



DEEP SEA ELECTRONICS PLC

52/53xx series configuration software for Windows™

Software Manual

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1 DESCRIPTION

The DSE **52/53xx series** configuration software allows the 52xx and 53xx family of modules to be connected to a PC. Once connected the various operating parameters within the module can be viewed or edited as required by the engineer. This software allows easy controlled access to these values and also has diagnostic monitoring facilities.

The configuration interface should only be used by competent, qualified personnel, as changes to the operation of the module may have safety implications on the panel / generating set to which it is fitted. Access to critical operational sequences and settings for use by qualified engineers, are barred by a PC software security code. Timers are protected by a separate code allowing operator changes to be made.

The information contained in this manual should be read in conjunction with the information contained in the appropriate module documentation. This manual only details which settings are available and how they may be used. The operation of the module is detailed in its own relevant manual.

The P810 USB interface is housed in a robust plastic case. Connection to the module is via an FCC 68 RJ45 'CAT5E Network' type cable ('straight-through' type), this allows for easy replacement in the field should the connecting lead be damaged or lost. For legacy support an RS232 version is also available with an adapter cable to allow connection to the 9 pin D type RS232 connectors as required.

1.1 CLARIFICATION OF NOTATION USED WITHIN THIS PUBLICATION.

 NOTE:	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates a procedure or practice that could result in injury to personnel or loss of life if not followed correctly.
 CAN	Indicates a function only applicable when the controller is configured for connection to a CAN engine controller
 ©	DEEP SEA ELECTRONICS PLC own the copyright to this manual, which cannot be copied, reproduced or disclosed to a third party without prior written permission.

1.2 MANUAL STRUCTURE

This manual is designed to assist users of the 52/53xx series configuration software; this is the common configuration software for all modules of the 52xx and 53xx range. All software operations such as file handling (loading and saving to disk, reading from and writing to the module) and printing are identical regardless of the module being configured. Some options are only available on the different variants of the 52xx and 53xx module such as Mains failure detect setting (5220 and 5320 AMF Modules only). A separate manual deals with the operation of the individual modules.

1.3 PC INTERFACE MODULE 810

The PC interface **810** kit comprises the following:-

- **810** (USB) Interface Module or **810** (RS232) Interface Module
- USB cable, (25 to 9 way adapter supplied with the RS232 version).
- FCC 68 (8 Pin) Connecting Lead
- 1 x CD with configuration software

1.4 INSTALLATION INSTRUCTIONS

Minimum system requirements

Processor	486 66Mhz
Operating System	Windows XP, 2000, NT4, ME, 98, 95
Ram	32Mb
Monitor	14 inch SVGA (640x480 resolution)
Fixed disk	10Mb free (80Mb minimum)
Disk drive	CD-Rom for software installation (see note below)
Communications	A USB port or an RS232 comms port is needed to communicate with the 810 interface and 5xxx configuration software (see note below)

Installing '52/53xx series configuration software For Windows™' program From Software CD

NOTE: - As 52/53xx series configuration software for Windows™ is a 32-Bit application it will not operate on Windows 2.0, 3.0, 3.1 or 3.11.

NOTE: - Exit all other programs before installing the software. It is recommended that any earlier releases of the software are uninstalled prior to installing this version.

NOTE: - CD Rom is required on at least one PC in order to operate the software CD.

NOTE: - The USB version of the P810 interface is for use on PC's fitted with USB ports. The USB driver must be correctly installed on the machine prior to using the P810 software, installation instructions are available on the Deep Sea Electronics web site at www.deepseapl.com. The driver will install a 'virtual COM port' for the USB P810 – this should be selected as the COM port in the 'set-up' tab. An RS232 version is also available.

NOTE: - Please register your software online at www.deepseapl.com – Once registered you will be notified of any updates to the software to ensure that you always have access to the latest features.

Insert the Software CD into the CD-ROM drive on the PC. The CD will then Auto-run if this feature is enabled on your PC.

Alternatively

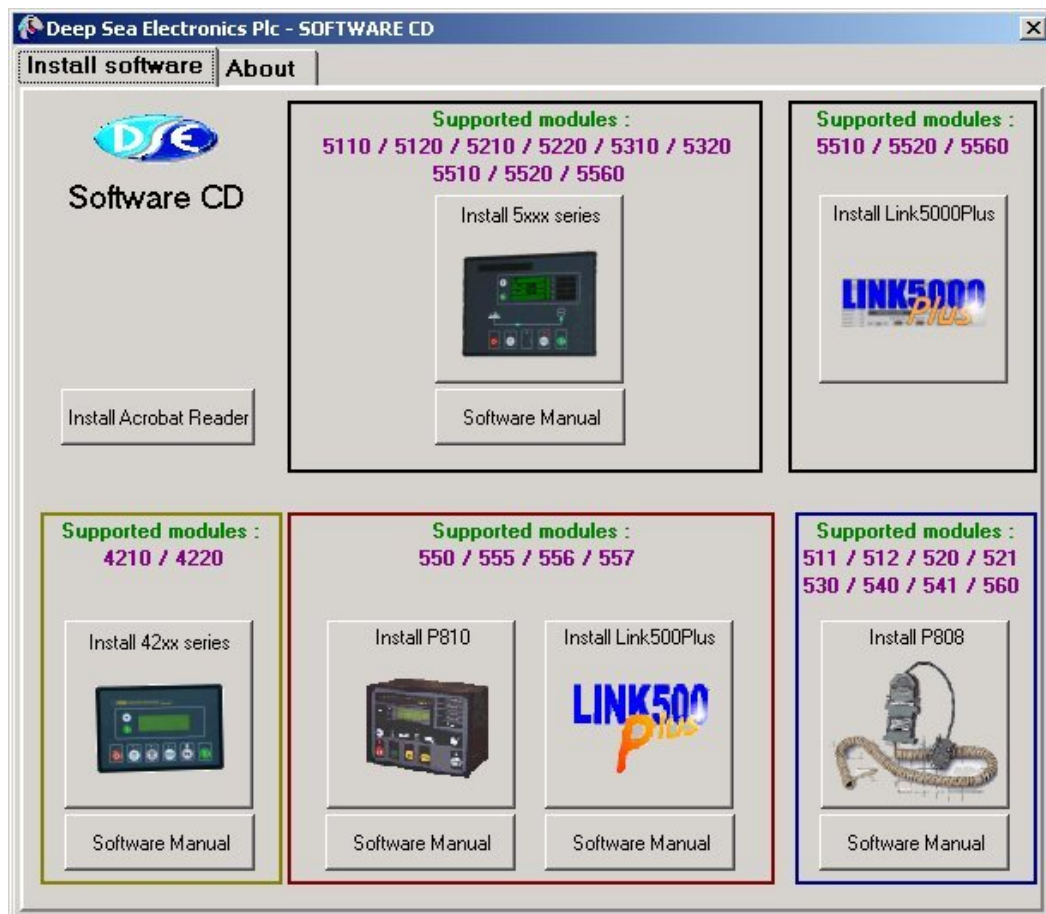
Double click on **My Computer**:



Then double click on **CD-ROM Drive**:



There will be a short delay while the CD-ROM is accessed, then the install program will run



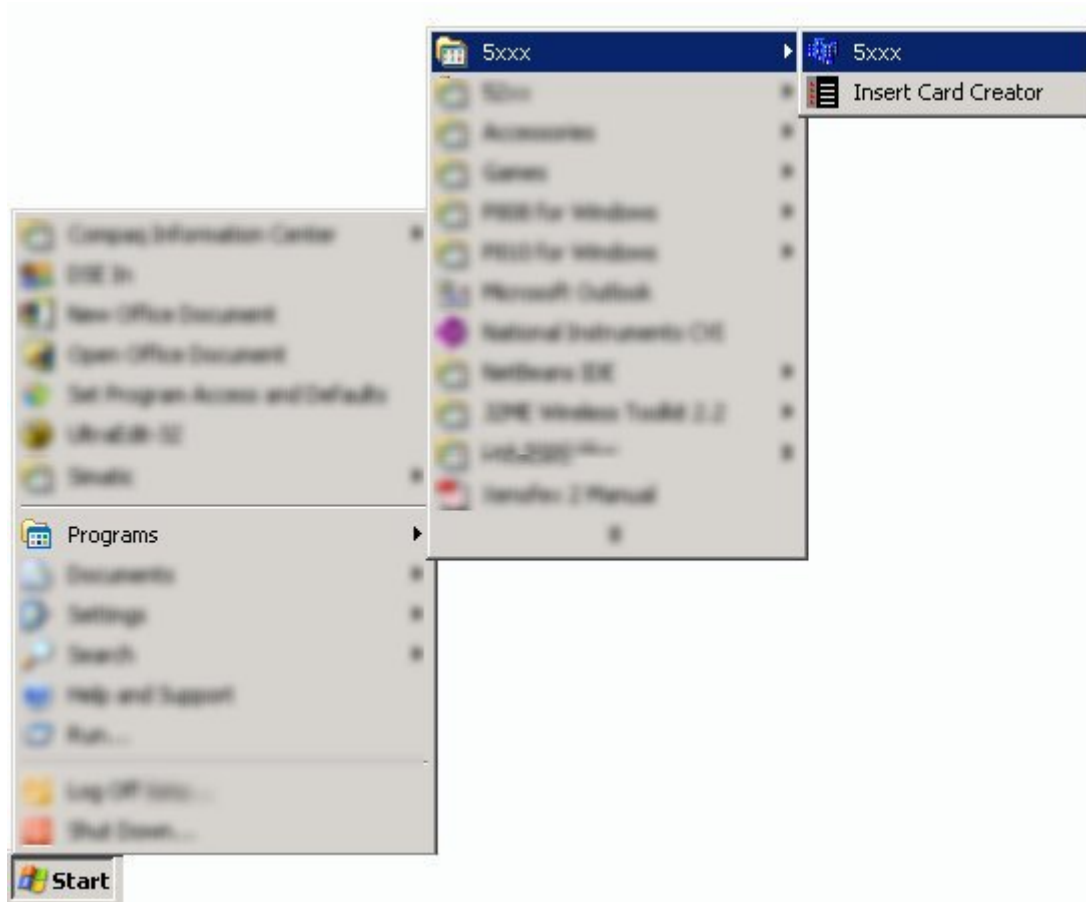
Click on the 'Install 5xxx series' button to install the software onto your PC in its own folder (directory). It will also create 'START MENU' items.

To run 52/53xx series configuration software For Windows program

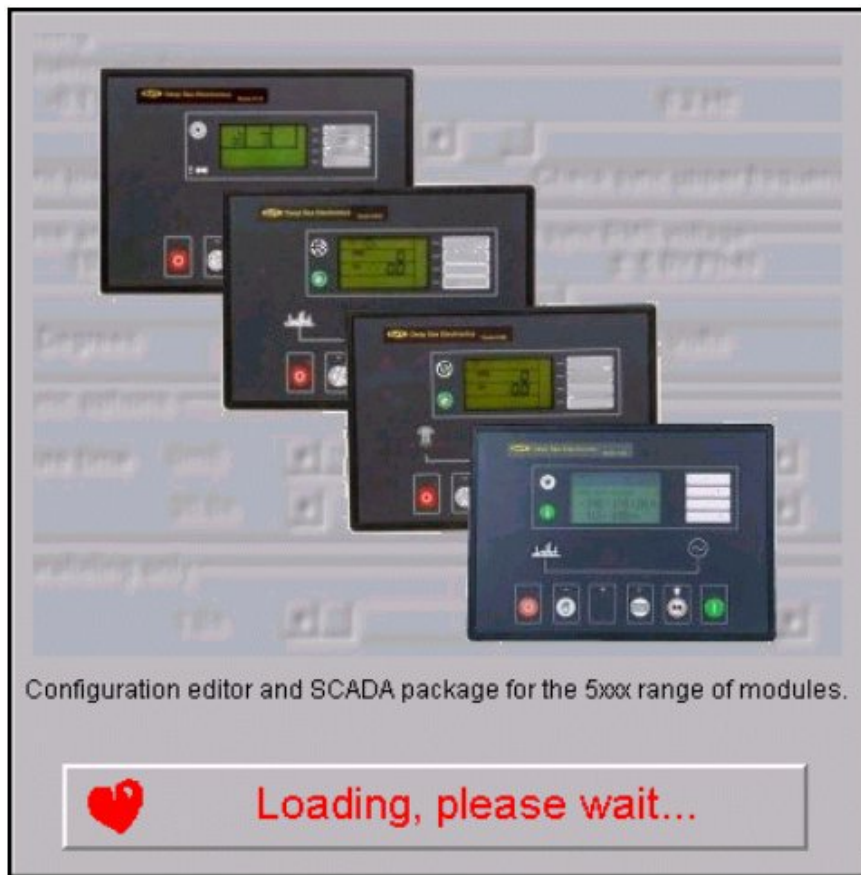
Press the:



And then select 'Programs' - '5xxx' as shown below: -



The screen will then display: -



The module type selector will appear after a short delay



Click on the button appropriate to the type of module to be configured and the PC will then load the version of P5xxx for Windows suitable for that type of module.

The password page will appear after a short delay.



The software provides three levels of password protection. The first level is the operator level; if the operator password is entered it will only be possible to edit the timers not the module configuration. In addition, operator level only allows the creation of new configuration files, existing files cannot be over-written. The second level of password protection is the technician Level, if this password is entered all of the module functions can be configured.

The third level of password is the Engineer level, if this password is entered all of the module functions can be configured, LOP and HET senders can be calibrated and the module time, hours run clocks, accumulated values can be adjusted. A software maintenance reset can also be performed. Password for all levels can also be changed with this level.

It is intended that the technician and engineering passwords be given to qualified engineers who are responsible for initial configuration of the unit, or modification of settings at a later stage.

The operator password is intended to be given to personnel who will not need to be altering the configuration of the module, but may need to visit a controller and modify timer settings, record these changes in a new file and view diagnostic information from the module.

The Maintenance password is intended to be given to personnel who will be attending the generator to perform routine maintenance only.

Users without a password will not be able to gain access to the software at all.

Enter the correct password for the required access level then; Click 'OK' or press the ENTER key.

NOTE: - The default Engineer password is blank and when a password is requested, Click 'OK' or press the ENTER button.

2 CONFIG MANAGER

Once loaded the '**Main**' Menu is displayed



Module Type: - This indicates the type of module for which the 52/53xx series software is currently configured. This will automatically be selected to the correct module when a configuration file is 'Loaded' from disk or 'Read' from the module. It can also be changed under the '*Misc*' tab in the '*Edit Config*' menu.

Access Level: - This indicates the current level of access to the software. Access is gained depending on the password typed to enter to program on start-up. It is the access level that determines what configuration options are available.

File Loaded: - This indicates the name of the configuration file currently loaded into the 52/53xx series software, the '*DEFAULT*' configuration is loaded at start up, If the configuration was 'Read' from the module then '*FROM MODULE*' will be displayed.

Load from Disk: - This is used to load an existing configuration from disk into the 52/53xx series software. The file can then be edited (if required) and then 'Written' to the module. To load a file, simply click this button and enter the name of the file to be loaded in the dialog box. Then click 'OK'. The '*File Loaded*' will then be indicated.

Save to Disk: - This is used to save the current configuration file to disk. The required filename for the configuration can be typed in the dialog box. Then click 'OK'.

Print Configuration: - This is used to produce a printout of the current configuration. A list of all the settings will then be produced.

Read from Controller: - This is used to 'Read' the configuration which exists in the module. The module must be connected to the PC via the 810 interface and have a DC supply feeding it. It is possible to read from the module while the generating set is running. Clicking the 'Read' button will transfer the current configuration to the 52/53xx series software to allow the setting to be inspected or modified.

Write to Controller: - This is used to write a new configuration to the module. To write to the module it must be connected to the PC via the 810 interface and be fed from a suitable DC supply. Additionally the module must be in the correct operating mode in order for re-configuration to be accepted.

If a module security PIN number has been set (**53xx only**), this will be asked for and must be correctly entered before the configuration file will be sent to the controller.

Should the module not be ready to receive data i.e. generator not at rest and in stop mode, the software senses that the engine is running and a warning message will be displayed. Steps should then be taken to ensure that the engine is at rest and the module is in the 'STOP' mode before attempting to write to the module.

Exit: - This is used to exit the 52/53xx series software and return to windows. If any configuration files are open which have not been saved, the software will query if it is OK to continue or if they need to be saved.

 **NOTES:** - It will not be possible to send a configuration for the wrong module type to a different module. E.g. You cannot send a 5210 configuration to a 5220 module. However, it is possible to base a new config on an existing config and change the options to suit the new module.

 **NOTE:** - The correct module version must be selected in order to write to the controller. I.e. you can only send version 2 configuration files to version 2 modules.

 **NOTE:** - The supplied configuration file 5310NFPA.mcf/5320NFPA.mcf contains set-up information for the expansion outputs, designed to operate the 549 NFPA110 annunciator module in conjunction with the P130 input expansion module. For further information on the P130 and P549 modules, please see the DSE manual entitled P130 input expansion module/P549 remote annunciator Operators Manual.

3 EDIT CONFIG MENU

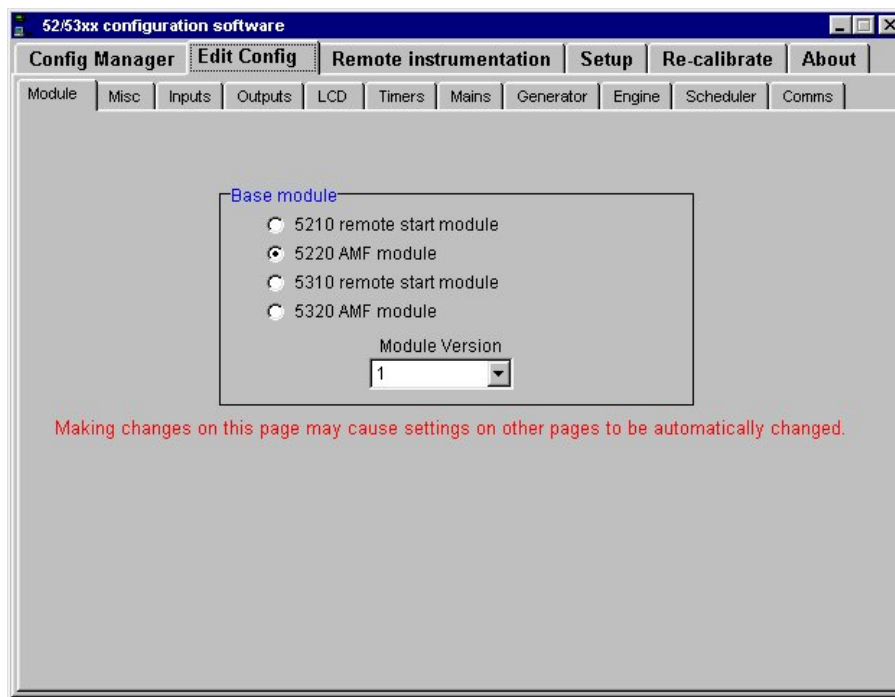
This menu allows the module configuration to be changed, such that the function of Inputs, Outputs and LED's can be altered. System timers and level settings can also be adjusted to suit a particular application.

Access to the various configuration parameters depends on the password entered when the program was started. If the Operator password was entered, then selecting the Edit Configuration option will take the user directly to the Edit Timers page as this is the only editable section with operator level clearance.

If the Technician or Engineering level password was entered then full access to the settings is possible.

This menu allows the user to change the type of module to be configured. This menu is used to determine which options are presented to the user elsewhere in the configuration. The following is displayed:

3.1 MODULE



NOTES: -

It will not be possible to send a configuration for the wrong module type to a different module. E.g. You cannot send a 5210 configuration to a 5220 module. However, it is possible to base a new config on an existing config and change the options to suit the new module.



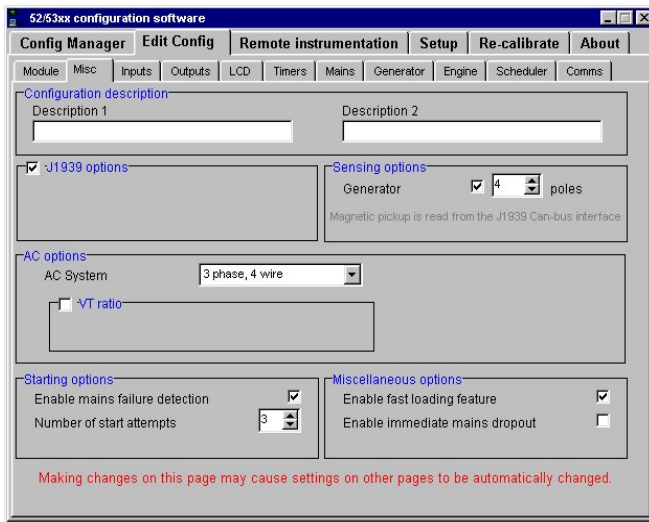
NOTE: - The correct module version must be selected in order to write to the controller. I.e. You can only send version 4 configuration files to version 4 modules.

MODULE DESCRIPTION

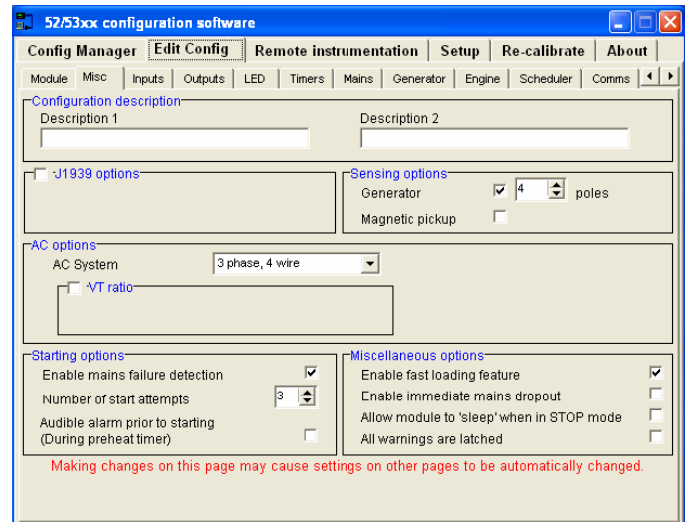
Item	Function
Base Module	Module Type - ☐ = 5210 Remote Start Module ☒ = 5220 Automatic mains failure module ☐ = 5310 Remote Start Module ☐ = 5310 Automatic mains failure module This setting determines whether the configuration file is for a 5210, 5220, 5310 or 5320 module. Depending upon selection, non-relevant options are hidden and the software will not allow the operator to 'Write' the wrong configuration file to the 'wrong' module type.

3.2 MISC

This menu allows the user to change the nominal operating parameters and also select the modules special operating modes, according to individual requirements. The following is displayed:



52xx modules



53xx modules

NOTES: - It is possible to configure the 52xx/53xx modules to use either alternator frequency or magnetic pickup speed sensing, both or none. If both sources are used shutdown will occur if either speed-sensing source gives an over or under-speed (frequency) signal.

If a magnetic pickup is not to be used it is important that “magnetic pickup” is unchecked. If the module expects to receive magnetic pickup pulses and none are apparent on starting, it assumes that the pickup is faulty and will shutdown the engine.

If connected to an electronically controlled engine which supports the CAN protocol – this can be connected to the modules CAN port (53xx only) This will then give engine speed data and other parameters direct from the engine control unit.

MISCELLANEOUS DESCRIPTION

Item	Function
Configuration description	53xx modules only. Allows a description to be given to the module's configuration file. This allows for easy reference to what the configuration is used for, who configured it and when.
CAN options	53xx modules only.  CAN CAN ☐ = Engine speed sensing is from alternator AC or magnetic pickup as configured below. Additionally other parameters such as oil pressure and coolant temperature are read direct from engine mounted sensors. ☒ = Configures the module to read engine speed, oil pressure, coolant temperature, hours run information and internal diagnostics information from the engine's ECU via the optional CAN datalink. Engine type (53xx modules only) • Generic J1939 – Basic CAN is available when used in conjunction with a CAN enabled engine. • Other engine types allow selection of engine manufacturer specific options such as ECU enable outputs and enhanced CAN instrumentation. Enhanced CAN instrumentation ☐ = Enhanced instrumentation disabled. ☒ = Enhanced instrumentation is shown on the module's display.  NOTE: - These options require a CAN enabled controller connected to a supported CAN engine ECU.
Speed sensing options	These settings are used to select which method of speed sensing is used: - Generator Frequency - ☐ = Speed sensing will not be derived from generator output frequency. ☒ = Speed sensing will be derived from the generator output frequency The number of alternator poles then needs to be set to allow the module to determine the engine speed. Magnetic Pick-up - ☐ = Speed sensing will not be derived from the magnetic pickup. ☒ = Speed sensing will be derived from the magnetic pickup The number of flywheel teeth on the engine then needs to be set.  NOTE: - Selecting either of the above will enable or disable relevant selections throughout the remainder of the configuration.

