MULTILIN

INSTRUCTIONS

DGP-DATA SOFTWARE

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These instructions do not purport to cover all details or variations in equipment nor provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

To the extent required the products described herein meet applicable ANSI, IEEE and NEMA standards; but no such assurance is given with respect to local codes and ordinances because they vary greatly.

DGP-DATA SOFTWARE

OVERVIEW

This program plots oscillography data obtained during a fault or an abnormal operating condition, and displays fault reports and fault events. The data displayed includes currents, voltages, digital inputs, digital outputs, and protection flags.

The program obtains the oscillography data from a disk file in the PC that is created by the DGP-LINK program. Refer to the **Information** section under **RELAY FUNCTIONS** in **DGP-LINK SOFTWARE** of your DGP™ system instruction book (e.g. GEK-100605) for a description of how to retrieve oscillography data from the DGP™ system.

The disk file containing the oscillography data is an ASCII file, and is formatted as follows. The DGP™ system settings (in the format that is displayed on the screen in the DGP-LINK program) is in the file first, followed by the fault report and events associated with the fault report (again, in the format that is displayed on the screen in the DGP-LINK program). Next are the title columns for a spread sheet. The remaining data consist of the oscillography data. Each line in the file consists of one sample of data. Each sample has eight currents (three phase and ground on power system and return side), four voltages (three phase and neutral to ground), eight flags and sampling frequency data. The currents are in hundreds of secondary amperes and voltages are in tens of secondary voltage. The flags contain the following data.

Flag   **Description**

1. Digital inputs (DI IN):
   Generator off-line,
   Turbine inlet valve,
   External trip 1,
   External trip 2,
   External oscillograph trigger,
   External VTFF,
   IRIG-B

2. Digital outputs (DI OUT):
   Trip outputs 94G, 94G1, 94G2, and 94G3
   Alarm outputs 74A, 74B, 74C, 74D and 74FF
   Non-critical alarm 74NC
   Critical alarm 74CR

3. Protection pickup flags (PU FLG0):
   87GA, 87GB, 87GC,
   46A, 46T
   32-1, 32-2,
   51VA, 51VB, 51VC,
   24AA, 24AB, 24AC,
   59

4. Protection pickup flags (PU FLG1):
   24TA, 24TB, 24TC,
   24IA, 24IB, 24IC,
   64G1, 64G2,
   81-1O, 81-2O, 81-3O, 81-4O,
   81-1U, 81-2U, 81-3U, 81-4U

5. Protection pickup flags (PU FLG2):
   AE (Accidental Energizing),
   27,
   51GN,
   External trip 1, External trip 2

6. Protection output flags (PR FLG0):
   87GA, 87GB, 87GC,
   46A, 46T
   32-1, 32-2,
   51VA, 51VB, 51VC,
   24AA, 24AB, 24AC,
   59

Flag   Description, continued
7. Protection output flags (PR FLG1):
        24TA, 24TB, 24TC,
        24IA, 24IB, 24IC,
        64G1, 64G2,
        81-1O, 81-2O, 81-3O, 81-4O,
        81-1U, 81-2U, 81-3U, 81-4U

8. Protection output flags (PR FLG2):
        AE (Accidental Energizing),
        27,
        51GN,
        External trip 1, External trip 2

SYSTEM REQUIREMENTS

HARDWARE

The minimum PC hardware requirements consists of the following components. An IBM-AT or compatible (Compaq, Zenith, Tandy, etc...) with one parallel port, a minimum of 450K of RAM in which to run the program, 40MB hard drive, low density 3 1/2 inch floppy drive, EGA monitor, and one of the printers described below for plotting oscillography data.

SOFTWARE

Requires MSDOS (PCDOS) 3.1 or above for the PC operating system.

INSTALLATION

Copy all files from the distribution diskette to your hard drive, using the DOS copy command.

