

User Manual



DG-LINK Application Program

071-0056-50

This document applies to firmware version 2.00
and above.

www.tektronix.com

Copyright © Tektronix Japan, Ltd. All rights reserved.

Copyright © Tektronix, Inc. All rights reserved.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supercedes that in all previously published material. Specifications and price change privileges reserved.

Tektronix Japan, Ltd., 5-9-31 Kitashinagawa, Shinagawa-ku, Tokyo 141-0001 Japan

Tektronix, Inc., P.O. Box 500, Beaverton, OR 97077

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Table of Contents

Getting Started

Getting Started	1-1
Overview	1-1
Installation Procedure	1-2
Starting and Exiting DG-LINK	1-4

Operating Basics

Operating Basics	2-1
Functional Overview	2-2
Setting the Destination Instrument	2-4
Loading Data into DG-LINK	2-6
Controlling Data Display	2-10
Transferring Data	2-13
Saving Data to a File	2-16
Setting the Output Pattern Data and the Output Channel	2-17

List of Figures

Figure 1–1: Main Control window and dialog box	1–4
Figure 1–2: Exit DG-LINK confirmation dialog box	1–5
Figure 2–1: Main Control window	2–2
Figure 2–2: Change Instrument window	2–4
Figure 2–3: Remote Instrument Not Connected dialog box	2–5
Figure 2–4: Select Load Data Format window	2–6
Figure 2–5: Select File dialog box	2–8
Figure 2–6: Pattern data display in CSV format	2–8
Figure 2–7: Setup TLA Data Bit & Type window	2–9
Figure 2–8: Pattern data display in CSV format	2–10
Figure 2–9: Data display controls and data range definition cursors	2–11
Figure 2–10: Setup Data Transfer window	2–13
Figure 2–11: Correspondence between Data Generator pattern data and the data transferred	2–14
Figure 2–12: Save Data error dialog box	2–16
Figure 2–13: Setup Output Channel Data window	2–17
Figure 2–14: Selected Instrument Not Connected dialog box	2–18

List of Tables

Table 2–1: Main Control window elements	2–2
Table 2–2: Data transfer error messages	2–15

Getting Started

Overview

DG-LINK is a Microsoft Windows 2000-based PC software application used to transfer and convert data between TLA 700-Series Logic Analyzers and DG2000-Series Data Generators. It lets you develop data generator test signals based on the data obtained with the TLA 700-Series Logic Analyzer.

Since DG-LINK runs on Windows 2000, you can install the software on the TLA 700-Series Logic Analyzer. You can then connect the TLA 700-Series Logic Analyzer to a data generator through the GPIB interface.

What the DG-LINK does

DG-LINK performs the following tasks:

- Loads CSV or ASCII (TLA-ASCII) format data
- Saves data in PDA or GPIB command format
- Transfers the loaded data to the data generator
- Controls the data generator hardware setups and the output channels
- Directly transfers data from the TLA 700-Series Logic Analyzer to a data generator
- Loads data of TLA 600 / TLA 700-Series(Ver. 4.0) to a data generator
Loads data of "SynaptiCAD's WaveFormerPro, VeriLoggerPro and TestBencherPro"(SynaptiCAD), because data format is equivalent to TLA 600 / TLA 700-Series(Ver. 4.0)

Supported Instruments

DG-LINK supports the DG2000-Series Data Generators.

Requirements

The following configuration is required to use DG-LINK:

- PC with Windows 2000 installed, or a TLA 700 Series Logic Analyzer.
- GPIB interface card and drivers. For example, a Tektronix S3FG210 (National Instruments GPIB-PCII/IIA) GPIB package.
- GPIB cable.
- 80 MB hard disk area.
- 16 MB RAM.

Installation Procedure

This section describes how to install the DG-LINK software onto your system.

Make Backup Copies

Make a copy of each of the DG-LINK diskettes before installing the software. Store the original disks in a safe place and use the copies for installation. After you are done installing the software, store the backup disks in another safe place.

Install DG-LINK

These installation instructions assume that you are familiar with basic Windows 2000 operations and commands. If necessary, read your Windows 2000 user documentation before installing DG-LINK.

Do the following steps to install DG-LINK:

1. Power up your PC (or TLA 700-Series Logic Analyzer).
2. Insert DG-LINK Disk 1 into the floppy disk drive.
3. Double-click the **My Computer** icon.
4. Select the **3.5 inches FD** menu item. The PC displays the contents of the floppy disk drive.
5. Double-click the **Setup.exe** list item. DG-LINK installation software then displays a series of setup windows. You can click **OK** to accept the default values, or you can change the values in any of the setup windows. You can click **Back** in any window to return to the previous window.
 - a. Welcome window.
Read the information and then click **Next>** to proceed.
 - b. Choose Destination Location window.
If you want to install the program at a different location, click **Browse** and choose or create a different directory. Click **Next>** to proceed.
 - c. Select Program Folder window.
The default name for the program folder is displayed; if you want to change the name, type in a new name or click **Browse** to select an existing name.
 - d. Start Copying Files window.
Click **Next>** to start installation.
 - e. Insert DG-LINK Disk 2 when prompted, and click **OK**.
In the same way, insert DG-LINK Disk 3, and then click **OK**.

f. Setup Complete window.

You will see the message that Setup has finished installing the DG-LINK program onto your computer. If you want to run the program immediately, select "Yes, Launch the program file", and then click **Finish**.

To exit the installation program without running DG-LINK, click **Finish**. Do not forget to remove DG-LINK Disk 3 from your disk drive.

Create a Desktop Shortcut

Do the following steps to create a desktop icon that you can use to run DG-LINK:

1. Move the cursor to any non-occupied desktop area,.
2. Click the right mouse button to open the desktop menu.
3. Select **New** and then **Shortcut** from the menu to open the Create Shortcut dialog box.
4. Click **Refer**.
5. Select the following directory folders in order (for default directory settings): **Program Files**, **Sonytek**, and **Dg-link**. The list box now shows the **Sample** folder and the **Dg-link.exe** file.
6. Select the **Dg-link.exe** file and then click **Open**. **Dg-link.exe** is displayed in the file name text box.
7. Click **Next**.
8. Click **Finish** to finish creating the desktop shortcut icon. The Dg-link.exe shortcut icon appears on the desktop. You can start the DG-LINK program by double-clicking the **Dg-link.exe** shortcut icon.

You have completed the software installation procedure.

