GEMS

GENERAL ENGINE MANAGEMENT SYSTEMS

DLOG97 for DA50

Data Analysis Software

& DA50 Data Logger

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Introduction

DLOG97 for DA50 *Lite* is a data analysis package designed to be used in conjunction with the **GEMS** *DA50* logger. In addition to a fully featured data analysis system, **DLOG97** is the means by which the *DA50* data logger is programmed. **DLOG97** runs under the *Windows 95* operating system.

Documentation

This *Getting Started* guide gives instructions on programming and reading data from the logger and a brief overview of many of the **DLOG97** features.

Throughout this guide, procedures in **DLOG97** are referred to using the menu commands separated by a | symbol. Thus **File | Open** means select the **Open** command from the **File** menu. If a keyboard shortcut or a button on the **DLOG97** toolbar also performs the same task, this is shown in the left hand margin.

A comprehensive on-line help system is provided with **DLOG97** to give more details on using the package. To view the help, press **F1** or select **Help | Help Topics**.
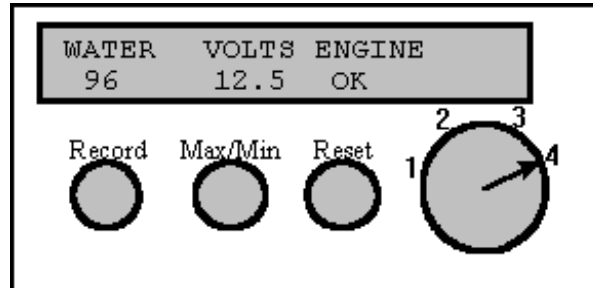
Installing DLOG97

To install **DLOG97 for DA50**:

- Insert the **DLOG97 for DA50** installation disk in drive A.
- From the Windows 95 Start menu, select Run.
- In the run dialog, type in A:\Setup and select OK.
- Follow the prompts from the installation program.

The DA50 Datalogger

A diagram of the DA50 logger is shown below:

The front panel of the logger consists of a display, 3 push-button controls and a rotary switch:.

Record Button

The record button will start and stop the logger recording information. When recording the message 'RECD' is shown in the right corner of the screen, irrespective of the mode the screen is in.

Max/Min Button

When the display is in standard view (any one of the 4 screens) then pressing the button will show the current maximum values for the displayed parameters. When pressed again, the minimum values will be shown. Pressing the button a third time will return the Display to the standard view.

Reset Button

Pressing the reset button will reset the minimum and maximum values.

Screen selector rotary switch

Rotating this switch will change the screen to show one of the four available pages. Pages 1 to 3 display 3 parameters whilst page 4 displays two parameters plus the engine status. The parameters displayed on the screen can be configured using DLOG97 for DA50. See below and in the on-line help for more information.

Errors and Alarms

If an engine has a problem with one of its' control systems or exceeds the set parameters, an error / alarm condition will be shown on the display.
If the parameter is already on screen then it will begin to flash on and off.
If it is not on the screen then the screen will alternate between the normal screen and a screen showing the parameter's warning message. If more than one parameter is out of range, then the screen will cycle through the warning messages.

Page 4 of the screen shows any engine errors. The following table gives the possible errors:

TPS	Throttle position sensor
BOOST	Map sensor.
AIR T	Air Temperature sensor
WATER	Water temperature sensor.
SYNC	Phase sensor.
CRANK	Crank sensor.
PIPE	Possible air leak to Map sensor or pipe off.
ECU	ECU Checksum error - possible ECU failure.

Transferring Data to and from the Logger

Data is transferred between the logger and the PC using a serial link. To enable data transfer, connect the serial port of the PC to the jack socket of the logger. The logger must not be in record mode during data transfer.

Programming the Data Logger

To program the data logger:

F4

- Load the setup to be programmed into **DLOG97** using **Setup | Open**. (Note: **DLOG97** automatically opens the last setup used when run - if you only have one setup, you will not need to use **Setup | Open**).
- Ensure the logger is connected to the PC and the record is off.

Shift F4

- Select **Setup | Program**.
- A box will appear showing the progress of the upload. If the progress bar does not appear to move after several seconds check the connection between the logger and the PC.

