Data logging systems

DLJ SETUP user manual

Ver 4.5 - 24/10/97

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1.0 Introduction

This manual provides a guide to using the Magneti marelli " Junior" data acquisition systems with the programming software DLJ setup version 4.5 for win 3.1_ or later. The previous approach to programming has been thoroughly revised with the intention of simplifying the procedure and eliminating the need for specific technical knowledge. Once the basic system has been setup (by the factory) each logging session is programmed by simply selecting the channels to be recorded.

This manual is designed for use with the following hardware:

Data logger	**Software version**
DAS3 , MT930	-
Micro DAS , MT941	-
Dashboard MT940	-
Dashboard MT809	-
MT913	-
MT914	-
MT916	-
MT916/WU	-
MT916/RR	-
MT916/NTC	-
MT920	-
MT922	-
MT924/b	-
MT926	-

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1.2 Hot keys

CTRL + N	Create a new file
CTRL + O	Open an existing file
CTRL + A	Save a file as another name
CTRL + P	Print file

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1.3 Hardware specification

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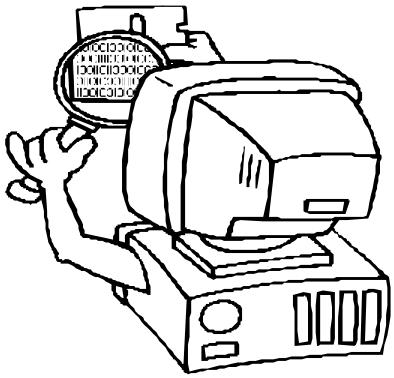
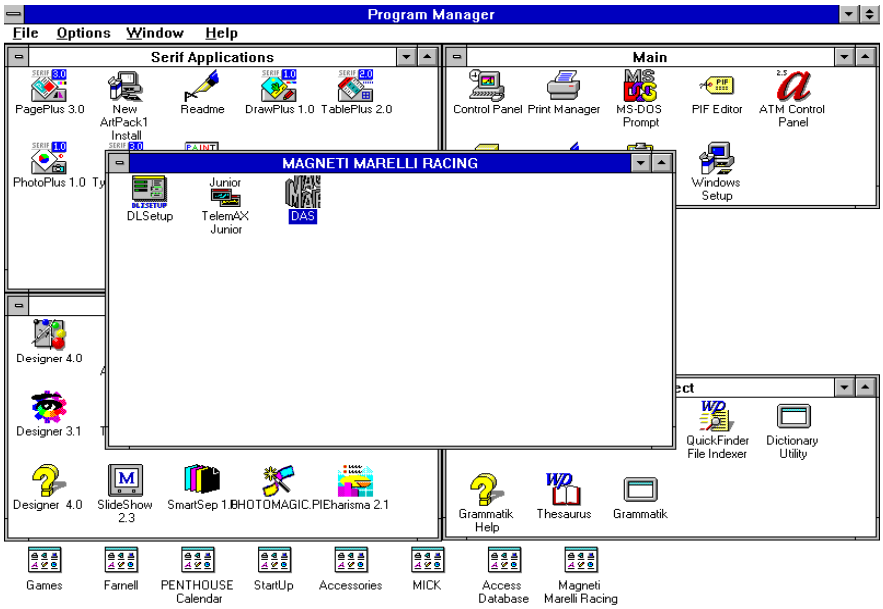
1.4 Installation

This software comes on a 3.5 inch floppy disk. We recommend that a copy of this disk is taken and worked from, leaving the original in a safe place. To copy a floppy disk use the DOS Diskcopy command or use *Windows* file manager. For more information on copying disks refer to your DOS and *Windows* manuals.



Insert the floppy disk marked ***TelemAx Junior / DLJsetup*** installation disk into the floppy disk drive on your PC and from ***Program Manager*** within *Windows* click the ***File*** menu and then choose the ***run*** command. Type in **a:setup** and press the ***Enter*** to install the software onto your PC.

The software will now create a group within *Windows* and place icons called TelemAX Junior , DLJsetup and DAS. The software is now installed, remove the installation disk from the disk drive and restart *Windows*.



This is an example of the completed installation.

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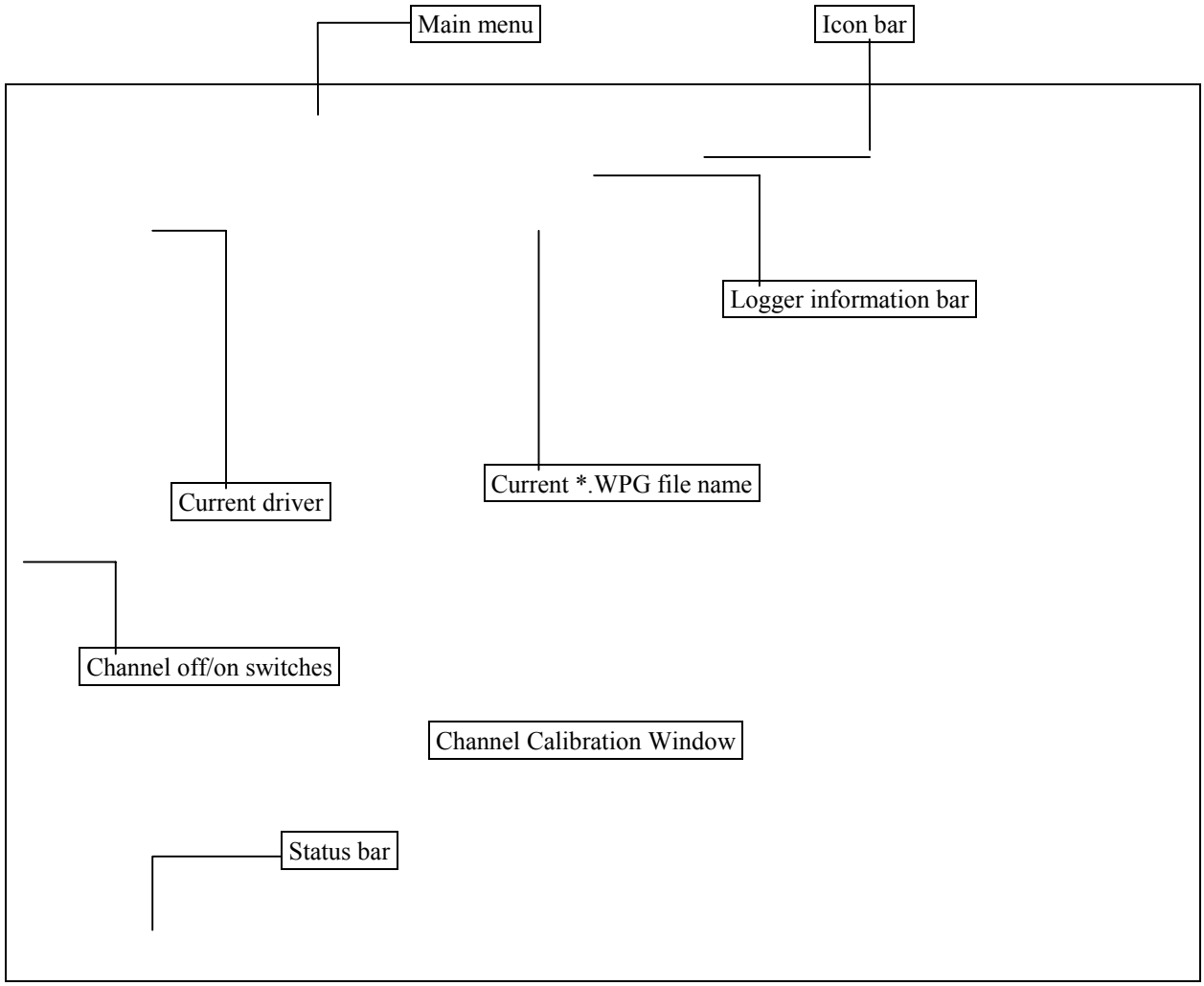
2.0 Page layout



NOTE: Always use the Windows Default colour setup. To change this use the Control Panel in your Main window

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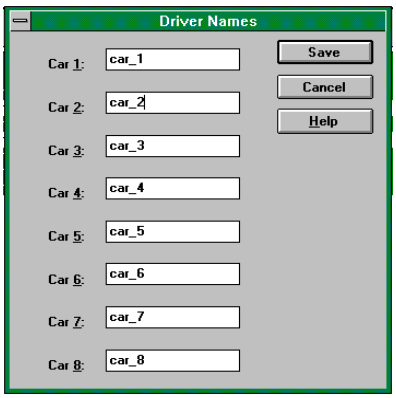
3.0 Driver name

The ***DLJ setup*** software allows up to 8 different tables to be stored for quick access, each one located in a different sub directory of ***DLJ setup*** and accessed by selecting the appropriate driver name.

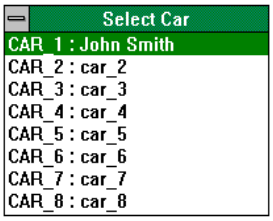
To enter a driver name, first select ***Car*** followed by ***Driver name*** from the main menu. This will bring up the following window.



Using the ***car_1*** position, type in the name of your driver and select the ***Save*** button.

All subsequent drivers and setup tables must be allocated to cars 2 to 8.

To select this driver name as the loaded table, choose ***Car***, followed by ***Select Car*** from the main menu. The following menu will be activated, select your driver by double clicking onto the name using the left mouse button. The name of your driver will now appear alongside ***Driver Active*** in the information bar.



Car number

Driver name

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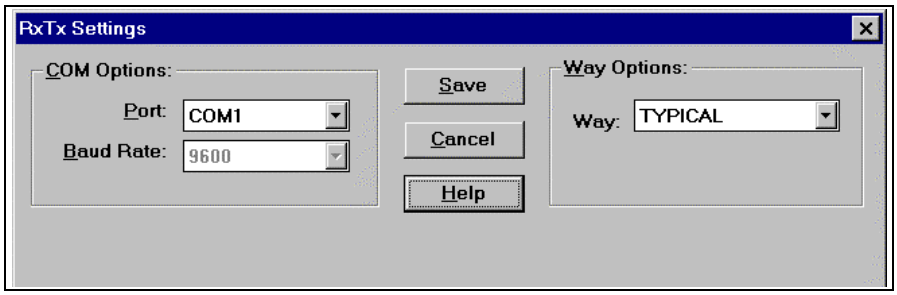
3.1 Transmit table

When your table has been completed it must be sent to the data logger. From the main menu select ***TX*** followed by ***Settings*** to activate the following window.

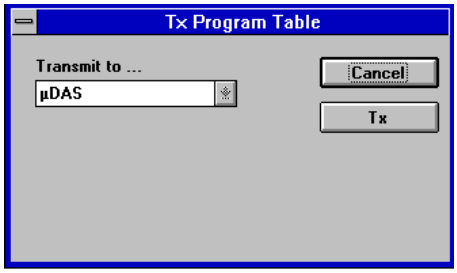
Press to save changes

Select the Com port you are using. The baud rate is pre-defined at 9600



Select the communication method
CAN - For communication via CAN/PCMCIA
TYPICAL - Automatically selects either RS232 for the MT941 or Centronics for the MT930

To transmit the table select ***TX*** followed by ***Table To*** which activates the following window.



Your table is now being transmitted to the data logger (approx 6 seconds). If you receive a Time Out error check the following:

1. Is the port set correctly ?
2. Is the logger turned on ?
3. Is the down load cable connected.
4. Is there an error on your setup table

Fast access icon

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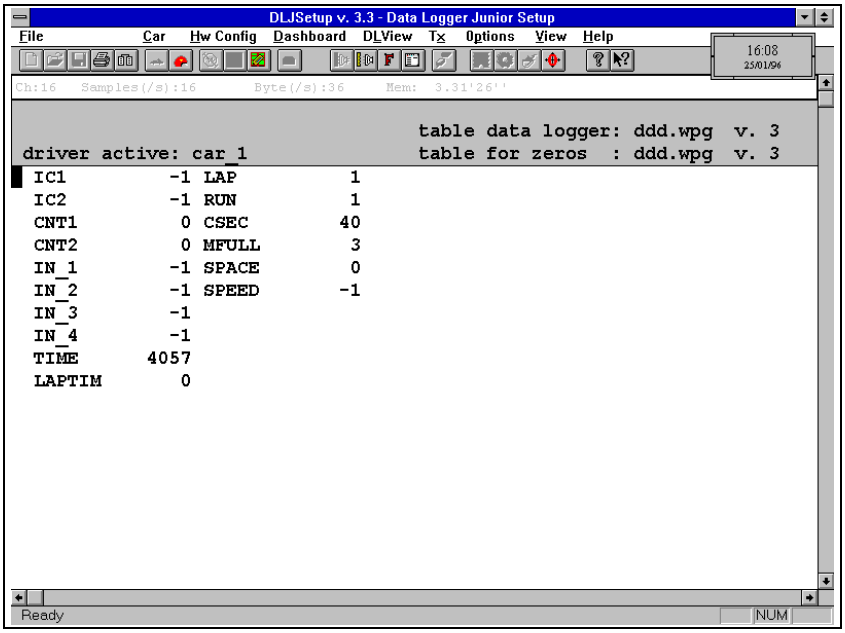
3.2 DL (data log) View

This function allows you to view channels in real time. Connect the down load cable and switch on the data logger. Select ***DL View***, followed by ***Connect*** from the main menu. The screen will now display a small flashing black icon in the top left of the active page. After approx 4 seconds your channels will appear with their current values alongside.



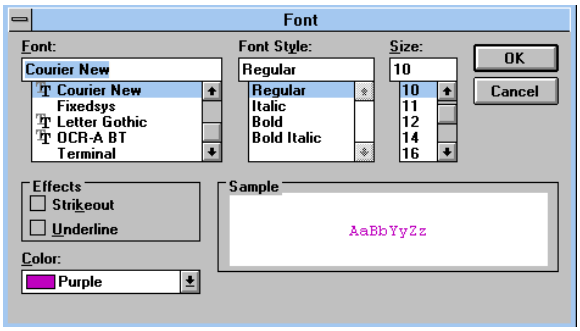
Typical view screen

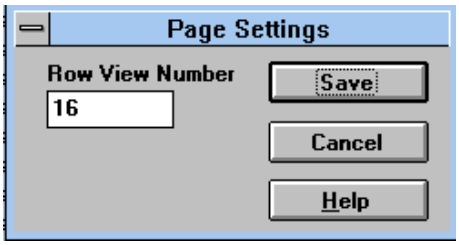
Connect to ***DL View***

Disconnect from ***DL View***

Font change

To change the font used in the view screen click this icon to activate the following window. Make your changes and select Ok to save and exit.





To change the vertical number of rows in your view screen, select ***DL View*** from the main menu followed by ***Page*** to activate this window.