Item	Function												
AC Options	These settings are used to detail the type of AC system to which the module is connected: - AC system - 1 phase 2 wire - (L + N) 2 phase 3 wire – (L1 + L2 + N) 2 phase 3 wire – (L1 + L3 + N) (53xx only) 3 phase 3 wire – (L1 + L2 +L3) 3 phase 4 wire – (L1 + L2 +L3 +N)												
	VT Ratio These settings enable the controller to be configured to accept connection to the secondary winding of Voltage Transformers (V.T.'s, sometimes called Potential Transformers or P.T.'s) ☐ = Voltage transformers are NOT used. ☒ = Voltage transformers are used to step down the generator output to a level that can be accepted by the 52xx/53xx controller. Primary Voltage The actual system voltage or output from the generator (i.e. 11,000 V AC ph-ph) Secondary Voltage The output from the voltage transformer secondary winding. I.e. 110 V AC ph-ph. This level must be below the VT primary voltage and within the generator and mains/utility (5220/5320) specification of the controller. For further details on this, see section entitled 'Specification'												
	 NOTE: - When VTs are used; the voltages displayed by the 52xx/53xx controller may be very large. To allow them to be displayed, the values displayed are in kilovolts (kV, or thousands of volts).												
	Example: 52xx controller displaying 14.7 kV AC ph-ph (14700 V AC) <table><tr><td></td><td></td><td></td></tr><tr><td>L1-L2</td><td>14.7H</td><td></td></tr><tr><td>L2-L3</td><td>14.7H</td><td></td></tr><tr><td>L3-L1</td><td>14.7H</td><td></td></tr></table>				L1-L2	14.7H		L2-L3	14.7H		L3-L1	14.7H	
													
L1-L2	14.7H												
L2-L3	14.7H												
L3-L1	14.7H												
Starting Options	Number of Start attempts - This value is the number of times the module will attempt to start the generator. Should the generator start, the module will not attempt further starts. If the generator does not start after the final attempt, the module will give a 'Fail to start' alarm.												

Item	Function
Miscellaneous Options	These settings are used to select a range of different functions: - Enable Fast Loading feature - ☐ = Normal Operation, the safety on timer will be observed in full. This feature is useful if the module is to be used with some engines where premature termination of the delay timer can lead to over speed alarms on start up. ☒ = The module will terminate the safety on timer once all monitored parameters have reached their normal settings. This feature is useful if the module is to be used as a standby controller as it allows the generator to start and go on load in the shortest possible time.  NOTE: - It is only recommended to Enable Fast Loading on systems where steps have been taken to ensure rapid start up of the engine is possible. I.e. When fitted with engine heaters, electronic governors etc. Enable Mains Failure Detection - (5220/5320 modules only) ☐ = The module will NOT monitor the incoming AC mains supply for failure. The AC mains instrumentation will still be active however. ☒ = The module WILL monitor the incoming AC mains supply. Should the supply go out side of limits the module will initiate its automatic mains failure sequence. Enable Immediate Mains Dropout - (5220/5320 modules only) ☐ = Normal Operation, in the event of a mains failure the module will attempt to maintain the supply to the load for the incoming AC mains supply until the generator is available to go on load. In the event of a generator failure the module will default back to the incoming AC mains supply. This provides a 'fail-safe' system, ensuring that in the event of a system failure the load will still be fed from the AC mains supply. ☒ = As soon as the module detects a mains failure the mains contactor or breaker relay will be opened to remove the supply from the load. This is to prevent damage to the load in case of a single-phase failure, especially useful if the load is a 3-phase motor or pump. The supply to the load will then be fed from the genset once it is available. In the event of a generator failure the module will open the generator relay and remove the supply to the load until either the mains supply is restored or the generator is restarted. Allow module to sleep when in stop mode (53xx modules only) ☐ = Sleep mode disabled. ☒ = Module will 'go to sleep' when left in stop mode after 1 minute of inactivity. This is a power saving feature to reduce plant battery usage when the controller is not in use. All warnings are latched – (53xx only) ☐ = Normal Operation, the warnings and pre-alarms will automatically reset once the triggering condition has cleared. ☒ = Warnings and pre-alarms will latched when triggered. To reset the alarm either an external reset must be applied to one of the inputs or, the 'Stop/Reset' pushbutton operated, once the triggering condition has been cleared. Audible Alarm prior to starting – (53xx only) ☐ = Normal Operation with-out audible alarm ☒ = The audible alarm will sound before the engine starts. The sounder will become active once the start delay is initialised, it will remain active until either the engine reaches crank disconnect speed or the start delay or pre-heat timers are cancelled.

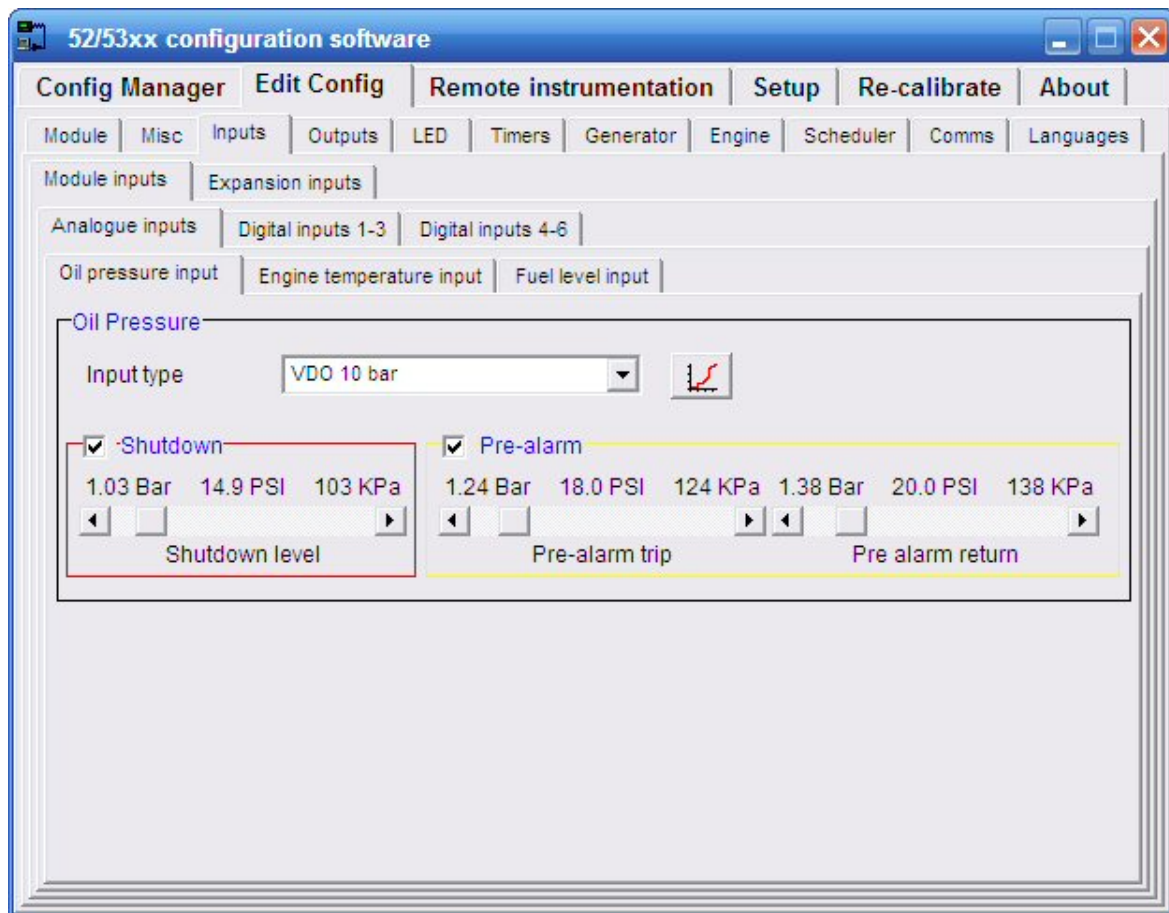
3.3 INPUTS

This menu allows the configurable inputs to be changed to suit the users requirements. The following is displayed: -

3.3.1 MODULE INPUTS

ANALOGUE INPUTS

OIL PRESSURE INPUTS



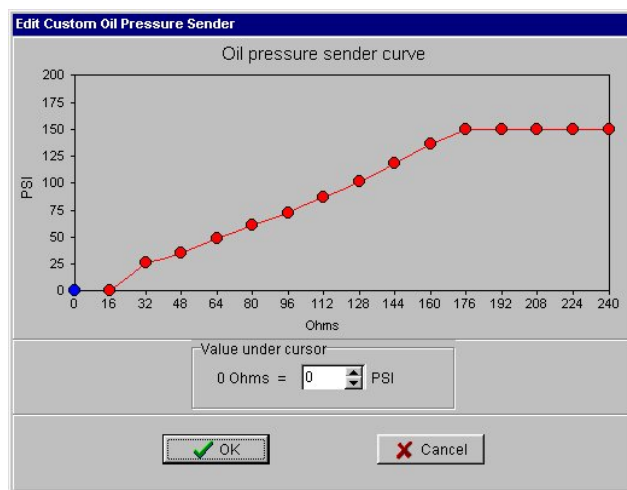
Custom curve editor

To enter the curve editor select the icon



This allows senders to be used, which have not been pre-configured in the 5xxx software. Each sender curve has 16 points, which map the relationship between sender resistance and reading.

Once the curve direction is started the curve must continue to follow the set direction – i.e. If resistance increases with rising oil pressure then each point on the graph must follow this. So each point must show a higher value than the one previous. If any two points on the graph are equal or reverse the initial direction the module will consider this the end of the curve and show 'over-range' for values which are past this point.



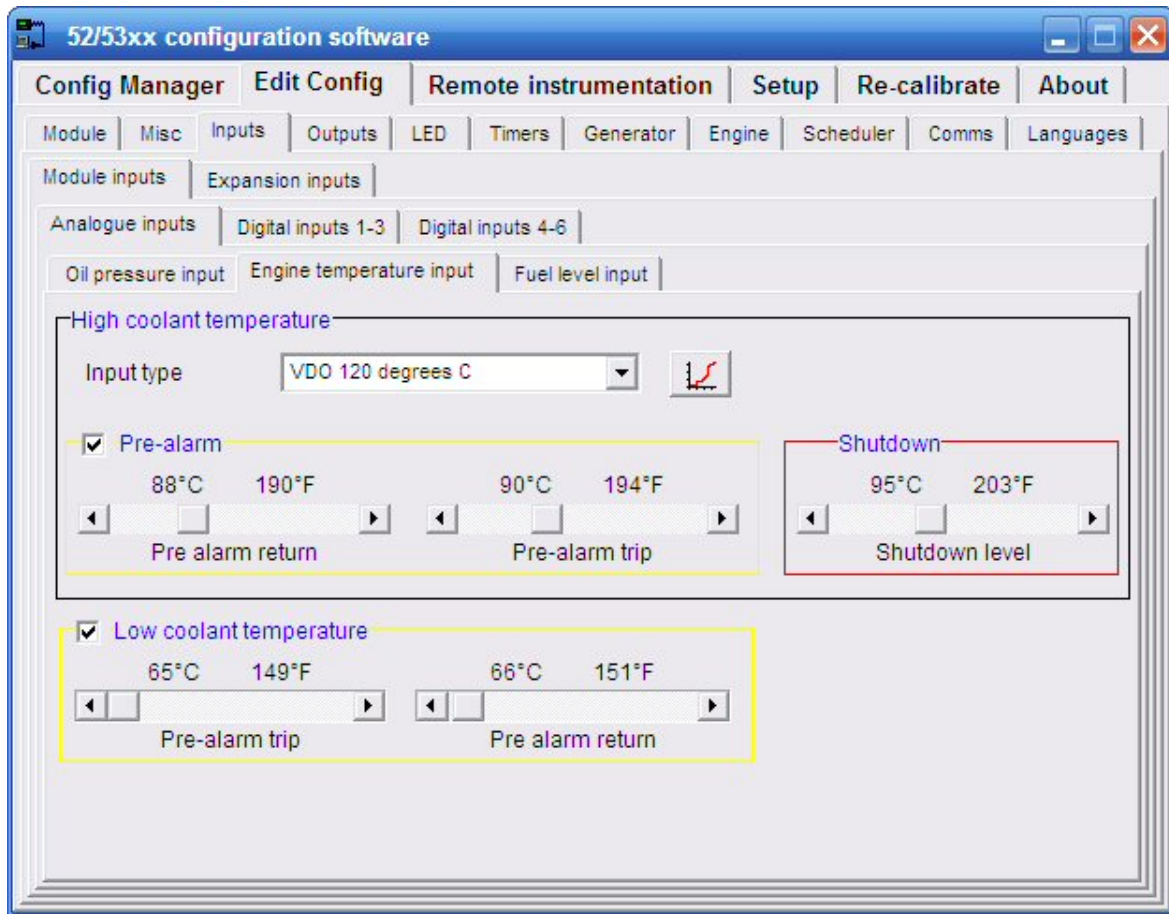
Function	Description
Oil Pressure settings	This section is used to configure the Oil Pressure sender input. Input Type: -  CAN If the module is configured for CAN, then input type is not configurable; oil pressure is read from the engine's ECU on the CAN datalink. (53xx only) <i>Disabled</i> - The Oil pressure input will not be monitored. <i>Digital - closed for low oil pressure</i> - The Oil Pressure input is fed from an engine mounted digital pressure switch. This switch returns a closed signal during low oil pressure conditions (and engine at rest), once oil pressure is established the switch will open. <i>Digital - open for low oil pressure</i> - The Oil Pressure input is fed from an engine mounted digital pressure switch. This switch returns an open signal during low oil pressure conditions (and engine at rest), once oil pressure is established the switch will close. <i>VDO match, 0-5bar</i> - The Oil Pressure input is connected to a resistive type engine mounted oil pressure transducer. The output of this transducer matches that of a VDO type sender with an operating range of 0-5bar. <i>VDO match, 0-10bar*</i> - The Oil Pressure input is connected to a resistive type engine mounted oil pressure transducer. The output of this transducer matches that of a VDO type sender with an operating range of 0-10bar. <i>Datcon match, 0-5bar</i> - The Oil Pressure input is connected to a resistive type engine mounted oil pressure transducer. The output of this transducer matches that of a Datcon type sender with an operating range of 0-5bar. <i>Datcon match, 0-7bar</i> - The Oil Pressure input is connected to a resistive type engine mounted oil pressure transducer. The output of this transducer matches that of a Datcon type sender with an operating range of 0-7bar. <i>Datcon match, 0-10bar</i> - The Oil Pressure input is connected to a resistive type engine mounted oil pressure transducer. The output of this transducer matches that of a Datcon type sender with an operating range of 0-10bar. <i>Murphy, 0-7bar</i> - The Oil Pressure input is connected to a resistive type engine mounted oil pressure transducer. The output of this transducer matches that of a Murphy type sender with an operating range of 0-7bar. CMB 812 – DO NOT USE. Special option only, not for customer use. Pre-Alarm: - (Not available with digital switch inputs) <i>User Defined</i> - The Oil Pressure input is connected to a resistive type engine mounted oil pressure transducer. The output of this transducer is defined by the user by means of the Custom Curve Editor. ☐ = Engine Low Oil Pressure will NOT give a pre-alarm warning ☒ = Engine Low Oil Pressure WILL give a pre-alarm warning in the event of the engine oil pressure falling below the displayed 'Oil Pressure pre-alarm' value. The 'Oil Pressure pre-alarm' value can be adjusted to suit user requirements. The oil pressure must return to above the 'oil pressure return' setting before the 52xx/53xx module will consider that the oil pressure is back within limits and cancel the pre-alarm. Shutdown - ☐ = Engine Low Oil Pressure will NOT give a shutdown alarm. Used to give oil pressure indication only. ☒ = Engine Low Oil Pressure WILL give a shutdown alarm in the event of the engine oil pressure falling below the displayed 'oil pressure trip' value. The 'oil pressure trip' value can be adjusted to suit user requirements.



NOTE: - *Deep Sea Electronics recommended sender. (Part No. 024-006)

NOTE: -  It is recommended that the oil pressure trip points are set higher or the same as the engine ECU trip points. (53xx only)

ENGINE TEMPERATURE INPUT



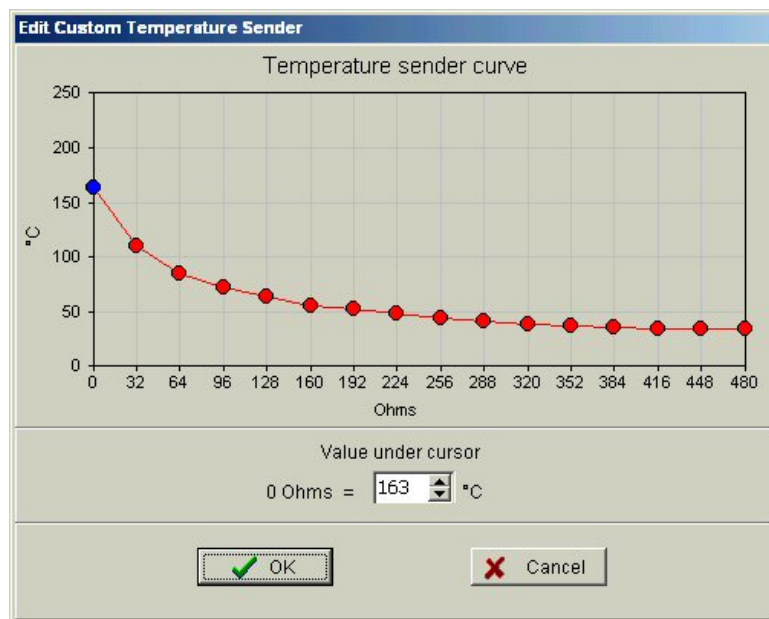
Custom curve editor



To enter the curve editor select the icon

This allows senders to be used which have not been pre-configured in the 5xxx software. Each sender curve has 16 points which map the relationship between sender resistance and reading.

Once the curve direction is started the curve must continue to follow the set direction – i.e. If resistance increases with rising oil pressure then each point on the graph must follow this. So each point must show a higher value than the one previous. If any two points on the graph are equal or reverse the initial direction the module will consider this the end of the curve and show 'over-range' for values which are past this point.



Function	Description
High Coolant Temperature settings	This section is used to configure the Coolant Temperature sender input. Input Type: -  CAN If the module is configured for CAN, then input type is not configurable; coolant temperature is read from the engine's ECU on the CanBus datalink. <i>Disabled</i> - The Coolant Temperature input will not be monitored. <i>Digital Switch, Normally Closed</i> - The Coolant Temperature input is fed from an engine mounted digital temperature switch. This switch returns a closed signal during low temperature conditions, should the temperature rise above the switch manufacturers trip point the switch contacts will open. <i>Digital Switch, Normally Open</i> - The Coolant Temperature input is fed from an engine mounted digital temperature switch. This switch returns an open signal during low temperature conditions, should the temperature rise above the switch manufacturers trip point the switch contacts will close. <i>VDO match, 120°C*</i> - The Coolant Temperature input is connected to a resistive type engine mounted temperature transducer. The output of this transducer matches that of a VDO type sender with an operating range of up to 120°C. <i>Datcon HIGH match</i> - The Coolant Temperature input is connected to a resistive type engine mounted temperature transducer. The output of this transducer matches that of a Datcon HIGH type sender. <i>Datcon LOW match</i> - The Coolant Temperature input is connected to resistive type engine mounted temperature transducer. The output of this transducer matches that of a Datcon LOW type sender <i>Murphy</i> - The Coolant Temperature input is connected to a resistive type engine mounted temperature transducer. The output of this transducer matches that of a Murphy type sender. <i>Cummins</i> - The Coolant Temperature input is connected to a resistive type engine mounted temperature transducer. The output of this transducer matches that of a Cummins type sender. <i>PT100</i> - The Coolant Temperature input is connected to a resistive type engine mounted temperature transducer. The output of this transducer matches that of a PT100 type sender however accuracy is limited to + - 5 °C. <i>User Defined</i> - The Coolant Temperature input is connected to a resistive type engine mounted temperature transducer. The output of this transducer is defined by the user by means of the Custom Curve Editor. Pre-Alarm: - (Not available with digital switch inputs) ☐ = Engine High Coolant Temperature will NOT give a pre-alarm warning ☒ = Engine High Coolant Temperature WILL give a pre-alarm warning in the event of the engine coolant temperature rising above the displayed 'Coolant Temperature pre-alarm' value. The 'Coolant temperature pre-alarm' value can be adjusted to suit user requirements. The Coolant temperature must return to below the 'coolant temperature return' setting before the 52xx/53xx module will consider that the coolant temperature is back within limits and cancel the pre-alarm.

Function	Description
High Coolant Temperature settings	Shutdown – Coolant temperature will give a shutdown alarm in the event of the engine coolant temperature rising above the displayed '<i>coolant temperature trip</i>' value. The '<i>coolant temperature trip</i>' value can be adjusted to suit user requirements.
Low Coolant Temperature settings (53xx only)	Pre-Alarm: - (Not available with digital switch inputs) ☐ = Low Coolant Temperature will NOT give an alarm warning ☒ = Low Coolant Temperature WILL give an alarm warning in the event of the engine coolant temperature falling below the '<i>Low Coolant Temperature alarm</i>' value. This value can be adjusted to suit user requirements and is intended to be used to signal engine block heater failure in standby applications (NFPA 110 Specification in particular) The Coolant temperature must return above the '<i>Low coolant temperature return</i>' setting before the 53xxx module will consider that the coolant temperature is back with in limits and cancel the alarm.

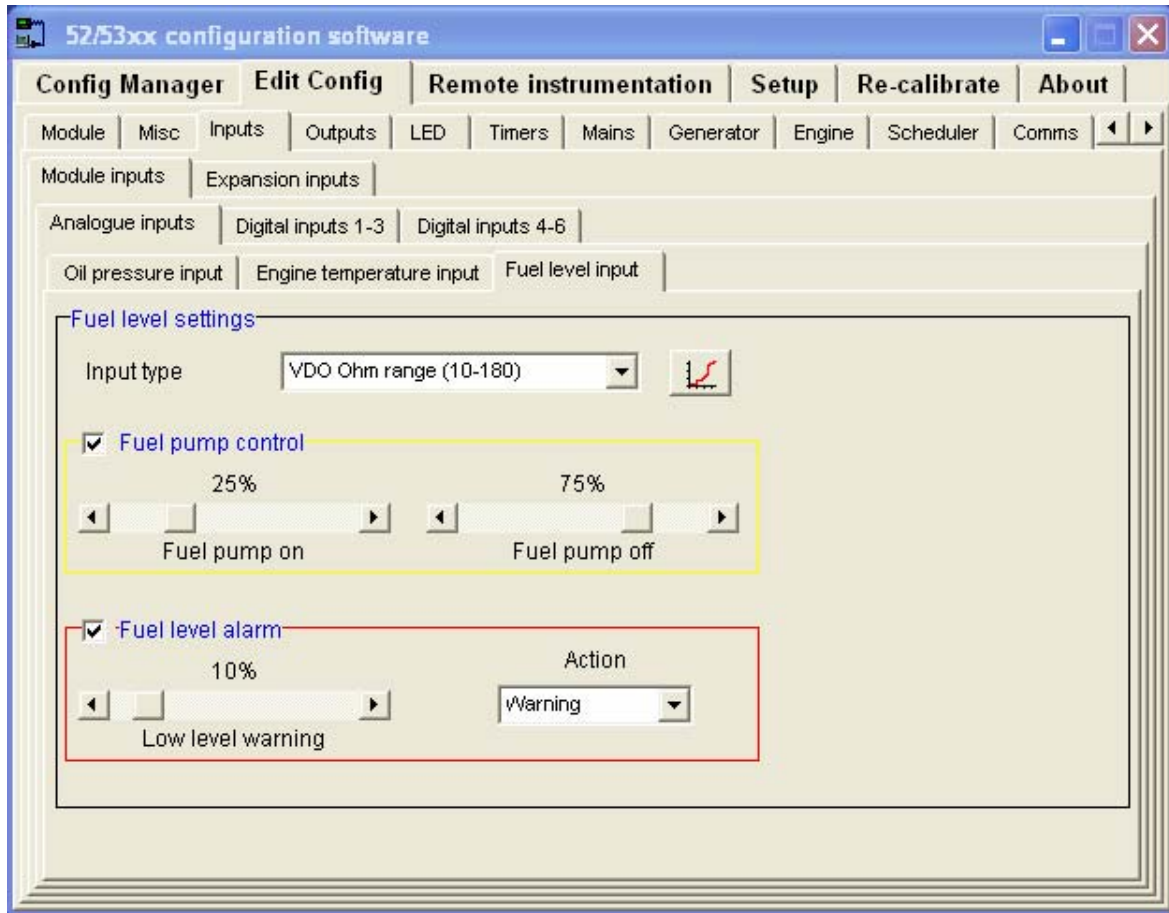


NOTE: - *Deep Sea Electronics recommended sender. (Part No: 024-007)



NOTE: - CAN It is recommended that the engine temperature trip points are set lower or the same as the engine ECU trip points.