GENERAL OPERATION

MOUSE/KEYBOARD USAGE

Either the mouse or the keyboard can be used to access all items in menus and dialog boxes. For full manipulation of graphical data, the mouse is required.

The mouse is used to access items in menus and dialog boxes by pressing, then releasing the left mouse button (clicking).

MAIN HORIZONTAL MENU BARS

Items in the main horizontal menu are selected in one of three ways:

1 - Position the mouse cursor on top of the menu item and click the left button.
2 - Use a hot key. The hot key is the combination of the ALT key and the letter that is highlighted in the item description (yellow in the default colors).
3 - Once an item on the menu has been selected, the RIGHT and LEFT ARROW keys can be used to go to adjacent menu items.

PULL DOWN MENUS

Pull down menus are selected in a number of ways:

1 - Position the mouse cursor on top of the menu item and click the left button.
2 - Position the mouse cursor on top of the menu item and press the left button. While holding the left button down, move the cursor to the desired menu item and release the button.
3 - Use a hot key. The hot key is the combination of the ALT key and the key highlighted (yellow in the default colors). This method is not available in the HELP pull down menu.
4 - Use the UP ARROW and DOWN ARROW keys to highlight the desired menu item, then press the ENTER key.

WINDOWS

Windows contain several objects that are of interest to the user. The first object is the title bar, which is displayed across the top of the window and has a small solid rectangle on the left side. The title bar contains the oscillography data file name, and the date and time of the fault. The second object is the quit button, which is just below the title bar. The remaining objects are specific to the data being viewed.

Windows containing data plots (currents/voltages/flags) and reports can in general be resized and moved anywhere on the screen. When the mouse cursor is moved into the title bar, the cursor changes shape into a crosshair. At this point, the window can be either resized or moved. To resize the window, hold the right mouse button down and drag the mouse until the window is the desired size, then release the right mouse button. To move the window, hold the left mouse button down and drag the mouse until the window is in the desired position, then release the left mouse button.

Windows can also be iconized (i.e. made into a small window just large enough to contain a title). The window can be iconized by moving the mouse cursor to the solid rectangle on the left of the title bar (the cursor will change shape to a left-pointing arrow) and clicking the left button. The window can later be restored to its last size and position by moving the mouse cursor over the icon and clicking the right button.

The window can be exited (or closed) by moving the mouse cursor over the QUIT button (the mouse cursor changes shape to a left-pointing arrow) and clicking the left button. Alternatively the user can enter ALT-Q to close the window.

A maximum of six windows can be placed on the screen at the same time, sized and positioned appropriately to view all of them.

DIALOG BOXES

Dialog boxes are generally characterized by a title bar (blue in the default colors), a grey box, and OK and CANCEL buttons. The dialog box cannot be moved, resized, or iconized. In addition, when a dialog box is displayed, the user can only access items in the dialog box, not any other items on the screen.

If an item in the dialog box has a title with a highlighted character (yellow in the default colors), the user can access this item from the keyboard by using the ALT key with the highlighted character (the hot key).

Buttons in the dialog box can be accessed from the keyboard by using the UP/DOWN ARROW keys, the TAB/SHIFT TAB keys, or, if the button has a highlighted character, the hot key. If the buttons require the user to make a selection, the selection is made by using the ENTER key. A button that is not selected has the same color as the dialog box (grey). A button that is selected turns white. Once a button is selected, it can be de-selected by using the ENTER key again. The mouse can also be used to select and de-select buttons. When the mouse cursor is moved inside a button, the cursor changes shape to a left-pointing arrow. At this point, the user can select/de-select the button just by clicking the left mouse button to select an item and again clicking the left button to de-select the item.

To exit from the dialog box and clear it from the screen, the user selects either the OK or the CANCEL button. The mouse can be used to select these buttons by moving the mouse cursor over the button (the cursor changes shape to a left-pointing arrow) and clicking the left mouse button. In addition the keyboard can be used to select these buttons by using their hot keys. The hot key for the OK button is ALT-O and the hot key for the CANCEL button is ALT-C.