3.3 Circular memory

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This function enables the memory to work in two ways:

No Tick -	In this mode the available memory will be used up and then stop logging any new data in order to preserve the initial information.
Ticked	In this mode only the latest data will be kept .

We recommend that for normal use, this function is active (ticked) on all logging tables. To activate, select ***Options*** from the main menu, followed by ***Circular Memory.***

Shortcut to circular memory

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3.4 Distance , lap

This function enables the system to create a distance channel in metres, derived from one of the digital inputs.

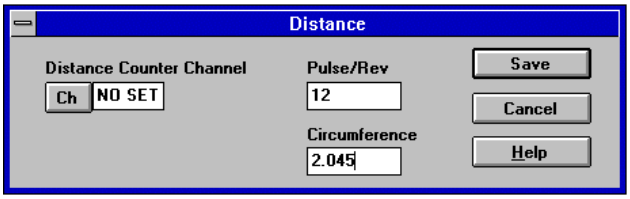
From the main menu, ***select Options*** followed by ***Distance*** to activate the following window.

Press this button to activate your channel list

Enter the number of triggers you are using for each wheel revolution.

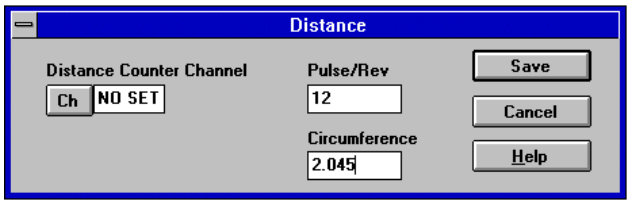
Enter your tyre circumference in metres, using up to 3 decimal places.

Press ***Save*** to accept your changes

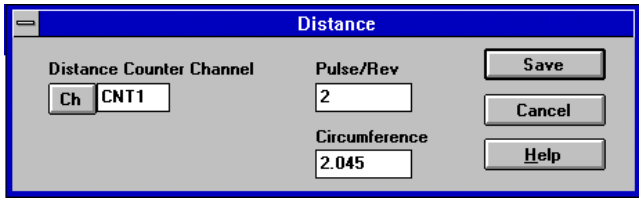


The ***Distance Counter Channel*** will be dependant on your hardware configuration, The following examples give the most commonly used options.

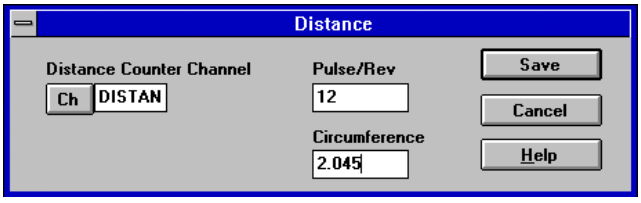
MT941 Micro DAS system will give a distance output on the Internal SPACE channel derived from both right and left wheel speeds, IC1 and IC3



MT941 Micro DAS or MT930 DAS3 will give a distance output on an Internal SPACE channel derived from the distance count of one internal speed channel.



MT941 Micro DAS or MT930 DAS3 will give a distance output on the Internal SPACE channel derived from the combined distance counter of the MT924/B speed input CAN module.



To help understand these inputs, the ***SPACE*** channel (Internal) will reference itself to the ***Distance Counter Channel*** and match the count in meters. The only difference being that the SPACE channel will re-set to zero and re-start the count every time the lap beacon is passed.

In this way the source counter channel is somewhat redundant and in order to save memory time it may be logged at zero Hz. **NOTE**: Even though it is being logged at 0Hz it **MUST** still be active in the main window.

NOTE: When using a divisor in the MT924/B, divide the Pulses/Rev by the amount of hardware division used. For more information on 'divisors' consult the MT924/b technical data sheet, or contact your hardware supplier.

3.5 Trigger

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This function allows you to control when to log data. Using the trigger to set a minimum and maximum value to a given channel, the logger will only record data when the channel value is between these points. Should you decide not to use a trigger, remember that you may overwrite valuable information whilst the car is stationary in a gravel trap or in Park-ferme with the power on.

NOTE: The internal memory back up battery will store data even with the power off.

From the main menu select ***Options*** followed by ***Trigger*** to activate the following window.

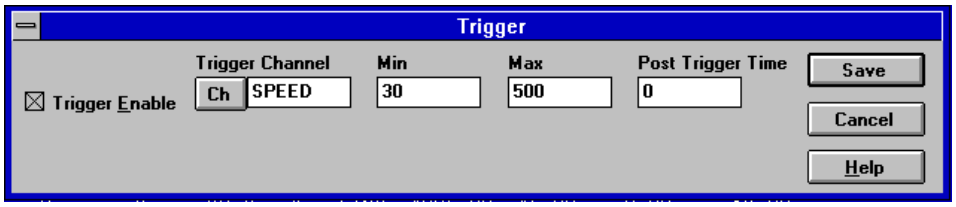
Click once to activate the trigger (X = active)

Select your desired trigger channel

Enter a value below which the system will not log

Enter a value above which the system will not log

See below



Post Trigger Time: This function allows the logger to store (n) number of seconds of data immediately after power on, before the trigger takes effect. In this way it is possible to have a set of reference pit values. Additionally, if the channel value drops out of trigger range the system will continue to log data for (n) seconds.

NOTE: Choose your values carefully. If a trigger is activated during a test it will re-set the time and distance counters, and create a new lap number.

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3.6 Zeros

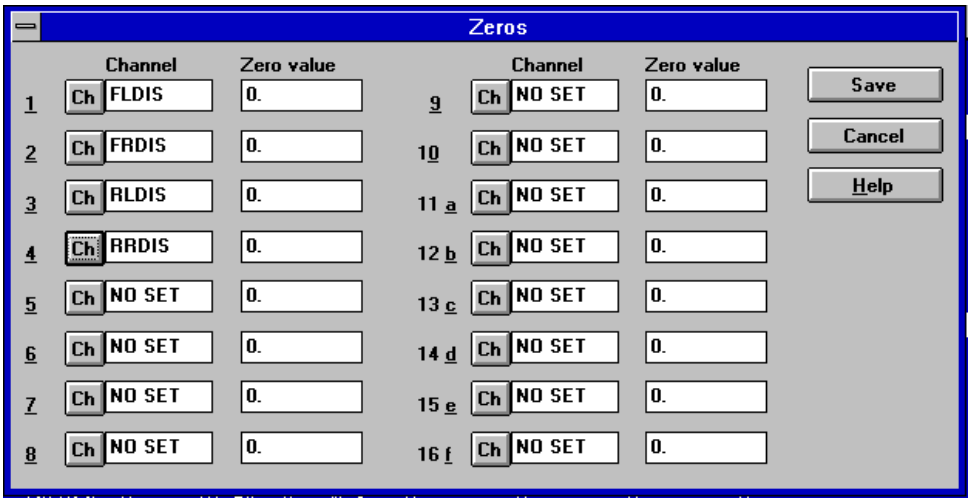
This function allows you to make offsets against any LINE elaboration. Eg: for setting the suspension sensors to 0mm (or any other value). These offsets only take effect when the zero icon is pressed during real time monitoring in DL View.

NOTE: When the offsets are activated, your line elaboration's are re-written.

From the main menu select **Options** followed by **Zeros** to activate the following window.

Select the desired channel from the list

Select the value for the channel to become



Press this button when in DL View to activate the zeros table

NOTE: If this icon is not highlighted in ***DL View***, ensure that you have transmitted to the logger the latest version of the setup table.

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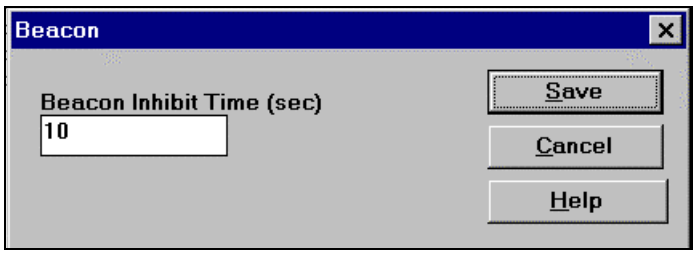
3.7 Beacon inhibit time

In order to safeguard against your system being triggered by any other lap timing devices around the track, the inhibit time will only re-arm the timing hardware after the time period entered here.

Example: The average lap time is 1:34:65 the best possible lap time is 1:33.80 . In this case the inhibit time could be set to 1:30:00 which will result in the system being re-armed approximately 3-5 seconds before your pit wall beacon comes into view.

To set up the inhibit time, select ***Options*** from the main menu followed by ***Beacon*** to display this window.

Enter a time in seconds, 1:30:00 would be entered as 90



Notes: Always ensure that this value is set below the best possible lap time or the pit wall beacon will not register against the data or the dash display

The maximum inhibit time is 255 seconds

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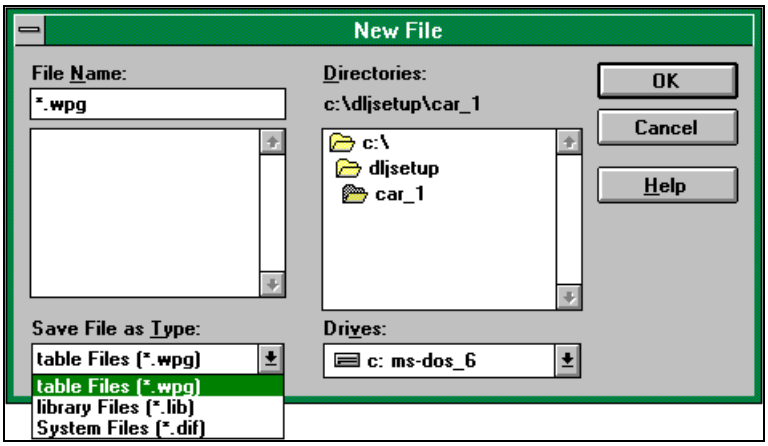
4.0 *.DIF files

These files retain information about which CAN modules are used in your data acquisition installation, and must be created before any work is started on your table.

First select the ***driver / car*** which this ***DIF*** file is to be related to, see section 3.0.

From the main menu select ***File*** followed by ***New*** to activate the following window.



To create the ***DIF*** file, click the system files (*.dif) option located under Save File as Type. This will then change the File Name window to display *.dif. Type in your desired file name using a maximum of 8 characters, there is no need to include the suffix .dif as DLJsetup will create this for you.

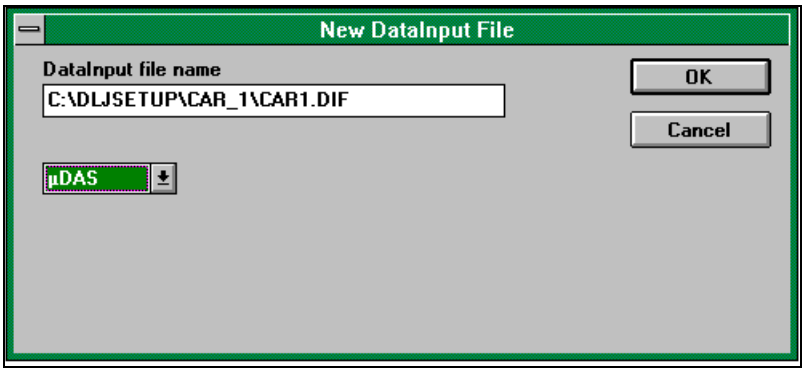
Because it is possible to allocate driver names to these files separately, the file name you choose now does not need to be relevant to the driver, a simple table1 or car1 will be sufficient.

Once this has been done, select the Ok button to accept your changes. The following Data Input window will appear. Use this window to make any changes to the file name (if desired) and more importantly , select the type of data logger you are using, uDAS (MT941)or DAS3 (MT930)

Click to activate the data logger options menu

Current file name and directory location

OK to accept these values



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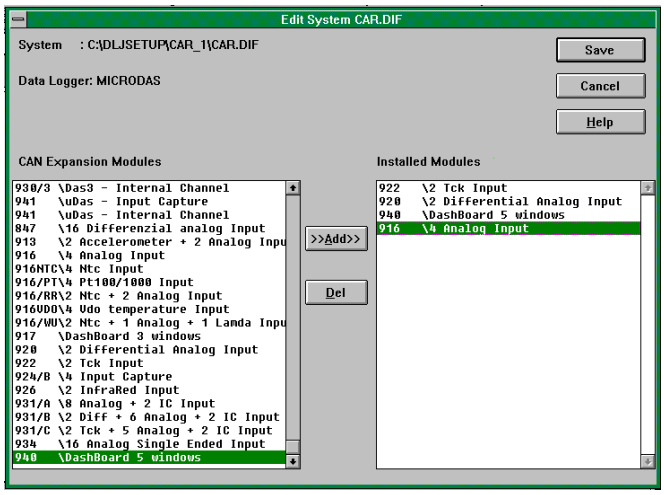
4.0 *.DIF files , continued

You will now be presented with the ***Edit system*** window which allows you to customise your table to only include the CAN modules which are fitted to your car. Each CAN module has a yellow label depicting it's MT number, eg; the MT916 is a can module with four analogue inputs.



To include a module, scan the left window and locate the desired module. Click the name once to highlight then press the ***Add*** button. Your selection will now appear on the right hand side in the ***selected module*** box.

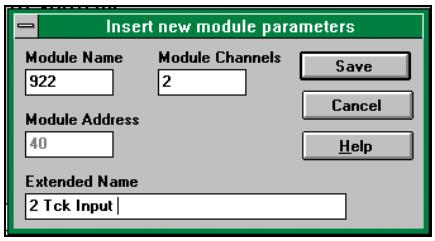
If you are installing two or more of the same CAN module, the second and subsequent times you select the module, the form below will be displayed. You must change the address to match that of the label on the module.

Module MT number

Default CAN address

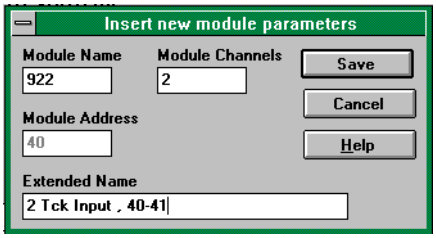
Information line

Number of possible inputs with this module



Ensure that the ***module address*** is the same as that specified on the yellow label on your module, if not, change this now. Eg; if your module specifies a CAN address of 64-67 then enter 64 in the ***module address*** box. Now is also a good time to add your module address to the ***Extended Name*** box. This serves no purpose other than allowing you to allocate channels easier in the future, should you add an identical module. Your revised ***Extended Name*** should look like this example.

Revised extended name to show the CAN address



NOTE: The dash display you are using is also a CAN module and must be selected from the list.

Once all of the modules have been included, select ***Save*** in the ***Edit system*** window. The *.DIF file now contains all of the information about the components used in your system.