FUEL LEVEL INPUT

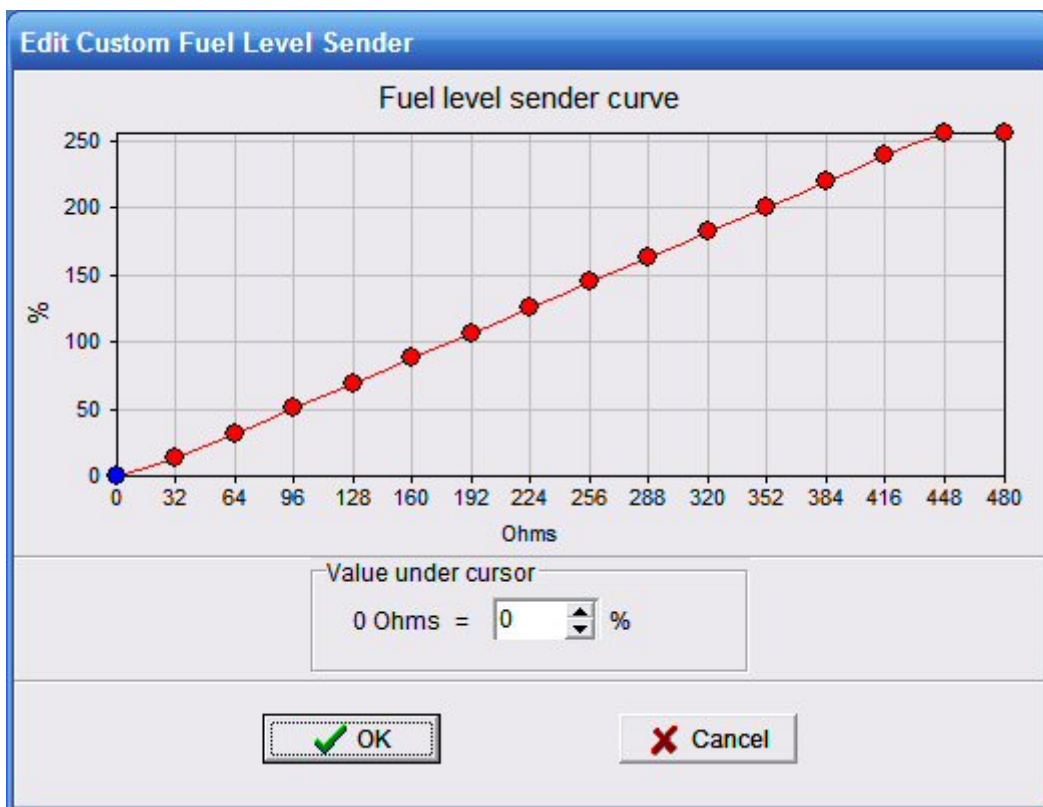


Custom curve editor

To enter the curve editor select the icon

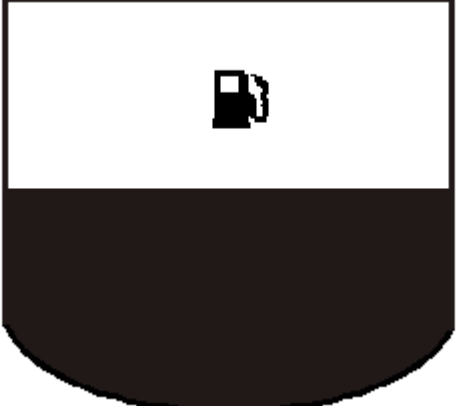
This allows senders to be used which have not been pre-configured in the 52/53xx software. Each sender curve has 16 points which map the relationship between sender resistance and reading.

Once the curve direction is started the curve must continue to follow the set direction – i.e. If resistance increases with rising oil pressure then each point on the graph must follow this. So each point must show a higher value than the one previous. If any two points on the graph are equal or reverse the initial direction the module will consider this the end of the curve and show 'over-range' for values which are past this point.

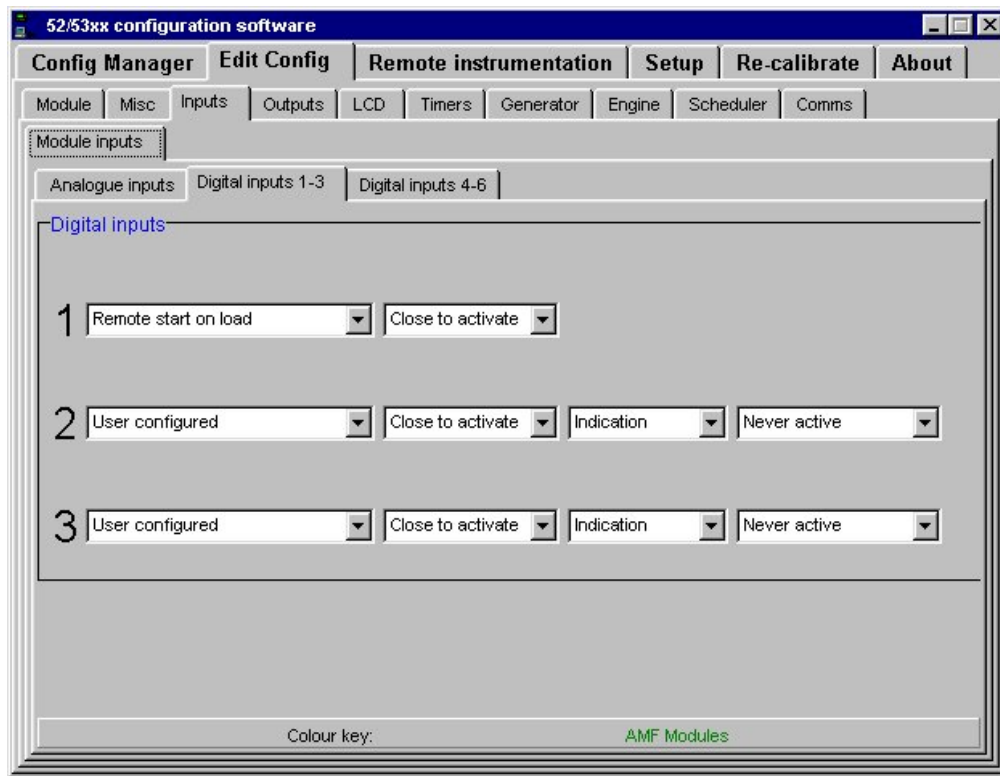


Function	Description
Fuel level sender settings	This section is used to configure the Fuel level sender input. Input Type: - <i>Not Used</i> – The fuel level input will not be monitored. <i>Digital Switch, Normally Closed</i> –The fuel level input is fed from a tank mounted switch. This switch returns a closed signal during low fuel conditions, should the level rise above the switch manufacturers trip point the switch contacts will open. <i>Digital Switch, Normally Open</i> - The fuel level input is fed from a tank mounted switch. This switch returns an open signal during low level conditions, should the level rise above the switch manufacturers trip point the switch contacts will close. <i>VDO Ohms type</i> - The Fuel Level input is connected to a resistive type tank mounted fuel level transducer. The output of this transducer matches that of a VDO type sender with an operating range of 10Ω (empty) to 180Ω (full). <i>VDO Tube type</i> - The Fuel Level input is connected to a resistive tube type tank mounted fuel level transducer. The output of this transducer matches that of a VDO tube type sender with an operating range of 90Ω (empty) to 0Ω (full). <i>US Ohms Range</i> - The Fuel Level input is connected to a resistive type tank mounted fuel level transducer. The output of this transducer matches that of the US Ohms ranged as used by Datcon, Stewart Warner and others. Its operating range is 240Ω (empty) to 33Ω (full). <i>GM Ohms Range (high)</i> - The Fuel Level input is connected to a resistive type tank mounted fuel level transducer. The output of this transducer matches that of a GM type sender with an operating range of 0Ω (empty) to 90Ω (full). <i>GM Ohms Range (low)</i> - The Fuel Level input is connected to a resistive type tank mounted fuel level transducer. The output of this transducer matches that of a GM type sender with an operating range of 0Ω (empty) to 30Ω (full). <i>Ford</i> - The Fuel Level input is connected to a resistive type tank mounted fuel level transducer. The output of this transducer matches that of a Ford type sender with an operating range of 73Ω (empty) to 10Ω (full). <i>User Defined</i> - The Fuel Level input is connected to a resistive type engine mounted temperature transducer. The output of this transducer is defined by the user by means of the Custom Curve Editor. Fuel pump control ☐ = Fuel pump control is disabled ☒ = Fuel pump control is enabled. When the fuel level falls below the 'fuel pump on' threshold, the Fuel Pump Control output (if configured) will energise. This is designed to control the pump to transfer fuel from a bulk tank to the day tank. When the fuel level rises above the 'fuel pump off' threshold, the output is de-energised. Fuel level alarm ☐ = Low Fuel level alarm is disabled ☒ = Low Fuel level alarm is enabled. When the fuel level falls below the 'low level warning' threshold, a warning alarm is generated. Should the level rise above the warning threshold, the alarm is automatically reset. Action – when Low Fuel level alarm is enabled Warning (Alarm only, No shutdown) Shutdown (Alarm and shutdown) Electrical Trip (Alarm/off-load generator followed by shutdown after cooling)

The resistive fuel level senders supported by the 52/53xx series controllers are devices that translate fuel level into resistance. A change in fuel level translates directly to a change in the resistance of the sender. In the case of a parallel sided fuel tank, an accurate measure of the fuel level can easily be made, however as shown in the example below, this is not the case with non-parallel sided fuel tanks. Therefore it is recommended that only parallel sided fuel tanks are used to ensure correct fuel level detection.

Measured level 100% — 50% — 0% —  Actual level 100% — 50% — 0% —	The fuel sender measures the distance between the top of the tank and the fuel level. Typically, they use a ball float. In this example, the distance between the top of the tank and the level of the fuel is 50% of the height of the tank. The fuel level sender will report the tank correctly as being 50% full. For a parallel-sided tank like this one, 50% distance between the top of the tank and the level of the fuel will occur when the tank is 50% full of fuel.
Measured level 100% — 50% — 0% —  Actual level 100% — 50% — 0% —	In this example, the distance between the top of the tank and the level of the fuel is again 50% of the height of the tank; the fuel level sender will report the tank as being 50% full. However, as the bottom of the tank is curved, the actual amount of fuel in the tank is only about 40%. The fuel sender is incorrectly reporting the amount of remaining fuel.

DIGITAL INPUTS



NOTE: - Each of the auxiliary inputs has the same selection choices, allowing flexibility. However, only one of the fixed input functions can be used at any one time. For example only one of the inputs can be configured to be 'remote start'. The User Configurable option is the exception to this rule, and allows any number of inputs to be used as Indications, Warnings, Shutdowns or as an electrical trip input

Polarity

The polarity of the input switching can be configured to be either “**Close to Activate**”, this is a normally open switch, and closes to negative when activated. Alternatively “**Open to Activate**”, this is a Normally Closed switch to negative, and opens when activated.

Function	Description
User Configured	This input is configured to perform an auxiliary function, this may be any of the following: - Indication (<i>annunciation only, no alarm or shutdown</i>) Warning (<i>Alarm only, no shutdown</i>) Shutdown (<i>Alarm and shutdown</i>) Electrical Trip (<i>Alarm/off-load generator followed by shutdown after cooling</i>) This function also has an activation time associated with it chosen from the following list: - Never active -This switches off the input if not in use. Always active -The input selected to be an indication or alarm even when the module is in the STOP/RESET MODE. Active from starting -The Auxiliary input is only active once an attempt to start the generator is made. It will remain active until the generator is at rest again. Active from safety on - Auxiliary inputs are only active once the Safety On timer has timed out. This allows a delay on start up for faults, such as Oil Pressure and High Engine Temperature Warnings, or other shutdown conditions which require a delay during start-up, such as Under-voltage. The configuration allows each auxiliary input to have an associated text message displayed on the LCD in addition to the alarm actions detail above. I.e. 'LOW FUEL LEVEL' - could be displayed on the LCD in the event of an Input configured as an; '<i>Always Active</i>', '<i>Warning</i>' being activated (Applies to module 53xx only).
Alarm mute	When active, this will disable an output configured to 'audible alarm', without resetting the module's alarm condition.
Alarm Reset	This input is used to reset any latched alarms from a remote location. It is also used to clear any latched warnings which may have occurred (if configured) without having to stop the generator.
Alternative Frequency (53xx only)	This input allows for switching between frequencies (50Hz normal or 60Hz alternate), convenient for generators used in dual frequency applications.
Alternative Voltage (53xx only)	This input allows the switching between voltages (230v normal or 115v alternate), convenient for generators used in dual voltage applications.
Auto Restore Inhibit	If this input is active the 52xx/53xx will operate thus: - To use this function the 52xx/53xx should be placed in the AUTO mode. In the event of a remote start/mains failure the generator will be instructed to start and take load. On removal of the remote start signal/mains return the module will continue to run the generator on load until this AUTO RESTORE INHIBIT input is removed. Once the input is removed the module will transfer the load back to the mains supply and follow a normal generator stop sequence. This input allows the 52/35xx to be fitted as part of a system where the manual restoration to mains is controlled remotely or by an automated system.

Function	Description
Auto start Inhibit	This input is used to provide an over-ride function to prevent the 52xx/53xx from starting the generator in the event of a remote start/mains out of limits condition occurring. If this input is active and a remote start signal/mains failure occurs the 52xx/53xx will not give a start command to the generator. If this input signal is then removed, the 52xx/53xx will operate as if a remote start/mains failure has occurred, starting and loading the generator. This function can be used to give an 'AND' function so that a generator will only be called to start if the mains fails and another condition exists which requires the generator to run. If the 'Auto start Inhibit' signal become active once more it will be ignored until the module has returned the mains supply on load and shutdown.
Auxiliary Mains Fail	The 5220/5320 modules will monitor the incoming single or three phase supply for Over Voltage, Under Voltage, Over Frequency or Under Frequency. It may be required to monitor a different mains supply or some aspect of the incoming mains not monitored by the module. If the devices providing this additional monitoring are connected to operate this input, the 5220/5320 will operate as if the incoming mains supply has fallen outside of limits, the generator will be instructed to start and take the load. Removal of the input signal will cause the module to act if the mains has returned to within limits.
Droop Enable	When used with CAN equipped engines the percentage droop is determined by the ECU additionally this input activates a module output (if configured), for connection to the droop terminals on equipped electronic governor controllers
Generator Closed Auxiliary	This input is used to provide feedback to allow the 52xx/53xx to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator load switching device auxiliary contact.
Generator Load Inhibit	This input is used to prevent the 52xx/53xx from loading the generator. If the generator is already on load, activating this input will cause the 52xx/53xx to unload the generator. Removing the input will allow the generator to be loaded again. ⚠ NOTE: -This input only operates to control the generator-switching device if the 52xx/53xx load switching logic is attempting to load the generator. It will not control the generator-switching device when the mains is on load.
Lamp Test	This input is used to provide a test facility for the front panel indicators fitted to the 52xx/53xx module. When the input is activated all LED and LCD indicators will illuminate.

Function	Description
Low Oil Pressure Switch	This input is used to give a low oil pressure shutdown from a digital normally open or closed switch. Using this input frees up the analogue input to be used for oil pressure indication only.
Main closed Auxiliary	This input is used to provide feedback to allow the 5220/5320 to give true indication of the contactor or circuit breaker switching status. It should be connected to the mains load switching device auxiliary contact.
Mains Load Inhibit	This input is used to prevent the 5220/5320 from loading the mains supply. If the mains supply is already on load activating this input will cause the module to unload the mains supply. Removing the input will allow the mains to be loaded again. ⚠ NOTE: -This input only operates to control the mains switching device if the 5220/5320 load switching logic is attempting to load the mains. It will not control the mains switching device when the generator is on load.
Panel Lock	This input is used to provide security to the installation. If the Panel lock input is active, the module will not respond to operation of the Mode select or start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator will still be able to view the various instrumentation pages etc. (<i>Front panel configuration access is barred while system lock is active</i>).
Remote Start on load	If this input is active, the 52xx/53xx will operate thus: - To use this function the 52xx/53xx should be placed in the AUTO mode. The module will perform the start sequence as described earlier in this manual.
Remote Start off load	If this input is active operation will be similar to the 'Remote Start on load' function except that the generator will not be instructed to take the load. This function can be used where an engine only run is required e.g. for exercise.
Simulate Mains available	This function is provided to over-ride the 5220/5320 module's (AMF module only) internal monitoring function. If this input is active the module will not respond to the state of the incoming AC mains supply. This can be used to control the operation of the generator during a mains failure by allowing generator operation only if equipment operation requires the genset to run
Smoke Limit	If this input is active it would force the module to run the generator at idle speed using a configured output or using control through CAN. Once the input is removed the generator would ramp up to normal running speed during the smoke limit off timer.
Scheduled Run Inhibit	If this input is active it would prevent the Scheduled run from occurring.
Transfer To Gen / Open Mains	This input is used to transfer the load to the generator (5310/20) AND open the mains contactor (5320 only) when running in MANUAL MODE .
Transfer To Mains / Open Gen	This input is used to remove the load from the generator (5310/20) AND transfer the load to the mains supply (5320 only) when running in MANUAL MODE .

3.3.2 EXPANSION INPUTS

Analogue input

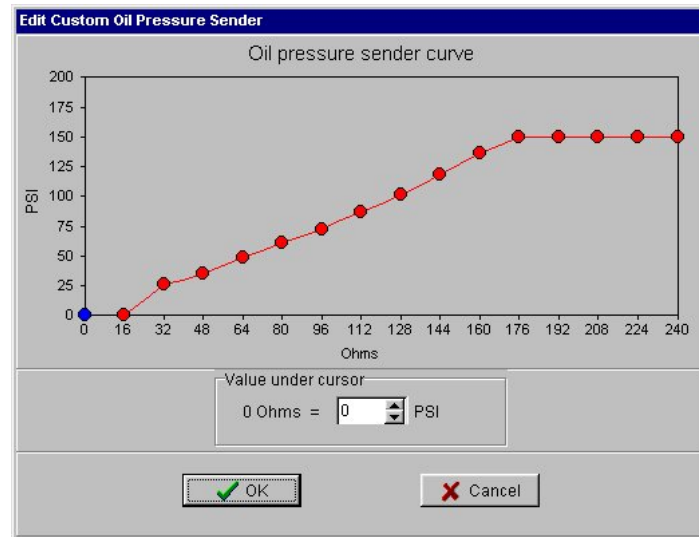
NOTE: - Expansion inputs are only available on the 53xx series modules, when used in conjunction with the P130 input expansion module.

The screenshot shows the '52/53xx configuration software' window. The 'Edit Config' tab is active, and the 'Expansion inputs' sub-tab is selected. Under 'Analogue expansion 1', the 'Enable P130 input expansion' checkbox is checked. The 'Input transducer name' is 'Analogue Expansion 1', 'Always active' is selected, and 'Transducer type' is 'GM Ohm range (0-90)'. The 'LOW alarm string' is 'Analogue Exp 1 - LOW'. The 'LOW shutdown' is set at 65%, and 'LOW pre-alarms' are set at 66% (Pre-alarm trip) and 67% (Pre-alarm return). The 'HIGH alarm string' is 'Analogue Exp 1 - HIGH'. The 'HIGH pre-alarms' are set at 68% (Pre-alarm return) and 69% (Pre-alarm trip), and the 'HIGH shutdown' is set at 70%. A note at the bottom states: 'NOTE : Expansion inputs (analogue or digital) require the 5xxx controller to be connected to the P130 expansion input module.'

Custom curve editor – (P130 expansion module)

This allows senders to be used, which have not been pre-configured in the 5xxx software. Each sender curve has 16 points, which map the relationship between sender resistance and reading.

Once the curve direction is started the curve must continue to follow the set direction – i.e. If resistance increases with rising oil pressure then each point on the graph must follow this. So each point must show a higher value than the one previous. If any two points on the graph are equal or reverse the initial direction the module will consider this the end of the curve and show 'over-range' for values, which are past this point.



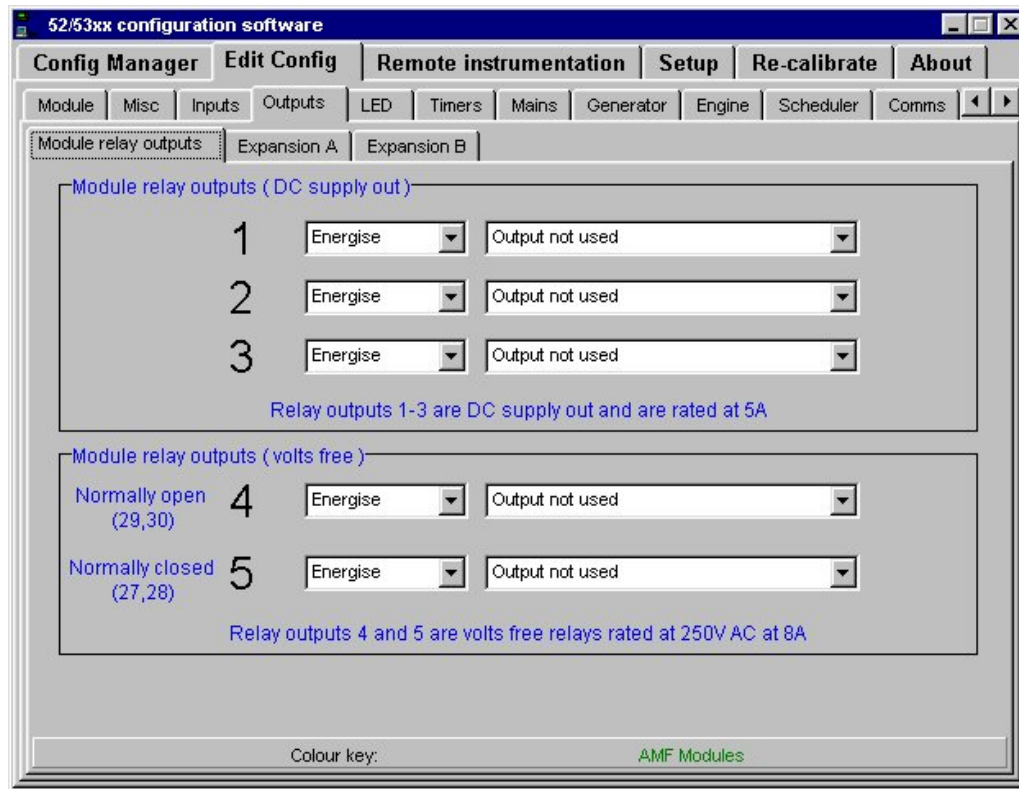
Function	Description
Expansion analogue input selections	Enable P130 input expansion: ☐ P130 input expansion module is not fitted. Relevant parameters are removed from the tab. ☒ P130 input expansion module is fitted. The adjustable parameters for input expansion will now be shown. ⚠ CAUTION! If P130 input expansion is enabled, and the P130 input expansion module is not correctly connected and powered up, the 53xx controller will generate a 'link lost' alarm indicating the failure. Input Transducer name: The name of your expansion analogue input, for example "Rad water temp" Activation: <i>Always active</i> -The input selected to be an indication or alarm even when the module is in the STOP/RESET MODE. <i>Active from starting</i> -The Auxiliary input is only active once an attempt to start the generator is made. It will remain active until the generator is at rest again. <i>Active from safety on</i> - Auxiliary inputs are only active once the Safety On timer has timed out. This allows a delay on start up for faults, such as Oil Pressure and High Engine Temperature Warnings, or other shutdown conditions, which require a delay during start-up, such as Under-voltage. Input transducer type: <i>Not used</i> - The input will not be monitored. <i>Digital Switch, Normally Closed</i> - The input is fed from an engine mounted switch. The switch returns a closed signal during normal conditions, should the temperature rise above the switch manufacturers trip point the switch contacts will open. <i>Digital Switch, Normally Open</i> - The input is fed from an engine-mounted switch. The switch returns a closed signal during fault conditions, should the temperature rise above the switch manufacturers trip point the switch contacts will close. Further options available in this list depend upon the 'Units' selected: Units: ☒ Pressure = The expansion analogue is configured for a pressure sender. Transducer types available are: <i>VDO match, 0-5bar</i> <i>VDO match, 0-10bar</i> <i>Datcon match, 0-5bar</i> <i>Datcon match, 0-7bar</i> <i>Datcon match, 0-10bar</i> <i>Murphy, 0-7bar</i> <i>User Defined</i> <i>CMB 812 – DO NOT USE. Special option only, not for customer use.</i>

Function	Description
Expansion analogue input selections	☉ Temperature = The expansion analogue is configured for a temperature sender. Transducer types available are: <i>VDO match, 120°C*</i> <i>Datcon HIGH match</i> <i>Datcon LOW match</i> <i>Murphy</i> <i>Cummins</i> <i>PT100</i> <i>User Defined</i> ☉ Percentage = The expansion analogue is configured for a percentage reading sender. The sender must be 'linear' in terms of Ω and the measurement level. This type of input is most suited for fluid level measurement. Transducer types available are: <i>VDO Ohms type</i> - operating range = 10Ω (empty) to 180Ω (full). <i>VDO Tube type</i> – operating range = 90Ω (empty) to 0Ω (full). <i>US Ohms Range</i> - operating range = 240Ω (empty) to 33Ω (full). <i>GM Ohms Range (high)</i> - operating range = 0Ω (empty) to 90Ω (full). <i>GM Ohms Range (low)</i> - operating range = 0Ω (empty) to 30Ω (full). <i>Ford</i> - operating range = 73Ω (empty) to 10Ω (full). <i>User Defined</i>
Expansion analogue settings	Low alarm string (only available if <i>LOW shutdown or Low pre-alarms</i> has been enabled) This is the text that will appear on the module's display when either of the LOW alarms occur (i.e. LOW rad water temp) High alarm string (only available if <i>HIGH shutdown or HIGH pre-alarms</i> has been enabled) This is the text that will appear on the module's display when either of the LOW alarms occur (i.e. HIGH rad water temp) LOW / HIGH Shutdowns - Passing the adjustable trip point will give a shutdown alarm, and the module will display the relevant High or Low alarm string (see above). The 'trip' value can be adjusted to suit user requirements LOW / HIGH Pre-Alarms: - (Not available with digital switch inputs) ☐ = Pre-alarm warnings are disabled. ☒ = Pre-alarm warnings will occur should the measurement pass the specified trip point. The 'pre-alarm' value can be adjusted to suit user requirements. The measurement must return past the "return" setting before the 53xx module will consider that it is back with in limits and cancel the pre-alarm.