Starting and Exiting DG-LINK

When you complete the installation, you can start DG-LINK. However, you need the GPIB interface installed to execute a file transfer and/or remotely control the Data Generator.

Starting DG-LINK

You have three ways to start DG-LINK. You can:

- Double-click the DG-LINK shortcut on the desktop
- Double-click the DG-LINK.exe file name in the Program Manager window
- Select DG-LINK from the Start – Programs menu.

However you start DG-LINK, the program displays its Main Control window and a startup dialog box, as shown in Figure 1–1. The startup dialog box is a reminder for you to specify a destination instrument before attempting to transfer data. To clear the startup dialog box, press the **Enter** key on the keyboard or click **OK** in the dialog box. DG-LINK closes the startup dialog box and the Main Control window is available for operations.



Figure 1–1: Main Control window and dialog box

Exiting DG-LINK

To exit (quit) DG-LINK, click **EXIT** at the bottom right corner in the Main Control window. A confirmation dialog box appears to confirm your operation (see Figure 1-2). Click **Exit** in the dialog box to quit DG-LINK. If you do not want to quit DG-LINK, click **Cancel** in the dialog box.

3

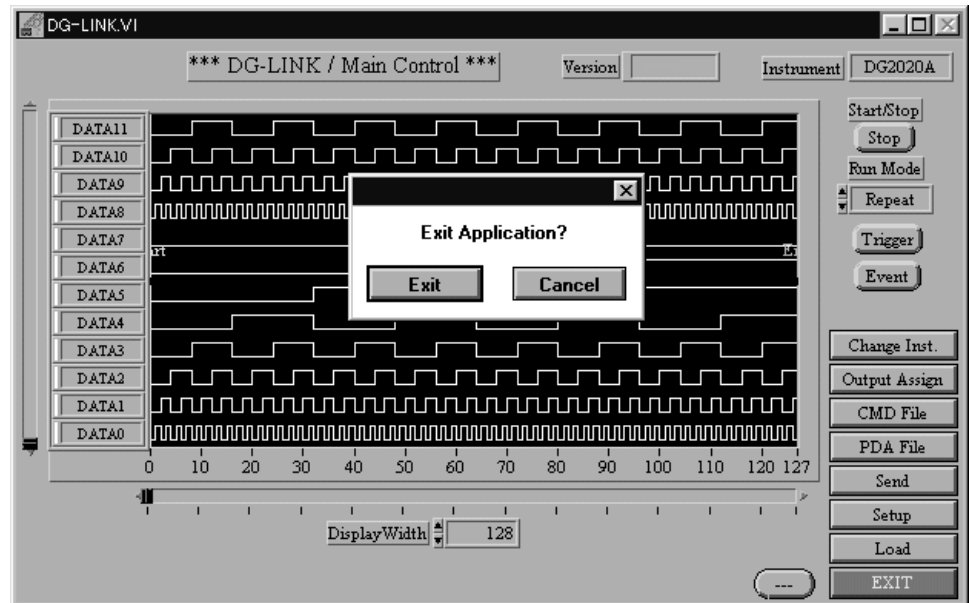


Figure 1-2: Exit DG-LINK confirmation dialog box

Operating Basics

This chapter describes DG-LINK window functions and operations.

- Functional overview
- Setting the data transfer destination instrument
- Loading the data from the file
- Controlling data display
- Transferring the loaded data
- Saving Data to a file
- Setting the output pattern data and the output channel

Functional Overview

DG-LINK operations are done through the Main Control window. Figure 2–1 shows the Main Control window operation areas. Table 2–1 describes the Main Control window elements.

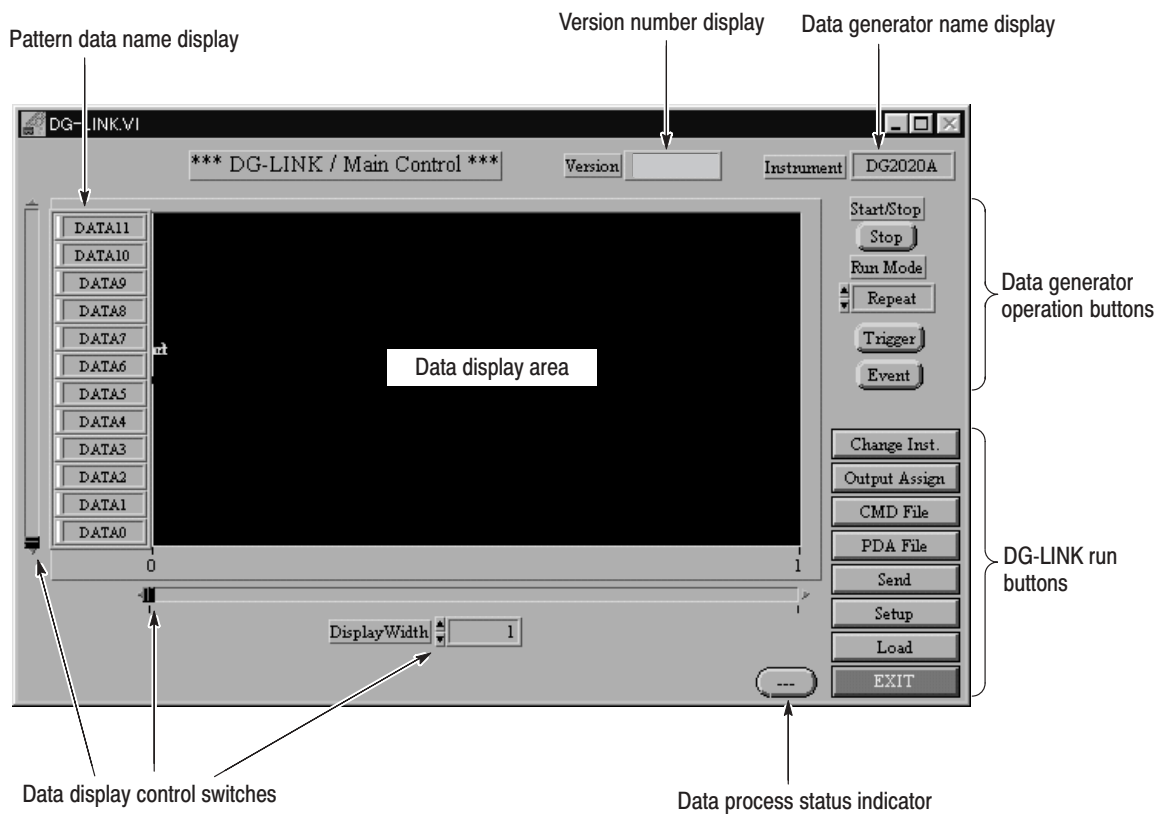


Figure 2–1: Main Control window

Table 2–1: Main Control window elements

Function	Description
Pattern data name display	Name of the pattern data.
Version number display	Displays DG-LINK version number. Clicking Version displays DG-LINK-related information.
Data generator name display	Displays the device name of the data generator that is being controlled.