The calibration of individual modules will be covered in greater detail in Section 9

4.1 *.WPG files

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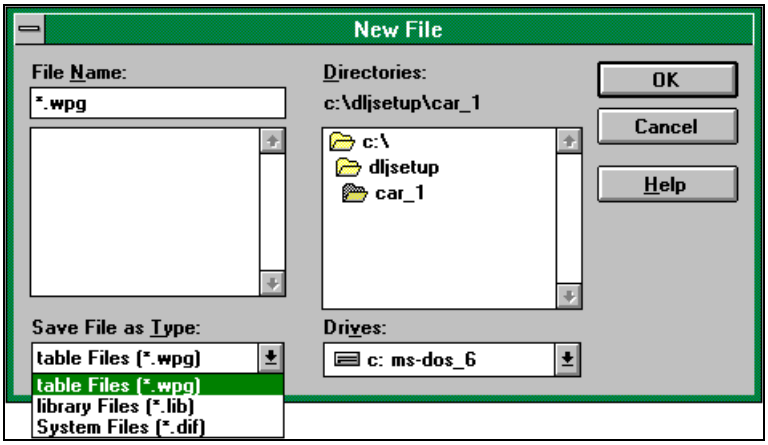
These files retain information about which sensors are connected to which module and all other elaboration's / setup options.

First select the ***driver / car*** which this WPG file is to be related to, see section 3.0.

From the main menu select ***New*** to activate the following window.



To create the WPG file, click the Table Files (*.WPG) option located under Save File as Type. This will then change the File Name window to display *.WPG. Type in your desired file name using a maximum of 8 characters. There is no need to include the suffix .WPG as DLJsetup will create this for you. It is recommended that the same name is used for the DIF and WPG files.

Because it is possible to allocate driver names to these files separately, the file name you choose now does not need to be relevant to the driver, a simple table1 or car1 will be sufficient.

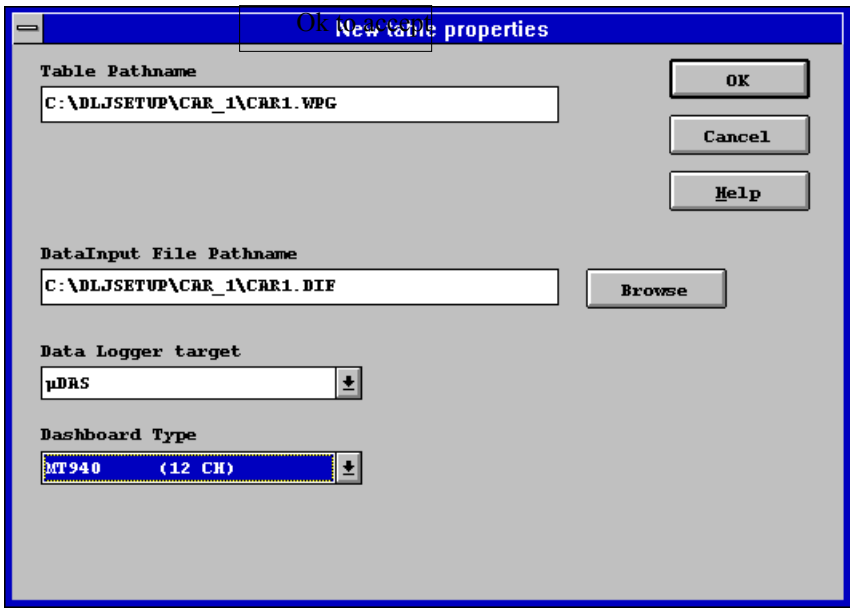
Once this has been done select the Ok button to accept your changes. The following New Table Properties window will appear. Use this window to specify the logger type and dash display.

Table path name

System file path name

Logger selected

Select your dash from the list



You will now be presented with the main page with the internal channels included.

4.2 *.LIB files

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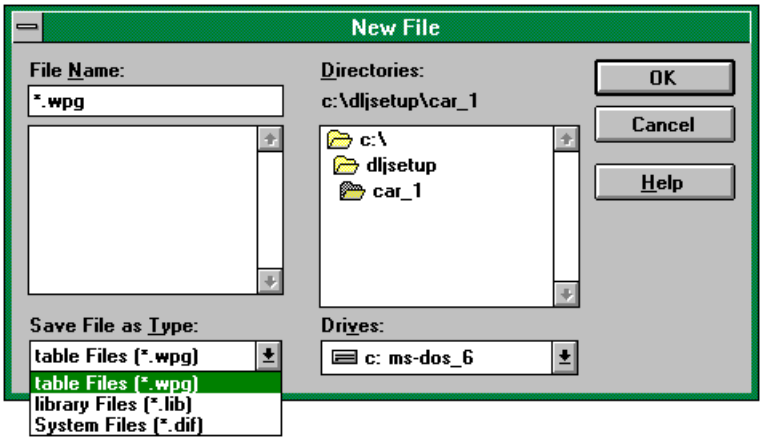
These files contain sensor elaboration's which may be used with your system. A standard set of elaborations are contained within the default.lib file which is located in the root directory of DLJsetup. Before using these calibrations It is important to know the type of calibration necessary with each module, for further information on this refer to the relevant page of section 14

First select the ***driver / car*** which this *.LIB file is to be related to, see section 3.0.

From the main menu select ***File*** followed by ***Open*** to activate the following window.



Select the Library files (*.Lib) from the Save files as type menu and select the default.lib file located in c:\dljsetup. Click OK to accept your choice.

For the more advanced user, an indefinite number of channel elaboration libraries may be created and stored.

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5.0 MT940 dash display description

Operating Modes

The MT940 dashboard may be set up to work independently of a data logging system. Because of this, it works in two special ways which are not normal for an expansion module.

1. Certain functions may not be configured in the software and require altering using the red page select button on the dash display. See below

   Uses of the page select button

   a. Change the constants for RPM in pulses per engine revolution.
   b. Change the duration of the lap time display.
   c. Change the constant for the dash internal speed input. (not normally used)
   d. Change the values of internal alarms (disabled when utilised with a logging system)

   For more information see sections 5.4 and 5.6

2. Any sensor which is connected to the dash display will be elaborated internally . The channel configuration for inputs 1 to 4 are displayed on a yellow label . Eg: Analogue input 1 will be described as AIN 1 with a sensor type alongside it, and a channel name. If this sensor type matches the sensor being used, no further elaboration in DLJsetup is necessary, with the exception of decimal places. See section 9.2

	TYPICAL NAME	DECIMAL PLACES	FREQUENCY	ELABORATION	ROUTINE	DESCRIPTION
DB AIN 1	WATERT	0	1	N/E	No Elaboration required	Engine water temperature
DB AIN 2	OILT	0	1	N/E	No Elaboration required	Engine oil temperature
DB AIN 3	OILP	1	5	N/E	No Elaboration required	Engine oil pressure
DB AIN 4	FUELP	1	5	N/E	No Elaboration required	Engine fuel pressure / boost
DB VBAT	BATT	1	2	N/E	No Elaboration required	System voltage (batt - 0.6v)
DB LAP	not used				This function is only active when the beacon set is directly wired to the dash	
DB RPM	RPM	0	10 max	N/E	No Elaboration required	Engine RPM
DB SPE	not used				This function is only active when a speed sensor is directly wired to the dash	
MAX SPE	MAXSPE	0	5	N/E	No Elaboration required	Maximum straight line speed
MIN SPE	MINSPE	0	5	N/E	No Elaboration required	Minimum corner speed

Note: The maximum acquisition frequency of any MT940 internal channel is 10Hz

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5.1 MT940 Dashboard channel list

Up to 12 channels may be transmitted for display on the dash

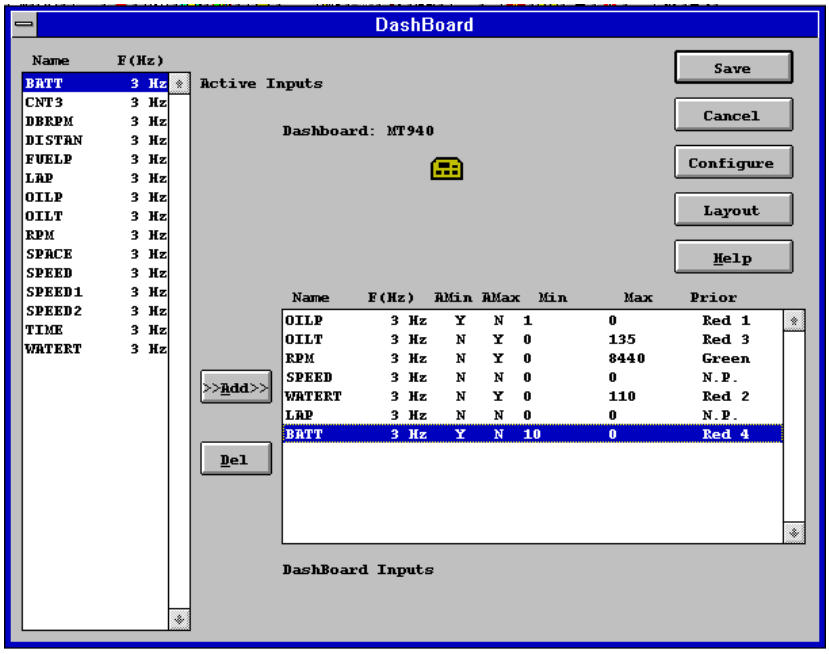
From the main menu select ***Dashboard*** followed by ***Setup*** to activate the following window.

List of available channels

Select **ADD** to include a dash channel

Select **DEL** to remove a dash channel

Selected channels



Use this procedure to select all of the channels which you wish to be displayed on the dash, maximum is 12.

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5.2 MT940 Dashboard alarm setup

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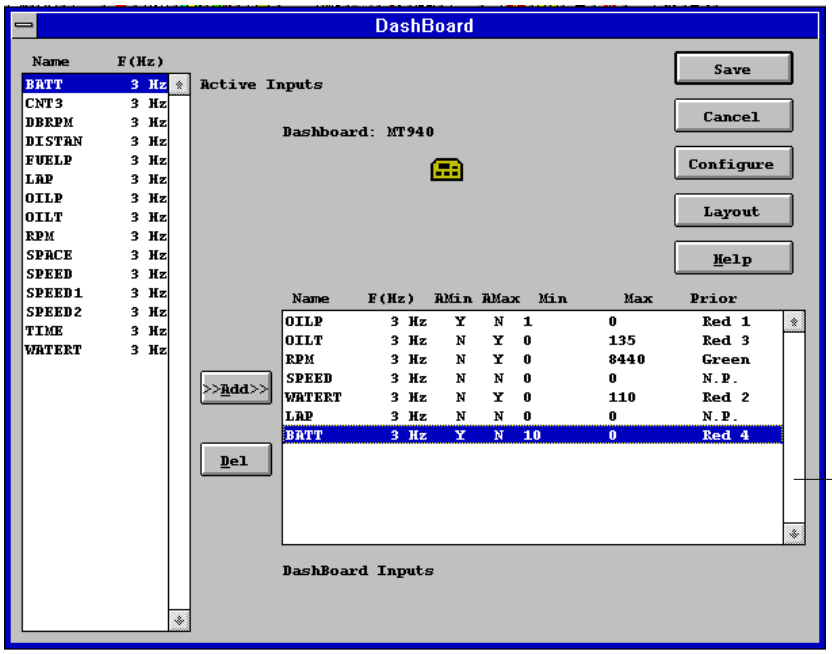
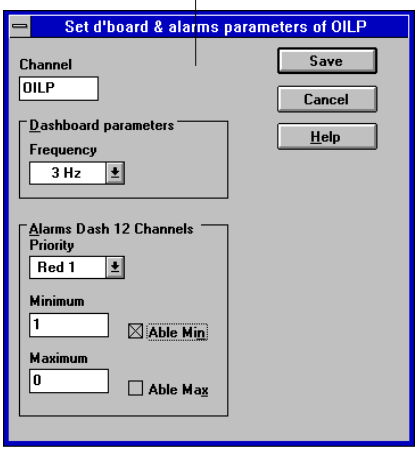
This dash board may be used to display alarms whenever a channel has exceeded your safety limits. On the MT940 there are two lamps mounted onto the front panel, one green and one red. The red lamp is also coupled with a larger external lamp (both on B1 version). As only one red alarm may be displayed at any one time it is necessary to give each alarm setting a priority from 1- 8. The green lamp may only be used by one channel, normally RPM for use as a gear change light.

When a Red alarm is activated the internal and external red lights will flash in unison. The LCD display will also state the channel name and the value of that channel. To clear the screen of an alarm, press the Page Select button (short press) on the dash panel. This will clear the LCD readout for 10 seconds, if after this time the alarm is still active, it will re-appear. During this time the red lights will continue to flash.

To set an alarm, choose ***Dashboard***, followed by ***Setup*** from the main menu to activate the following window.



Double click any channel to display the Alarm Setup window



Channel name

Update frequency of the display value

To set a minimum alarm, place a cross in the box to activate, and enter a minimum value.

To set a maximum alarm, place a cross in the box to activate, and enter a maximum value.

Use the arrow button to display the listing of alarm priorities from 1 to 7, only one channel may be allocated to each priority level, the green is normally used for the gear change shift light.

NOTE: Do not set a maximum & minimum alarm on the same channel.

5.3 MT940 Dashboard channel layout

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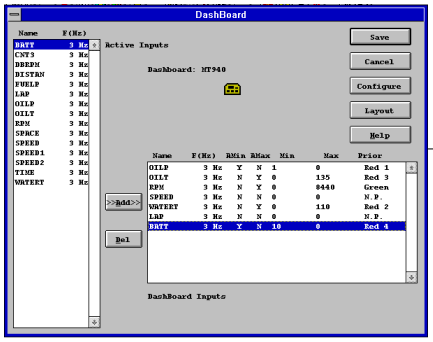
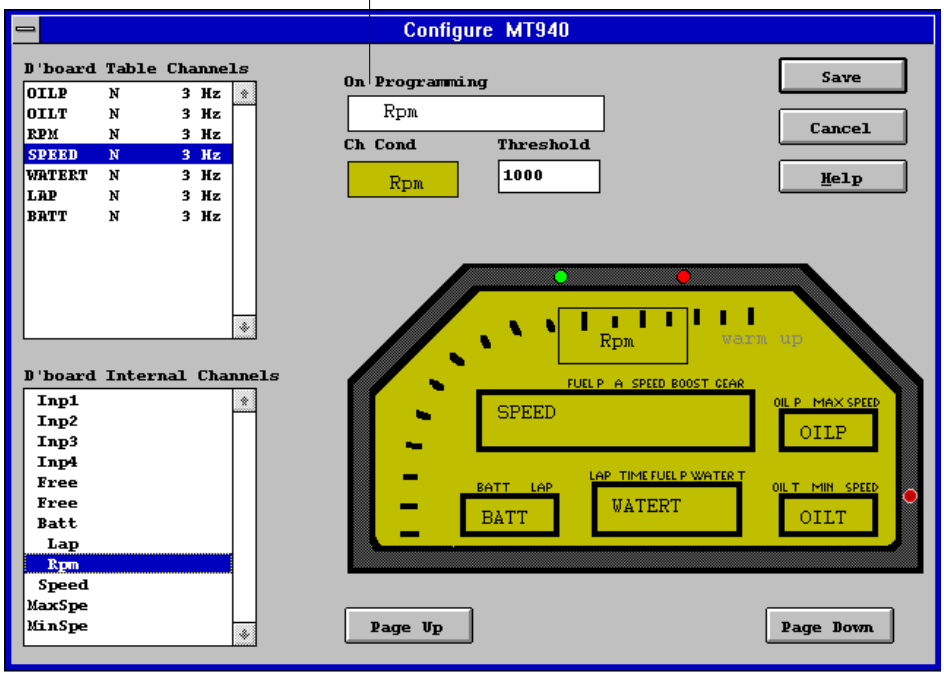
Using this function it is possible to modify each of the three dashboard pages to display any channel. From the main menu, select ***Dashboard*** followed by ***Setup*** to display the following window.