Reading Data

Once logging is finished, the data can be downloaded from the logger via the serial link:

- Connect the serial port of the PC to the jack socket of the logger and ensure that the logger is not recording.

Shift F3

- Select **File | Read**. You will be prompted for a file name. Note that **DLOG97** can be set to automatically name files: open the Options editor with **Config | Options** and select the **File Naming** page. Click on **Date** in the **File Naming System** box.
- A box will then appear showing the progress of the download of data from the logger. If the progress bar does not appear to moving after several seconds, check the connection between the PC and the logger.
- Once the data has been downloaded, the default graph of the data will be displayed.

Quick Reference

The following sections give a brief overview of options and menu commands available in **DLOG97**. For more information, see the on-line help.

The Main Graph Screen

The following screenshot shows a typical DLOG97 graph screen with areas of interest marked.
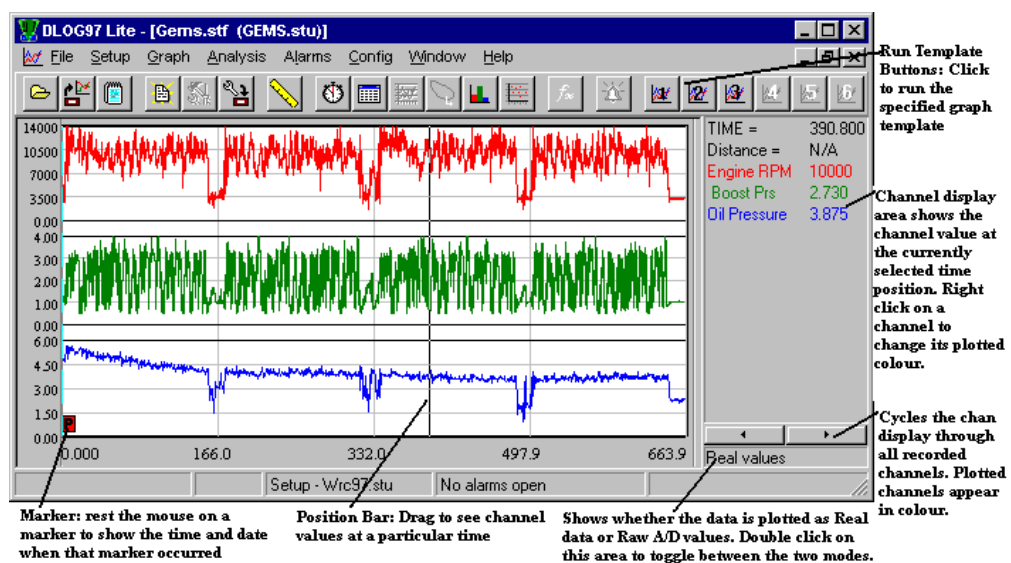
Many of the commands in the Graph menu are reproduced in the graph popup menu. To view this menu, right click on the graph itself.

To zoom in on the graph to view the data in more detail:

Keypad +

- Select **Graph | Zoom | In**. A Magnifying glass with an X in it will appear showing that you are in x axis zoom mode.
- Click on the area of the graph where you want the zoom to start.
- Click on the area of the graph where you want the zoom to end. The graph will be redrawn with the new zoom range.
- The selected zoom range is bounded by red vertical lines at the start and end. Using the scroll bar at the bottom of the graph, data outside of this zoom range can be viewed.
- If there is data outside of the scrollable region, a ◄ or ► will be shown at the edge of the scrollable area. These will shift the zoom area to the left or right respectively.

Ctrl Keypad
+

The y axis can be zoomed in a similar manner by selecting **Graph | Zoom | Expand**.

Menu Commands

The following section gives a brief overview of the menu commands and their use. If a tool bar button or a keyboard shortcut can be used to perform the same function, it is shown in the left hand margin.

File Menu

F3

Open
- Use the open command to open a log file.

Reopen
- Allows a file to be selected from the most recently opened log files.

Shift F3

Read
- Reads data from the logger and saves it to disk. See *Transferring Data to and From the Logger* earlier in this guide for more information.

Compress
- Compresses a log file to its minimum size.

Compress All
- Compresses all log files in the current directory.
- Data files retrieved from the logger are of the same size as the memory installed in the logger. However, the space required for the data is often significantly less than this size. Using the compress command reduces data files to their minimum size and should be carried out whenever disk space is short.