3.4 OUTPUTS

This menu allows the configurable output to be changed to suit the users requirements. The following is displayed: -

3.4.1 MODULE RELAY OUTPUTS



▲NOTE: - Each Auxiliary output has the same selection choices, allowing a combination of different uses.

Expansion outputs are available for 52xx/53xx type modules on a plug in Expansion module type 157, this provides up to 8 volt free contacts. The 157 modules are fitted with switch labelled 'A' and 'B'. With the switch in the 'A' position the 157 module will respond to signals from the 52xx/53xx module.

The 53xx module will also control a second output device (Expansion B) whereby the expansion module's selector must be in the 'B' position.

▲NOTE: - If the switch is placed in the 'B' position the 157 module will ignore all signals from the 52xx module.

If expansion outputs are required to be fitted for indication purposes only, a plug in LED Expansion module type 548 is available to provide up to 8 configurable LED's (+ Power On and Link Lost indicators). The 548 modules are fitted with switch labelled 'A' and 'B'. With the switch in the 'A' position the 548 module will respond to signals for expansion relays 1 - 8 and illuminate the appropriate LED's. The 53xx module will also control a second output device (Expansion B) whereby the expansion module's selector must be in the 'B' position.

▲NOTE: - In the 'B' position the 548 module will ignore all signals from the 52xx module.

If required it is possible to use a mix of both a 157 Relay module and a 548 LED module on the same 52xx/53xx Host. Expansion Relay 1 will operate in conjunction with Expansion LED 1 to provide volts free relay signals and LED indications of the same function.

!CAUTION! - The 157 relay status is updated twice a second. While this makes the response of the relays fast enough for annunciation, remote monitoring and normal system control it is not considered suitable for use in time critical applications such as high speed breaker tripping etc. If this type of function were intended, we would recommend using the 52xx/53xx modules own internal relay outputs to control such systems.

Polarity

Each of the outputs can be configured as:

- a) **Energised** - Normally open relay contact which closes on activation.
- b) **De-energised** - Normally closed relay contact, which opens on activation.

▲NOTE: - If the Expansion relays are actually control sources used for a 548 module then Energised = Lit and De-energised = Unlit.

▲NOTE: - The supplied configuration file 5310NFPA.mcf/5320NFPA.mcf contains set-up information for the expansion outputs, designed to operate the 549 NFPA110 annunciator module in conjunction with the P130 input expansion module. For further information on the P130 and P549 modules, please see the DSE manual entitled P130 input expansion module/P549 remote annunciator Operators Manual.

Output selection

Function	Description
Output Not Used	This output is not used.
Air flap Relay	This output controls the closing of the air-flaps in an Emergency Stop or Over-speed situation.
Alternative Frequency (53xx only)	This output indicates that the module has been configured to the alternate nominal frequency i.e. 60Hz.
Alternative Voltage (53xx only)	This output indicates that the module has been configured to the alternate nominal voltage i.e. 115V AC.
Audible alarm	This output is intended to drive an external Klaxon or alarm indicator and will be active upon the module triggering a warning, shutdown or electrical trip alarm. This external alarm can be 'muted', without resetting the module's alarm condition by activating an auxiliary input that has been configured to "Alarm Mute".
Battery High Voltage	This output indicates that a Battery High Voltage alarm has occurred.
Battery Low Voltage	This output indicates that a Battery Low Voltage alarm has occurred.
 CAN CAN ECU error (53xx only)	The engine ECU has indicated that a warning alarm is present.
 CAN CAN ECU fail (53xx only)	The engine ECU has indicated that a shutdown alarm is present.
 CAN CAN data fail (53xx only)	The 52xx/53xx module is unable to communicate with the engine ECU.
Charge alternator failure	This output indicates that a failure of the auxiliary charging alternator on the generator has occurred.
Calling for Scheduled run	This output indicates that a scheduled run in is progress.
Close Generator	This output source is intended to be used to control the load switching device. Whenever the 52xx/53xx module selects the generator to be on load this control source will be active.
Close Generator Pulse	This output source is intended to be used to control the load switching device. Whenever the 52xx/53xx module selects the mains to be on load, this control source will be active for the duration of the 'Breaker Close Pulse Timer'. Once this timer has expired, the output source will once again become inactive.
Close Mains	This output source is intended to be used to control the load switching device. Whenever the 5220/5320 modules select the mains to be on load this control source will be active.
Close Mains Pulse	This output source is intended to be used to control the load switching device. Whenever the 5220/5320 module selects the mains to be on load this control source will be active for the duration of the 'Breaker Close Pulse Timer'. Once this timer has expired the output source will once again become inactive.
Combined under & over Frequency warning	This output indicates that either an under frequency or over frequency warning has been activated.
Combined under & over Frequency shutdown	This output indicates that either an under frequency or over frequency shutdown has been activated.
Combined under & over voltage warning	This output indicates that either an under voltage or over voltage warning has been activated.
Combined under & over voltage shutdown	This output indicates that either an under voltage or over voltage shutdown has been activated.
Common alarm	This output indicates that a warning, electrical trip or shutdown alarm has been activated. Reset depends on whether it is a Warning or a Shutdown fault.

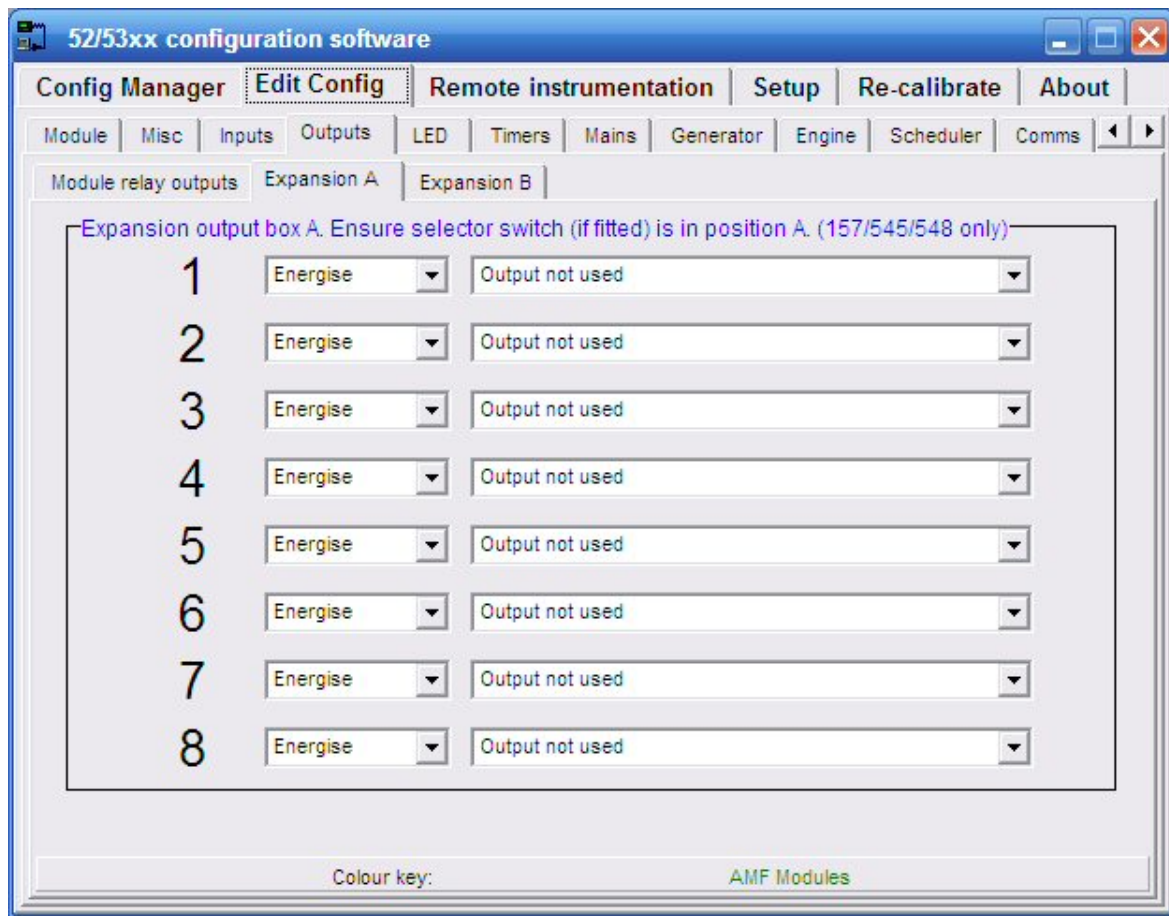
Function	Description
Common Electrical Trip alarm	This output indicates that an electrical trip alarm has been activated. This output can only be reset by removal of the fault and by then pressing the Stop Reset button.
Common Shutdown alarm	This output indicates that a shutdown alarm has been activated. This output can only be reset by removal of the fault and by then pressing the Stop Reset button or by using an external 'Alarm Reset' Input.
Common Warning alarm	The output indicates that a warning alarm has been activated. This output is normally self-resetting on removal of the fault. However, it is possible to configure the module such that the warning alarms are latching, if so this alarm will need to be reset either by pressing the Stop Reset button or by using an external 'Alarm Reset' Input.
Coolant temperature high pre-alarm	This output indicates that a high engine coolant temperature warning (pre-alarm) has occurred.
Coolant temperature high shutdown	This output indicates that a high engine coolant temperature shutdown has occurred.
Cooling down timer in progress	This output source will be active when the cooling off-load timer is running.
Delayed alarms active	The output indicates that the delayed alarms are now enabled. Can be used to control external logic circuitry.
Digital Input 1 active	This output indicates that Digital input 1 is active.
Digital Input 2 active	This output indicates that Digital input 2 is active.
Digital Input 3 active	This output indicates that Digital input 3 is active.
Digital Input 4 active	This output indicates that Digital input 4 is active.
Digital Input 5 active	This output indicates that Digital input 5 is active.
Digital Input 6 active	This output indicates that Digital input 6 is active.
Droop Enabled (53xx only)	The output indicates that Droop has been enabled.
ECU Power	This output is used to control the 'enable' or power signal to the CAN engine controller. The action of this output is determined by the 'Engine type' selected on the 'Misc' page.
ECU Stop	This output is used to control the 'stop' signal to the CAN engine controller. The action of this output is determined by the 'Engine type' selected on the 'Misc' page.
Emergency Stop	This output indicates that an Emergency stop alarm has occurred.
Energise to stop	The output controls the fuel solenoid on an ETS type generator, energising for the time period selected in the Edit Timer Menu. The normal fuel output (pin 4) should not be connected to the fuel solenoid, however it can be used for controlling panel instruments and other functions required whilst the engine is running.
Expansion Analogue IP 1 High pre-alarm	This output indicates that a high pre-alarm has been detected on expansion analogue input 1.
Expansion Analogue IP 1 High Shutdown	This output indicates that a high Shutdown has been detected on expansion analogue input 1.
Expansion Analogue IP 1 Low pre-alarm	This output indicates that a low pre-alarm has been detected on expansion analogue input 1.
Expansion Analogue IP 1 Low Shutdown	This output indicates that a low Shutdown has been detected on expansion analogue input 1.
Expansion Analogue IP 2 High pre-alarm	This output indicates that a high pre-alarm has been detected on expansion analogue input 2.
Expansion Analogue IP 2 High Shutdown	This output indicates that a high Shutdown has been detected on expansion analogue input 2.
Expansion Analogue IP 2 Low pre-alarm	This output indicates that a low pre-alarm has been detected on expansion analogue input 2.
Expansion Analogue IP 2 Low Shutdown	This output indicates that a low Shutdown has been detected on expansion analogue input 2.
Expansion Digital Input 1 Active	This output indicates that Expansion digital input 1 is active.

Function	Description
Expansion Digital Input 2 Active	This output indicates that Expansion digital input 2 is active.
Expansion Digital Input 3 Active	This output indicates that Expansion digital input 3 is active.
Expansion Digital Input 4 Active	This output indicates that Expansion digital input 4 is active.
Expansion Digital Input 5 Active	This output indicates that Expansion digital input 5 is active.
Expansion Digital Input 6 Active	This output indicates that Expansion digital input 6 is active.
Expansion Digital Input 7 Active	This output indicates that Expansion digital input 7 is active.
Expansion Digital Input 8 Active	This output indicates that Expansion digital input 8 is active.
Expansion loss of link	This indicates that the link to the P130 expansion module cannot be detected by the 53xx. Check the connection and configuration.
Fail to start alarm	The output indicates that the engine has not started after the specified number of attempts, selected in the Edit Miscellaneous Menu.
Fuel Pump Control	The output is used to control a fuel transfer pump. Once the 'fuel pump on' level has been reached the module will activate the fuel pump control output. This output will remain active until the 'fuel pump off' level is reached.
Generator at Rest	This output indicates that the generator is not running.
Generator Available	This output indicates when the generator is ready to accept load, i.e. after safety on and warm up timers have timed out. It could be used to connect to an Automatic Transfer System or PLC to give a signal that the set is available.
Generator Excite	This output is used to excite the main alternator once the engine is up to speed.
Generator High Frequency Pre-alarm	This output indicates that a Generator High Frequency Warning (pre-alarm) has occurred.
Generator High Frequency Shutdown	This output indicates that a Generator High Frequency Shutdown has occurred.
Generator High Voltage Pre-alarm	This output indicates that a Generator High Voltage Warning (pre-alarm) has occurred.
Generator High Voltage Shutdown	This output indicates that a Generator High Voltage Shutdown has occurred.
Generator Low Frequency Pre-alarm	This output indicates that a Generator Low Frequency Warning (pre-alarm) has occurred.
Generator Low Frequency Shutdown	This output indicates that a Generator Low Frequency Shutdown has occurred.
Generator Low Voltage Pre-alarm	This output indicates that a Generator Low Voltage Warning (pre-alarm) has occurred.
Generator Low Voltage Shutdown	This output indicates that a Generator Low Voltage Shutdown has occurred.
Louvre control	The output controls the opening of the louvres on engine starting and closure when engine has stopped.
Low Coolant temperature (Not applicable to 52xx.)	This output indicates that the temperature of the engine coolant has fallen below the low temperature alarm trip point, possibly indicating engine block heater failure.
Low Fuel Level	This output indicates that the level of fuel has fallen below the low fuel alarm trip point.
Mains Failure	This output indicates that the module has sensed that a failure of the incoming AC mains supply. This output will become active whenever the mains voltage or frequency goes out of limits, or if the auxiliary mains failure input active (if used) and the mains transient timer has expired.
Mains High frequency	This output indicates that the module has sensed that the incoming AC mains supply has exceeded the frequency limit setting.

Function	Description
Mains High voltage	This output indicates that the module has sensed that the incoming AC mains supply voltage has exceeded the voltage limit setting.
Mains Low frequency	This output indicates that the module has sensed that the incoming AC mains supply has fallen below the frequency setting.
Mains Low voltage	This output indicates that the module has sensed that the incoming AC mains supply voltage has fallen below the voltage limit setting.
Oil Press sender Open circuit	This output indicates that the module has detected an open circuit failure in the Oil Pressure transducer circuit.
Oil pressure low Pre-alarm	This output indicates that a low oil pressure warning (pre-alarm) has occurred.
Oil pressure low shutdown	This output indicates that a low oil pressure shutdown has occurred.
Open Generator	This output source is intended to be used to control the load switching device. Whenever the 52xx/53xx module selects the mains to be on load this control source will be active.
Open Generator Pulse	This output source is intended to be used to control the load switching device. Whenever the 52xx/53xx module selects the mains to be on load, this control source will be active for the duration of the 'Breaker open Pulse Timer'.
Open Mains	This output source is intended to be used to control the load switching device. Whenever the 5220/5320 module selects the generator to be on load this control source will be active.
Open Mains Pulse	This output source is intended to be used to control the load switching device. Whenever the 5220/5320 module selects the generator to be on load this control source will be active for the duration of the 'Breaker open Pulse Timer'. Once this timer has expired the output source will once again become in-active and the 5220/5320 will issue commands to load the generator.
Over current Pre-alarm	This output indicates that the over-current warning (pre-alarm) level has been reached.
Over current trip	This output indicates that the over-current trip level been reached.
Over speed Pre-alarm	This output indicates that an over speed warning (pre-alarm) has occurred.
Over speed Shutdown	This output indicates that an over speed shutdown has occurred.
Pre-heat (during preheat timer)	The output controls the pre-heater. Pre-heat output is available for the duration of the pre-heat timer, which terminates prior to cranking.
Pre-heat (until end of cranking)	The output controls the pre-heater. As 'Pre-heat (during preheat timer)' mode but pre-heat is also available during cranking.
Pre-heat (until end of warming)	The output controls the pre-heater. As 'Pre-heat (until safety on)' but pre-heat continues to be available until the warm-up timer has elapsed.
Pre-heat (until safety on)	The output controls the pre-heater. As 'Pre-heat (until end of cranking)' but pre-heat is also available while waiting for the delayed alarms to become active.
Smoke Limit	This is used to supply a smoke-limiting signal to an Electronic Governor to limit smoke emissions on start-up. It is used in conjunction with the Smoke limit timer settings. Once the Timer has expired, the Smoke limit output will cease to operate allowing the engine to accelerate to normal running speed.
System in Auto Mode	The output indicates that the module is in the Auto mode.
System in Manual Mode	This output indicates that the module is in the manual mode.
System in Stop Mode	The output indicates that the module is in the Stop mode.
System in Test Mode	This output indicates that the module is in the test mode.
Telemetry Active (Relay)	This output indicates that the remote telemetry link is active. This output may be used by either an LED or a Relay. It will be active whenever the remote telemetry link is active.
Telemetry data activity (LED)	This output indicates that the remote telemetry link is active. This output is intended to be fed to an LED to indicate data activity. It is not suitable for use by the output relays.
Under speed Shutdown	This output indicates that an under speed shutdown has occurred.
Under speed Warning	This output indicates that an under speed warning (pre-alarm) has occurred.

Waiting for manual restore	The 52xx/53xx has detected that the remote start signal is inactive or the mains supply has returned to within limits and is now available to take the load. However, it is receiving a 'Manual Restore' signal. Until this is removed it will continue to run on the generator.
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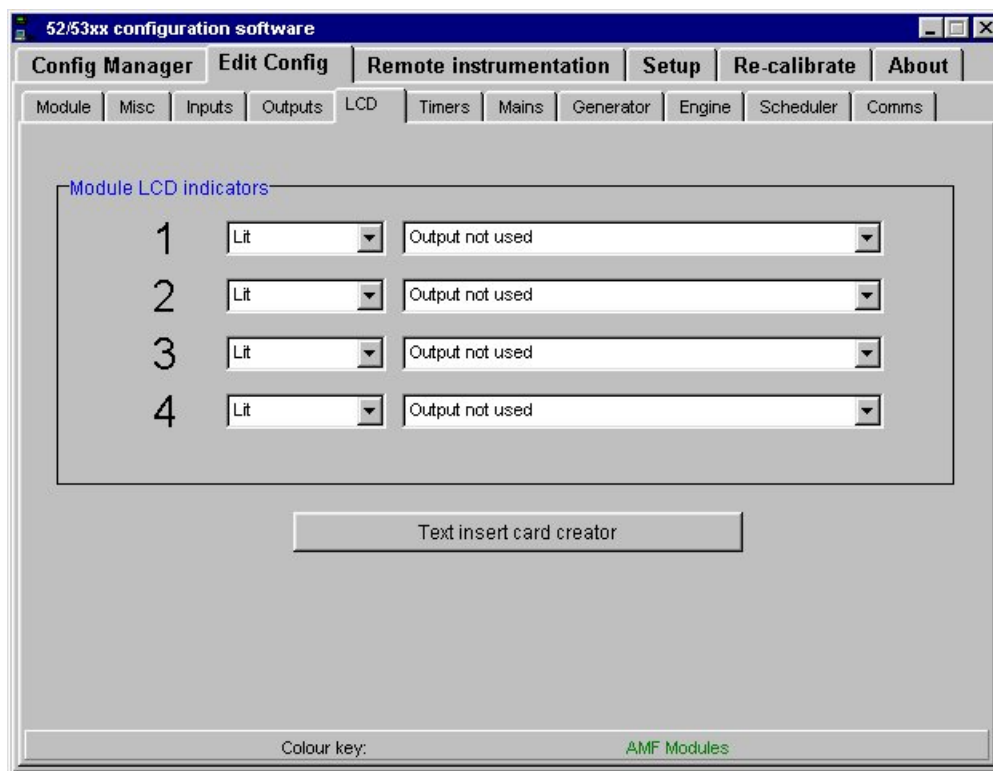
3.4.2 EXPANSION A (AND B 53XX ONLY)



Expansion outputs A and B use the same drop down list as the module relay outputs, and are configured in exactly the same way. Both 52xx and 53xx support expansion output A, and the 53xx supports expansion B.

3.5 FRONT PANEL INDICATORS (LCD's)

This menu allows the configurable LCD indicators (52xx) or LED indicators (53xx) to be changed to suit the users requirements. The following is displayed:- (Typical Settings for information only).



NOTES:-1: - Each of the four configurable LCD/LED indicators has the same selection of choices as stated in the edit outputs section of this manual.

2: - Each of the four configurable LCD/LED indicators can be set to any function, allowing for flexible configuration.