Press configure to activate

Displays either RACE, WARM UP or PRACTICE to indicate which page is currently being worked on.



List of available channels

Use to select the Max Spe, MinSpe & Batt channels only. **Do Not Use Any Others unless you are confident of their function**

Dashboard page selectors

To select a channel, double click any one from the top left window, it will now appear in the ***On Programming*** box. Click onto the channel in the ***On Programming*** box with the left mouse button and holding the button down, drag to your desired location on the dash where you release the button.

Any channel may be placed in any dash location but remember the following. Above each position on the display is a list of pre-defined labels which will only be activated if the channel name you are using corresponds exactly to one of the label names. The use of a different name will simply result in the readout value having no label tag above it.

Ch - Cond To disable the alarms when the system power in ON but the engine is not running, enter the RPM channel in this box and a value alongside below which the alarms will not activate.

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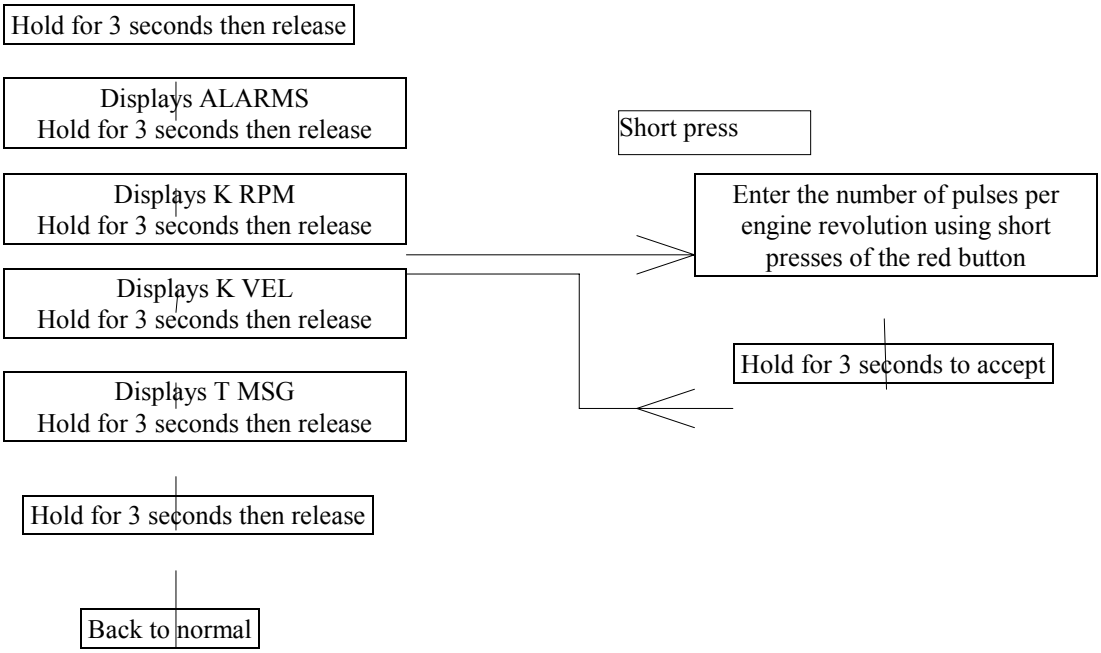
5.4 MT940 Dashboard RPM input configuration

This configuration is only required when your system has the RPM signal directly wired to the MT940 dash display. All other RPM input options must be configured using the software in the normal way.

The MT940 may be set up to accept any number of pulses per revolution between 1 and 12. To change this constant, use the page select button on the dash with a series of long and short presses as shown in the following chart.



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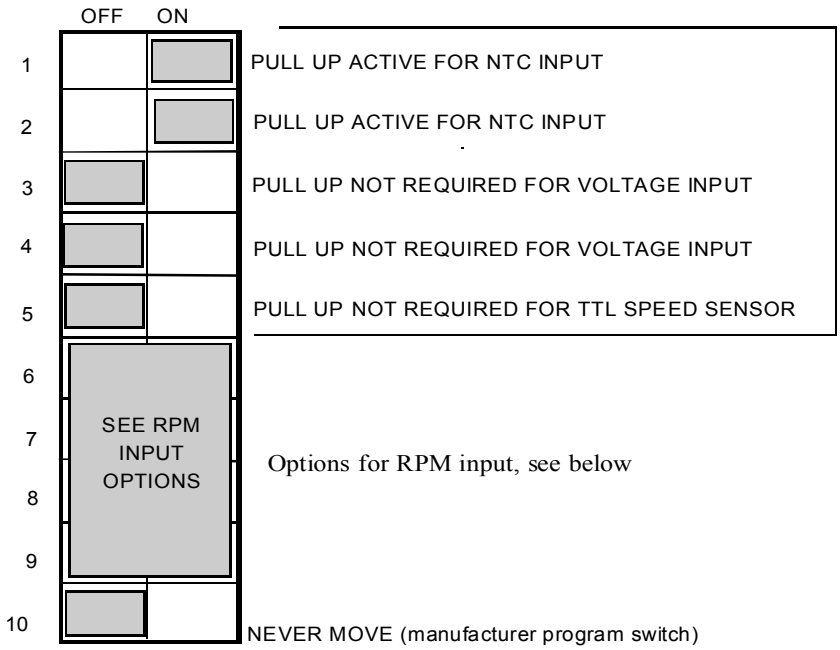
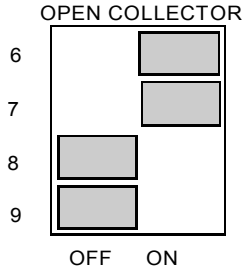
5.5 MT940 Dashboard input pulse type

The MT940 may be configured by the user to accept most types of RPM driver, using a series of switches on the rear of the panel.



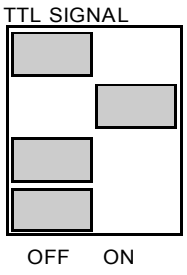
Factory pre-set positions dependant on installation design , do not change

Options for RPM input, see below

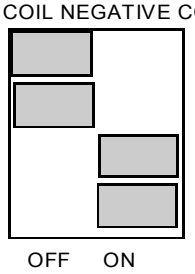


For very low level signals which require a 'Pull Up' to amplify the input.

Also for use with the crank sensor input.



For wave form signal which have an amplitude greater than 5v



Filtered input for use with the signal from an ignition coil negative connection.

5.6 MT940 Dashboard lap time display duration

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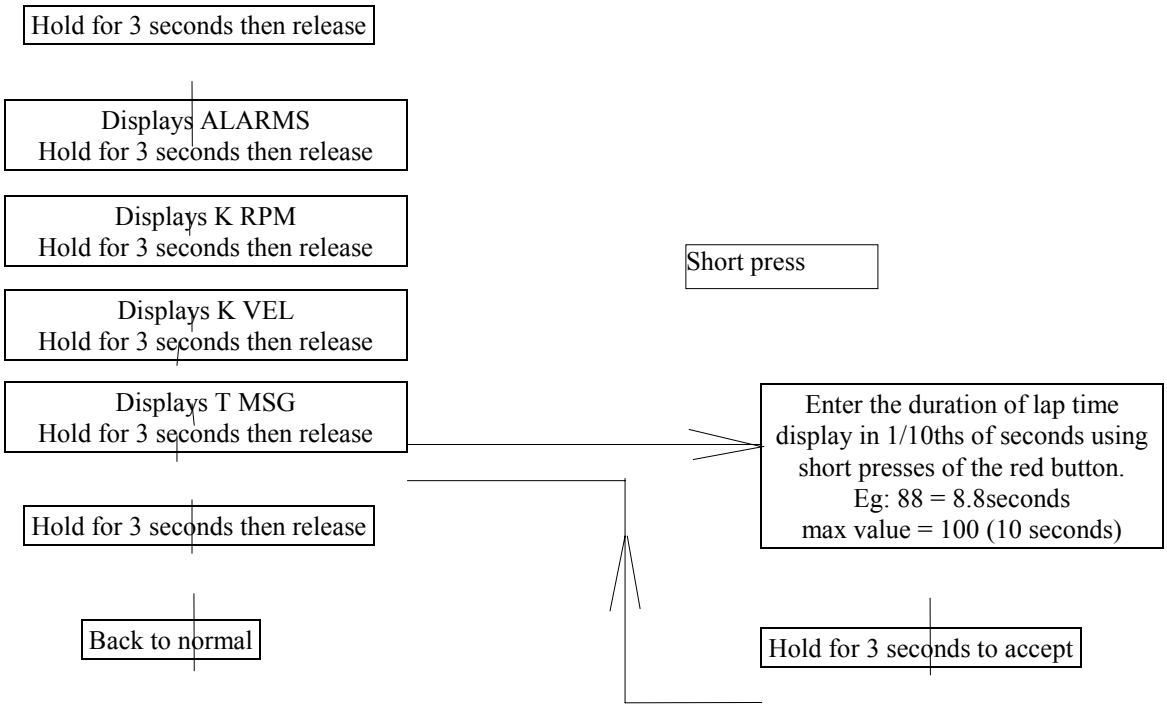

The duration of the automatic lap time display may be changed using the page select button on the front of the dash panel. Using a series of long or short presses follow the flow diagram .

The number entered is in 1/10 ths of a second, so a number 74 will equate to 7.4 seconds of lap time display. The maximum duration is 10 seconds.

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6.0 MT941 Micro DAS , general description

Throughout this section you will see a lot of instructions regarding Internal , Input capture and CAN channels. The following is designed to give you an insight into how your logger is capturing all of the possible 63 inputs.

INTERNAL CHANNELS
These channels are created by the logger and require very little outside elaboration from the user.

INPUT CAPTURE
These consist of 3 digital channels which may be wired directly to the data logger. Other channels are calculated internally from these inputs.

CAN inputs
Unlike any other data acquisition system available today, the Magneti Marelli product range utilises a communication system known as C.A.N. (controller area network). The reason for this is very simple. All other systems rely on direct wiring between the sensor and the data logger box. This has three main drawbacks.

1, It is subject to electrical interference and voltage drops over a long signal run.
2, Modifications to existing wiring are complex and expensive making hardware expansion almost impossible.
3, Wiring is bulky and heavy.

The CAN system consists of 4 wires, one each for power and ground and two for data transfer. Each CAN expansion module is allocated a location number on the CAN data stream between 1 and 240 which is marked on the yellow label. Eg; an MT916 is a 4 input analogue module which has a default CAN address of 60. This results in input 1 of the box having a location of 60 , input 2 - location 61 , input 3 - location 62 and input 4 - location 63.

To add additional modules of the same MT number, it is necessary to order the next module with an alternative CAN location, in this case 64-67. In this way an existing system may be extended very easily using a simple CAN link wire and an additional module.

Each CAN module is configured for very specific sensor inputs and each type of MT module is given a specific range in the overall list of CAN addresses.

The CAN network is built up as a series of modules with the start being the data logger and the end being a 120 Ohm resistor, almost any number of modules may be fitted between these two devices and in any order. The only thing to remember is that a break at any point of the CAN wiring or a module which is disconnected will result in all of the modules being disconnected.

The diagram below gives an example layout

Module	***Typical direct wired channels***
MT941 Micro DAS	lap beacon , left speed , right speed ,
MT940 dashboard	oil/water temperature , oil/fuel pressure , rpm , battery voltage
MT916 4 input expansion module	lateral G , steering , throttle , front brake pressure
120 ohm resistor (end of CAN)	

6.1 MT941 Internal channels

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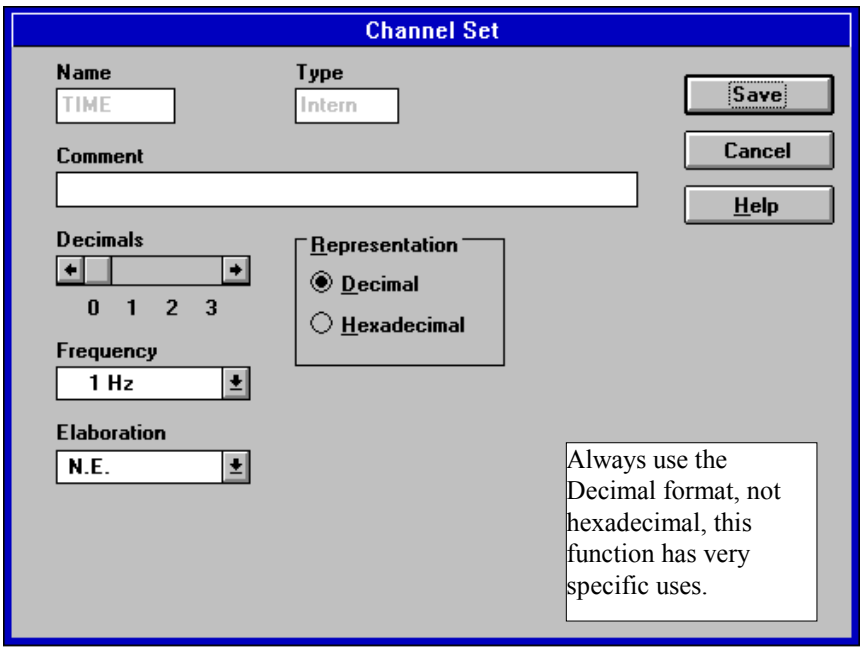
These channels are calculated internally by the data logger. The following table gives the necessary elaboration's for each input along with recommended acquisition frequencies.