Update
- Updates files from previous versions of GEMS data analysis systems for use in **DLOG97**.

Export
- Exports data in an ASCII format suitable for use in other applications such as word processors or spreadsheets.

Abstract
- Copies selected channels into a new data file.

Ctrl F3

Notes
- Displays notes about the current data file and allows new notes to be added.

Exit
- Quits DLOG97.

Setup Menu

Shift F3

Open
- Opens a setup file for programming into the logger.

Reopen
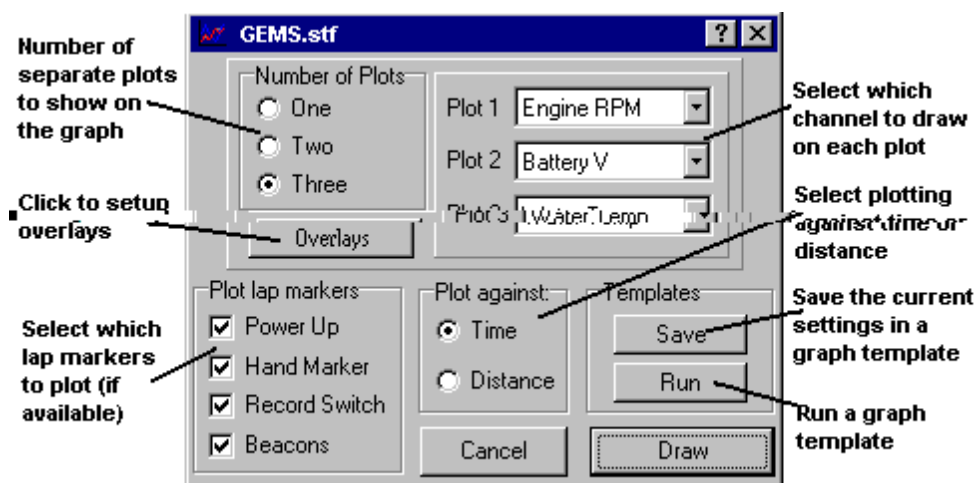- Allows a recently used setup to be reopened.

Shift F4

Program
- Programs the current setup into a logger. See *Transferring Data to and From the Logger* earlier in this guide for more information.

Graph Menu

Ctrl G

Graph
- Invokes the graph options editor where the number of lines, overlays and lap markers can be specified. An example screen is shown below

Shift Overlays
- Allows the overlay axis to be changed relative to the x axis.

Zoom
- Allows zooming in or out on the x and y axes.
- *In* Zooms in the x axis.
- *Out* Zooms out the x axis.
- *Expand* Zooms in the y axis.
- *Contract* Zooms out the y axis.
- *Normal* Resets all zooms.

Values
- Selects either plotting with A/D values (raw data) or scaled real values.

Ctrl T

Tape Measure
- Displays the Tape Measure window.

Print
- Prints the current graph.

Analysis Menu

F5

Lap Times
- Use to display lap markers, split and total lap times.

F6

Statistics
- Displays minimum, maximum and average values of channels.
- Double clicking on a minimum or maximum value will automatically zoom the graph around that point.

Alarms Menu

Channel alarms can be used to alert users if data in a channel exceeds a predefined limit. Alarms can also be set to be conditional on two channels exceeding their limits. A maximum of 100 alarms can be set. A setup file must be loaded before Alarms can be edited.

Create
- Creates a new alarm file.

Open
- Opens an existing alarm file.

F10

Edit
- Edits the current alarms list.

Ctrl F10

Save
- Saves the current alarm list.

Shift F10

Show for Current
- Displays any activated alarms for the currently loaded log file

Active On Read
- When checked, any activated alarms will be displayed when a card is read.

Active On Open
- When checked, any activated alarms will be displayed when a log file is opened.

Config Menu

Com Port
- Use to set the default Com port used by the PC for communicating with the logger.

Options
- Edit various global options associated with *DLOG97*.

Show Toolbar
- If Checked, the tool bar will be displayed.

Close On Read
- When checked, all existing data files will be closed when a data is read from the logger. This can be useful during a logging session which may result in the potentially confusing situation of many windows being open at once. Opening files will not force other windows to close. When not checked, existing files remain open when a new file is read from a card.

