smoothed is that each data point is modified to become the average of data points both before and after it. (The real data in the file is never changed - only the data plotted on the screen is modified.) Therefore, the stair step of the data is decreased or even eliminated which results in a smoother derivative.

WARNING: You must be aware that smoothing data is altering the data values which are plotted (or used for derivative calculations) and therefore smoothing should be done with caution. To see if smoothing is acceptable, plot the smoothed and unsmoothed parameter on a Multi-Plot so that you can see exactly how the data is changed.

"I can't import my data from Lotus 1-2-3 successfully. I get some of the data but not all of it. What's wrong?"

ID-2000 includes import capability from various spread-sheet applications and LabTech Notebook, etc. However, it is important to make sure the file is in the proper format before importing it. In order to import a file it must first be saved as a TEXT or ASCII file. In Lotus 1-2-3 this is done by printing to a file which produces a .PRN file. Microsoft Excel allows you to save files as a .CSV type. Most software packages have some method of producing an ASCII version of their file.

There are some common mistakes made when attempting to import a file. Parameter names are not required but if they are included they should be on the line immediately before the first scan of data. Also make sure that the parameter names are 9 characters or less, start with a letter, and only contains letters, numbers, and/or a '_' . ID-2000 allows you to edit or enter names during the import process. There must be at least one space, comma, or tab between each parameter. Each line needs to end with a carriage return and line-feed character - most software packages do this automatically for you. Make sure there is not a blank line or row between the names and the data. Compare your data file with the sample EXCEL.CSV and LOTUS.PRN files included with ID-2000. If you still don't see anything wrong, call Technical Support for assistance.

"I already have data files which are not ASCII but I want to analyze them in ID-2000. How can I convert them?"

If the program that produced the file has an export capability to ASCII you might try using it and then importing the data as an ASCII file in ID-2000. Otherwise you must use a custom written conversion program. The data file format information is included in this manual if you desire to write one yourself. If you prefer you may contact technical support to discuss having one written for you on a contract basis. If you decide to create a conversion program yourself you may want to name it "U_IMPORT.EXE" so that you can import your files directly into ID-2000.

"I can't find my printer (or graphics card) in the list under SETUP. What do I do?"

ID-2000 supports many different printers and new ones are always being added. Call Technical Support to see if support for your particular printer has been added. Many printers can emulate a more common brand such as Epson or Hewlett Packard. You may be able to select one of these printers instead if your printer has emulation capabilities.

If your sepecific graphics card is not listed you may be able to use the VESA or IBM ADAPTER INTERFACE driver if your graphics card supports these standards. If your card is not compatible with these standards it may have a utility program that can be executed to make it compatible. Refer to your graphics card documentation for VESA or IBM ADAPTER compatibility. Many graphics cards are also compatible with older versions of the cards. For example, the ATI Graphics Ultra can use the ATI VGA Wonder driver.

"It takes a long time for me to print a plot at 300DPI on my printer. Is there any way to speed the printing process up?"

Yes, you can reduce printing times by up to 50% with the addition of extended or expanded memory to your system. If ID-2000 detects extended or expanded memory it will automatically use it to create the image that will be printed instead of using the hard disk.

You can also speed up ID-2000 printing and normal operation by using disk caching. This will speed up reading and writing to a hard disk which will improve the performance of ID-2000. DOS 4.01 and higher includes a disk caching program called SMARTDRV. There are also disk caching programs available from many software manufacturers.

Many times you may not require the highest printing resolution available. You can try using lower resolutions to determine if they may be adequate for your requirements.

"I can't tell which parameter is which on a Multi-Plot when I print it on my black and white printer?"

ID-2000 has a MULTI-PLOT MARKER feature that can be turned on or off that will "mark" each of the data traces on a Multi-Plot. You may turn it on and off through the PREFERENCES option in the Graph Setup screen or in VIEW from the Graphics screen. If you enable these markers, a number with a box around it will be drawn several places on the data trace and the parameter name will display the data trace number so that you can tell which trace belongs to which parameter.

"ID-2000 always starts with the same data file that I used last time. Can I have it start with a different one?"

ID-2000 remembers what you were doing when you last used it and forces all the settings to those when you next start ID-2000. You may also specify a primary data file on the command line when starting ID-2000. Simply type the name of the data file (including the extention) following ID2000 at the DOS prompt. For example, to load "myfile.dat" you would type at the DOS prompt: "ID2000 MYFILE.DAT" and it would automatically be loaded.

"I am using a laptop that has a VGA display but is in black and white. I can't see some of the things on the screen. What do I do?"

In the CONFIGURE function from the Graph Setup screen you may adjust the colors. One of the options is MONO which will default all the colors to black and white.

"The data in my file was not recorded at a constant rate. Can ID-2000 still import it?"

ID-2000 is capable of using data files with multiple recording rates and files that include actual time data. However, the current import function does not directly support it. You may contact Technical Support to discuss a custom conversion program or write one yourself. If your data file includes time as a parameter, you may trick ID-2000 by importing it with a scanrate of 1 and using your time parameter instead of SECONDS when you create graphs. The only disadvantage of doing this is that some ID-2000 features will not be available such as data coordinate tracking, autoscaling during zooming, etc.

"I am placing text and leaders on the plot but I keep losing them. What is happening?"

Text and leaders should be the very last thing you do before printing or saving. If you zoom, pan, or redraw the text and leaders will be erased.

"When I try to start ID-2000 it tells me that I must have a Microsoft compatible mouse. Why doesn't it recognize my mouse."

ID-2000 does require a Microsoft compatible mouse. The vast majority of mice are either Microsoft compatible or have a Microsoft compatible mode in which they can be set. Make sure the mouse driver is loaded before running ID-2000. If your mouse is still not recognized then it is not supported by ID-2000.

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