Table 2-1: Main Control window elements (Cont.)

Function	Description	
Data generator operation buttons	Remotely operates the data generator currently connected to DG-LINK.	
	Start/Stop	Starts or stops data generator data output.
	Run Mode	Sets the data generator operation mode. You can select Repeat , Single , Step , or Enhanced . Refer to the data generator user manual for an explanation of these modes.
	Trigger	Generates a trigger. Click this button when the data generator is waiting for a trigger. Using this button is the same as pressing the FORCE TRIGGER front panel button on the data generator.
	Event	Generates a step or an event. Click this button when the data generator is set to Step mode or is waiting an event. Using this button is the same as pressing the Step/Event front panel button on the data generator.
DG-LINK function run buttons	Runs various DG-LINK functions.	
	Change Inst.	Selects the data transfer destination instrument or set the GPIB address. For more detail, refer to <i>Setting the Data Transfer Source Instrument</i> on page 2-4.
	Output Assign	Assigns the output of the data transfer destination instrument to the appropriate target channel. For more detail, refer to <i>Setting the Output Pattern Data and the Output Channel</i> on page 2-17.
	CMD File	Saves GPIB commands including the pattern data used when transferring the data from the PC to the appropriate instrument. For more detail, refer to <i>Saving the Data to a File</i> on page 2-16.
	PDA File	Saves the data loaded in DG-LINK to a file in PDA format. For more detail, refer to <i>Saving the Data to a File</i> on page 2-16.
	Send	Sends the data to the specified instrument. If the instrument is not connected, the process generates an error message. For more detail, refer to <i>Transferring the Loaded Data</i> on page 2-13.
	Setup	Sets up program for transferring data. For more detail, refer to <i>Transferring the Loaded Data</i> on page 2-13.
	Load	Loads the data from the specified file. For more detail, refer to <i>Transferring the Loaded Data</i> on page 2-13.
	Exit	Quits DG-LINK.
Data processing status indicator	Displays the DG-LINK data processing status. The program displays a "—" when there are no tasks being executed. If the program is executing tasks, the status indicator displays Busy .	
Data display area	Displays the pattern data loaded from the file.	
Data display control switch	Controls the displayed data. For more detail, refer to <i>Controlling Data Display</i> on page 2-10.	

Setting the Destination Instrument

DG-LINK can control DG2000-Series Data Generators. Note that you can control only one instrument at a time. When two or more data generators are connected to the GPIB bus, you need to specify the instrument to which you are transferring data.

Do the following steps to set the destination data generator:

1. Click **Change Inst.** at the bottom right corner in the Main Control window. The Change Instrument dialog box appears as shown in Figure 2–2. This dialog box lists the current destination data generators and their corresponding GPIB addresses.

DG-LINK searches the GPIB bus for the listed instruments and updates the connected instruments list to show the data generators that are actually connected to the GPIB bus.

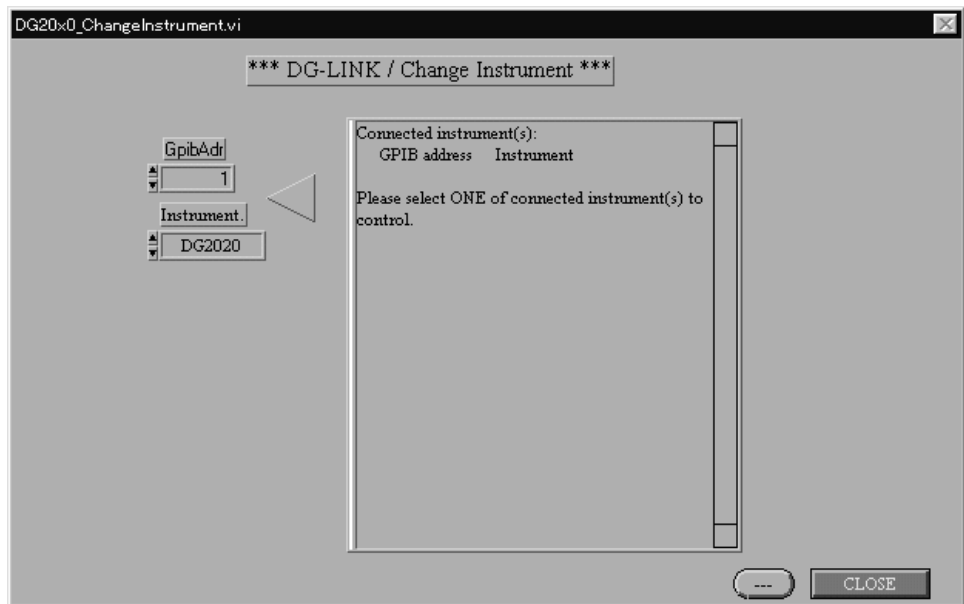


Figure 2-2: Change Instrument window

2. Click ▲▼ on the Instrument box to select the instrument type (DG2000-Series or TLA 700).
3. Click ▲▼ on the GpibAdr box to select the GPIB address of the instrument (1 through 32).

4. Click **CLOSE** at the bottom right corner in the window. If DG-LINK can locate the instrument on the GPIB bus, the dialog box closes and you return to the Main Control window. The name of the instrument you selected here is also displayed in the Data Generator Names field at the top right corner of each of the other windows.

If DG-LINK cannot locate the remote instrument, it displays the Selected Instrument Not Connected dialog box as shown in Figure 2–3. This situation can occur if the connected data generator is not turned on. Click **OK** if the settings are correct. Click **Re-select** to re-enter the instrument settings in the Change Instrument dialog box.