Notes On Read
- When checked, the user will be prompted to enter notes about the data file whenever a data is read from the logger.

Window Menu

Tile
- Arranges windows in a tiled format.

Cascade
- Arranges windows in a cascaded format.

Arrange Icons
- Arranges iconized windows.

The numbered list at the foot of the Window menu can be used to make the desired window active.

Cascaded windows appear on the screen diagonally, from upper left to lower right, overlapping so that the title bar of each window remains visible.

Tiled windows are distributed to each corner of the screen, so that each window is visible and none overlap.

Icons (or reduced windows) appear at the bottom of the DLOG97 main window. Each icon remains visible. Double-click an icon to activate that window.

Help Menu

F1   Help Topics
- Display the Help Topics dialog box:

About
- Display program version and serial number information.

To find a topic in Help:

- Click the Contents tab to browse through topics by category.
- Click the Index tab to see a list of index entries: either type the word you're looking for or scroll through the list.
- Click the Find tab to search for words or phrases that may be contained in a Help topic.

Context sensitive help can be obtained by pressing the **F1** key.

Help can also be obtained in dialog boxes by clicking on the **?** in the top right of the dialog box and then clicking on the item for which you require help.

F11

<u>Graph Templates</u>

Shift F11

Graph templates allow frequently used graph set-ups to be applied at the click of a button. To use graph templates:

F12

- Create the desired graph setup, i.e. number of lines, channels to plot, overlayed files, etc.
- Within the Graph Options editor, click the Save button and enter a filename for the template.

Shift F12

- Select Config | Options and assign the template filename to one of the template buttons.

Ctrl F11

- The template can now be run at any time by clicking the appropriate template button.

Ctrl F12

Creating Data Logger Set-ups

In order for the logger to record data, it is necessary for it to be programmed with a setup. The setup specifies the channels to record and the rates at which to record them. In addition, the setup enables **DLOG97** to convert raw 8 bit data into real engineering units. The DA50 logger and DLOG97 will normally be supplied with a setup suitable for the application stated when ordered. However, this setup can be changed if desired.

Shift F5

Set-ups are edited using the Setup Editor. To invoke the editor, choose **Setup | Edit**.

There are five steps to creating a DA50 logger setup:

1. Specifying the Input Allocation Table.
2. Specifying the sensor calibrations.
3. Specifying the speed input to be used for the distance channel.
4. Specifying the record list.
5. Specifying the DA50 display setup.
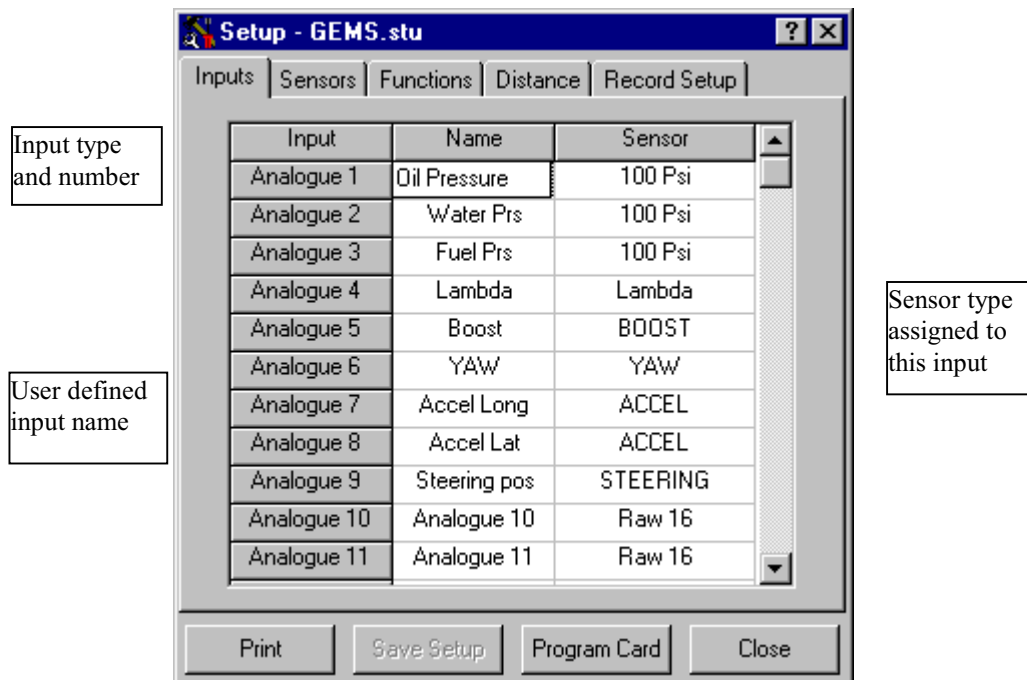
Each of these five steps will be considered below.