3: - If expansion outputs are required to be fitted for indication purposes only, a plug in LED Expansion module type 548 is available to provide up to 8 configurable LED's (+ Power On and Link Lost indicators). The 548 modules are fitted with a switch labelled 'A' and 'B'. With the switch in the 'A' position the 548 module will respond to signals for expansion relays 1 - 8 and illuminate the appropriate LED's. With the switch in the 'B' position the 548 module will respond to signals for expansion relays 9 - 16 and illuminate the appropriate LED's – Only the 53xx module can provide output control.

The 53xx module will also control a second output device (Expansion B) whereby the expansion module's selector must be in the 'B' position.

NOTE: - In the 'B' position the 548 module will ignore all signals from the 52xx module.

Polarity

Each of the LED's can be configured as:

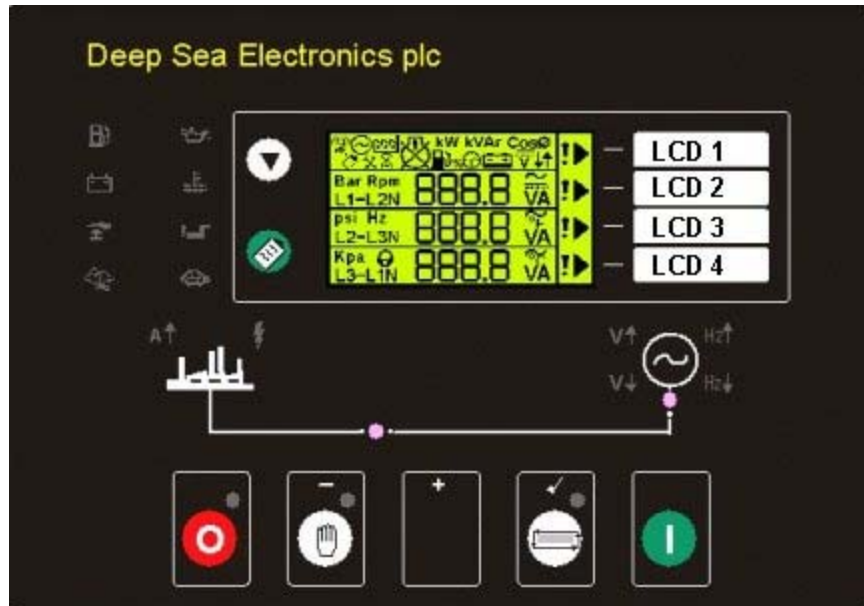
- a) **Lit** - Normally extinguished LED/LCD indicator, which illuminates on activation.
- b) **Unlit** - Normally illuminated LED/LCD indicator, which extinguishes on activation.

Control Source

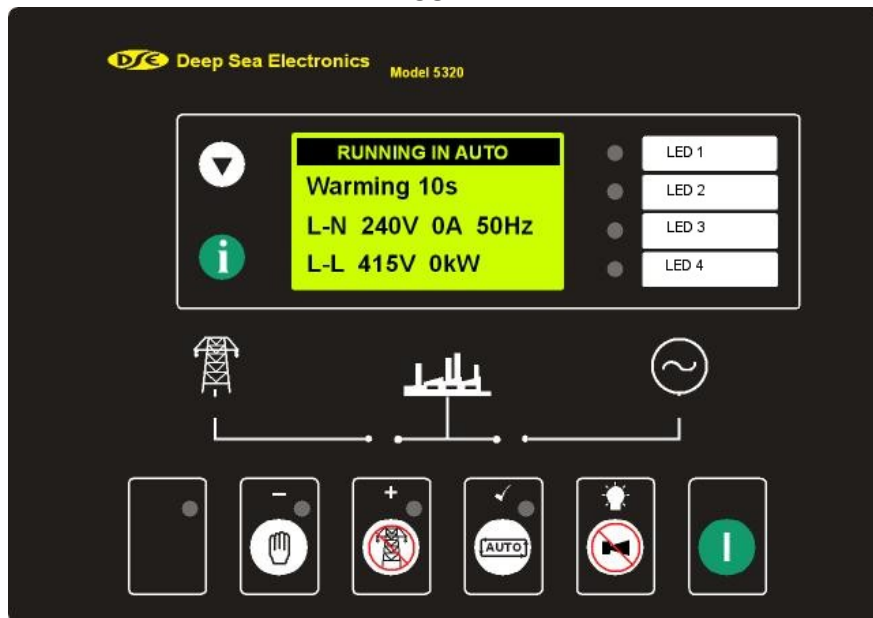
Refer to Output Selection shown in Edit Outputs section of this manual.

LCD IDENTIFICATION

52xx



53xx

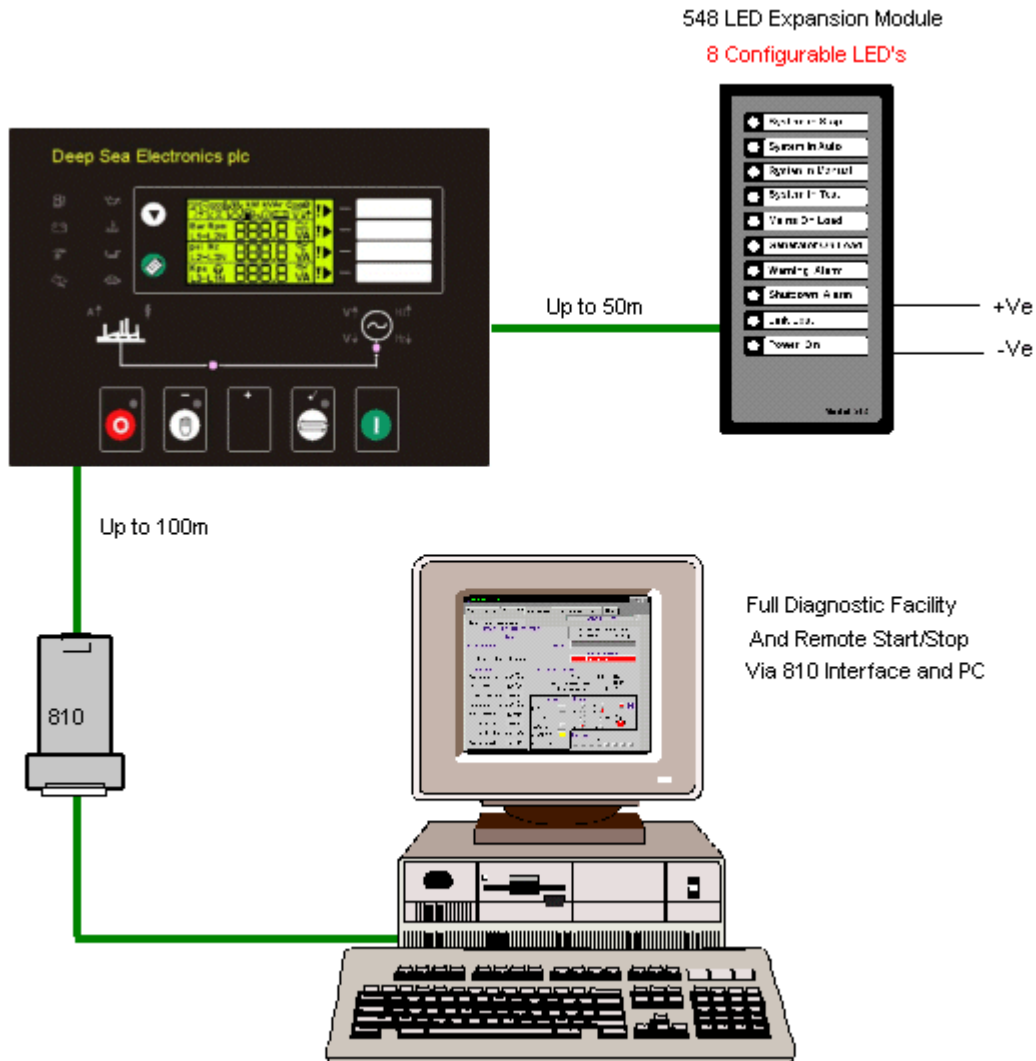


The above diagram indicates which LCD number in the configuration corresponds to which LED/LCD indicator on the front label.

LED EXPANSION

The 52xx Module supports a single 548 (8 LED) expansion module.

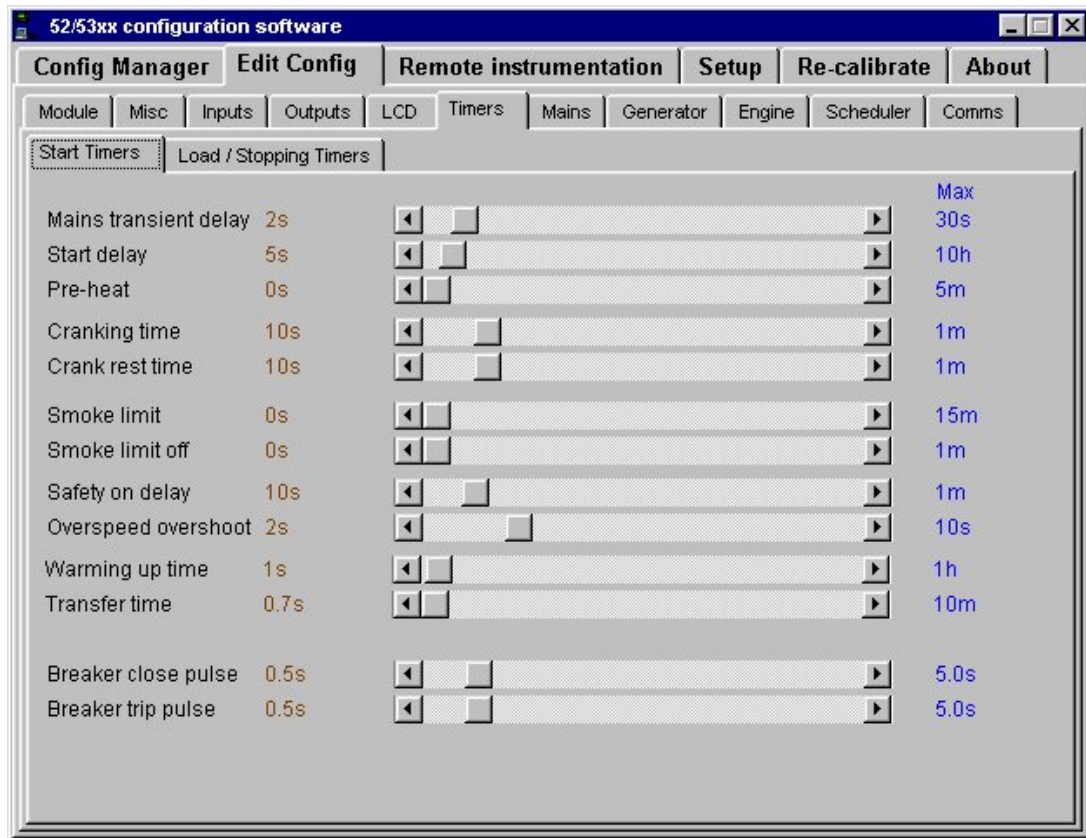
The 53xx Module supports up to two 548 (8 LED) expansion modules – giving up to 16 configurable LED's.



3.6 TIMERS

This menu allows the configurable system timers to be changed to suit the users requirements. The following menu is displayed: -

3.6.1 START TIMERS

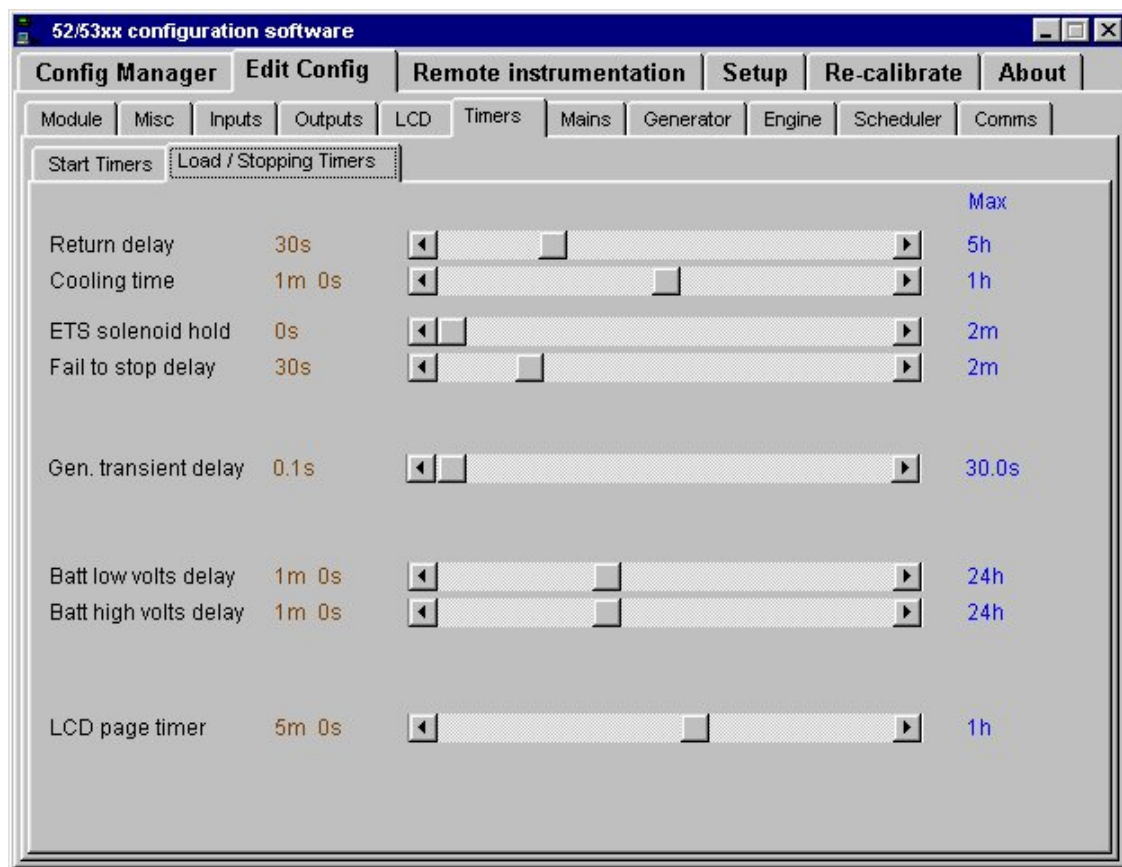


NOTES: - Timers can be adjusted by clicking on either the up or down arrow or by clicking on the bar and dragging the bar to the correct time. As the timers can be accurately set to exact times, it is possible to initially configure the module with the timers reduced to allow rapid testing of the finished generating set. Once the set is ready for a final witness test, it is just a simple matter of entering the specified timer settings and writing them to the module.

Start Timers	Function
Mains Transient Delay	(Only available on 5220/5320 module) This timer dictates how long a mains anomaly must be present before the module will respond to it. This can be used to prevent nuisance tripping when switching loads etc.
Start delay	This timer dictates how long the module will wait after it has received a remote start signal (or mains failure signal – 5220/5320 only) before it will attempt to start. This prevents unnecessary starting on a fluctuating mains supply, etc.
Pre-heat	This timer dictates the duration that the pre-heat output will be active before an attempt is made to start the engine. Once this timer has expired cranking will commence.
Cranking time	This is the maximum amount of time that the module will energise the starter motor for during starting attempts once the starter has engaged.
Crank rest time	This is the amount of time the module will wait for between start attempts. This is to allow the starter motor to cool and the starter batteries to recover.
Smoke limiting	This is the amount of time that the smoke limiting output will remain active once the engine has started. While the smoke limiting output is active the engine will be held at a reduced speed to minimise smoke emissions on start-up. (Only if fitted with an appropriate Electronic Fuel Control module). Once the timer has expired the engine will be allowed to accelerate up to its normal operating speed.
Smoke limiting off	This is the amount of time that the 'delayed alarms' protection is held inactive following termination of the Smoke Limit mode. This is to allow the engine to accelerate to it's normal running speed without triggering an under speed alarm, etc. The Low Oil Pressure Alarm is not delayed by this timer.
Safety on delay	This timer dictates how long the module will ignore the Low oil pressure, High Engine Temperature, Underspeed, Undervolts and any other inputs configured as active from safety on. It allows the values such as oil pressure to rise to their operating values on starting without triggering an alarm. Once the timer has expired all alarm conditions are monitored again. If configured to use 'fast loading', should all the monitored conditions, such as oil pressure, come to the expected state prior to the end of the safety on timer, the timer will be terminated prematurely ensuring maximum protection as soon as possible.
Over speed Overshoot	This timer is used to prevent nuisance tripping on generators where a slow response governor allows the engine to over speed slightly during start-up. This setting allows the normal over speed shutdown level to be exceeded by a percentage (up to a maximum of 10% - see 'Engine', 'Speed settings') for the duration of the timer. Should the engine speed exceed this temporarily elevated level it will be shutdown. Once the over speed timer has expired the over speed shutdown value is restored to the normal level.  NOTE: - This is not a delay on over speed shutdown, only a temporary raising of the over speed value, therefore over speed protection is not compromised.
Warm up timer	This timer is initiated once the engine is up and running. It delays loading the generator until it has stabilised. Once this timer has expired the 'Close generator' signal will be given and the generator is available to be loaded.

3.6.2 LOAD/STOPPING TIMERS

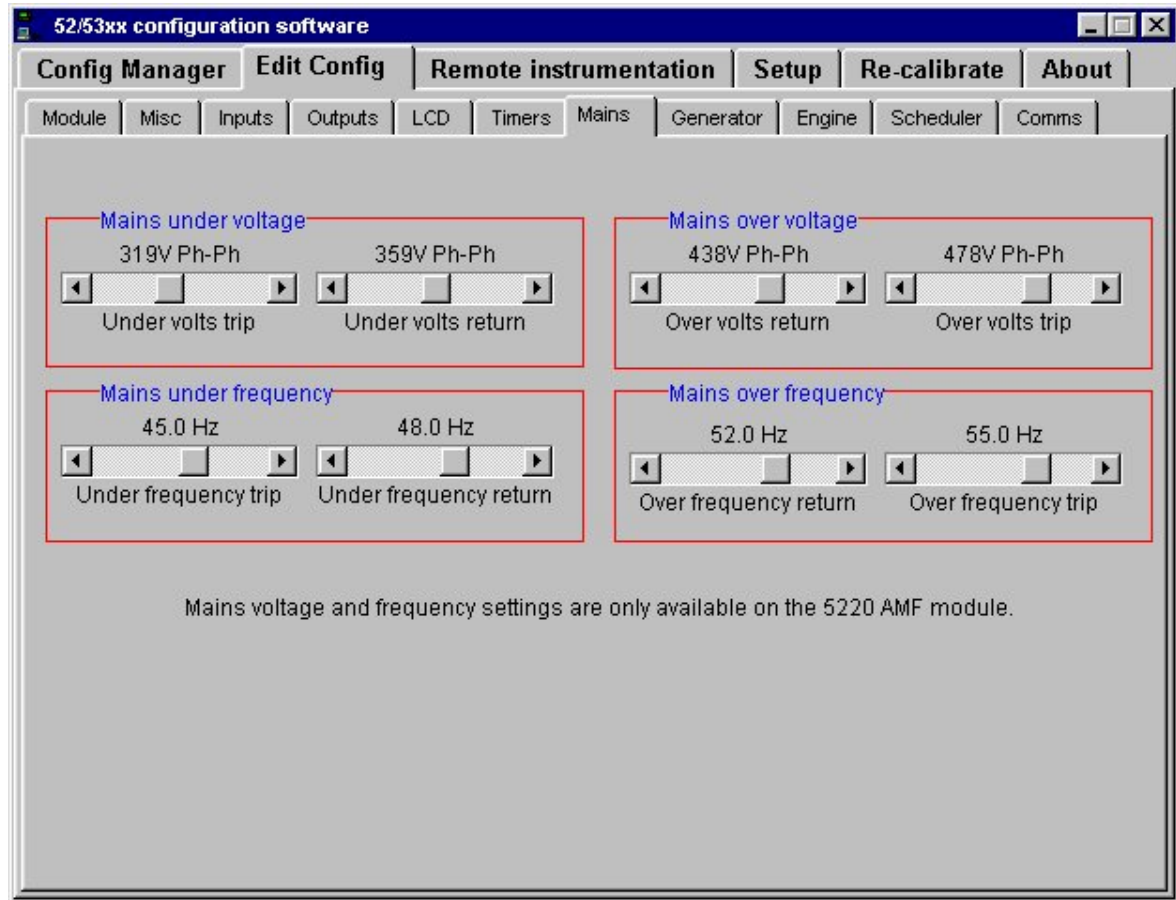
Start Timers	Function
Transfer time	This is used to allow for fixed duration transfer breaks when switching from mains to generator and back. It can be used to ensure that the supply is removed from the load for a fixed period of time to allow pumps/motors to come to rest etc.
Breaker Close Pulse Time	This is used to determine the duration of the Mains and Generator close signals. This timer is only used if Pulsed outputs are configured to be used.
Breaker Open Pulse Time	This is used to determine the duration of the Mains and Generator open signals. This timer is only used if pulsed outputs are configured to be used.



Loading /Stopping	Function
Return delay	This timer dictates how long the module will wait before it will unload the generator (back to the mains supply if AMF) and initialise it's run-on and shutdown cycle. This is to ensure that the mains supply has stabilised before transferring the load back to mains.
Cooling Time	This is the time the generator is to run off-load once the load transfer signal has ceased. This gives the engine time to cool down before shutdown.
ETS Solenoid hold time	This timer is used if the unit is configured to operate an Energise to stop engine. It dictates the duration that the ETS output will remain active after the module has detected the engine has come to rest. If the ETS output is not configured, this timer will still operate, preventing an immediate restart.
Fail to stop delay time	Once the module has given a shutdown signal to the engine it expects the engine to come to rest. It monitors the Oil pressure and speed sensing sources and if they still indicate engine movement when this timer expires a 'Fail to stop' alarm signal is generated.
Generator Transient Delay	This timer dictates how long a generator anomaly must be present before the module will respond to it. This can be used to prevent nuisance tripping when switching loads etc.
Battery Low Volts Delay	This timer dictates how long the module will wait before it will give a low DC plant voltage alarm in the event of the plant voltage falling below low voltage trip level. This can be used to prevent nuisance alarms when using poorly regulated power supplies and battery chargers, and during engine cranking.
Battery High Volts Delay	This timer dictates how long the module will wait before it will give a high DC plant voltage alarm in the event of the high voltage trip level being exceeded. This can be used to prevent nuisance alarms when using poorly regulated power supplies and battery chargers.
LCD Page timer	This timer dictates how long the module will remain on a given page before returning the default status display. On the 53xx this feature is overridden when 'Auto-scroll' is in operation.