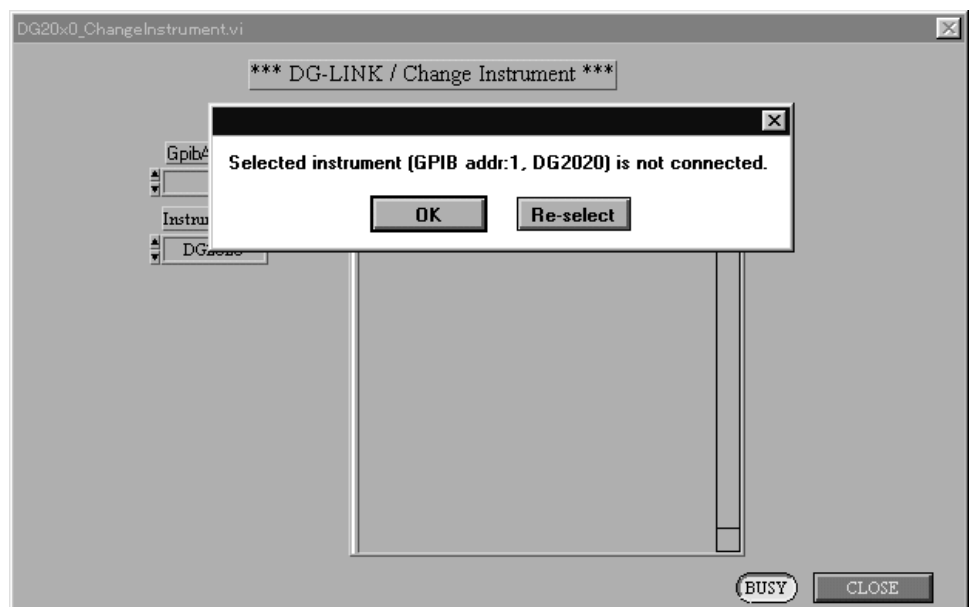


Figure 2–3: Remote Instrument Not Connected dialog box

Loading Data into DG-LINK

DG-LINK can load Comma Separated Value (CSV) format data created by the DG2000-Series Data Generator. DG-LINK can also load TLA-ASCII format data created by the TLA 600 / TLA 700-Series Logic Analyzer.

Observe the following restrictions when loading data into DG-LINK:

- The maximum pattern data width is 136 bits.
- The length of data that you can load into DG-LINK is limited only by your available PC memory.
- The maximum pattern data width in each data group is 32 bits for the TLA-ASCII format.

Do the following steps to load data into DG-LINK:

1. Click **Load** at the bottom right corner in the Main Control window. DG-LINK opens the Select Load Data Format window, as shown in Figure 2-4. Click **Close** to cancel this window operation and return to the previous window.

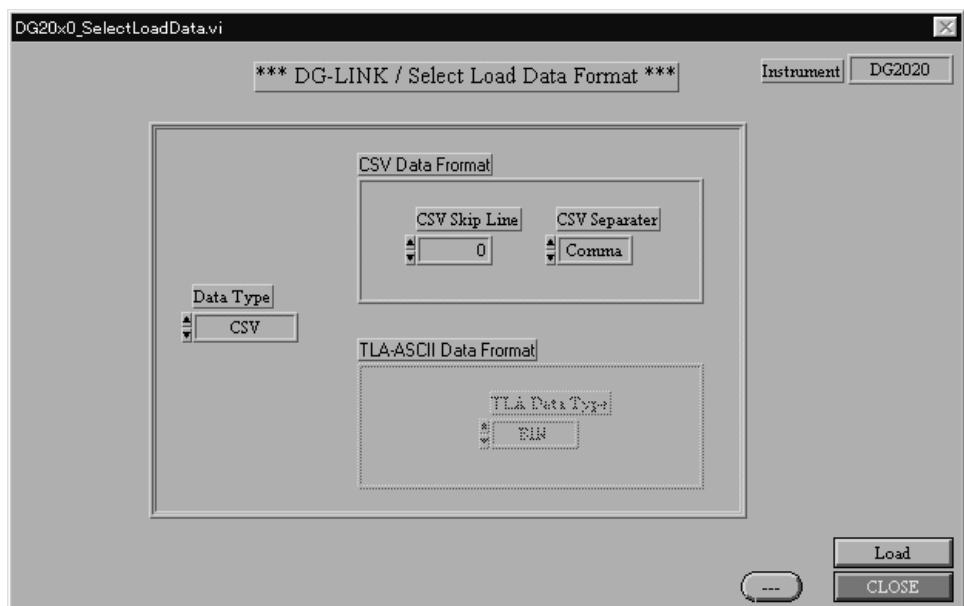


Figure 2-4: Select Load Data Format window

2. Click ▲▼ on the Data Type box to select either **CSV**, **TLA-ASCII** or **TLA-ASCII2**(load data of SynaptiCAD).
3. If you selected CSV, do the following steps:

- a. Click ▲▼ on the CSV Skip Line box to select the number of data lines to skip from the top of the data file. Use this setting if the data file contains a non-data area (such as comment text) at the start of the data.
- b. Click ▲▼ on the CSV CSV Separator box to select the data separator character used in the data file. You can select **Comma**, **Space**, or **Tab**.

NOTE. For the CSV format, you must separate each "0" or "1" data character. For example, use the following format: 0,1,0,1,0,1... .

If you omit part of the data or use more than one separator type in a data file, DG-LINK will not recognize the data.

4. If you selected TLA-ASCII, click ▲▼ on the TLA Data Type box to select the mode of data conversion. You can select **BIN** (binary), **HEX** (hexadecimal), or **DEC** (decimal).

NOTE. The TLA-ASCII format converts data on a block-by-block basis. The mode of data conversion set here will be used for initialization of block conversion; you can change it later if the conversion has been performed in different ways for different blocks. For the TLA-ASCII format, the blocks of the data must be separated by spaces or tabs. It is recommended that tabs be used for the purpose of reducing the data processing time.

5. If you selected TLA-ASCII2, the TLA Data Type box is unworkable, because the file includes data type.

NOTE. The TLA-ASCII2 format converts data on a block-by-block basis. The mode of data conversion set here will be used for initialization of block conversion; you can change it later if the conversion has been performed in different ways for different blocks. For the TLA-ASCII2 format, the blocks of the data must be separated by spaces or tabs. It is recommended that tabs be used for the purpose of reducing the data processing time.

6. After selecting the data type settings, click **Load**. DG-LINK opens the Select File dialog box as shown in Figure 2-5.