The Input Allocation Table

The input allocation table specifies what is connected to the various inputs of the logger. An example of the input allocation page is shown below.

Input type
and number

User defined
input name

Sensor type
assigned to
this input

The left hand column of the table gives the type of the input. The middle column specifies the name of the data source connected to that input. For example, in the setup shown above, a pressure transducer measuring the engine oil pressure is connected to Analogue 1 on the logger. This name can be any 12 characters but since it is used for accessing recorded data and other functions, it is useful for it to be a meaningful name.

The right hand column specifies the sensor type used by that particular input. The sensor type is used by the logger to determine what gain should be used when recording that particular channel. The sensor type also specifies how the raw 8 bit data is converted into real engineering units by **DLOG97**. Note that a sensor type can be used by more than one channel. Calibrating sensors is considered in the next section.

The Sensors Table

Sensors need to be calibrated to allow the **DLOG97** to display values in real units. Calibrations are entered into the Sensors page of the setup editor and assigned to an input using the Inputs page. An example Sensors page is shown below.

The name of this sensor type as referenced in the input allocation table

The gain is not used by the DA50 and should be set to 8x1

The multiplier and offset convert the raw data into real units. If the multiplier is zero, the offset box is used to select a function table

Setup - GEMS.stu

Inputs | Sensors | Functions | Distance | Record Setup

Name	Gain	Multiplier	Offset/Func	Graph Start	End
Raw 16	16 bit	1	0	0	65535
Raw 8	8x1	1	0	0	255
100 Psi	8x16	0.4739	-19.98	0	100
Lambda	8x16	0	Lambda	0	25.5
BOOST	8x16	0.02	0	0	3
YAW	16 bit	0.962	-120	-90	90
ACCEL	16 bit	0.12	-2	-2	2
STEERING	8x16	0.785	-100	-100	100
OilTemp	8x16	0	Oil T	0	200
Temp Hi	8x4	4	-50	0	950
Temp Lo	8x1	1	-50	0	200

Print | Save Setup | Program Card | Close

Sets the lower and upper graph ranges when the data is plotted. These ranges are also used by the DA50 for displaying warnings. See Display Setup below.

The Name column specifies the name of the sensor as referenced in the inputs table. The name can be up to 12 characters long.

The multiplier and offset columns specify how the raw 8 or 16 bit data is converted into real units. The following equation is used to convert raw data into real units:

$$Real = Raw \times Multiplier + Offset$$

The Graph Start and Graph End values define the lower and upper limits of the y axis when the data is plotted. See the **Calibrating Sensors** section for more details on setting up the sensor table.

If a multiplier of zero is specified, the offset box is used to select a function table. Function tables are used to convert non-linear sensor output into linear real data and are entered into the Functions page of the setup editor. An example function table page is shown below:

The name of this function table. The name is used to identify the function table in the sensor table.

The table output value is multiplied by the multiplier to produce the final real value

Sorts the table in ascending input values

Setup - GEMS.stu

Inputs | Sensors | Functions | Distance | Record Setup

Input	Output
694	100
883	90
1121	80
1412	70
1750	60
2127	50
2519	40
2897	30
3072	25
3233	20
3508	10

Name
Thermistor

Multiplier
1

Sort

Print | Save Setup | Program Card | Close

The raw input value

The signed 16 bit output value.

The name box is used to specify the name of the currently selected function table, which can be up to 12 characters. The name is used to identify the function table in the sensor table. The name box is also used for selecting the current function table to be edited. There are ten function tables available.

To create a function table, enter the 8 bit raw values in the input column and the corresponding output values in the output column. The output values are signed 16 bit and so have a range of -32768 to 32767. If values outside this range are required, the multiplier can be used.