The OK button accepts the selection(s) made by the user and allows the program to use these selections. The CANCEL button does not accept (cancels) the selections made by the user and thus the program uses the previous selections.

LIST BOXES

A list box is a box within a dialog box that lists all entries a command could affect (for example, a list of file names). If the list of available entries is longer than the displayed list box, the list box has a vertical scroll bar that allows the user to scroll through the list.

List boxes are accessed either with a mouse or the associated hot key. They can be used entirely with a mouse or from the keyboard. The following keys from the keyboard are valid:

UP ARROW   Move up one selection.
DOWN ARROW Move down one selection.
PAGE UP   Move up one page of selections.
PAGE DOWN   Move down one page of selections.
HOME   Move to the first selection.
END   Move to the last selection.
ENTER   Accept the current selection and exit the list box.
ALT-X   Exit the list box without making a selection.

The user may also click the left mouse button on the scroll bar to move through the selections. When the mouse cursor moves to the list of items in the list box, the cursor changes shape to a left-pointing arrow. Clicking the left mouse button on an item selects that item.

The current selection of a list box is highlighted (yellow in the default colors).

ENTERING TEXT AND NUMBERS

The following keys are used when entering and editing text and numbers.

LEFT ARROW   Move the cursor one character to the left.
RIGHT ARROW Move the cursor one character to the right.

DELETE   Delete the character at the cursor.

BACKSPACE   Delete the character to the left of the cursor.

INSERT   Toggle between the insert and overwrite mode.
Overwrite mode is indicated by an underscore character for the cursor. Insert mode is indicated by a block character for the cursor.

ENTER   Accept the text or number in the field/box

ESCAPE   Clear the text or number in the field/box.

PLOTS OF CURRENTS/VOLTAGES AND FLAGS

Each window containing a plot of the currents/voltages and flags has several characteristics.

The prefault cycles are all in grey.

The y axis for currents and voltages is the magnitude of the currents and voltages. The y axis has no specific meaning for the flags. The x axis represents the sample number, with sample number 0 being the origin of the x axis.

There are two vertical bars through the graph that can be moved along the x axis to get information on timing and, in the case of currents/voltages, magnitudes of the currents/voltages. To move these vertical bars, place the left edge of the mouse cursor (the point of the left-pointing arrow) on the bar, or on the box at the top of the bar, press and hold down the left mouse button, and move the mouse until the bar is in the desired position, then release. (See Figure 1 and Figure 2)

At the top of the window (just below the title line) is the area for displaying the sample numbers at the vertical bars. The origin of the x axis represents sample number 0. Also the time difference (in milliseconds) between the two bars is displayed. The time difference is based on the line frequency. For currents and voltages, additional data is displayed, representing the magnitudes of the currents and voltages at each vertical bar.

On the left of the window is the area used for displaying the range for the y axis for currents and voltages and for displaying either the names of the flag groups or the individual flags in the group.

ZOOM

This feature allows the user to select a rectangular area of a graph and expand that area for more detail. If the graph is a current/voltage graph, the area can include from one phase to all phases. If the graph is the all-flags graph, the area can include from one flag group to all flag groups on the display. If the graph is a flag-group graph, the area can include from one flag to all flags in the group.

The user starts the process by positioning the mouse cursor in one corner of the rectangular area to be viewed in more detail and clicking the right mouse button. The cursor changes shape to a cross hair. The user then moves the mouse in any direction to create a rectangle (yellow in the default colors). When the user is satisfied with the rectangular area, he clicks the left mouse button. Then a message box is displayed on the screen to ask the user to zoom in on the rectangular area or cancel it. If the user cancels it (selects the CANCEL button), then the rectangle is removed and the screen is restored. If the user selects the OK button to zoom in on the rectangular area, a new window is created and the rectangular area is plotted. This window then can be manipulated in the same way as the previous window. In fact the previous window is still there (under the new window). If the user resizes the new window to a smaller size, then some portion of the previous window is displayed.