3.7 MAINS

This menu allows the mains sensing configurable trip values to be edited to the users required levels. The following menu is displayed:



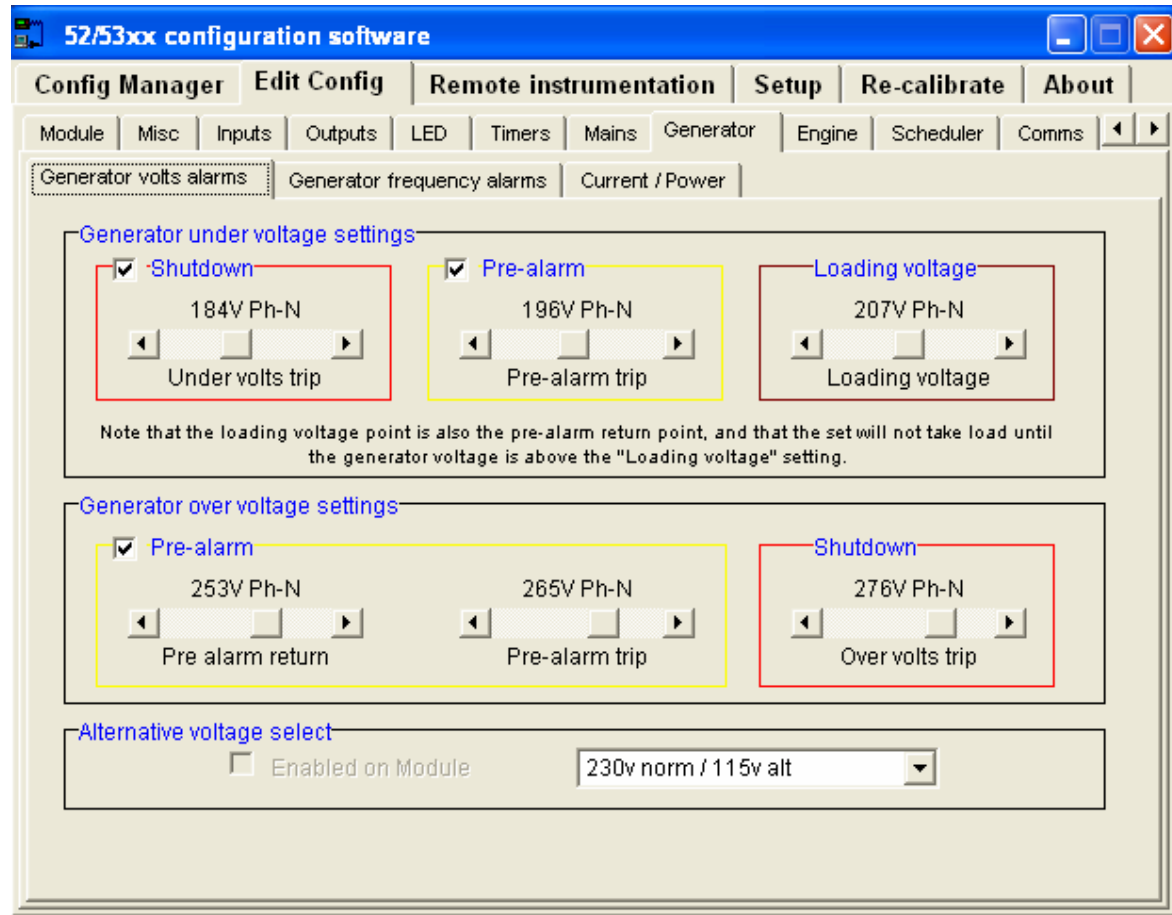
NOTE: Mains sensing is only available on the 5220/5320 modules

Level	Function
Mains Under voltage	These settings are used to configure the mains under voltage alarm: - Under Voltage Trip - This is the minimum voltage that the 5220/5320 will consider the incoming AC mains supply to be within limits. Should the input fall below this value the module will indicate a mains failure and function accordingly. Under Voltage Return - This is the voltage above the under voltage trip that the incoming mains supply must return to before the 5220/5320 module will consider that the supply is back with in limits. (I.e. With a under voltage trip of 184.0V and a under voltage return of 207.0V, the mains voltage must return to 207.0V following an under voltage event to be considered within limits.)
Mains Over voltage	These settings are used to configure the mains Over voltage alarm: - Over Voltage Trip - This is the maximum voltage that the 5220/5320 will consider the incoming AC mains supply to be within limits. Should this value be exceeded the module will indicate a mains failure and function accordingly. Over Voltage Return - This is the voltage that the incoming mains supply must return to before the 5220/5320 module will consider that the supply is back with in limits. (i.e. With a over voltage trip of 276.0V and a over voltage return of 253.0V, the mains voltage must return to 253.0V following an over voltage event to be considered within limits.)
Mains Under Frequency	These settings are used to configure the mains under frequency alarm: - Under Frequency Trip - This is the minimum frequency that the 5220/5320 will consider the incoming AC mains supply to be within limits. Should the input fall below this value the module will indicate a mains failure and function accordingly. Under Voltage Return - This is the frequency above the under frequency trip that the incoming mains supply must return to before the 5220/5320 module will consider that the supply is back with in limits. (I.e. With a under frequency trip of 45.0Hz and a under frequency return of 48.0Hz, the mains frequency must return to 48.0Hz following an under frequency event to be considered within limits.)
Mains Over Frequency	These settings are used to configure the mains Over frequency alarm: - Over Frequency Trip - This is the maximum frequency that the 5220/5320 will consider the incoming AC mains supply to be within limits. Should this value be exceeded the module will indicate a mains failure and function accordingly. Over Voltage Return - This is the frequency below the over frequency trip that the incoming mains supply must return to before the 5220/5320 module will consider that the supply is back with in limits. (I.e. With a over frequency trip of 55.0Hz and a over frequency return of 52.0Hz, the mains frequency must return to 52.0Hz following an over frequency event to be considered within limits.)

3.8 GENERATOR

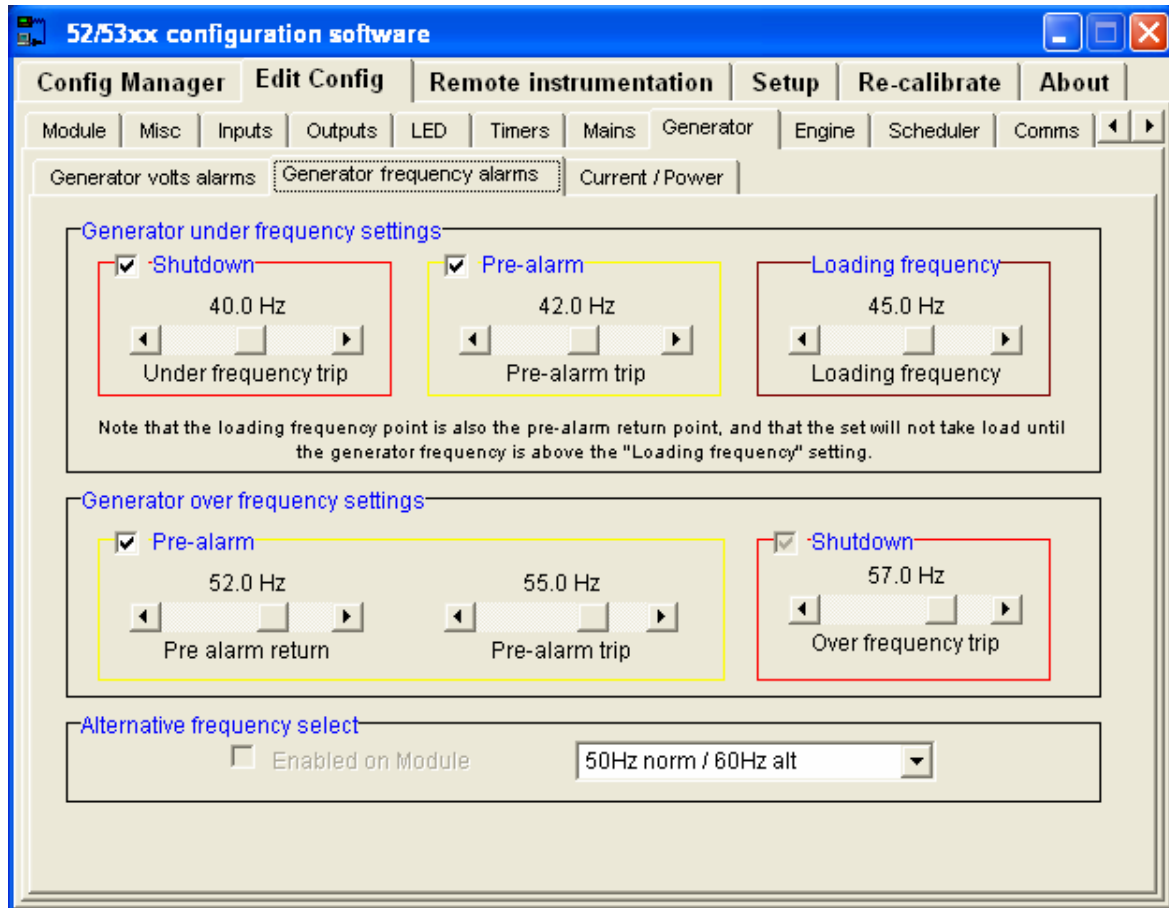
This menu allows the generator configurable trip values to be edited to the users required levels. The following menu is displayed:

3.8.1 GENERATOR VOLTS ALARMS



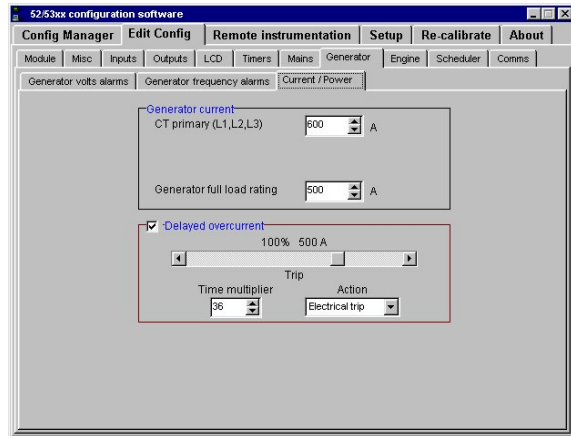
Generator Volts Alarms	Function
Generator Under voltage	These settings are used to configure the generator under voltage alarm: - Shutdown - ☐ = Generator Under Volts will NOT give a Shutdown alarm ☒ = Generator Under Volts WILL give a shutdown alarm in the event of the generator output falling below the displayed '<i>under volts trip</i>' value. The '<i>under volts trip</i>' value can be adjusted to suit user requirements. Pre-alarm - ☐ = Generator Under Volts will NOT give a pre-alarm warning ☒ = Generator Under Volts WILL give a pre-alarm warning in the event of the generator output falling below the displayed '<i>under volts pre-alarm</i>' value. The '<i>under volts pre-alarm</i>' value can be adjusted to suit user requirements. Loading Voltage - This is the minimum voltage the generator must be operating at before the 52xx/53xx module will consider it available to take the load. It is also the voltage above the under voltage trip that the generator output must return to before the 52xx/53xx module will consider that the supply is back with in limits. (I.e. With a under voltage trip of 184.0V and a under voltage return of 207.0V, the output voltage must return to 207.0V following an under voltage event to be considered within limits.)
Generator Over voltage	These settings are used to configure the generator over voltage alarm: - Pre-alarm - ☐ = Generator Over Volts will NOT give a pre-alarm warning ☒ = Generator Over Volts WILL give a pre-alarm warning in the event of the generator output rising above the displayed '<i>over volts pre-alarm</i>' value. The '<i>over volts pre-alarm</i>' value can be adjusted to suit user requirements. The voltage must return to below the '<i>Over volts return</i>' setting before the 52xx/53xx module will consider that the supply is back with in limits. (I.e. With a over voltage trip of 276.0V and a over voltage return of 253.0V, the mains voltage must return to 253.0V following an over voltage event to be considered within limits.) Shutdown - This is the setting at which a Generator Over Volts will give a shutdown alarm in the event of the generator output rising above the displayed '<i>over volts trip</i>' value. The '<i>over volts trip</i>' value can be adjusted to suit user requirements.

3.8.2 GENERATOR FREQUENCY ALARMS

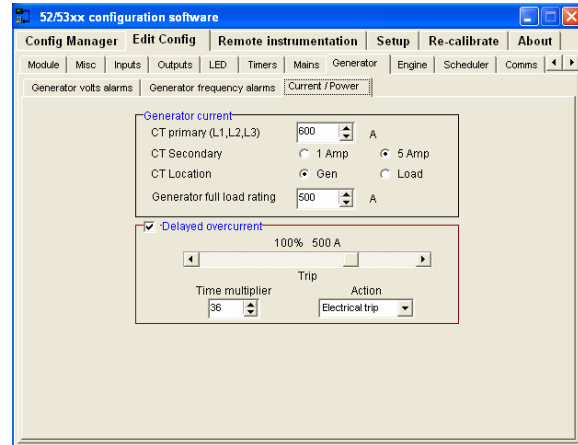


Generator Freq. Alarms	Function
Generator Under frequency	These settings are used to configure the generator under frequency alarm: - Shutdown - ☐ = Generator Under Frequency will NOT give a Shutdown alarm ☒ = Generator Under Frequency WILL give a shutdown alarm in the event of the generator output falling below the displayed '<i>under frequency trip</i>' value. The '<i>under frequency trip</i>' value can be adjusted to suit user requirements. Pre-alarm - ☐ = Generator Under frequency will NOT give a pre-alarm warning ☒ = Generator Under frequency WILL give a pre-alarm warning in the event of the generator output falling below the displayed '<i>under frequency pre-alarm</i>' value. The '<i>under frequency pre-alarm</i>' value can be adjusted to suit user requirements. Loading Frequency - This is the minimum frequency the generator must be operating at before the 52xx/53xx module will consider it available to take the load. It is also the frequency above the under frequency trip that the generator output must return to before the 52xx/53xx module will consider that the supply is back within limits. (i.e. With a under frequency trip of 45.0Hz and a under frequency return of 48.0Hz, the mains frequency must return to 48.0Hz following an under frequency event to be considered within limits.)
Generator Over frequency	These settings are used to configure the generator over frequency alarm: - Pre-alarm - ☐ = Generator Over frequency will NOT give a pre-alarm warning ☒ = Generator Over frequency WILL give a pre-alarm warning in the event of the generator output rising above the displayed '<i>over frequency pre-alarm</i>' value. The '<i>over frequency pre-alarm</i>' value can be adjusted to suit user requirements. The frequency must return to below the '<i>Over frequency return</i>' setting before the 52xx/53xx module will consider that the supply is back within limits. (i.e. With a over frequency trip of 55.0Hz and a over frequency return of 52.0Hz, the mains frequency must return to 52.0Hz following an over frequency event to be considered within limits.) Shutdown - ☐ = Generator Over Frequency will NOT give a Shutdown alarm ☒ = Generator Over Frequency WILL give a shutdown alarm in the event of the generator output rising above the displayed '<i>over frequency trip</i>' value. The '<i>over frequency trip</i>' value can be adjusted to suit user requirements.  NOTE: - If Generating output frequency is selected as the only source of speed sensing (i.e. no Mag-pickup fitted), then the generator over frequency trip can not be disabled as it provides an over speed protection function. If a Mag-pickup is fitted and selected as the speed-sensing source it is possible to disable the over frequency trip if required.

3.8.3 CURRENT/POWER



52xx controllers



53xx controllers

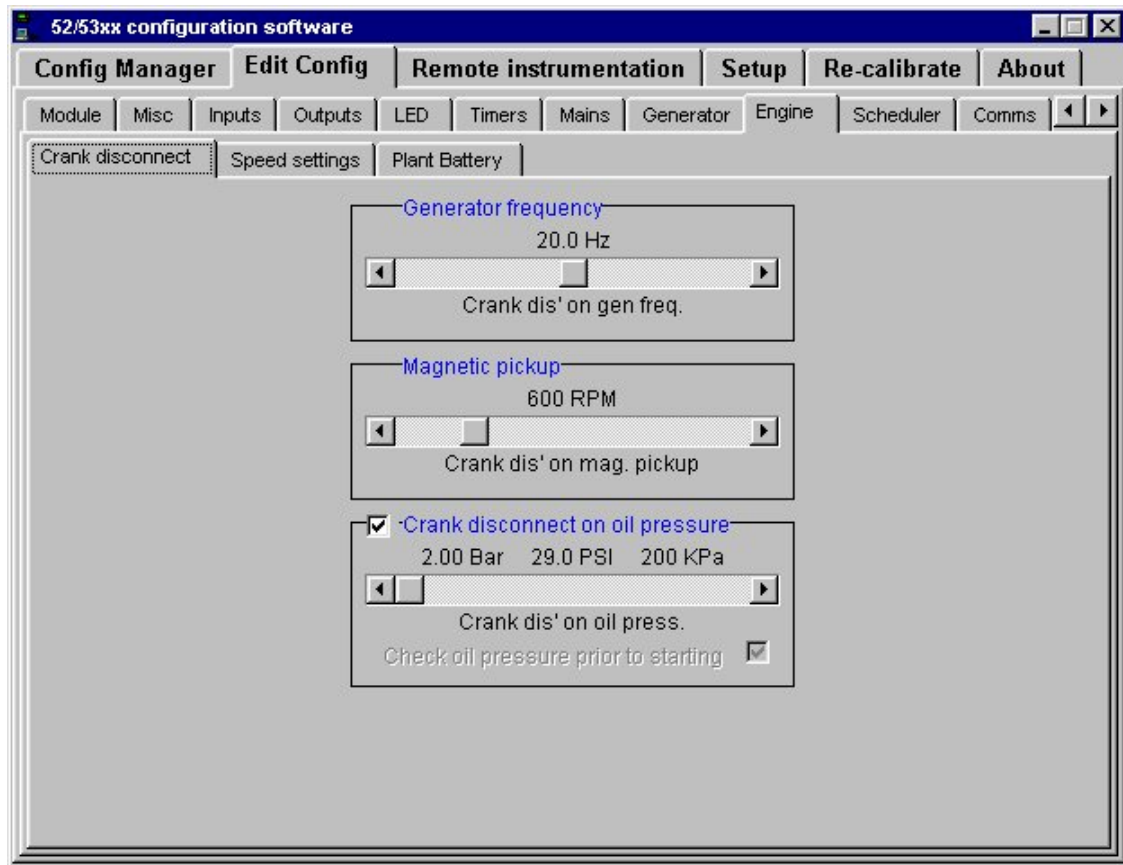
Generator Current Transformer Settings	Function
CT Primary (L1,2,3) -	This setting is used to set the primary current rating of the three phase monitoring CT's. The secondary of the CT's should be rated at 5 Amps output on the 5220.
CT Secondary (53xx only)	Option to select 1A or 5A Secondary CT's
CT Location	5320 modules only ☉ = Generator only. The CTs are used only to measure the generator output current. ☉ = Load feed. The CTs are used to measure the load current. When running on generator, this is the generator output current, when running on mains, this is the mains supply current. ! CAUTION! The CTs are used for Generator load instrumentation and protection, and mains load instrumentation only. There is NO protection against mains overcurrent.
Generator Full Load Rating -	This setting is used to set the actual full load current the generator is rated to give. This setting is used to give over-current protection and may be adjusted to 'de-rate' the generator, for example, for temperature or altitude. This setting must be within the range of 50% - 100% of the actual CT primary ratio fitted to the generating set.

Generator Current/Power Alarms	Function
Delayed Over current	This setting is used to configure the generator over current alarm: - ☐ = Generator over current will NOT give an electrical trip alarm. ☒ = Generator over current WILL give an electrical trip alarm in the event of the load current exceeding the displayed 'over current trip' values. The 'over current trip' values can be adjusted to suit user requirements as detailed below. The following configurable settings are provided: Delayed over current setting (I_T/I) (range 0.80 to 1.20 in steps of 0.01) (default 1.00) Time multiplier (t) (range 1 to 36 in steps of 1) (default 36) Where: I_T is the delayed over-current trip point I is the Generator full load current rating The delayed over-current tripping time is given by the formula: $T = t / ((I_A/I_T)-1)^2$ Where: T is the tripping time in seconds I_A is the actual current of the most highly loaded line (L1 or L2 or L3) I_T is the delayed over-current trip point t is the time multiplier setting and also represents the tripping time in seconds at twice full load when $I_A/I_T = 2$ If I_A exceeds I_T, then the Delayed Over Current warning will occur immediately and the protection will trip after T seconds. This curve matches the thermal damage curve of a typical brush-less alternator but it can be modified if necessary by changing the configurable settings. Example. If the time multiplier is set to 36 a 2 x overload will trip in 36 seconds Actions Warning (Alarm only, No shutdown) Shutdown (Alarm and shutdown) Electrical Trip (Alarm/off-load generator followed by shutdown after cooling)

3.9 ENGINE

This menu allows the engine configurable trip values to be edited to the users required levels. The following menu is displayed:

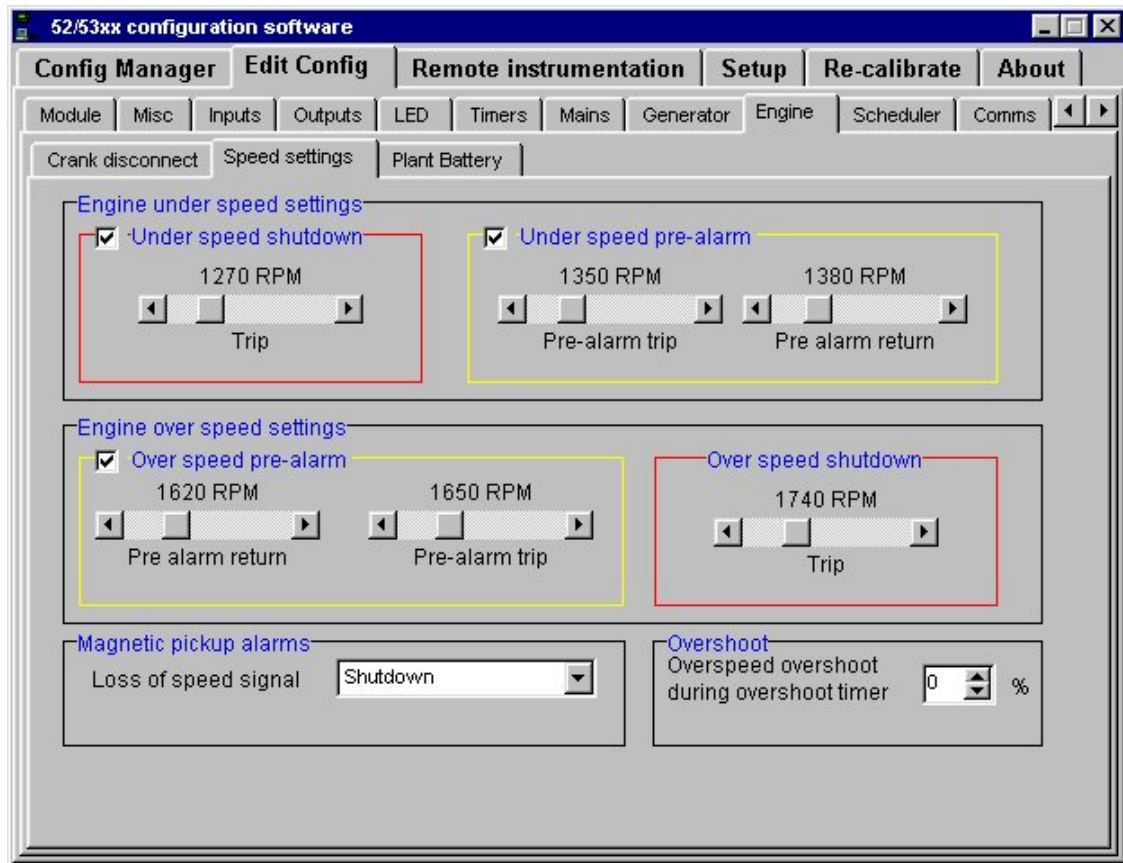
3.9.1 CRANK DISCONNECT



NOTE: The 52xx/53xx module has three possible sources of crank disconnect namely magnetic pickup, alternator frequency and engine oil pressure. Any of these sources may be used individually, but it is also possible to use multiple sources or all three. If this is the case the source which reaches its crank disconnect level first will cause the starter motor to disengage regardless of the state of the remaining monitored sources. This feature allows for a much faster crank disconnect response leading to less wear on the engine and starter components, and provides added safety in case one source is lost.

Crank Disconnect	Function
Crank disconnect on generator frequency	(Only available if using Generator Frequency Sensing) This level dictates the value that has to appear on the alternator frequency input (if used) before the starter motor will be instructed to disengage.
Crank disconnect on magnetic pickup	(Only available if using Magnetic Pick-up Sensing) This level dictates the value that has to be given by the magnetic pickup sensor (if used) before the starter motor will be instructed to disengage.
Crank disconnect on oil pressure	☐ = Engine oil pressure will NOT be used for crank disconnect. ☒ =Engine oil pressure WILL be used for crank disconnect in the event of the oil pressure exceeding the displayed '<i>crank disconnect on oil pressure</i>' value. The '<i>crank disconnect on oil pressure</i>' values can be adjusted to suit user requirements as detailed below. This level dictates the value that has to be reached by the engine oil pressure sender reading before the starter motor will be instructed to disengage. This setting can be used to obtain a crank disconnect much earlier than if alternator speed sensing is used, particularly if using alternators fitted with digital voltage regulators as these can take some time to produce an output. ⚠ CAUTION! - If this feature is not to be used ensure that this setting is set to OFF to prevent premature crank disconnect. Check oil pressure prior to starting - If oil pressure is not required to be monitored to provide a crank disconnect and the feature is set to OFF; The software will query if oil pressure should be monitored as a indication of engine at rest: ☐ = Engine oil pressure will NOT be monitored to check if the engine is at rest. This would be used if an oil prime or pre-lubrication system is fitted, and would ensure that the engine would be allowed to start if oil prime was operating. ☒ =Engine oil pressure WILL be used to ensure that the engine is at rest. This is a back up to prevent the start motor from being engaged onto a running engine in the event of all other speed sensing forms being unavailable. ⚠ CAUTION! - This is a safety feature and should only be set to OFF if it is strictly necessary to disable oil pressure monitoring at rest. Such as when fitted to system which incorporate a pre-lube oil pump.