Function tables calculate the real value by looking up the raw value in the input list and matching it to an output value which is multiplied by the multiplier. Linear interpolation between nearest sites is carried out if necessary.

The Record List

The record list tells the logger which channels to record and the rate at which to record them. A typical record list page is shown below:

Inserts a new entry before the active row

Inserts a new entry after the active row

Deletes the active row

Shows the maximum record time for the current setup for the selected card size

Use to set the size of logger memory being used

Setup - GEMS.stu

Inputs | Sensors | Functions | Distance | Record Setup

Channel
Insert
Before
After
Delete

Max.Rec.Time
62m28s
1MB

Chan	Input Name	Rate
1	Engine RPM	10 Hz
2	Boost Prs	10 Hz
3	Water Temp	2 Hz
4	Oil Pressure	2 Hz
5	Fuel Prs	10 Hz
6	T P S	10 Hz
7	Water Prs	10 Hz
8	Oil Temp	2 Hz
9	Lambda	10 Hz
10	A I T s	10 Hz
11	Turbo Spd	10 Hz

Print | Save Setup | Program Card | Close

The input to be recorded

The rate at which it is to be recorded

To add items to the record list, click the Before or After buttons which will insert a new entry in the list before or after the currently active row. The active row is denoted by the channel number being in red. (Channel number in this case merely refers to the position in the record list and not any physical channel). To delete an entry, select it by clicking on the input or gain for that entry and then click the delete button.

In the Input column, select the input to record. In the rate column, select the rate at which that channel is to be recorded. Recording a channel at a high rate can provide more information on fast transient signals at the expense of using more memory. Slow moving signals, such as air temperature, can be recorded at a relatively slow rate such as 2Hz saving memory and thus extending that maximum available run time.

The Max Rec. Time box shows the maximum available run time for the current record list based on the size of the card selected below. The card size does not have to be set correctly since it is only used to calculate the maximum record time displayed in the setup editor for information purposes.

However, it is useful to set the card size box to the size of card being used so that the maximum record time is correct.

DA50 Display Setups

The display setup page specifies the parameters and labels to be shown on the DA50 display. A typical display setup is shown below:

Disp	Source	Sensor	Label	Message
1	ERPM	ERPM	R P M	rpm
2	Boost	Map 3 bar	BOOST	BOOST
3	TPS	TPS	TPS	THROTTLE
4	Oil Prs	10 BAR	OIL P	OIL press
5	Fuel Prs	10 BAR	FUELP	FUEL Press
6	Battery	Volts	VOLTS	BATTERY
7	AITs	TEMPs	A I T	Air Temp
8	Water	TEMPs	WATER	Water Temp
9	EGT	EGT	E G T	Exhaust Temp
10	LOAD	TPS	load	LOAD
11	MAT	Lucas/1k	M A T	M A T

Setup - Da50mit2.stu — Inputs | Sensors | Functions | Distance | Record Setup | Display

Print | Save Setup | Program DA50 | Close

The DA50 display has four pages, each of which can display three parameters (the last page can only display two). In addition, if any of the parameters exceed the range specified by the sensor used, a warning message is displayed.

To setup a display:

1. In the **Source** column, choose the Input (as defined in the Input Table) for which this display position is to show values for.
2. In the **Sensors** column, choose the sensor used to convert the raw data into engineering units for display on the screen. The **Graph Start** and **Graph End** values in the sensor are also used to define alarm conditions within the DA50. If the value falls below **Graph Start** or exceeds **Graph End**, the message displayed in the **Message** column will be shown.

3. In the **Label** column, specify the label to be shown on the screen. The label identifies what the displayed value is and can be up to 5 characters.
4. In the message column, specify the message to be shown if the value falls outside of the **Graph Start** or **Graph End** values of the sensor being used.

Programming the Data Logger

To program the setup into the data logger:

Shift F4

- Click the **Save Setup** button to save the setup. This button will only be enabled if the setup has been changed.
- Ensure the logger is connected to the PC and the record is off.
- Click the **Program DA50** button to start programming.
- Alternatively, if the Setup Editor is not shown, select **Setup | Program**.
- A box will appear showing the progress of the upload. If the progress bar does not appear to move after several seconds check the connection between the logger and the PC.