REPORTS

The windows containing the reports have scroll bars on the right side. If the report is too long for the window, the user may scroll through the report by clicking the left mouse button on the scroll bar.

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PROGRAM OPERATION

MAIN MENU

The main menu has the following items and hot keys.

File	ALT-F
Graphs	ALT-G
Reports	ALT-R
Setup	ALT-S
eXit	ALT-X
F1 = Help	F1

Each item in the main horizontal menu has a pull down menu associated with it except for "eXit".

FILE MENU

The file menu has the following items and hot keys.

Open	ALT-O
Create pcx file	ALT-C
Print screen	ALT-P
Information	ALT-I

Open

Selection of this item displays a dialog box that allows the user to select an oscillography data file to use. The file may be selected either by entering the file name in the data-entry box, or by using the left list box.

The first field in the dialog box, marked "Selected file", contains the file that is currently selected (originally, the first file in the file list). The user can select this field by either clicking the left mouse button on the field or typing an ALT-S (the highlighted character in the field title). Once this field is selected, a new file name can be entered. The file name can consist of any characters that DOS accepts, including wild card characters (* or ?). When the file name has been entered, the user presses the ENTER key to accept the file name. This takes the user into the file list box.

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The next field indicates the current drive and directory from which the list of files is obtained. This field cannot be edited by the user.

The next two fields are list boxes. The left list box, titled "File list", contains a list of files from which the user can select. The right list box, titled "Directory list", contains a list of directories and drives where the user can go for additional lists of files.

The user can select the directory list box by using either the hot key, ALT-D (the letter highlighted in the title, with yellow in the default colors), or clicking the left mouse button inside the list box. When a new drive or directory is selected, both list boxes are rebuilt.

The user can select the file list box by using either the hot key, ALT-F (the letter highlighted in the title, with yellow in the default colors), or clicking the left mouse button inside the list box. When the user selects a file, the file name is displayed in the data-entry box above the list box and it becomes the current file selection.

The last two fields are the OK button and the CANCEL button. If the user selects the CANCEL button, the oscillography data file is not read into the program. Then the plotting of data and viewing reports are not allowed. If the user selects the OK button, the oscillography data file is read into the program and the plotting of data and viewing of reports are allowed.

Create PCX File

Selection of this item displays a dialog box that allows the user to select the file to which the screen is to be saved in PCX format. The screen is saved without the main horizontal menu.

The first field in the dialog box, marked "PCX file" contains the file to which the screen is saved. The user can select this field either by clicking on the field with the mouse, or by typing an ALT-P (the highlighted character in the field title). Once this field is selected, the file name can be entered. When the file name is entered, the user uses the ENTER key to accept the file name.

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The last two fields are the OK button and the CANCEL button. If the user selects the CANCEL button, the screen is not saved in PCX format. If the user selects the OK button, the screen is saved to the specified file in PCX format.

Print Screen

Selection of this item displays a dialog box that allows the user either to print the screen or to save the screen in a file that can be printed later. The screen is printed with the main horizontal menu.

The first item in the dialog box is a list box listing the various types of printers that are supported. The printer type that the user selects can be saved in the setup file; then the user only has to select a printer type if the user's printer changes.

The next item in the dialog box is a button that determines whether the printer performs a form feed after printing the screen. The button in its unselected state does not cause a form feed after printing. In its selected state, it causes a form feed after printing. This item can also be saved in the setup file, so that a user need only select it once. The default is to have the printer do a form feed after printing (selected state of the button).

The next item allows the user to select a printer port (LPT1, LPT2, etc.). The default is LPT1. If the printer is attached to LPT1, the user can ignore this item. This item can also be saved in the setup file, so that a user need only select it once.