To edit your internal channels, double click on the desired channel in the main window to activate the following ***Channel Set window.***

Drag box to change decimal places

Click the arrow box to activate the frequency pull down menu

Click the arrow box to activate the elaboration menu , if required



When you have finished your elaboration's, click each channel switch once in the main window to change its colour from white to blue, this will activate the channel (when using Windows default colour scheme). See section 2.0 for location of channel switch.

NOTE: The ***Space*** and ***Time*** channels should be logged at the same frequency. To increase the split time accuracy, use 50Hz for both channels.

NOTE: The channels ***Time*** and ***Space*** are created from an internal 16bit clock which allows a total count of 32736, after which it will re-set to zero and then resume the count. The ***Time*** channel has a 1/100 second resolution giving a total count of 327.36 seconds or 5 1/2 minutes. If your lap time is longer than this it will be necessary to use the ***CSEC*** channel which allows a count of 32736 seconds (9 hours). If the CSEC channel is not required , delete it from the list.

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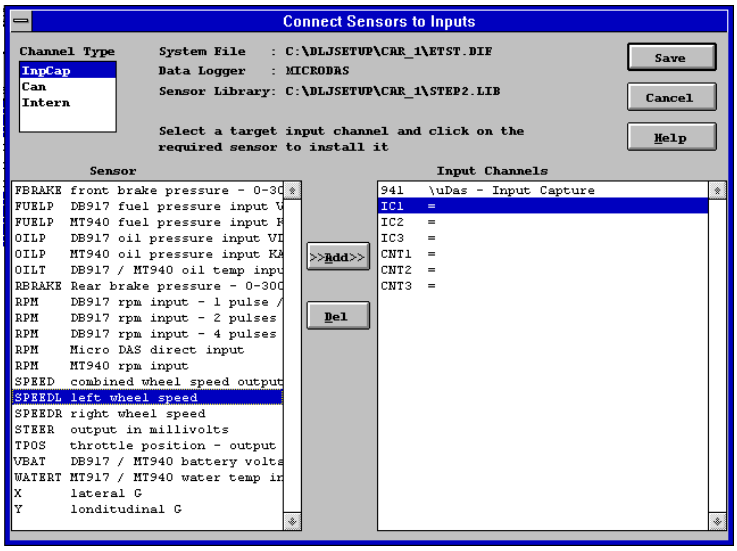
6.2 MT941 Input capture channels

These channels are created from sensors wired directly to the data logger and consist of three digital inputs, two for speed and one for RPM. The RPM channel is only used when the system does not include a dash display or ECU interface.

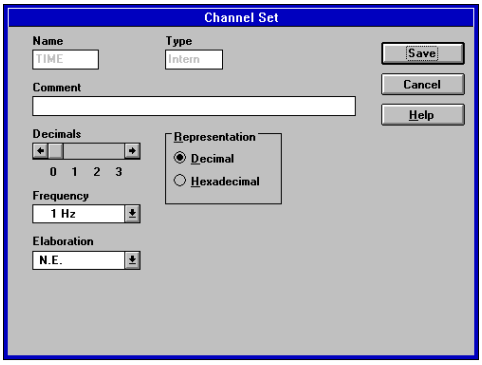
To include these channels select ***HW Config*** from the main menu, followed by ***Set Sensor*** to activate the following window.

Click ***InpCap*** to activate the list of these channels in the Input Channels window

Sensor menu *.LIB file



To allocate an elaboration and name to a channel, double click the channel in the right hand window to activate the elaboration window. Use this window to make your changes then Save to exit. Your completed set of channels should look similar to the following table. The counter channels need not be used at all if you do not require them and remember that the internal RPM channel is only used if you do not have a dash display or ECU interface. If in doubt consult the manufacturer of your wiring loom.



The following table gives a typical set of calibrations

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6.3 MT941/4a Micro DAS supplement

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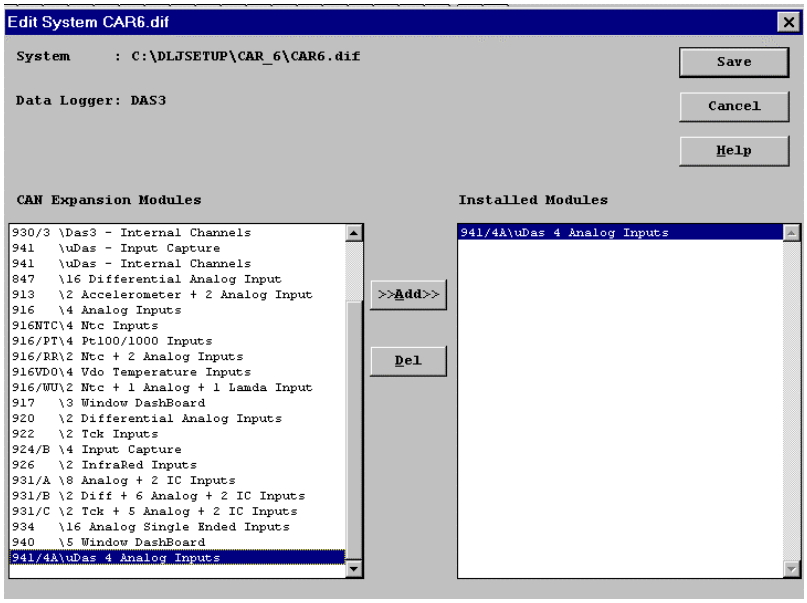
The 4A version is identical in every aspect to the Micro DAS described in section 7.0 with the exception of having 4 analogue channels internally.

These 4 channel are in affect an internally mounted MT916 4 input expansion module and are to be installed and calibrated as follows:

from the main menu select ***HW Config*** followed by ***CAN modules*** to display the following window.



Scan the list of available modules and double click the MT941/4a

This will load the 4 internal inputs

Note: To remove any possibility of a CAN address conflict between this module any other MT916 modules , the start address of this has been moved to 84 to87

To allocate channels to this module refer to section 12.0 & 12.2

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7.0 MT930 DAS3 , general description

Throughout this section you will see a lot of instructions regarding Internal , Input capture and CAN channels. The following is designed to give you an insight into how your logger is capturing all of the possible 63 inputs.

INTERNAL CHANNELS
These channels are created by the logger and require very little outside elaboration from the user.

INPUT CAPTURE
These consist of channels which are wired directly to the data logger. Other channels are calculated internally from these inputs.

CAN inputs
Unlike any other data acquisition system available today the Magneti Marelli product range utilises a communication system known as C.A.N. (controller area network). The reason for this is very simple. All other systems rely on direct wiring between the sensor and the data logger box. This has three main drawbacks.

1, It is subject to electrical interference and voltage drops over a long signal run.
2, Modifications to existing wiring are complex and expensive making hardware expansion almost impossible.
3, Wiring is bulky and heavy.

The CAN system consists of 4 wires, one each for power and ground and two for data transfer. Each module is allocated a location number on the CAN data stream between 1 and 240 which is marked on the yellow label. Eg; an MT916 is a 4 input analogue module which has a default start address of 60, this results in input one of the box having a location of 60 , input 2 - location 61 , input 3 - location 62 and input 4 - location 63.

To add additional modules of the same MT number, it is necessary to order the next module with an alternative CAN location, in this case 64-67. In this way an existing system may be extended very easily using a simple CAN link wire and an additional module.

Each CAN module is configured for very specific sensor inputs and each type of MT module is given a specific range in the overall list of CAN addresses.

The CAN network is built up as a series of modules with the start being the data logger and the end being a 120 Ohm resistor, almost any number of modules may be fitted between these two devices and in any order. The only thing to remember is that a break at any point of the CAN wiring or a module which is disconnected will result in all of the modules being disconnected.

The diagram below gives an example layout of the CAN network

Module	***Typical direct wired channels***
MT930 DAS3	lap beacon (+ 8 analogue direct inputs)
MT940 dashboard	oil/water temperature , oil/fuel pressure , rpm , battery voltage
MT924/B speed module	all 4 wheel speeds & 5th speed ignoring lock ups & lap distance
MT 914 engine interface	All engine information
120 ohm resistor (end of CAN)	

ANALOGUE INPUTS
The DAS3 has eight inputs which are available directly wired to the data logger. These normally consist of suspension channels or other inputs which require high frequency capturing. In standard form these inputs are of a 0-5v type.

7.1 MT930 DAS3 , internal channels

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These channels are calculated internally by the data logger. The following table gives the necessary elaboration's for each input along with recommended acquisition frequencies.

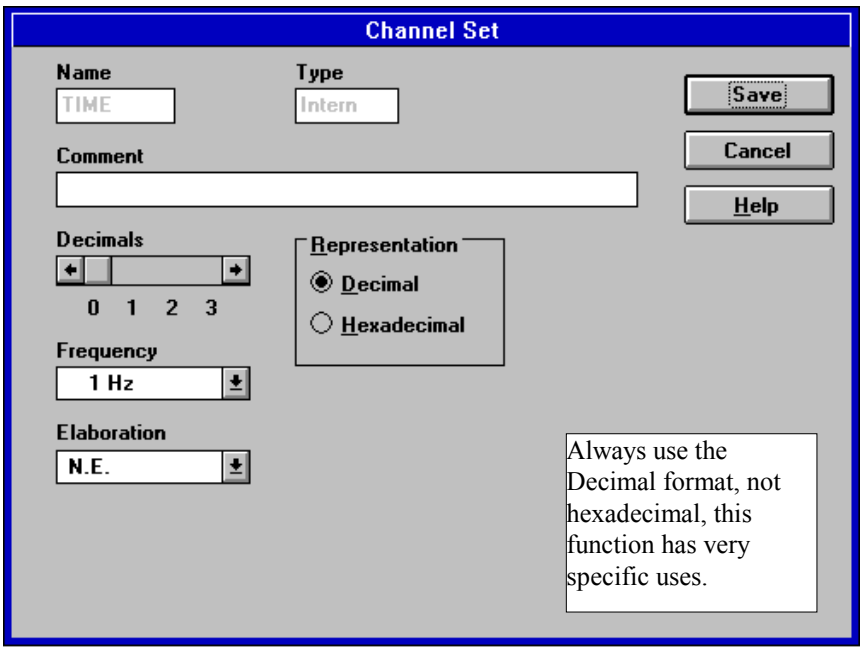
	DECIMAL PLACES	FREQUENCY	ELABORATION	ROUTINE	DESCRIPTION
TIME	2	50	N/E		Internal clock to 2 decimal places, resets at beacon
LAP TIME	2	1	N/E		Lap time to 2 decimal places
LAP	0	1	N/E		Lap number
RUN	0	1	N/E		New run created at every power ON/OFF
CSEC	0	1	N/E		Internal time counter to 0 decimal places (rally)
MFULL	0	1	N/E		memory used counter 0=empty , 1000=full
SPACE	0	50	N/E		Distance calculated from that specified in OPTIONS

To edit your internal, channels double click on the desired channel in the main window to activate the following ***Channel Set window***.

Drag box to change decimal places

Click the arrow box to activate the frequency pull down menu

Click the arrow box to activate the elaboration menu , if required



When you have finished your elaboration's, click each channel switch once in the main window to change its colour from white to blue, this will activate the channel (when using Windows default colour scheme). See section 2.0 for location of channel switch.

NOTE: The ***Space*** and ***Time*** channels should be logged at the same frequency.

NOTE: The channels ***Time*** and ***Space*** are created from an internal 16bit clock which allows a total count of 32736 after which it will re-set to zero and then resume the count. The Time channel has a 1/100 second resolution giving a total count of 327.36 seconds or 5 1/2 minutes. If your lap time is longer than this it will be necessary to use the ***CSEC*** channel which allows a count of 32736 seconds (9 hours). If the CSEC channel is not required , delete it from the list.

7.2 MT930 DAS3 input capture channels

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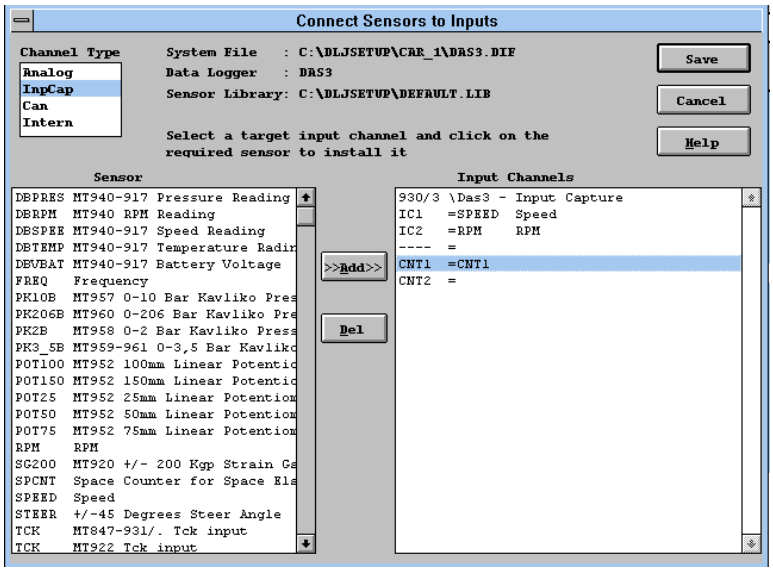
These channels are created from sensors wired directly to the data logger and consist of two digital inputs, one for speed and one for RPM. The RPM channel is only used when the system does not include a dash display or ECU interface

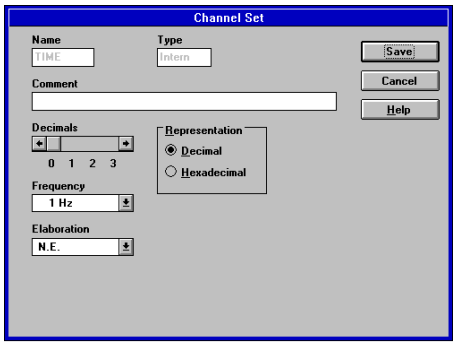
To include these channels select ***HW Config*** from the main menu followed by ***Set Sensor*** to activate the following window.



Click **InpCap** to activate the list in the ***Input Channels*** window

*.LIB File

To allocate an elaboration and name to a channel, double click the channel in the right hand window to activate the ***Channel Set*** window. Use this window to make your changes then **Save** to exit. Your completed set of channels should look similar to the following table.



The counter channels need not be used at all if you do not require them and remember that the internal RPM channel is only used if you do not have a dash display or ECU interface. If in doubt consult the manufacturer of your wiring loom.