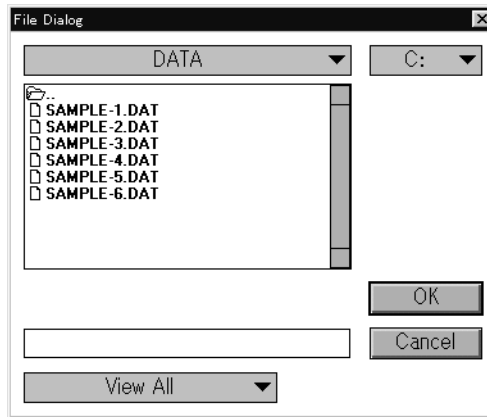


Figure 2-5: Select File dialog box

7. Select the data file to load.
8. Click **OK**. DG-LINK responds in either of two ways:
 - a. If you loaded a CSV file, DG-LINK returns you to the Main Control window and displays the pattern data, as shown in Figure 2-6. You can click **Cancel** to cancel the file load and return to the previous window.

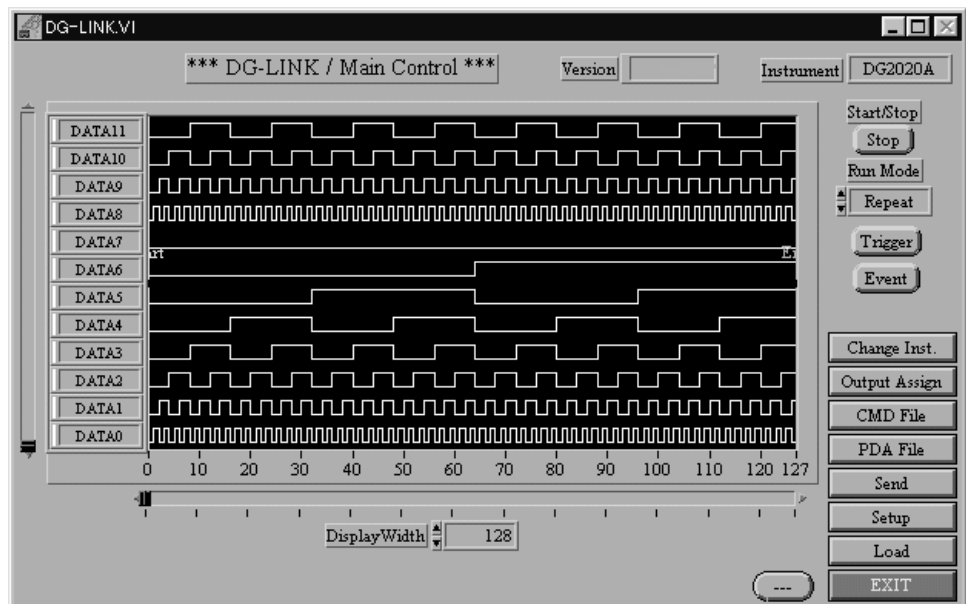


Figure 2-6: Pattern data display in CSV format

- b. If you loaded a TLA-ASCII format file, DG-LINK displays the Set Up TLA Data Bit & Type window as shown in Figure 2–7. This window lets you set up a more detailed data display structure.

In the Data Bit & Type area, set the data bit (DataBit) and the mode of data conversion (DataType) for each block (group). If five or more blocks exist, click ◀▶ to display the other blocks. The total number of data bits you set is displayed in the TotalDataBit field.

NOTE. The maximum data bit width for each block (group) is 32 bits. The maximum number of data bits for all blocks combined is 136 bits.

Click **Analyze Data** at the bottom right corner of the window. After completion of the data conversion, DG-LINK returns you to the Main Control window and displays the pattern data, as shown in Figure 2–8.