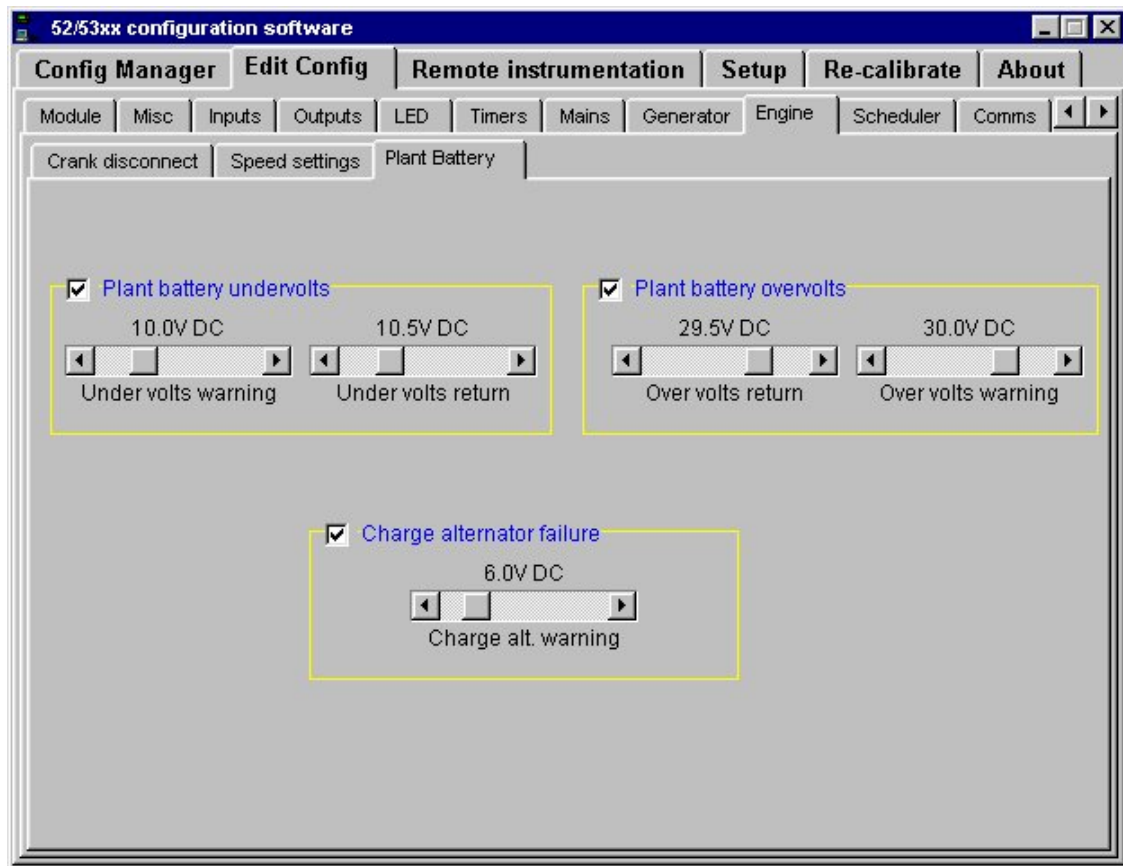
3.9.2 SPEED SETTINGS



Speed Settings	Function
Generator Under Speed	These settings are used to configure the generator under speed alarm: - Shutdown - ☐ = Generator Under speed will NOT give a Shutdown alarm ☒ = Generator Under speed WILL give a shutdown alarm in the event of the generator speed falling below the displayed '<i>underspeed trip</i>' value. The '<i>underspeed trip</i>' value can be adjusted to suit user requirements. Pre-alarm - ☐ = Generator Under speed will NOT give a pre-alarm warning ☒ = Generator Under speed WILL give a pre-alarm warning in the event of the generator speed falling below the displayed '<i>under speed pre-alarm</i>' value. The '<i>under speed pre-alarm</i>' value can be adjusted to suit user requirements. The speed must return to above the '<i>Underspeed return</i>' setting before the 52xx/53xx module will consider it back within limits.

Speed Settings	Function
Generator Over Speed	These settings are used to configure the generator over speed alarm: - Pre-alarm - ☐ = Generator Over speed will NOT give a pre-alarm warning ☒ = Generator Over speed WILL give a pre-alarm warning in the event of the generator speed rising above the displayed '<i>over speed pre-alarm</i>' value. The '<i>over speed pre-alarm</i>' value can be adjusted to suit user requirements. The speed must return to below the '<i>Over speed return</i>' setting before the 52xx/53xx module will consider that it is back within limits. Shutdown - This is the setting at which a Generator Over speed will give a shutdown alarm in the event of the generator speed rising above the displayed '<i>over speed trip</i>' value. The '<i>over speed trip</i>' value can be adjusted to suit user requirements.
Overshoot	Over-speed Overshoot during Overshoot timer- This value is used to prevent nuisance tripping on generators where a slow response governor allows the engine to over speed slightly during start-up. This setting allows the normal over speed shutdown level to be exceeded by a percentage (up to a maximum of 10%) for the duration of the over speed overshoot timer. Should the engine speed exceed this temporarily elevated level it will be shutdown. Once the over speed overshoot timer has expired, the over speed shutdown value is restored to the normal level.  NOTE: - This is not a delay on over speed shutdown, only a temporary raising of the over speed value, therefore over speed protection is not compromised.
Magnetic Pickup alarms	 CAN This option is not available when the controller is configured for CAN operation. Loss of Speed Signal The 52xx/53xx module will monitor the Magnetic pick-up input to ensure that a value signal is received once cranking commences. If it does not detect a magnetic pickup signal a 'Loss of speed signal' alarm will be triggered. The user can configure the module to either; Alarm but continue to operate the generator (only to be used if other speed sensing sources are available), or to shutdown the generator until the fault is rectified. Actions Warning (<i>Alarm only, No Shutdown</i>) Shutdown (<i>Alarm and shutdown</i>)  CAUTION! - This alarms is set to SHUTDOWN by default. It should only be set to WARNING if it really is necessary and ONLY if alternative speed sensing sources are available to the 52xx/53xx module to use. Failure to observe this may result in damage to the engine and/or starting equipment.

3.9.3 PLANT BATTERY

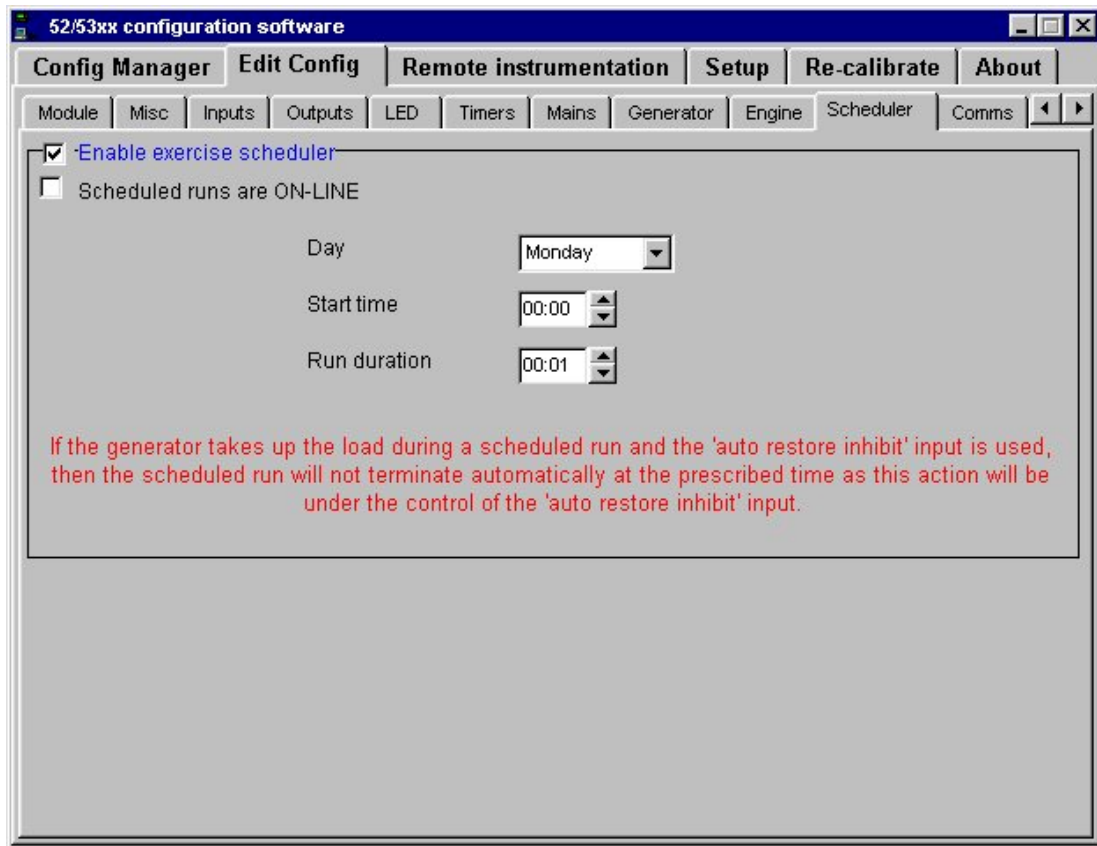


Plant Battery	Function
Plant Battery Undervolts	Plant Battery Undervolts - ☐ = Low Plant voltage trip will NOT give a warning alarm ☒ = Low Plant voltage WILL give a warning alarm in the event of the generator plant battery voltage falling below the displayed '<i>low voltage alarm</i>' value. The '<i>low voltage alarm</i>' value can be adjusted to suit user requirements. Should the input fall below this value the module will initiate the low voltage delay timer, if the voltage remains low and the timer expires, a low voltage warning will be given. The voltage must return to above the '<i>low voltage return</i>' setting before the 52xx/53xx module will consider that it is back within limits. (I.e. With a low voltage trip of 10.0V and a low voltage return of 12.0V, the plant voltage must return to 12.0V following a low voltage event to be considered within limits.)

Plant Battery	Function
Plant Battery Overvolts	Plant Battery Overvolts - ☐ = High Plant voltage trip will NOT give a warning alarm ☒ = High Plant voltage WILL give a warning alarm in the event of the generator plant battery voltage rising above the displayed '<i>High voltage alarm</i>' value. The '<i>high voltage alarm</i>' value can be adjusted to suit user requirements. Should the input rise above this value the module will initiate the high voltage delay timer, if the voltage remains high and the timer expires, a high voltage warning will be given. The voltage must return to below the '<i>high voltage return</i>' setting before the 52xx/53xx module will consider that it is back with in limits. (i.e. With a high voltage trip of 27.0V and a high voltage return of 25.0V, the plant voltage must return to 25.0V following a high voltage event to be considered within limits.)
Charge Alternator Failure	Charge Alternator Failure - ☐ = Charge alternator low voltage will NOT give a warning alarm ☒ = Charge alternator low voltage WILL give a warning alarm in the event of the charge alternator voltage falling below the displayed '<i>Charge fail alarm</i>' value. The '<i>Charge Fail alarm</i>' value can be adjusted to suit user requirements. As the input is a true analogue value total failure of the charge alternator is not the only failure that the module will provide protection for. Faults that cause the output voltage to fall, such as worn brushes etc., will cause the alarm to operate. The voltage must return to above the '<i>Charge Fail return</i>' setting before the 52xx/53xx module will consider that it is back with in limits.  NOTE: - If this input is not used ensure that this setting is set to ☐ to prevent the possibility of a spurious Charge Fail Alarm occurring.

3.10 SCHEDULER

This menu allows the scheduled run event to be configured. These events will automatically start and run the generator at a given time for a given duration. This function can be used to provide a regular generator exercise feature.



NOTES

1. The 52xx/53xx Module will only respond to a scheduled run event if in the 'auto' mode. The engine will only be started if there are no shutdown alarms present.
2. Should the module not be able to run when a scheduled event is called the event will not be cancelled but will remain active for the duration configured. Therefore should the module be restored to a condition where it can run, it will act in accordance with the scheduled run settings.
3. If the 'Auto restore inhibit' input is active and an 'on-load scheduled run' is requested the generator will start and take load. However at the end of the scheduled run the generator will remain running on-load until the 'Auto restore inhibit' input is de-activated.
4. It is recommended that an LCD/LED is configured to indicate 'Calling for Scheduled Run' to avoid operator confusion as to why the genset may be running for what appears to be no reason.

Scheduler Settings	Function
Enable Exercise Scheduler	Enable Exercise Scheduler - ☐ = The module will not respond to the scheduled run commands from the exercise scheduler. ☒ = The module will respond to the scheduled run commands from the exercise scheduler.
Scheduled Runs are On-load	Scheduled Runs are on-load - ☐ = In the event of a scheduled run command the module will start the generator and run off-load for the duration of the scheduled run. E.g. To exercise a standby generator without interrupting the load. Should a remote start/mains failure occur during the off-load run, the genset will take load as normal. ☒ = In the event of a schedule run command the module will start the generator and the generator will take load for the duration of the scheduled run. E.g. For a timed peak lopping application.
Exercise Scheduler	Exercise Scheduler - Day - <i>Day of the week that the event will occur.</i> Start - <i>The Time of Day that the scheduled run command will be issued.</i> Run Time - <i>The duration that the scheduled run command will be present for, therefore the amount of time the generator will run for.</i>

⚠ CAUTION! - Should the generator take load during a scheduled run, either because the run was configured to be 'on load', or a remote start/mains failure occurred during the run; if the 'Auto restore inhibit' input is active the genset will not stop at the end of the scheduled run, until the 'Auto restore inhibit' input becomes inactive.

3.11 COMMS

This menu allows configuration of the module's communication settings. This section is only applicable where the module is fitted with the optional RS232 or RS485 interface.

52/53xx configuration software

Config Manager | Edit Config | Remote instrumentation | Setup | Re-calibrate | About

Module | Misc | Inputs | Outputs | LED | Timers | Generator | Engine | Scheduler | Comms | Languages

Module identification

Site identity

Genset identity

Modem's modem configuration (if applicable)

Modem mode
 Normal

Number for module to dial on alarm

Modem initialisation strings

Modem init (not auto answer)

Modem init (auto answer)

Modem hangup string

Connection settings

Master inactivity timeout (s) 5

Connect delay time (s) 60

Number of retries on each number 4

Delay between retries (s) 5

Delay between repeat cycle (s) 10

☒ **Enable SMS messaging**

SMS message centre number

SMS recipient number(s)

NOTE: - Please see section entitled 'Communications options connections' for further details on using the 52xx/53xx controller in conjunction with RS485 or RS232 (modem) applications.

Setting	Function
Module's Modem Configuration	Communications setting configure how the module is to communicate with the modem. Module Identification - Site Identity = This is used to allow the operator to identify the location of the genset that is being communicated with. This is held in the unit and will be transmitted to the PC whenever the link is established. Genset Identity = This is used to allow the operator to identify the exact genset at the location which is being communicated with. This is held in the unit and will be transmitted to the PC whenever the link is established.
Module's Modem Configuration	Modem Mode - No Modem = If no modem is selected the module will not attempt to communicate with the PC. All communications must be performed through the 810 connection. (Or the RS485 port if fitted) Incoming Calls Only = The 52xx/53xx module will only respond to incoming calls. It will not attempt to dial out in the event of an alarm condition. This function should be selected if remote control/ telemetry from the generator is required, but it is not possible for the PC to monitor alarm calls 24 hours a day. Normal = Normal mode of operation using a modem. Module will respond to incoming calls from the PC and will dial out in the event of an alarm. If the PC does not respond to the alarm call the module will retry. Outgoing Alarms Only = Module will NOT respond to incoming calls from the PC but will dial out in the event of an alarm. If the PC does not respond to the alarm call the module will retry. Number for module to dial on alarm- This is the telephone number of the modem connected to the monitoring PC. In the event of an alarm condition the module will dial this number and establish a link with the monitoring PC and report the alarm.

Item	Function
Connections Settings	These setting are used to configure the way a connection is established: - Master Inactivity time-out - This timer is used to determine how long the module will continue to monitor its last used communication port before monitoring all ports again. This setting should not normally need adjustment in the field. (Default 5 seconds) Connection Delay - This setting is used to tell the module how long to wait for a link to be established after the modem has been answered. If a successful link has not been established when this timer expires the module will instruct the modem to 'hang up' the line. (Default 60 seconds) Number of retries - This is the number of attempts that will be made to contact the remote module. (Default 4 attempts) in one cycle Delay between retries - This is the time the module will wait between dialling attempts in the event of a failure to connect on the previous attempt. (Default 5 seconds) Delay between repeat cycles - This is the time the module will wait before repeating the cycle
Modem Initialisation Strings	These setting are to configure the modem. Each modem will require a specific set of strings to be sent to ensure that it operates correctly. This information should be available from the modem manufacturer: - Modem Init. (not auto answer) - Modem 'AT' commands used in the 'Outgoing calls only' modes. Modem Init. (auto answer) - Modem 'AT' commands used in all other calls modes. Modem Hang-up - Modem 'AT' command used to instruct the modem to hang-up.

 **NOTE: - If the module does not connect to our answering software, the module will continue to dial out indefinitely.**

 **NOTE: - Please see section entitled 'Communications options connections' for further details on using the 52xx/53xx controller in conjunction with RS485 or RS232 (modem) applications.**

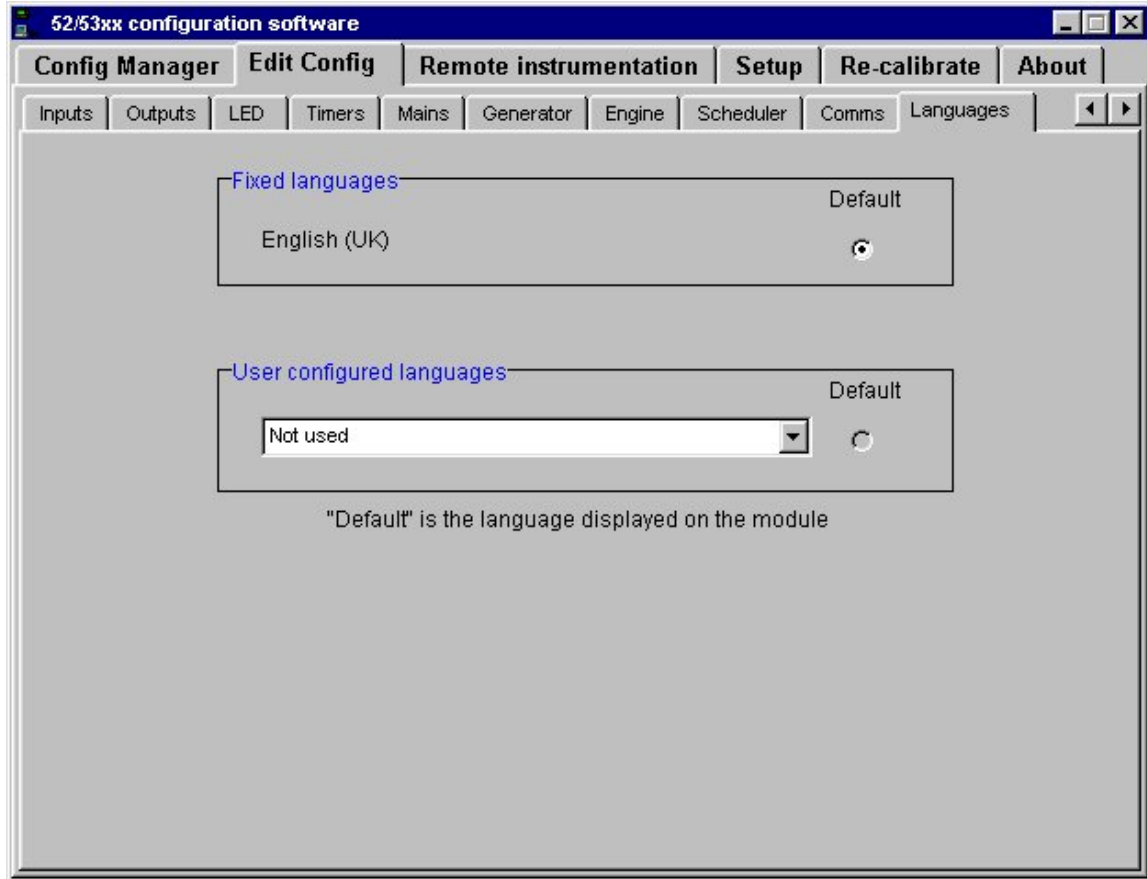
Item	Function
Enable SMS Messaging	These setting are used to allow the module to send a short text message (SMS message) to a GSM cellular telephone. This function is to allow the module to notify an engineer personally, prior to attempting to report the fault to the main monitoring PC. ! CAUTION! - This function can only operate if the module is connected to a suitable GSM Modem. Refer to the appendix for suitable modems. NOTE: - The GSM SMS service is a one-way service and will not notify the sender if the message is not delivered. Therefore the SMS message should be considered as an addition alarm notification and not a replacement to the remote monitoring PC link. Enable SMS Messaging - ☐ = When a shutdown is detected the module will not attempt to send an SMS. ☒ = When a shutdown is detected the module will first attempt to send an SMS message detailing the Site ID, Genset ID, Alarm details and the time and date. Once this message has been transmitted the module will then revert to normal communications and attempt to call the remote PC. No further SMS messages will be sent unless a further alarm is triggered. SMS Message centre Number - This is the number for the SMS message centre provided by the GSM Modem SIM card service provider. Please refer to your GSM Service provider for details. SMS Recipient Number - This is the cellular telephone number of the Engineer or other individual to whom the SMS message is to be sent. (<i>Up to three numbers can be entered in the 53xx series</i>)

NOTE: - GSM is the cellular mobile phone system in use in the United Kingdom, Europe and other countries. This system allows for the sending of data and for short text messages (SMS text messages).
The 52xx/53xx controller can be used in conjunction with a GSM cellular modem to provide data communications and SMS messaging over the GSM cellular network. The modem must be used in conjunction with a 'data SIM card' that can be purchased from your local GSM service provider.

3.12 LANGUAGES

(53xx controller only)

The Languages sub-tab allows selection of the module's main and alternative display language. The 'default' language is the one displayed the next time the module is powered up. Changes to the default language can be made either in the PC configuration software, or via the front panel configuration editor.



4 REMOTE INSTRUMENTATION

When communicating with an RS232 or RS485 enabled 52xx/53xx controller, a connection to the module must first be made using the connect button. For details of configuring the communications options, see section entitled "Set-up this software".

Diagnostics

A particularly useful feature of the module is its ability to provide real-time diagnostic information to the PC. This can be used to give on-screen details of the operation of the module and generating set performance.

A number of different diagnostic displays are available: -

The first display is Mimic Display. This provides at-a-glance monitoring of the system. All non-essential information is hidden. Clear graphical displays allow easy control and performance monitoring. Should an alarm occur this is clearly displayed by an 'Alarm' legend. This page provides the normal operator control interface for remote operation (if enabled)

The second display is the Alarm Display this allows the user to see details on any alarm conditions that are currently active. The module internal firmware revision details are also given; this is to aid DEEP SEA ELECTRONICS technical staff in the event of a query.

The third display is the Status Display this allows the user to see at a glance the values of all measured inputs and the status of any of the digital inputs. The state of the output relays and LED's are also displayed. As the displays are real-time the opening and closing of the inputs and outputs can be viewed this can assist in system performance monitoring and fault finding.

The Fourth display is the Engine Display this allows the user to see at a glance most of the measured values to allow monitoring of the Engine performance.

The fifth display is the Generator/Mains Display this allows the user to see the state and levels of the Generator / Mains supply.

 **NOTE: - Mains supply monitoring is only available on 5220/5320 module.**

The final tab allows the operator to interrogate the Event log stored in the module, allowing recent shutdown events to be viewed.