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7.3 MT930 DAS3 , analogue inputs

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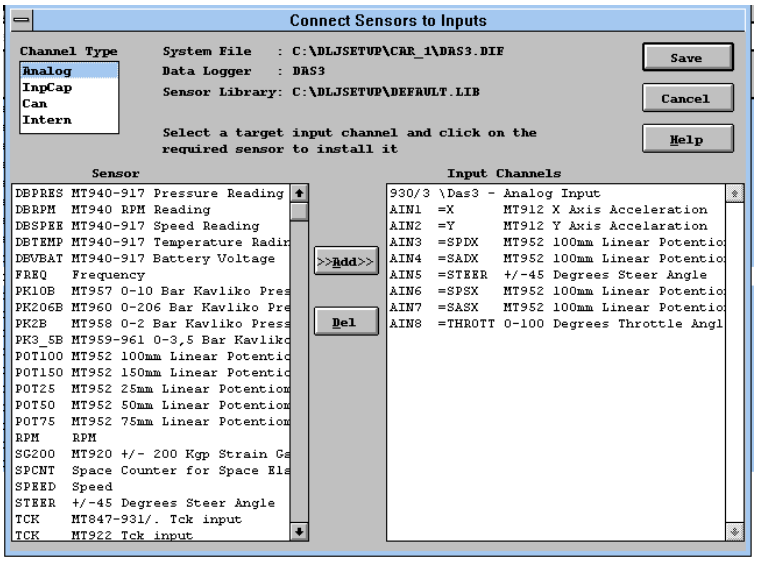
These channels are created from sensors wired directly to the data logger and consist of eight inputs, all are of the form 0-5v as standard.

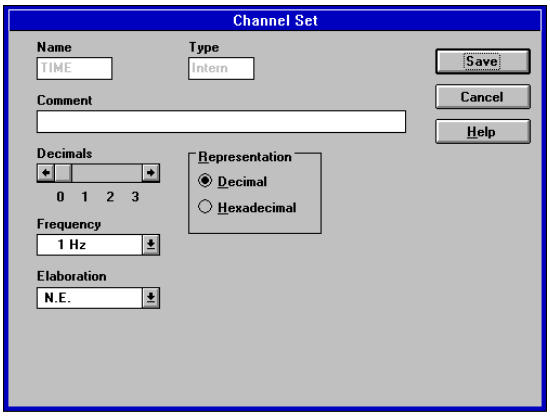
To include these channels select ***HW Config*** from the main menu followed by ***Set Sensor*** to activate the following window.



Click Analogue to activate the list analogue channels in the ***Input Channels*** window

*.LIB library file

To allocate an elaboration and name to a channel, double click the channel in the right hand window to activate the ***Channel Set*** window. Use this window to make your changes then ***Save*** to exit. Your channel list will be totally dependant on the manufacturer of the wiring loom. Alternatively, highlight the desired channel elaboration in the ****.LIB*** file and select the input channel on the right. Press ***Add*** to allocate.



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7.4 MT930 DAS3 , Fuel consumption channels

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The DAS3 is now able to integrate the ECU (engine control unit) fuel counter as a set of internally calculated channels.

To have this function it is necessary to have the following hardware:

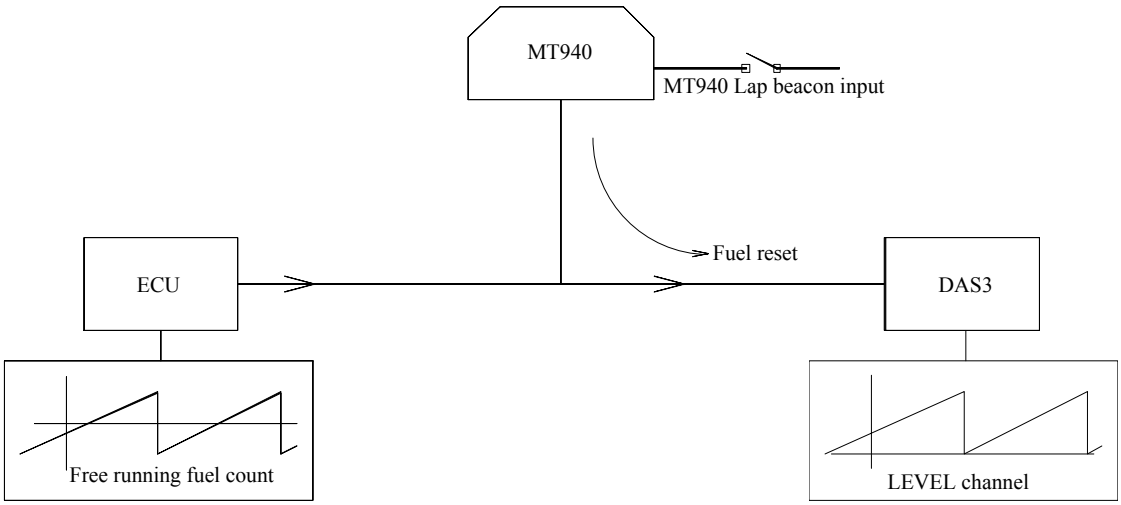
- An engine control unit which provides a count starting from zero, this output can be in whatever engineering units the engine supplier dictates, normally cc.
- DAS3 data logger using software version
- DLJ Setup software version 4.5 onwards
- MT940 dash display with software

The DAS3 creates 3 new channels for fuel monitoring.

LEVEL Creates a copy of the engine control fuel counter. This channel resets to zero at 'power on' or when the dash lap beacon input is switched.

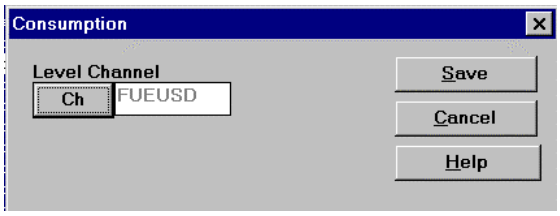
LAPCON Number of fuel units used in the last lap.

CONSPC lap distance divided by LAPCON to give the fuel used per meter average for the last lap.



To create this function select ***Consumption*** from the ***Options*** menu to activate the following window

Stage 1



Press ***CH*** to give your channel listing, choose the ECU fuel counter channel

S

In the main page switch each channel 'on' using the check box on the left of the screen. The elaboration's for these channels do not normally require changing, the chart below gives a typical example.

	Typical Name	Decimal Places	frequency	Elaboration	Description
LEVEL	LEVEL	0	1	N/E	Creates a copy of the ECU fuel counter
LAPCON	LAPCON	0	1	N/E	Number of fuel units used in the last lap.
CONSPC	CONSPC	0	1	N/E	Fuel used per meter average of last lap

8.0 Line elaboration

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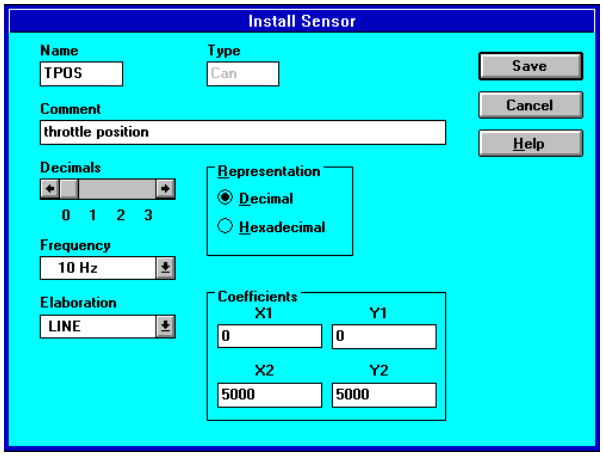
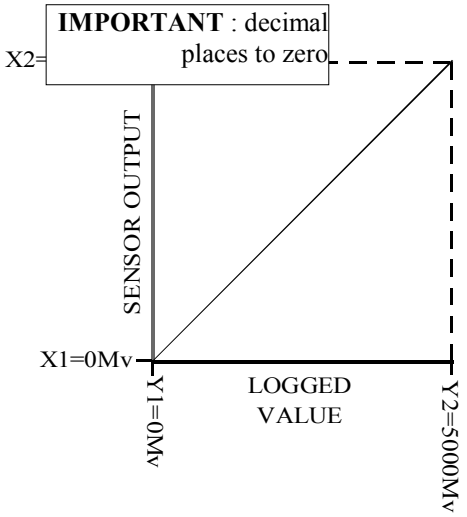
For sensors which give a variable millivolt output ie suspension, steering, throttle, strain gauges etc it is necessary to convert the Mv signal into engineering units eg: mm, Kg, degrees, %. To do this first ensure that the sensor is setup as follows, to give a 0-5000Mv output



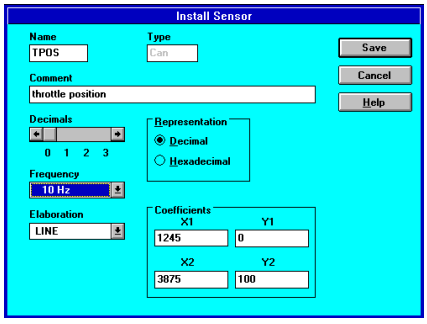


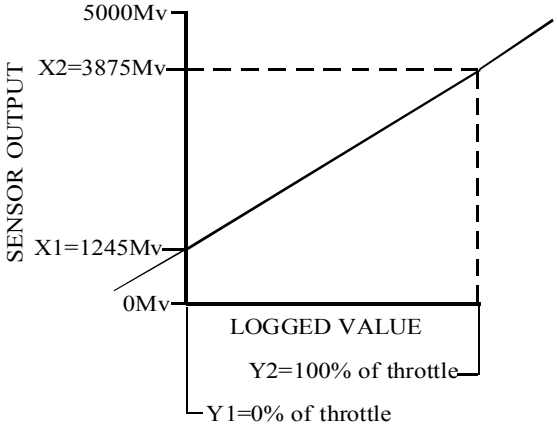
This line means that the output from the sensor is identical to the logged value as shown on this graph

Use ***DL View*** to monitor these channel values when the sensor is moved.

Example of throttle position ***LINE*** elaboration:

1. Connect to the car and activate ***DL View***.
2. With the throttle pedal in the zero throttle position make a note of the Mv reading against this sensor. eg 1245Mv
3. Move the pedal to full throttle and again make a note of the Mv reading. eg 3875Mv
4. Using this information, make changes to the elaboration to emulate the following.





5. Save the changes to your ***LINE*** elaboration and transmit the revised table to the data logger. Using ***DL View*** you will see that the channel now reads in your desired engineering units.
6. Should you wish to re-make the elaboration, it will first be necessary to convert back to millivolts.
7. The addition of decimal places is now possible , refer to section 8.2

8.1 Channel names / frequencies

The following list gives our recommended channel names and the minimum / maximum acquisition frequencies we suggest you use

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8.2 Decimal places

0-5v INPUTS

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The decimal places which may be placed against any channel are dependant on the bit resolution of the measuring module and the output range of the sensor. The following example will clarify.

EXAMPLE 1: Boost channel utilising a 0-10bar sensor with a 10bit measuring module.
The 10bit module gives a resolution of 1/1023 so the number of decimal places will be 10/1023 equalling 0.0097 (0.01) . This calculation indicates that the maximum number of decimal places will be 2 giving a resolution of 0.01 bar.

EXAMPLE 2: Suspension channel using a 75mm sensor with a 10 bit measuring module.
The 10 bit module gives a resolution of 1/1023 so the number of decimal places will be 75/1023 equalling 0.073 (0.07). In this case you should still use 2 decimal places but the maximum resolution will be 0.07mm

8 bit = 1/256
10 bit = 1/1023
12 bit = 1/4092

DIGITAL INPUTS
All digital inputs to this system must be set to zero decimal places.

COUNTER CHANNELS
All distance counter channels must be set to zero decimal places.

NTC TEMPERATURE INPUTS
All NTC inputs which are pre-elaborated by the measuring module, must be set to zero decimal places

NOTE: Applying a greater than possible number of decimal places to a channel will return a value of zero.

8.3 Pre defined elaboration's

Certain sensors used with this system have a pre-defined elaboration which may be found in this list, or loaded from the Default.Lib file

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9.0 Tool bar

Sensor description	Part No.	Engineering units	Elaboration type	Elaboration
0-30psi sensor , Absolute		M/Bar	LINE	500 = 0 , 4500 = 2041
		psi	LINE	500 = -15 , 4500 = 15
0-50psi sensor , Absolute		M,Bar	LINE	500 = 0 , 4500 = 3401
		psi	LINE	500 = -15.0 , 4500 = 35.0
0-150psi sensor , gauge		Bar	LINE	500 = 0 , 4500 = 10.2
		psi	LINE	500 = 0 , 4500 = 150
		Bar	N/E	When connected to an MT940
0-3000psi sensor , gage		bar	LINE	500 = 0 , 4500 = 204.1
		psi	LINE	500 = 0 , 4500 = 3000
50mm position sensor		mm	LINE	0 = 0 , 5000 = 50
		M/Volts	LINE	0 = 0 , 5000 = 5000
75mm position sensor		mm	LINE	0 = 0 , 5000 = 75
		M/Volts	LINE	0 = 0 , 5000 = 5000
100mm position sensor		mm	LINE	0 = 0 , 5000 = 100
		M/Volts	LINE	0 = 0 , 5000 = 5000
125mm position sensor		mm	LINE	0 = 0 , 5000 = 125
		M/Volts	LINE	0 = 0 , 5000 = 5000
150mm position sensor		mm	LINE	0 = 0 , 5000 = 150
		M/Volts	LINE	0 = 0 , 5000 = 5000
Thermocouple amplifier		degrees C	LINE	500 = 300 , 4500 = 1100

From the Main menu, select ***VIEW*** followed by ***Tool Bar*** to display the Tool bar (Icon bar) On or Off the screen

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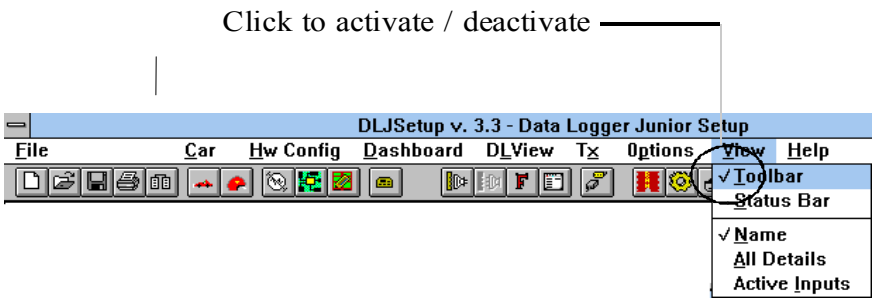

9.1 View Status bar

From the Main menu, select ***VIEW*** followed by ***Status bar*** to display the Status bar information On or Off the bottom of the screen

9.2 View channel descriptions

From the Main menu, select ***VIEW*** followed by ***NAME*** to change the main page to display the channel descriptions.