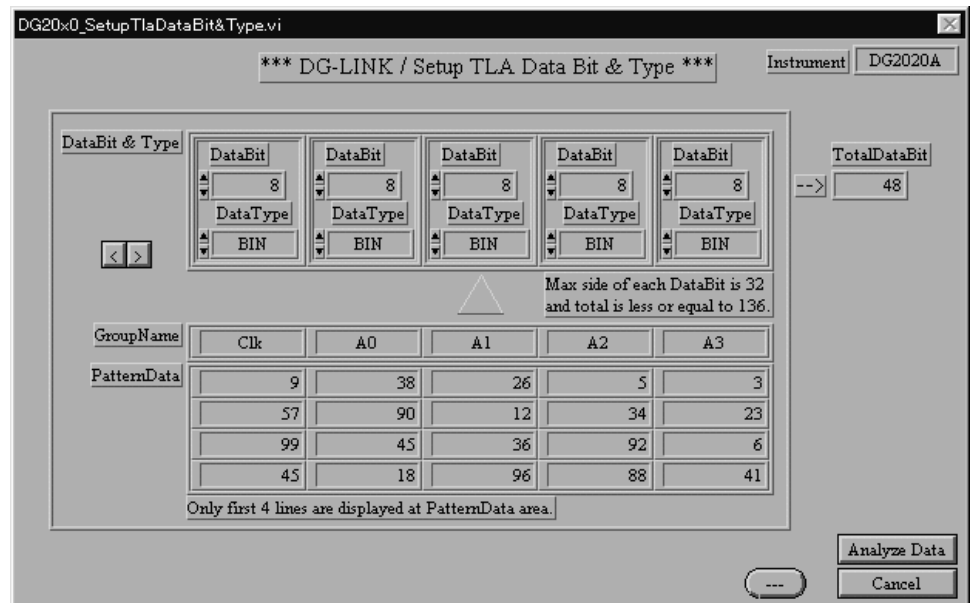


Figure 2–7: Setup TLA Data Bit & Type window

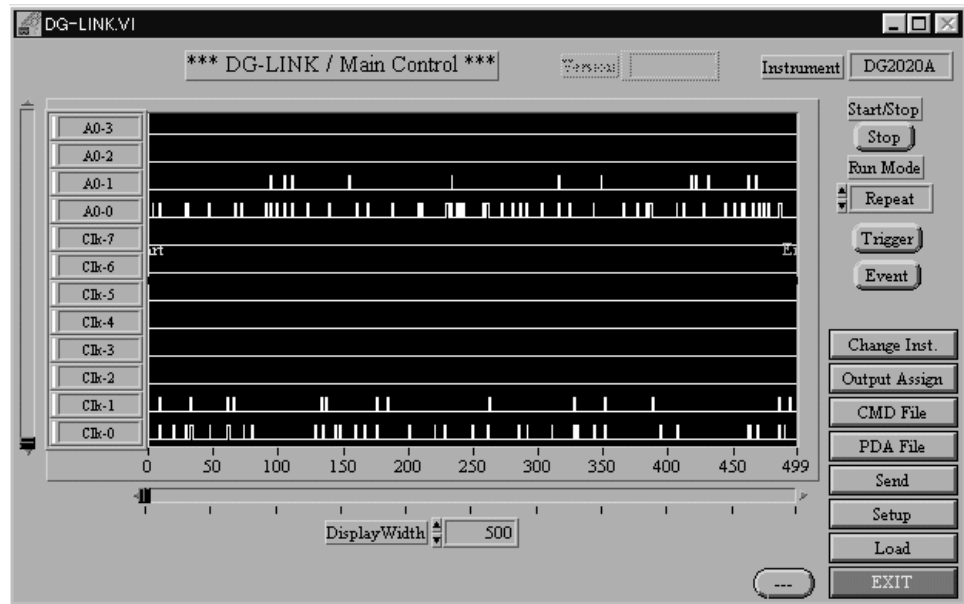


Figure 2-8: Pattern data display in CSV format

Each signal of the loaded data is named "block name" + "sequence number." The latter is a sequential number beginning with the least significant bit (LSB) in each block (0, 1, 2, and so on). The name of each signal is used as the data (group) name in the Data Generator after the data transfer.

Controlling Data Display

You can control the display of the loaded data using the data display control switches. You can also define the range of the data to be transferred by using the data range definition cursors. Figure 2-9 shows the Main Control window display controls. The names and functions of the controls used to control data display and the functions of the range definition cursors are described in the following text.

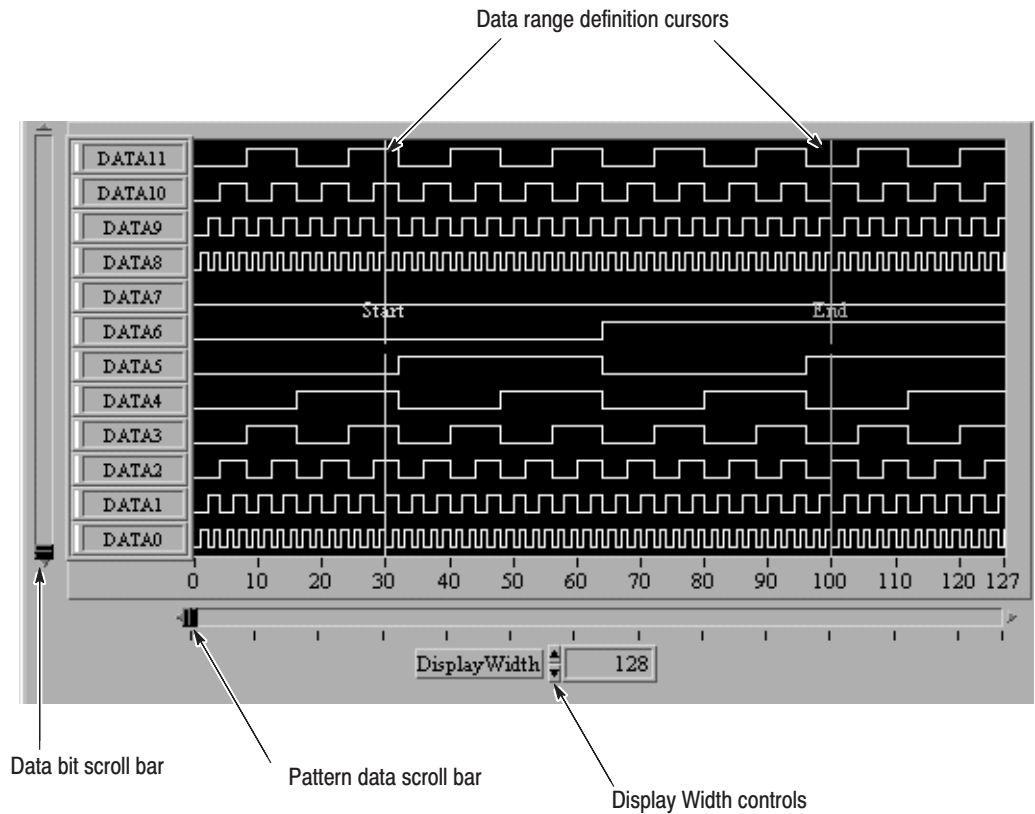


Figure 2-9: Data display controls and data range definition cursors

Data Bit Scroll Bar

If the number of loaded data bits is 12 or more, you can scroll them by clicking ▲▼ to move the displayed data vertically. The marker in the scroll bar shows the displayed data relative to the overall data record loaded into DG-LINK.

Pattern Data Scroll Bar

Click ◀▶ to scroll the pattern data horizontally. The marker in the scroll bar shows the displayed data relative to the overall data record loaded into DG-LINK.

Display Width Field

Click ▲▼ to change the number of pattern data points displayed in the window. The initial value is the total number of points of the loaded data.

Data Range Definition Cursors

Start and End cursors define a range of data to transfer. The default Start and End cursor locations are at the left and right ends of the display area, respectively. If you do not define a range, DG-LINK transfers data depending on the following conditions, whichever is shorter:

- The total number of points of the loaded data

- The maximum number of points of data that can be loaded into the destination instrument

Do the following steps to move the cursors to define a range of data:

1. Move the mouse pointer to the data display area. The pointer changes to a cross (+) cursor.
2. Move the + cursor to the left or right end in the data display area. The + cursor changes to a ↔ cursor.
3. Move the cursor to the right or left direction while holding down the mouse button. You can move either the Start or End cursor.

Transferring Data

To transfer the data, first you must set the destination pattern memory to which the loaded data is to be transferred. Then, with the data number, you must specify the data to be actually transferred. When necessary, in the pattern memory of the Data Generator set the first position in which the data is to be written.

Setting the pattern data and the transfer data

Do the following steps to set pattern and transfer data:

1. Click **Setup** at the bottom right corner of the Main Control window. The Setup Data Transfer window in Figure 2–10 is displayed.