The next item allows the user to save the screen in a file for later printing. If this item is blank, the screen is not saved, but is printed. If this item contains a file name (instead of being blank), the screen is saved in the file and **not** printed. The file can be printed later by entering the DOS command:

TYPE FILENAME > LPT1

The next item is the number of copies to be printed. This item is always 1 unless the user changes it. If the user saves the screen to a file, this item is ignored.

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Finally, there are the OK and CANCEL buttons. Selecting the OK button causes the screen to be printed (or saved in a file) and the necessary items to be saved in the setup file. Selecting the CANCEL button causes no action and the items are not saved in the setup file.

Information

Selection of this item displays a dialog box with the program name, version and copyright notice. It also displays the amount of memory available for the program to use. The amount of available memory needs to be at least 80K bytes for the program to run properly.

GRAPHS MENU

The graphs menu has the following items and hot keys.

Default currents/voltages	ALT-D
Select currents/voltages	ALT-S
select Reference current/voltage	ALT-R
sElect groups for	
all flags display	ALT-E
all Flags	ALT-F
flag Group	ALT-G
Custom (flag) group	ALT-C

Once an item is selected to be displayed, the same item cannot be selected to view again until it is cleared from the display by closing the window, using the QUIT button just below the title block.

Note: An item can be saved by making it an icon (see WINDOWS under **GENERAL OPERATION**), which can be restored and saved as many times as necessary. This eliminates the need to close the window to be able to view the item again.

Default Currents/Voltages

This item plots default currents and voltages in a single window. This includes power system side three phase currents and voltages.

Select Currents/Voltages

Selection of this item displays a dialog box that allows the user to select specific phases of currents and/or voltages for display. The user can select up to six currents/voltages out of twelve available signals.

The cursor is positioned at the first button. With the keyboard, the user can move through the buttons and select the currents and/or voltages to plot (this procedure is described in **DIALOG BOXES** under **GENERAL OPERATION**). Or the user can click the left mouse button on the dialog box buttons to select or de-select the currents/voltages.

The last two fields are the OK button and the CANCEL button. If the user selects the CANCEL button, the selected currents/voltages are not displayed. If the user selects the OK button, the selected currents/voltages are displayed and the selection remains in effect until the program is terminated by selecting the QUIT button.

Select Reference Current/Voltage

This item allows the user to select a reference current or voltage for display with the flags.

A dialog box is displayed, allowing the user to select the reference. The user can select the reference with the keyboard, by moving through the buttons to select the current or voltage (this procedure is described in **DIALOG BOXES** under **GENERAL OPERATION**). The user can also select the reference by moving the mouse cursor to the desired button and clicking the left mouse button. The user can then select either the OK or the CANCEL button to leave the dialog box. If the user selects the OK button, the selected reference remains in effect until the program is terminated. If the user selects the CANCEL button, the previously selected reference remains in effect.

The default reference is phase-A system side current.

SElect Groups for "All Flags" Display

Selection of this item displays a dialog box that allows the user to select specific flag groups for displaying in the ALL FLAGS display. The user can select a maximum of 7 flag groups for a VGA display and a maximum of 5 flag groups (out of the total of 7 groups) for an EGA display.

The cursor is positioned at the first button. With the keyboard, the user can move through the buttons to select the flag groups (this procedure is described in **DIALOG BOXES** under **GENERAL OPERATION**). The user can also use the mouse and click the left button on the dialog box buttons to toggle between selecting (highlighting) or de-selecting the flag groups.

The last two fields are the OK button and the CANCEL button. If the user selects the CANCEL button, the previously selected flag groups are not changed. If the user selects the OK button, the selected flag groups are changed to those selected, and are saved in the setup file.

All Flags

This item displays all the flags in all the flag groups selected for display, along with the previously selected reference current/voltage. The number of flag groups that can be displayed depends on whether the display is EGA or VGA (see **Select Groups for All Flags Display** above). If a reference current/voltage has not been previously selected, the reference is defaulted to phase-A current.

Flag Group

This item allows the user to select a single group of flags for display.