9.3 View all details

From the Main menu, select ***VIEW*** followed by ***All Details*** to display the channel elaborations alongside each input.

9.4 View active inputs

From the Main menu, select ***VIEW*** followed by ***Active Inputs*** to display only the active channels, ie: those that are high lighted.

10.0 Adding a CAN module

To install a new module, select ***H W Config*** from the main menu, followed by ***CAN modules*** to activate the following window. Alternatively, press this icon

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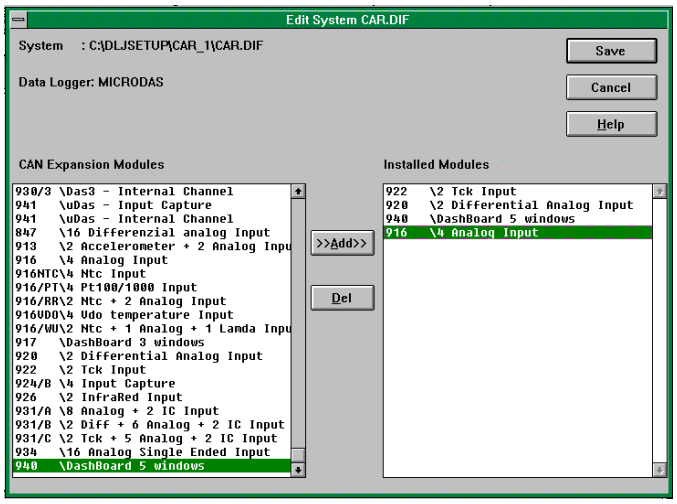
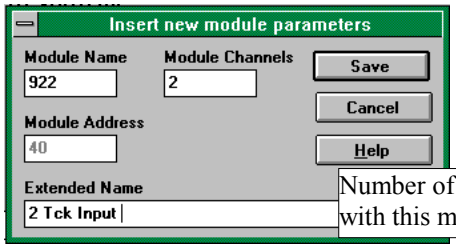


To include a module, scan the left window and locate the desired module. Click the name once to highlight, then press the ***Add*** button. Your selection will now appear on the right hand side in the ***selected module*** box.

Once all of your modules have been installed it is necessary to specify which CAN address each is to use. Using the left mouse button double click onto the module to display the following box:



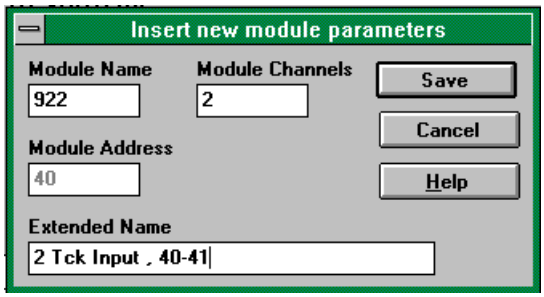
Number of possible inputs with this module

Module Mt number

Press to save

Ensure that the start module address is the same as that specified on the yellow label on your module. If not, change this now. Eg: if your module specifies a CAN address of 64-67 then enter 64 in the module address box. Now is also a good time to add the module address to the Extended Name box, this serves no purpose other than allowing you to identify the number in the future should you add an identical module. Your revised Extended Name should look like this example.

Module start CAN address



Revised extended name

10.1 Changing a channel frequency

Double click your desired channel in the main page to display the following window.

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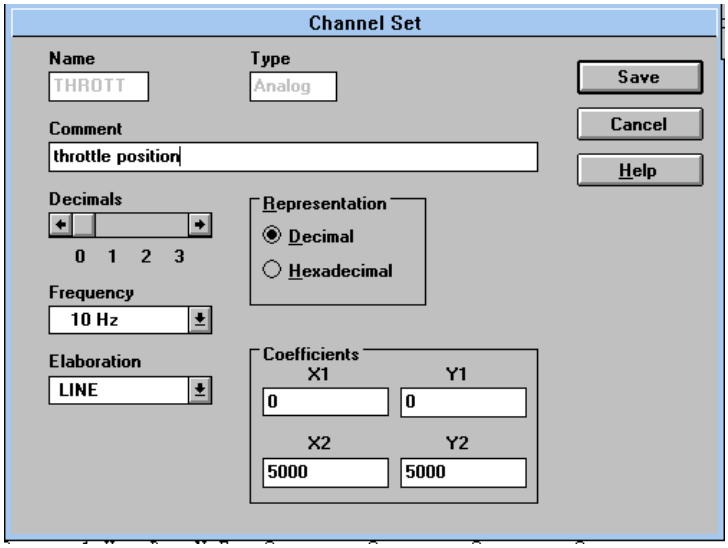
Click the down arrow to display the list of available frequencies, select with one click of the left mouse button



Re-transmit the modified table to the car as shown in section 3.1.

10.2 Changing a channel name

From the main menu, select ***H.W.Config*** to display the following window:

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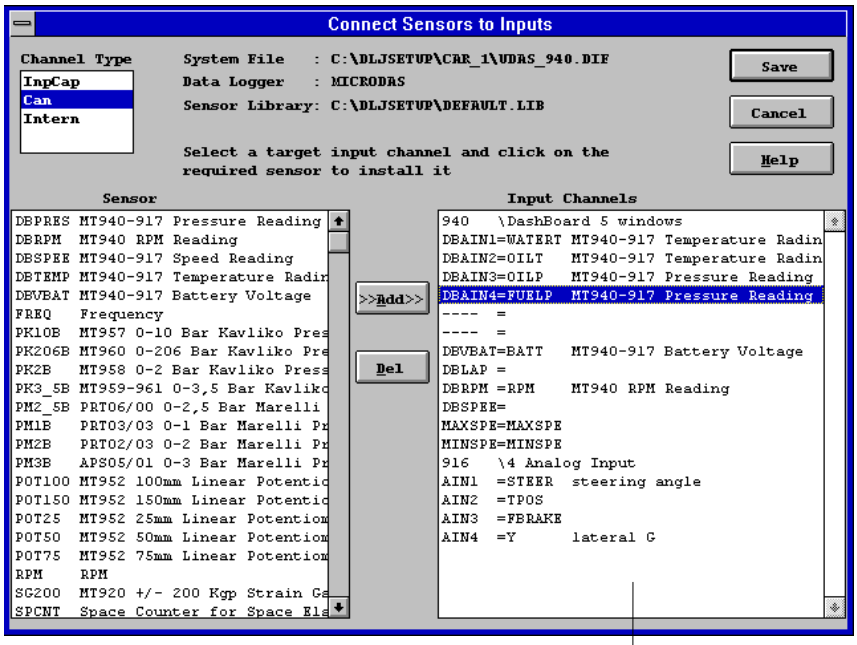
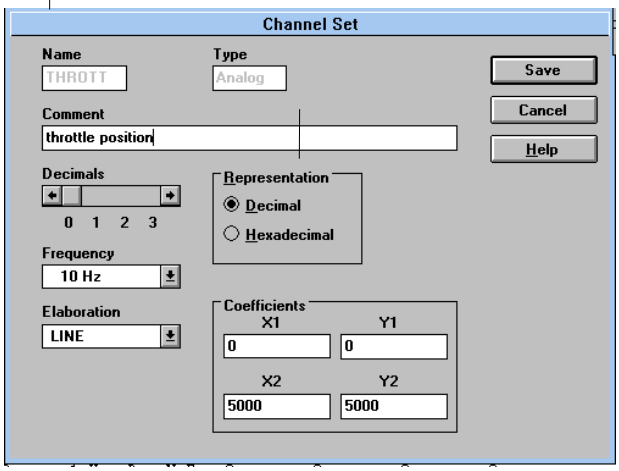


Locate the channel name that you wish to edit and double click with the mouse button to display this window



Enter your revised channel name here, max 6 characters

Your new channel name will no longer be active in the main page and must be turned ON using the switches on the left of the screen

10.3 Optimising memory

There are two ways of optimising memory
1. Turn the channel off.
2. Reduce the acquisition frequency.

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1. Channel On (blue) / Off (white)

In the main page, use the left hand switches to turn the channel from blue(on) to white(off). Note the memory available time in the Logger information bar. Turn off as many channels as you need to obtain the desired logging time.

NOTE: Never turn off the logger internal channels with the exception of CSEC and MFULL.
Never turn off the MT924/B distance counter channel (if applicable)

2. Channel frequency changing - see section 10.1

10.4 Copying tables

Because of the necessity to copy both the *.DIF and the *.WPG files, it is faster to do this using the Windows ***File Manager***, or other preferred program.

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Example:

1. You have created the TEST.DIF and TEST.WPG in the CAR_1 directory of DLJSETUP. Using ***File Manager***, copy both of these files to C:\DLJSETUP\CAR_2

2. Using ***File manager***, it is possible to re-name these files if you wish to, remembering to keep the original suffixes.

3. In each Car_? directory there is a file called CAR.CFG, using a suitable text editor, open this file and change the name of the *.WPG entry to match the name of the one you have just copied.
   eg: The new file name is Mick.wpg and this has been copied to C:\DLJSETUP\CAR_2 . Open the CAR.CFG file in the directory of CAR_2 which will read as default C:\DLJSETUP\CAR_2\ to the end of this directory add your new file name which in this case will result in
   C:\DLJSETUP\CAR_2\MICK.WPG.

4. Return to DLJsetup and select CAR 2 from the main menu under CAR to activate the CAR.CFG file which will automatically open your new table.

5. From the File menu open the new *.DIF file, this will connect the *.DIF and the *.WPG together allowing individual changes to be made to the table without affecting any other table.

Note:

1. The ***Distance Options*** are common to all tables, should your tables requires different setups in this environment it will be necessary to change this after opening each table.
2. Because the *.DIF file contains much of the primary table information, always ensure that the table you are working on has the correct *.DIF file loaded. This can be determined by selecting HW Config followed by Set sensor. The *.DIF file which is currently being used will be display.
3. Failure to take caution here will result in changes that you make in one table affecting others that are referenced to the same *.DIF file.

11.0 Printer setup

DLJsetup will utilise any standard ***Windows*** print driver. From the main menu, select ***File*** followed by ***Printer Setup*** to display the following window.

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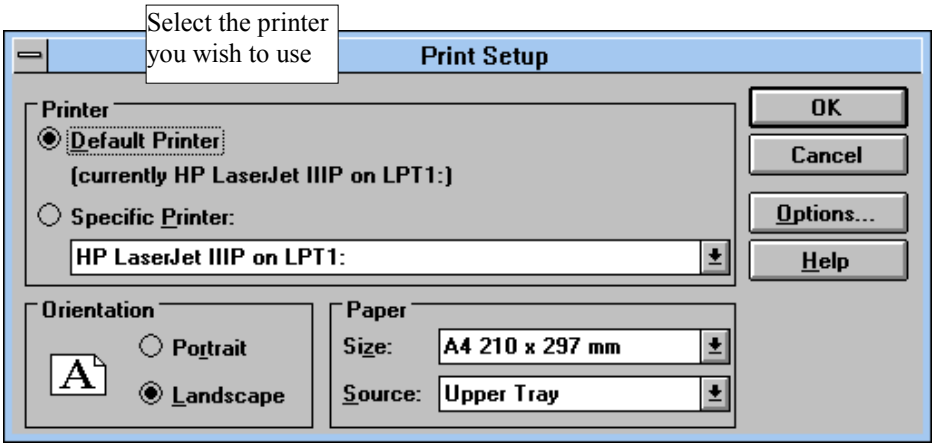
Select the printer you wish to use

OK to accept



Choose from
Portrait - Vertical
Landscape - Horizontal

11.1 Print preview

The ***Print preview*** function allows you to see the outcome of your print and subsequently make any changes. From the main menu select ***File*** followed by ***Print Preview*** to display a page which will look similar to this.

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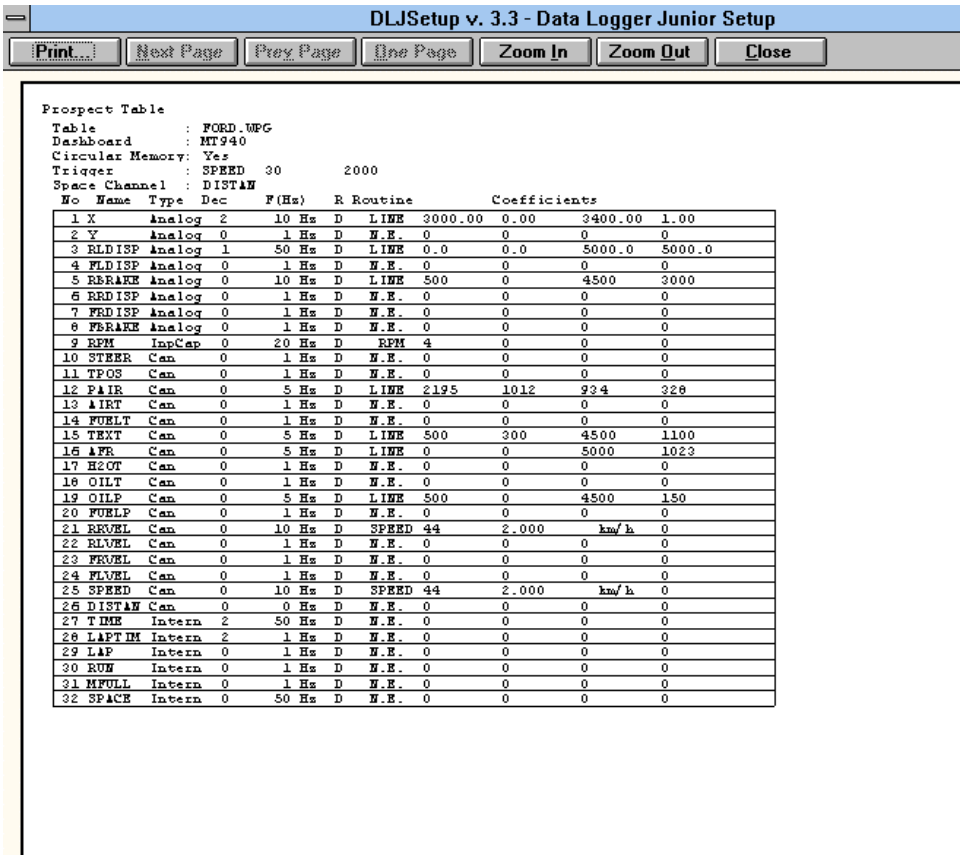

Prospect Table

Table : FORD.WPG
Dashboard : MT940
Circular Memory: Yes
Trigger : SPEED 30 2000
Space Channel : DISTAN