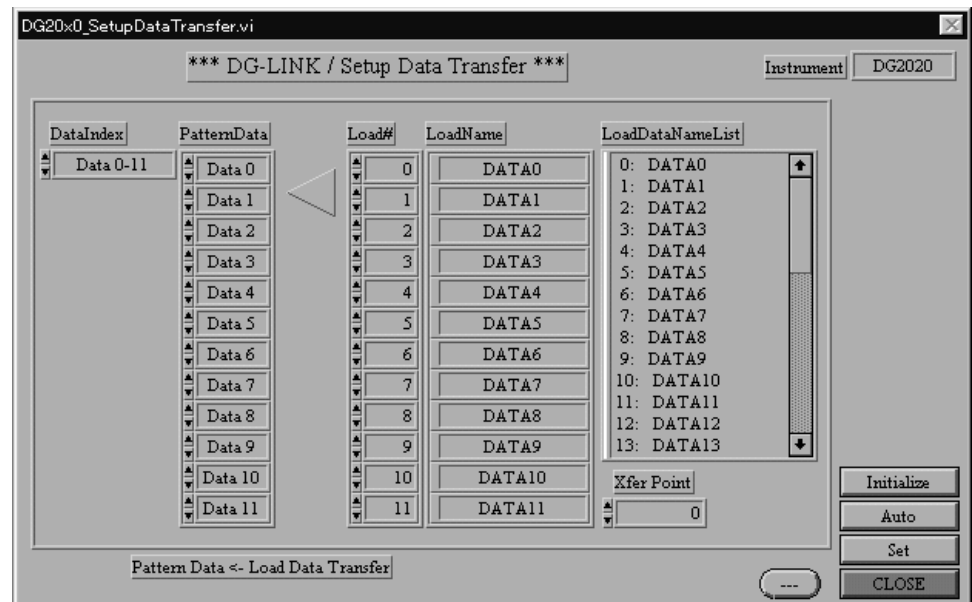


Figure 2–10: Setup Data Transfer window

2. Click ▲▼ on the Data Index field to select the data pattern displayed. Note that this field is not displayed on the DG2030 Data Generator.
3. Click ▲▼ on the PatternData field to select the pattern data.
4. Click ▲▼ on the Load# field to select the data number of the data to be transferred. If you change the data number, the data name in the LoadName field will also change.

The loaded data is listed in the LoadDataNameList field. You can scroll the data list by using the scroll bar to the right of the box.

5. Enter the data transfer start position in the Xfer Point field. Figure 2–11 shows the correspondence between the data generator pattern data and the data transferred.

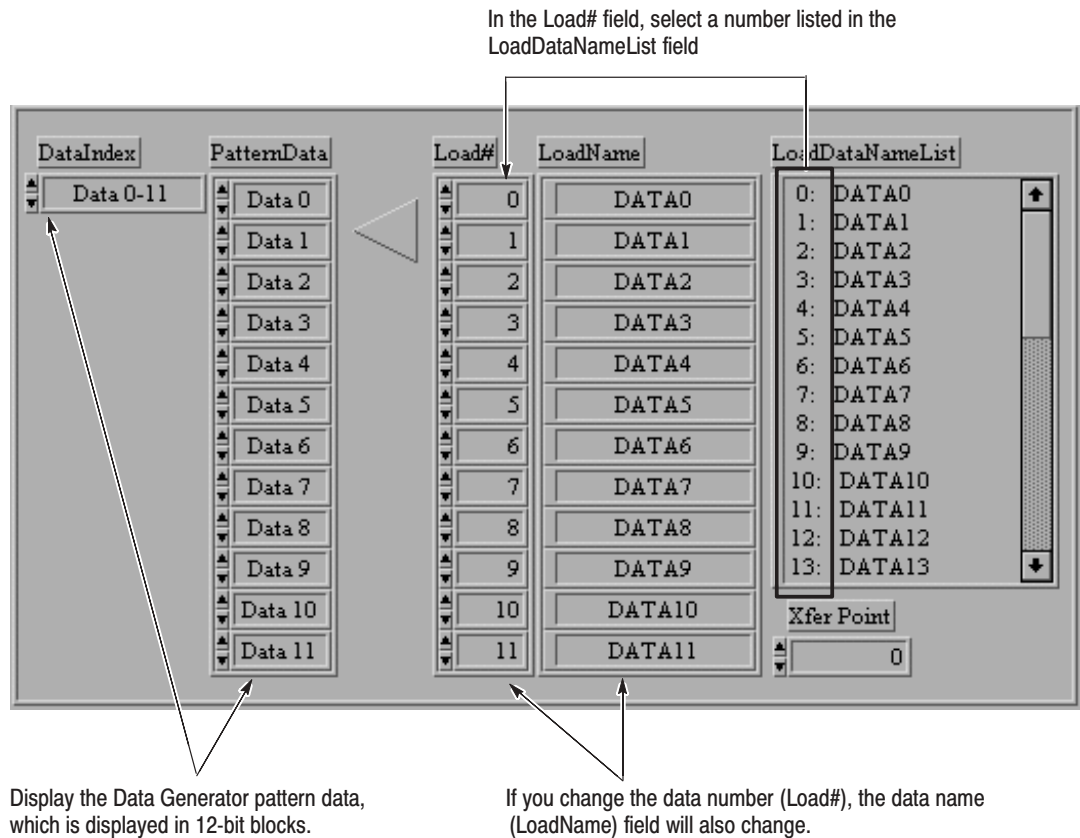


Figure 2-11: Correspondence between Data Generator pattern data and the data transferred

6. Click **Set** at the bottom right corner in the window. The settings take effect. The settings can be initialized or the data items can be sorted in a defined order by selecting the following:

Initialize - Initializes correspondence between loaded data and pattern data.

Auto - Assigns the pattern data to the data number for Data 0 as the start number and the subsequent data numbers in ascending order. When the last data item is reached, the assignment returns to the first item.

7. Click **CLOSE**. The Setup Data Transfer window closes and you return to the Main Control window.

NOTE. Correspondence between the pattern data and the loaded data is made for all pattern data. This means that the data currently defined in the data generator is overlapped with the new data. Be sure to save the contents of the data generator in external media such as floppy disks if it contains important data.

Transferring Data

To transfer data, click **Send** at the bottom right corner of the window. If the instrument connection and the settings are correct, the data is immediately transferred.

NOTE. The data currently defined in the Data Generator is overlapped with the new data by performing the data transfer. Be sure to save the contents of the Data Generator in external media such as floppy disks if it contains important data.

Data Transfer Error Messages

If a problem concerning the instrument conditions or the settings is detected during data transfer, DG-LINK displays a dialog box with an error message. Table 2-2 lists the error messages and most likely cause of the message.