A dialog box is displayed, allowing the user to select the group. The user can select the group by moving the mouse cursor to the desired group and clicking the left button. The user can also select the group with the keyboard, by moving through the buttons to select the flag group (this procedure is described in **DIALOG BOXES** under **GENERAL OPERATION**). The user can then select either the OK or the CANCEL button to leave

the dialog box. If the user selects the OK button, the selected group is displayed along with the previously selected reference current/voltage (or the default phase-A current). If the user selects the CANCEL button, a flag group is not displayed.

Custom (Flag) Group

This menu item allows a user to select up to 16 flags (out of nearly 80) from any of the flag groups and assign them to a custom group. The custom flag group is saved in the setup file, so that once the flags are selected, they remain in the group until the group is re-configured by the user.

A dialog box is displayed with 7 list boxes (1 for each flag group). Either the mouse or the keyboard can be used to select flags from any group in any order. The custom group is listed on the right side of the dialog box. The list is automatically updated as the user selects and de-selects flags.

The user selects the OK button to save and plot the custom group of the flags, or the ACTIVE FLAGS button to plot all the flags that are active any time during the data capture period, or the CANCEL button to cancel any changes made to the custom group and return to the main menu, leaving the previous flag group unchanged.

REPORTS MENU

The reports menu has the following items and hot keys.

Fault report	ALT-F
Events	ALT-E
Settings	ALT-S

Once an item is selected to be displayed, the same item cannot be selected to view again until it is cleared from the display by closing the window, using the QUIT button just below the title block.

Note: An item can be saved by making it an icon (see WINDOWS under **GENERAL OPERATION**), which can be restored and saved as many times as necessary. This eliminates the need to close the window to be able to view the item again.

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Fault Report

Selection of this item displays the fault report associated with the oscillography data (the report is generated at the DGP™ system).

Events

Selection of this item displays the events associated with the oscillography data (the events are generated at the DGP™ system).

Settings

Selection of this item displays the settings from the relay at the time of the fault. The settings can only be viewed.

SETUP MENU

The setup menu has the following items and hot keys.

Flag names	ALT-F
Colors	ALT-C
Default colors	ALT-D
Printer grey shades	ALT-P

Flag Names

Selection of this item displays a dialog box that allows the user to modify any of the flag names. The right list box is used to select the flag group. The left list box is used to select the flag name to modify from the flag group selected in the right list box. The selected flag name is displayed in the data-entry box above the left list box. The user may modify the name in the data-entry box (it may be up to 13 characters long). When the name has been modified, press the ENTER key and the new name will be displayed in the left list box. Select the OK button to make the new flag name/s permanent (saved in the setup file) or select the CANCEL button to ignore any flag name changes.

Colors

Selection of this item displays a dialog box that allows the user with a color monitor to change any color that is displayed. The colors are divided into groups according to the types of objects that are displayed. The groups and their descriptions are:

HORIZONTAL MENU
    Colors associated with the main horizontal menu.
PULL DOWN MENU
    Colors associated with the pull down menus.
ACTION BUTTON
    Colors associated with buttons that cause an action, such as the QUIT, OK, and CANCEL buttons.
DIALOG BOX
    Colors associated with the basic (empty) dialog box and labels placed in the dialog box.
LIST BOX
    Colors associated with a list box.
MESSAGE BOX
    Colors associated with the message box.
DATA-ENTRY BOX
    Colors associated with the data-entry box.
SELECTION BUTTON
    Colors associated with selection buttons used to make selections in a dialog box.
WINDOW
    Colors associated with the basic (empty) window (both the report and graph windows).
REPORT
    Colors associated with the displaying of a report in a window.
GRAPH
    Colors associated with the drawing of a graph.
GRAPH DATA
    Colors associated with displaying the data in a graph.
GRAPH LABEL
    Colors associated with displaying the axis labels in a graph.

This item uses two dialog boxes.