No	Name	Type	Dec	F(Hz)	R	Routine	Coefficients			
1	X	Analog	2	10 Hz	D	LINE	3000.00	0.00	3400.00	1.00
2	Y	Analog	0	1 Hz	D	N.E.	0	0	0	0
3	RLDISP	Analog	1	50 Hz	D	LINE	0.0	0.0	5000.0	5000.0
4	FLDISP	Analog	0	1 Hz	D	N.E.	0	0	0	0
5	RBRAKE	Analog	0	10 Hz	D	LINE	500	0	4500	3000
6	RRDISP	Analog	0	1 Hz	D	N.E.	0	0	0	0
7	FRDISP	Analog	0	1 Hz	D	N.E.	0	0	0	0
8	FBRAKE	Analog	0	1 Hz	D	N.E.	0	0	0	0
9	RPM	InpCap	0	20 Hz	D	RPM	4	0	0	0
10	STEER	Can	0	1 Hz	D	N.E.	0	0	0	0
11	TPOS	Can	0	1 Hz	D	N.E.	0	0	0	0
12	PAIR	Can	0	5 Hz	D	LINE	2195	1012	934	328
13	AIRT	Can	0	1 Hz	D	N.E.	0	0	0	0
14	FUELT	Can	0	1 Hz	D	N.E.	0	0	0	0
15	TEXT	Can	0	5 Hz	D	LINE	500	300	4500	1100
16	AFR	Can	0	5 Hz	D	LINE	0	0	5000	1023
17	H2OT	Can	0	1 Hz	D	N.E.	0	0	0	0
18	OILT	Can	0	1 Hz	D	N.E.	0	0	0	0
19	OILP	Can	0	5 Hz	D	LINE	500	0	4500	150
20	FUELP	Can	0	1 Hz	D	N.E.	0	0	0	0
21	RRVEL	Can	0	10 Hz	D	SPEED	44	2.000	km/h	0
22	RLVEL	Can	0	1 Hz	D	N.E.	0	0	0	0
23	FRVEL	Can	0	1 Hz	D	N.E.	0	0	0	0
24	FLVEL	Can	0	1 Hz	D	N.E.	0	0	0	0
25	SPEED	Can	0	10 Hz	D	SPEED	44	2.000	km/h	0
26	DISTAN	Can	0	0 Hz	D	N.E.	0	0	0	0
27	TIME	Intern	2	50 Hz	D	N.E.	0	0	0	0
28	LAPTIM	Intern	2	1 Hz	D	N.E.	0	0	0	0
29	LAP	Intern	0	1 Hz	D	N.E.	0	0	0	0
30	RUN	Intern	0	1 Hz	D	N.E.	0	0	0	0
31	MFULL	Intern	0	1 Hz	D	N.E.	0	0	0	0
32	SPACE	Intern	0	50 Hz	D	N.E.	0	0	0	0

11.2 Print

From the main menu, select ***File*** followed by ***Print*** to activate the following window:

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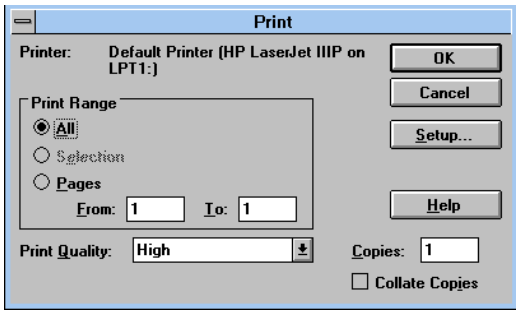

Select the number of copies and the print quality, then ***Ok*** to accept the print.

12.0 CAN modules , allocating channels

After installing a CAN module (section 10.0) it is necessary to allocate a channel name and calibration. This section shows how to enter this information and the following pages show the calibrations necessary for the majority of CAN modules.

From The main menu select ***HW Config*** followed by ***Set Sensor*** to activate the following window.

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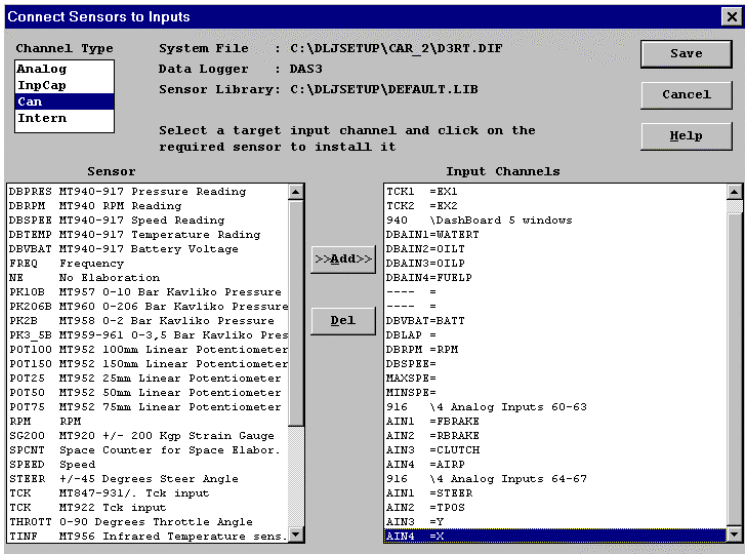
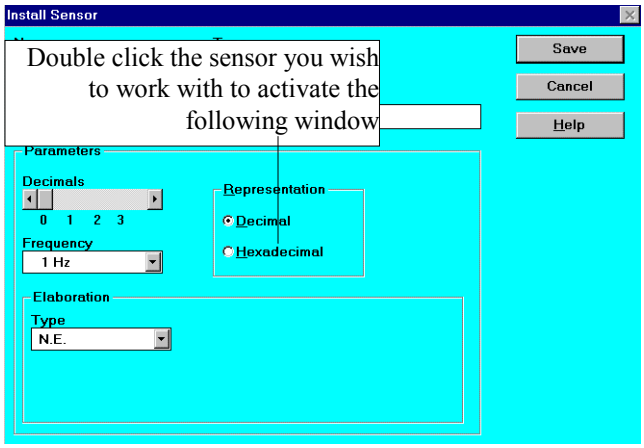


Select ***CAN*** to activate the list of Can channels in the right hand window



Double click the sensor you wish to work with to activate the following window

Enter the channel name

Enter a description of the channel

Choose the correct number of decimal places

Select a Frequency

Note: Remember to activate the channels in the main page using the switches**.**

Select the correct calibration, refer to the following pages.

12.1 MT924/b version MSPEED5

This module is specifically designed to capture 4 individual wheel speeds and provide a corrected output for distance and speed, irrespective of individual wheel lock ups.

The following features are common to all software versions:

CAN **Name** **Description**

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92	IC1	-	Input capture 1
93	IC2	-	Input capture 2
94	IC3	-	Input capture 3
95	IC4	-	Input capture 4
96	AVSP	-	If IC1 and IC2 are within 3% of each other then AVSP will return the average value If either IC1 or IC2 are outputting a value which is more than 3% less than the other then AVSP will return the greater value. This results in a speed output which will ignore any individual wheel locks.It will be seen from this that IC1 and IC2 must be used for the 2 undriven wheels of a 2 wheel drive car , or the 2 wheels which are subject to the least wheelspin on a 4 wheel drive car.
97	CNT1	-	Provides a count in meters relative to the distance travelled of IC1
98	CNT2	-	Provides a count in meters relative to the distance travelled of IC2
99	AVCNT	-	Provides a distance count derived from AVSP

Function with DAS 3 using software version

A typical calibration layout will appear as follows, frequencies are only examples and based on a rear wheel drive car.

The default CAN address for this module is 92-99, alternative modules are available with locations 100-107

Notes for older systems
MSPEED3 is to be used only with DAS 3 software version D3D04580
MSPEED5 is to be used only with DAS 3 software version D3D05487 onwards

Module information
Maximum acquisition frequency is 200Hz

12.2 MT916

The MT916 is an expansion module capable of measuring 4 individual 0-5v inputs direct from the sensor. Versions with alternative voltage input ranges are available on request. Up to 8 of these modules may be added to each system with the following CAN addresses available.

1	60 - 63	Default start address
2	64 - 67	

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3	68 - 71	
4	72 - 75	
5	76 - 79	
6	80 - 83	
7	84 - 87	(Fitted internally in the MT941/4a Micro DAS data logger)
8	88 - 91	

Details of the CAN address are given on the yellow module label.

All channels of the MT916 must be calibrated using the LINE elaboration as detailed in section 8.0

Module information
Maximum acquisition frequency is 200Hz
This module measures at 10bit resolution.

12.3 MT916/RR

The MT916/RR is an expansion module capable of measuring 2 individual 0-5v inputs and 2 NTC Weber thermistor inputs direct from the sensor. Up to 8 of these modules may be added to each system with the following CAN addresses available. N.B. You will notice that the MT916 and Mt916/RR use the same set of CAN addresses, choose your modules to avoid conflict.

1	60 - 63	
2	64 - 67	Default start address
3	68 - 71	
4	72 - 75	
5	76 - 79	
6	80 - 83	
7	84 - 87	
8	88 - 91	

Details of the CAN address are given on the yellow module label.

A typical set of calibrations using the MT916/RR will be as follows, no further elaboration is required against the NTC channels as the output from this sensor is pre-programmed into the module.

Module information
Maximum acquisition frequency is 200Hz
This module measures at 10bit resolution.

12.4 MT914/WU

The MT916/RR is an expansion module capable of measuring 1 0-5v input, 1 NGK UEGO lambda sensor and 2 NTC Weber thermistor inputs direct from the sensor. Up to 8 of these modules may be added to each system with the following CAN addresses available. N.B. You will notice that the MT916 and MT916/WU use the same set of CAN addresses, choose your modules to avoid conflict.

1	60 - 63
2	64 - 67

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3	68 - 71	Default start address
4	72 - 75	
5	76 - 79	
6	80 - 83	
7	84 - 87	
8	88 - 91	

Details of the CAN address are given on the yellow module label.

A typical set of calibrations using the MT916/WU will be as follows, no further elaboration is required against the NTC channels as the output from this sensor is pre-programmed into these inputs.

Module information
Maximum acquisition frequency is 200Hz
This module measures at 10bit resolution.

12.5 MT916/NTC

The MT916/NTCis an expansion module capable of measuring 4 NTC Weber thermistor inputs direct from the sensor. Up to 8 of these modules may be added to each system with the following CAN addresses available. N.B. You will notice that the MT916 ,WU & RR use the same set of CAN addresses, choose your modules to avoid conflict.

1	60 - 63	
2	64 - 67	
3	68 - 71	
4	72 - 75	Default start address
5	76 - 79	
6	80 - 83	
7	84 - 87	
8	88 - 91	

Details of the CAN address are given on the yellow module label.

A typical set of calibrations using the MT916/NTC will be as follows, no further elaboration is required against these channels as the output from this sensor is pre-programmed into the module

	TYPICAL NAME	DECIMAL PLACES	FREQUENCY	ELABORATION	ROUTINE	DESCRIPTION
T NTC 1	FUELT	0	1	N/E	No Elaboration required	Fuel temperature
T NTC 2	AIRT	0	1	N/E	No Elaboration required	Air temperature
T NTC 3	WATERT	0	1	N/E	No Elaboration required	Water temp
T NTC 4	OILT	0	1	N/E	No Elaboration required	Air fuel ratio

Module information
Maximum acquisition frequency is 200Hz
This module measures at 10bit resolution.

12.6 MT920

The MT920 is an expansion module capable of measuring 2 differential inputs direct from the strain gauge. Up to 4 of these modules may be added to each system with the following CAN addresses available. **N.B.** You will notice that the MT920 and MT922 use the same set of CAN addresses, choose your modules to avoid conflict.

1	40 - 41	
2	42 - 43	
3	44 - 45	Default start address
4	46 - 47	

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Details of the CAN address are given on the yellow module label.

A typical set of calibrations using the MT920 will be as follows, The calibration must be created using ***LINE*** as described in section 8.0

Module information
Maximum acquisition frequency is 200Hz
This module measures at 12bit resolution.

12.7 MT922

The MT922 is an expansion module capable of measuring 2 differential type 'K' thermocouples direct from the sensor. Up to 4 of these modules may be added to each system with the following CAN addresses available. N.B. You will notice that the MT920 and MT922 use the same set of CAN addresses, choose your modules to avoid conflict.

1	40 - 41	Default start address
2	42 - 43	
3	44 - 45	
4	46 - 47	

Details of the CAN address are given on the yellow module label.

A typical set of calibrations using the MT920 will be as follows. The curve of the type 'K' output is pre-mapped into this module along with all signal conditioning. Both grounded and non grounded thermocouples may be used.

Module information
Maximum acquisition frequency is 200Hz
This module measures at 12bit resolution.

12.8 MT913

The MT913 is special CAN module which combines the MT916 and one MT912 Bi-axial G sensor in one box. This results in the first two inputs being dedicated to the accelerometer and two user definable analogue inputs. The unit only has one CAN location.

88 - 91 Default start address

Details of the CAN address are given on the yellow module label.

A typical set of calibrations using the MT913 will be as follows.

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Module information
Maximum acquisition frequency is 200Hz
This module measures at 10bit resolution.

12.9 MT926

The MT926 is an expansion module capable of measuring 2 Magneti Marelli infra red tyre temperature sensors. Up to 4 of these modules may be added to each system with the following CAN addresses available.

1	108 - 109	Default start address
2	110 - 111	
3	112 - 113	
4	114 - 115	

Details of the CAN address are given on the yellow module label.

A typical set of calibrations using the MT926 will be as follows. The curve of the type sensor ouput is pre-mapped into this module along with all signal conditioning. The emmisivity is pre-defined for use with rubber.

Module information
Maximum acquisition frequency is 200Hz
This module measures at 10bit resolution.

12.10 MT914

The MT914 is an interface module which is capable of converting the data stream output from an engine control unit and converting it to a readable format by the data logger. The converted channel information may be viewed on the dash , transmitted by ‘real time’ or simply stored in the same way as any other measured input.

Because of the variety of engine control devices on the market it is necessary to have each interface custome built to suit the application, with the correct level of software. Your Magneti Marelli distributor can help with this.

Due to the large amount of information the MT914 has 40 CAN addresses starting from 0, each channel of the ECU data stream is given a location between 0 and 39, the position of each channel is dictated by the order in which it appears on the stream.

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To simplify this, all MT914 modules are supplied with a *.mod file on disk which must be copied to the directory C:\DLJSETUP\MODULES. Once installed on you computer it is possible to load this module in the same way as any other CAN module, refer to section 10.0 . The *.mod file contains a list of all of the possible channels from the ECU in the correct order, all you have to do is give each a name and provide the correct calibration

The calibration of ECU channels is often completely different from any other Magneti Marelli calibration because the information comes from other manufacturers. To help with this, a list of calibrations will be supplied to you.

NOTE: It is not necessary to activate all of the ECU channels.

Module information
Maximum acquisition frequency is 200Hz
This module measures at 10bit resolution.