Table 2-2: Data transfer error messages

Message	Description
Selected instrument (GPIB addr:1, DG2020) is not connected.	This message warns you of the fact that the instrument being set up (in this example, the DG 2020 of GPIB address 1) is not connected. In this case, the data transfer does not operate. Click OK in the dialog box. Then make settings again for the currently connected instrument.
DG-IINK DATA:PATTERN: WORD:Data out of range.	This message warns you of the fact that the data transfer resulted in an error in the instrument. This example indicates that the instrument's memory size is smaller than the transferred data. Click OK in the dialog box. Then, decrease the data to be transferred, or increase the memory size before retrying the data transfer.
Transfer Data size is out of range. Application will adjust data.	This message warns you of the fact that the data length of the data to be transferred is smaller than the minimum data length. The minimum data length is 64 words for the DG2020 and DG2020A, 90 words for the DG2030, and 360 words for the DG2040. If you click Continue in the dialog box, the shortfall is made up and the data transfer is retried. If you click Cancel data transfer , the data transfer is canceled. When the data transfer is executed, the pattern generator data output stops and the data name corresponding to each pattern data is set as the pattern data group.

Saving Data to a File

DG-LINK is capable of saving data in one of two formats: PDA and GPIB command. This section describes the differences between these formats and how to save the data in each format.

PDA Format

The PDA format allows the data to be saved in the same format used to save data and settings to a floppy disk. You can then copy this file to a floppy disk and load the data and settings on a data generator.

Do the following steps to save the data in PDA format:

1. Click **PDA File** at the bottom right corner in the Main Control window. A dialog box appears to select the destination file.
2. In the dialog box, select the destination file and its location. Then, click **OK**. The data is saved.

GPIB Command Format

The GPIB command format allows GPIB commands to be saved to a file. These commands include the pattern data used when transferring the data from the PC to the appropriate instrument via GPIB connection. You can load the saved data elsewhere to enable it to be transferred to the desired destination via interface such as GPIB.

Do the following steps to save the data in GPIB command format:

1. Click **CMD File** at the bottom right corner in the Main Control window. A dialog box appears to select the file to contain the file.
2. In the dialog box, select the file and its location. Then, click **OK**. The data is saved.

Saving Data Error Message

If the data length saved is shorter than the minimum data length of the appropriate instrument, DG-LINK displays the dialog box shown in Figure 2–12, regardless of the format to which you are saving.

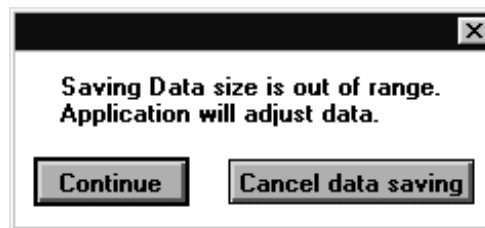


Figure 2-12: Save Data error dialog box

The minimum data length is 64 words for the DG2020 and DG2020A, 90 words for the DG2030, and 360 words for the DG2040. If you click **Continue**, the data will be adjusted to meet the minimum requirements and the data will be saved. If you click **Cancel data saving**, the data saving will be canceled.

Setting the Output Pattern Data and the Output Channel

DG-LINK enables you to set up the pattern data output channels of the destination data generator.

The setting procedure is as follows:

1. Click **Output Assign** at the bottom right corner in the Main Control window. The Set Up Output Channel window in Figure 2–13 is displayed.

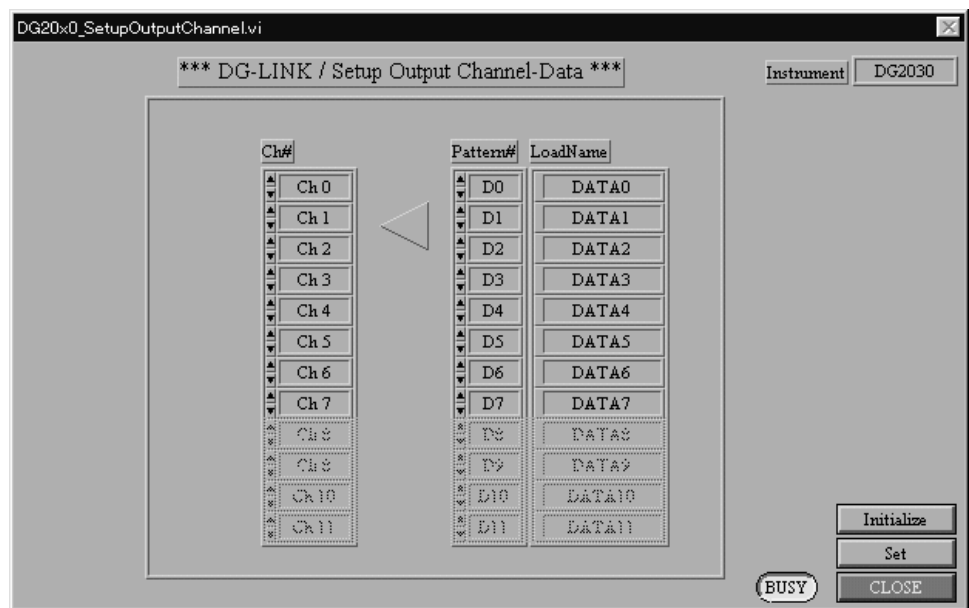


Figure 2–13: Setup Output Channel Data window

If the instrument you have selected is not connected to the GPIB bus, DG-LINK displays the dialog box shown in Figure 2–14. To select an instrument, click **Re-select**. After you move to the Change Instrument window and the setup is completed, you return to the Set Up Output Channel Data window.

To quit the output channel setup mode, click **Close setup**.



Figure 2-14: Selected Instrument Not Connected dialog box

2. For the DG2030 and DG2040, select the output channel by clicking ▲▼ on the Ch# field. For the DG2020 or DG2020A, first click ▲▼ on the Pod field. If you select an undefined pod, a warning dialog box will be displayed.
3. Click ▲▼ on the Pattern# field to select the data pattern to be output to the appropriate channel. Select None for the channel(s) not to be used for output.
4. Click **Set** at the bottom right corner in the window to enable the settings. If you click **Initialize**, the settings are reset to the initial values.
5. Click **CLOSE**. The Setup Channel Data window is closed, and you return to the Main Control window.