The first dialog box is used to select the group whose colors are to be changed, using either the mouse or the keyboard. Once the group has been selected, a second dialog box is displayed, which allows the modification of the colors of individual items in the group. The item is selected when it is highlighted. When an item is highlighted and the SPACE bar is pressed, the color of the item is changed to the color in the color box in the upper right corner of the dialog box. Also a sample of the new color scheme is shown in the dialog box.

Select the OK button to make the new colors for the group permanent (saved in the setup file) or select the CANCEL button to ignore the new colors for the group. In either case, the first dialog box is displayed again, to permit selection of another group.

Default Colors

This allows the user to put all items back to their original colors and shades of grey (those that are on the distribution diskettes). A message box is first displayed to make sure the user wants to do this. If the user wants to do this, the OK button in the message box should be selected; otherwise select the CANCEL button. If OK is selected, the original colors and shades of grey are made permanent (saved in the setup file).

Printer Grey Shades

Selection of this item displays a dialog box that allows the user to assign shades of grey to colors so that all items on a display can be seen on the output of a black and white printer. The user selects the color from the list box and then uses the indicated hot keys to select the button for the desired shade of grey. Select OK to make the changes permanent (saved in the setup file) or select CANCEL to cancel the changes.

BLACK cannot be assigned a shade of grey. It always results in the printer printing nothing (i.e. the color of the paper).

Any of the "permanent" settings can be changed if desired, by making new selections and saving them to the Setup file, where they will overwrite the previous settings.

E**X**IT

This item causes the program to exit to DOS. A message box
is first displayed to make sure the user really wants to exit the
program. If the user wants to exit the program, the OK button
in the message box should be selected; otherwise select the
CANCEL button.

HELP

This item displays a pull down menu with a selection of topics
for which help exists. This pull down menu is different from
the other pull down menus in that the items do not have hot
keys associated with them. The user must use either the mouse
or the UP and DOWN ARROW keys, followed by the ENTER
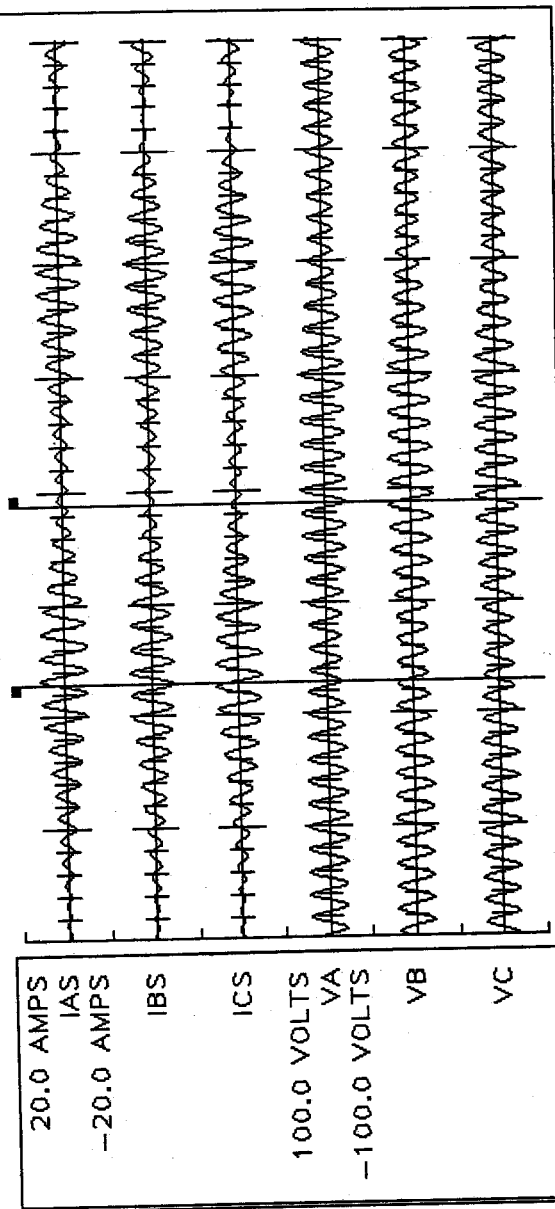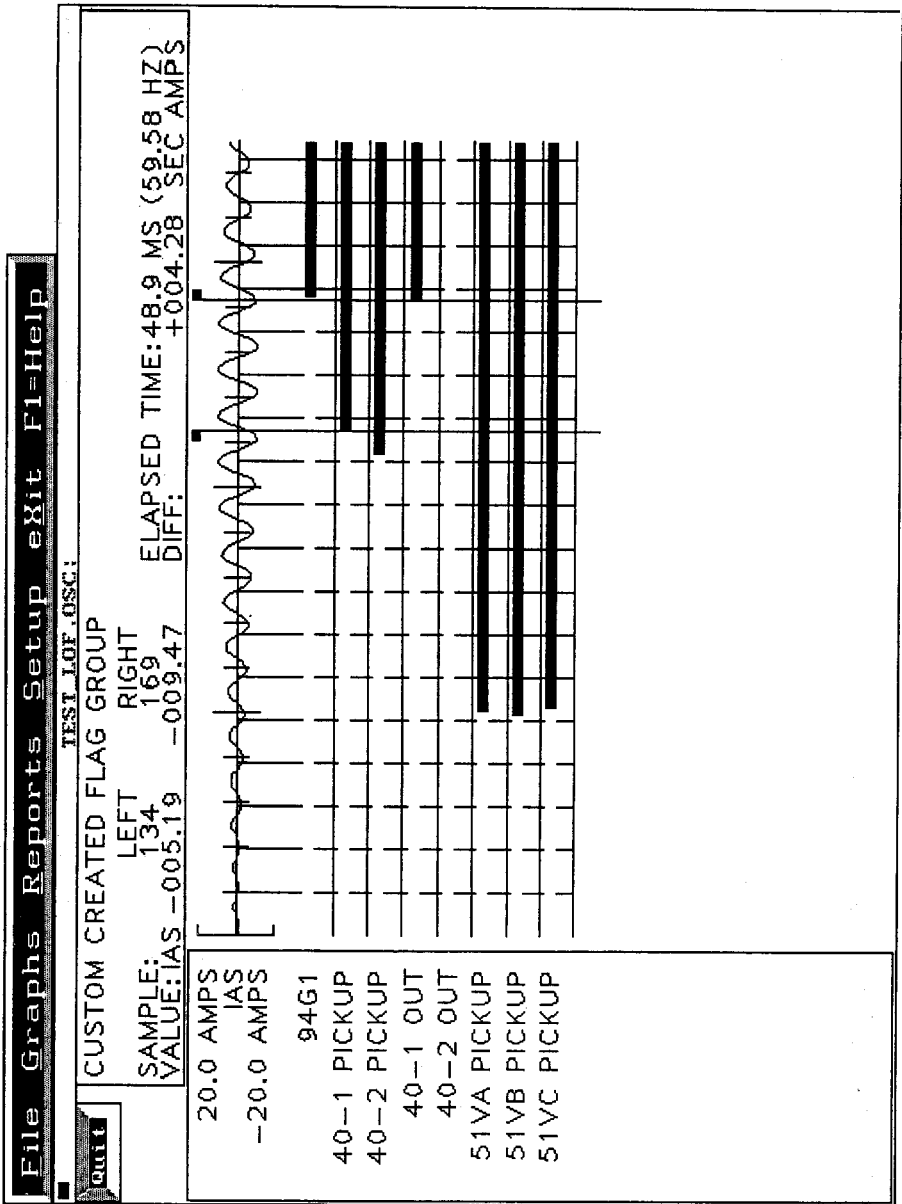key, to access the menu items.

Figure 1 (0286A5606) Oscillography -- Currents and Voltages

Figure 2 [0286A5607 [1]] Flag Screen