Communications State Indication

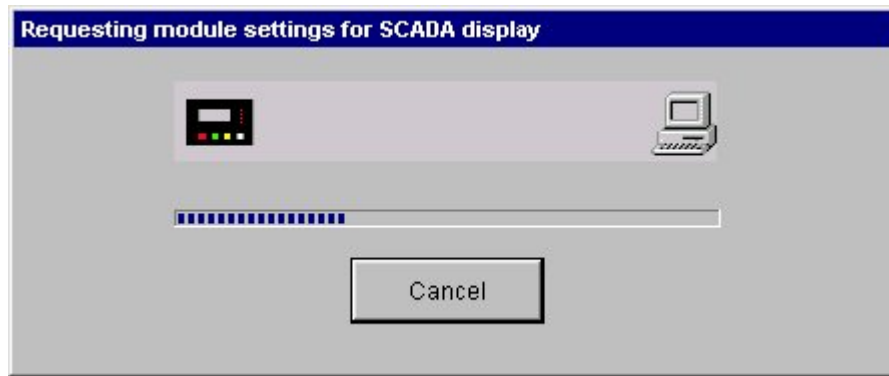
Comms: - A small icon in the bottom left of the screen indicates that the link to the module is healthy.

	Communication Link is OK when 'Beating Heart' is displayed.
	Communication Link is OK when 'Beating Heart' is displayed.
	Communication Link is not functioning, no data is being received. Check 'Set-up' and ensure module is connected. You may need to click on 'Dial' or 'Connect RS485' to establish the link.

Module Type: - A small icon in the bottom of the screen indicates the type of module and any options fitted.

	Module type unknown (prior to comms link being made or when link is lost)
5210	Currently connected module is 5210 Automatic Start Module
5220	Currently connected module is 5220 Automatic Mains Failure Module
5310	Currently connected module is 5310 Automatic Start Module
5320	Currently connected module is 5320 Automatic Mains Failure Module
	Currently connected module has RS232 communications option fitted
	Currently connected module has RS485 communications option fitted
	53xx Only Currently connected module has CAN option fitted
	53xx Only No valid PIN has been entered for the currently connected module. Read only access – Operator can view module parameters but can not change operating mode or reset alarms, etc.
	53xx Only Valid PIN entered, full read/write access – Operator can view module parameters and control the module, resetting alarms etc.

Requesting module settings for SCADA display (if enabled)

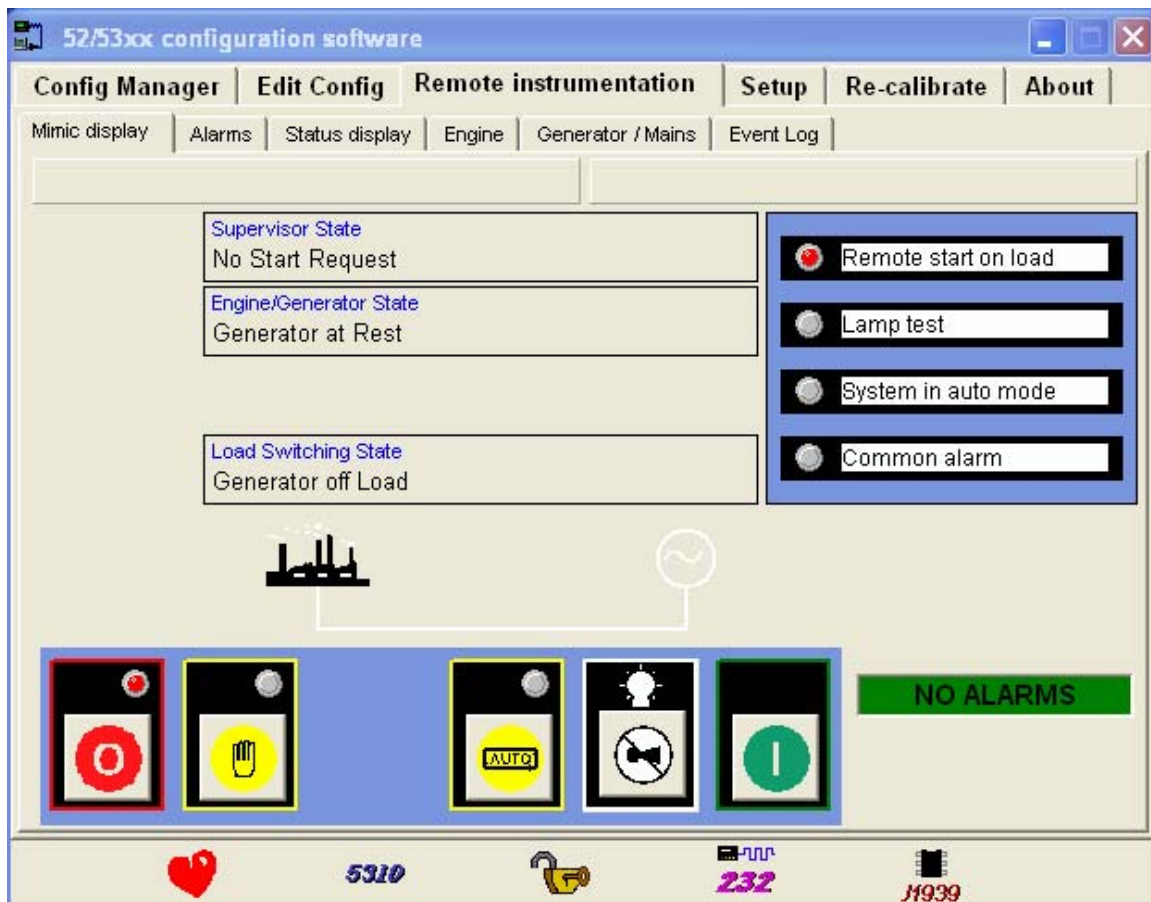


Once connected the 5xxx series software will ask the module to send details of its internal configuration. This is then used by the SCADA display to provide more detailed information about the operation of the module and the remote site. While this information is being received, the following screen will be displayed: -

NOTE: - The additional information is used to identify the function of inputs, outputs and LED's etc. If this extra detail is not required then the cancel button can be pressed to stop the transfer. This facility can be disabled in 'Set-up' if it is not required.

4.1 MIMIC DISPLAY

If the Mimic Display option is selected the display will show:

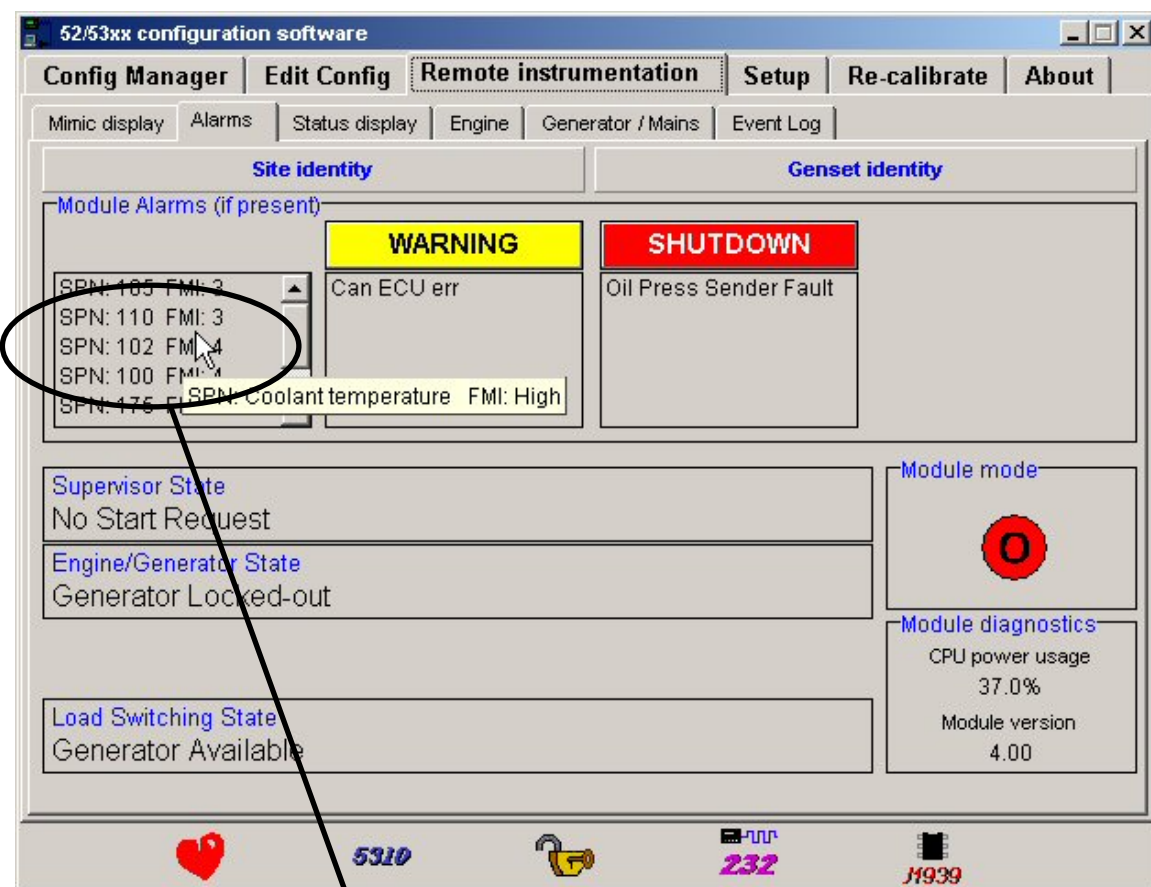


NOTE: - Using the Mouse to 'click' on the buttons will allow the module to be operated from the PC screen. This function can be used to provide remote control of the 52xx/53xx module via the 810 interface. The 810 interface cable can be extended up to 100 meters (from the module to the 810).

The remote control facility can be disabled from the 'Set-up' tab if remote monitoring only is required.

4.2 ALARM STATUS

If the Status Display option is selected the display will show:



53xx Only

 **CAN** ECU error messages (when available) are displayed on the alarms page as shown above.

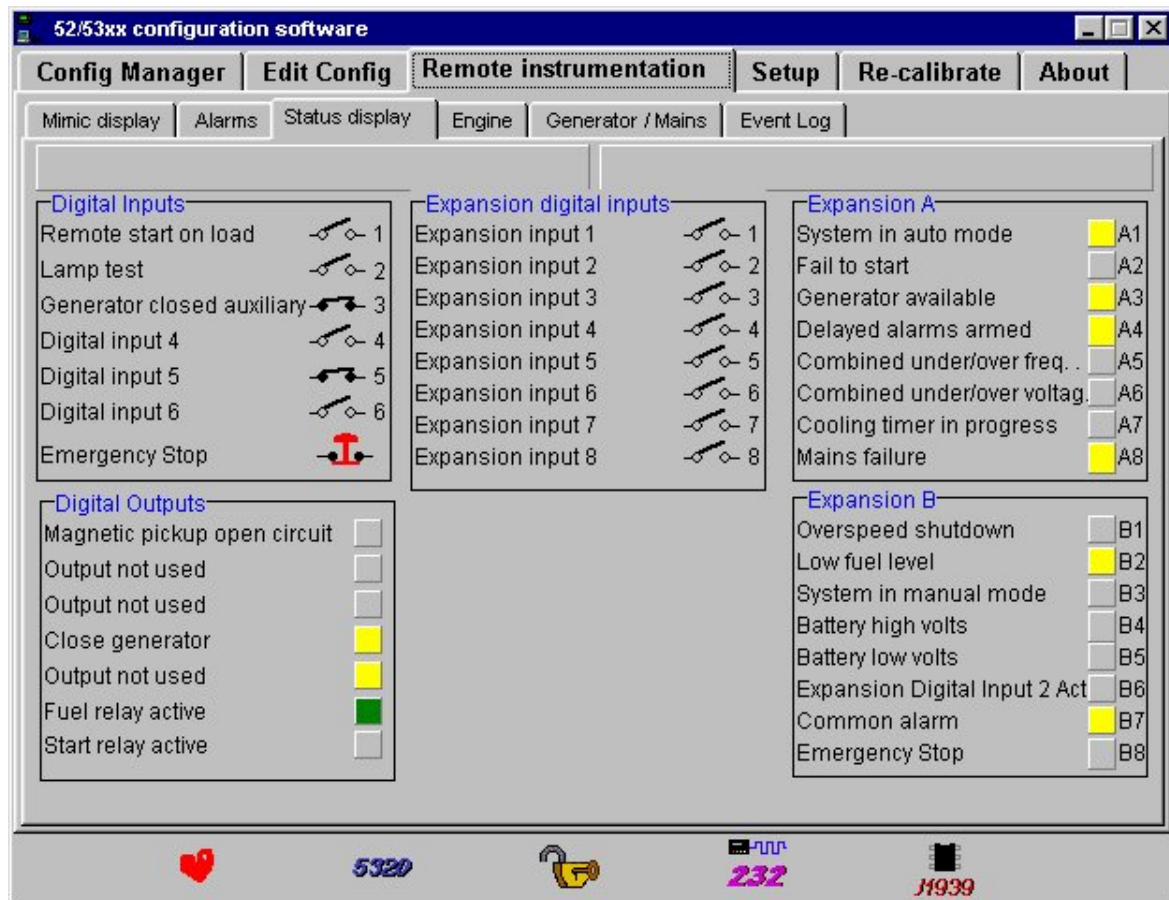
Examples of SPN / FMI numbers, taken from the Volvo Penta TAD12 manual are:

SPN 110 – Engine coolant temperature
 FMI 0 – Out of range
 FMI 3 – Above normal
 FMI 4 – Below normal

NOTE: - 'Hovering' the mouse cursor over the SPN/FMI numbers will display the CAN messages where appropriate.
 For further details on these code meanings, refer to the ECU instructions provided by the engine manufacturer.

4.3 STATUS DISPLAY

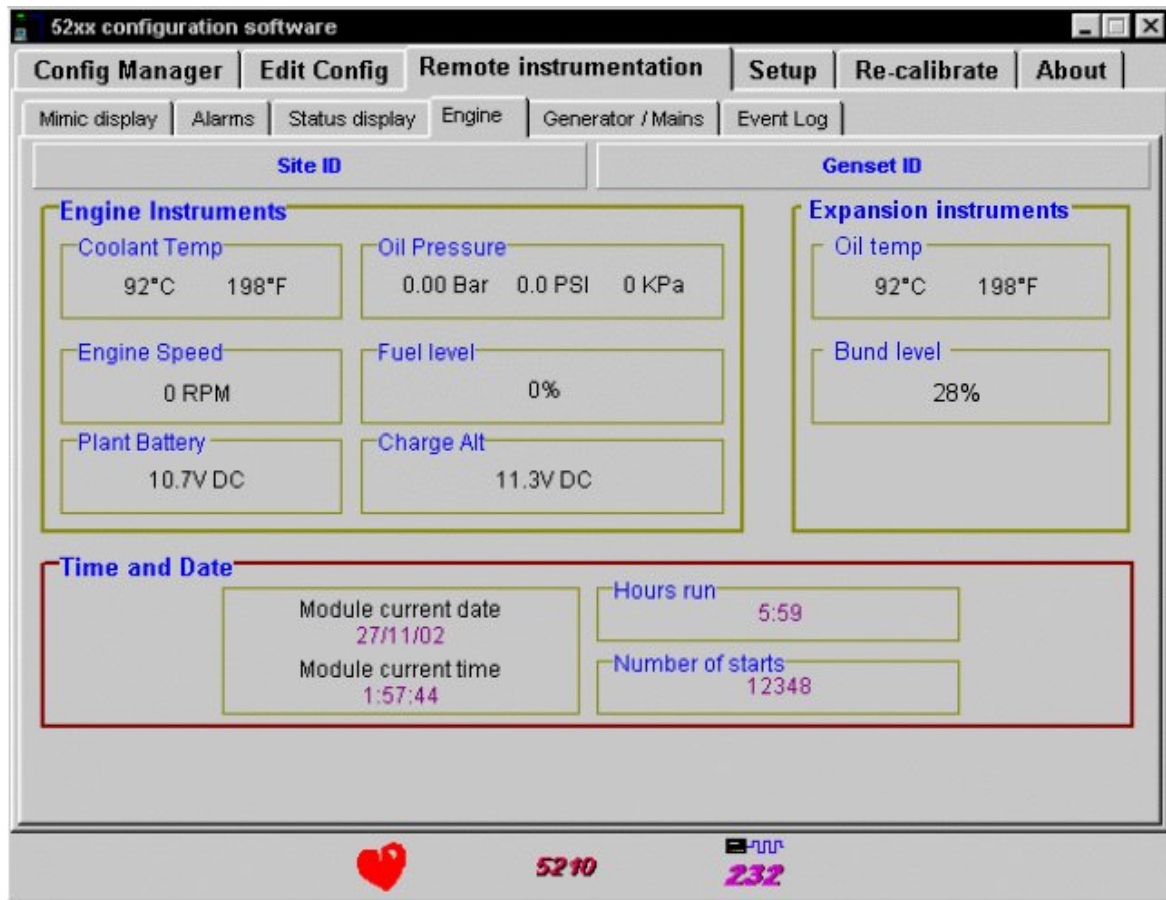
If the Status Display option is selected the display will show:



NOTE: - Expansion B and Expansion digital inputs are only shown when connected to 53xx controllers. Expansion Inputs are only applicable when the 53xx controller is connected to a P130 input expansion module.

4.4 ENGINE

If the Engine Instruments Display option is selected the display will show:



NOTE: - Expansion inputs are only applicable when a 53xx controller is used in conjunction with a P130 input expansion module. Analogue expansion 1 is the “top” of the two instruments; analogue expansion 2 is the “lower” of the two instruments.

4.4.1 CAN ENHANCED INSTRUMENTATION SUBTAB

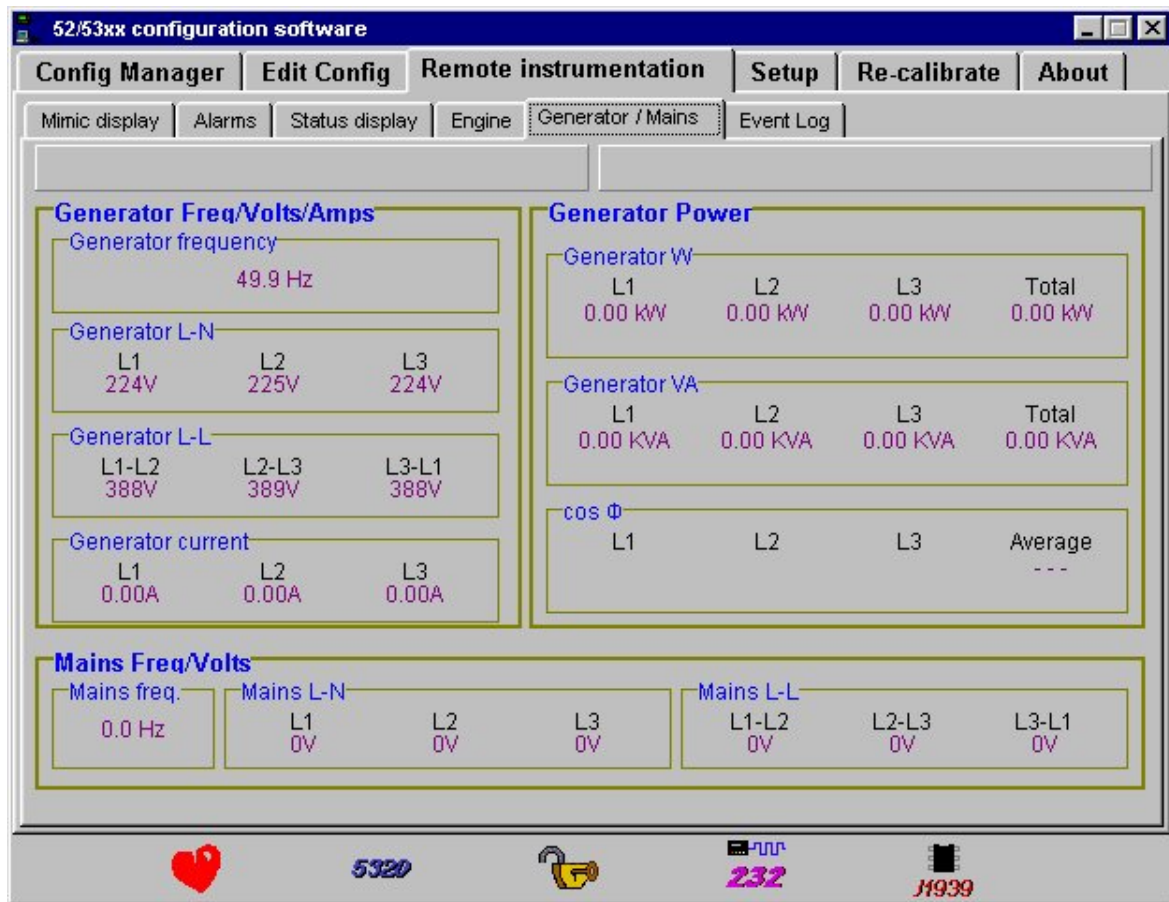
This engine instrumentation sub-tab is only available on 53xx modules when “enhanced CAN instrumentation” has been enabled, and the controller is used in conjunction with a compatible ECU

Data is only shown where the measurement is supported by the engine ECU.



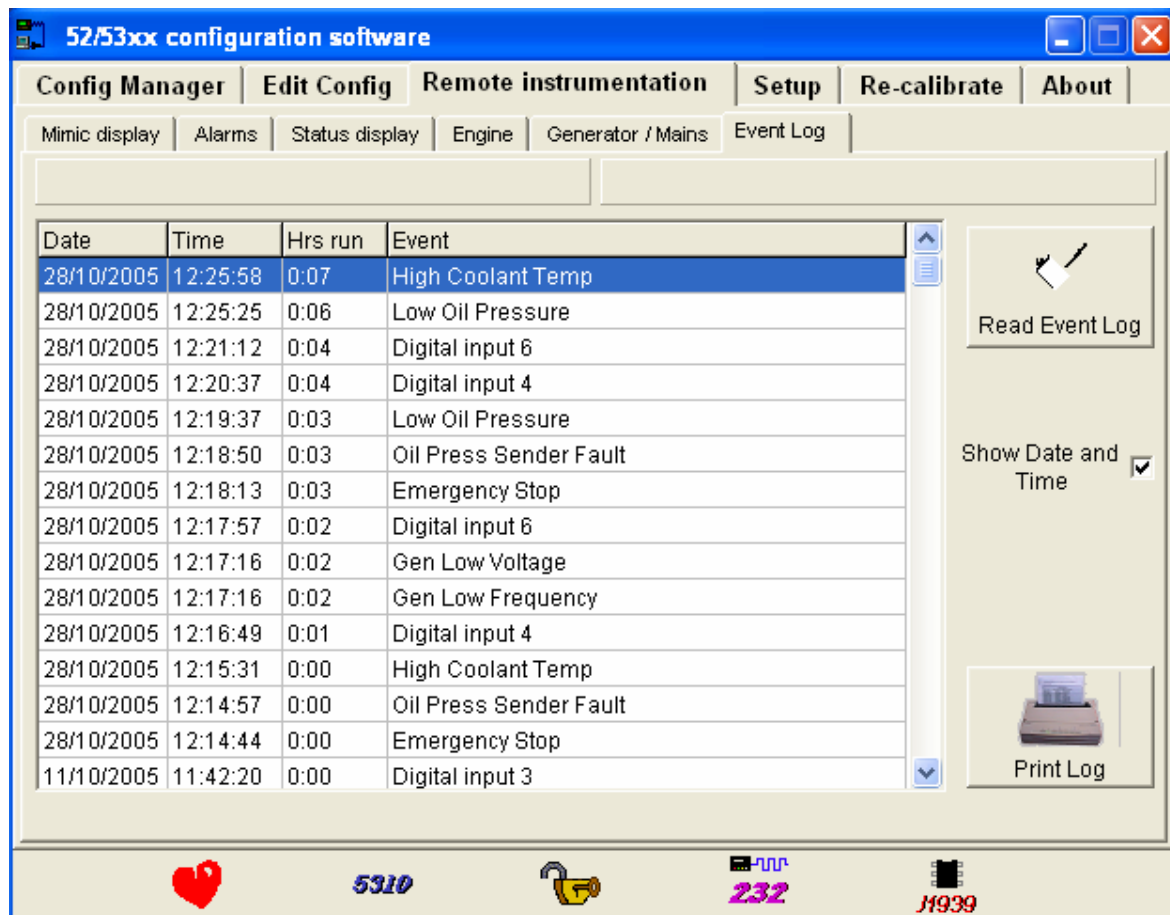
4.5 GENERATOR/MAINS

If the Generator/Mains Instrumentation Display option is selected the display will show:



4.6 EVENT LOG TAB

If the Event Log option is selected the display will show:



Set-up	Function
Event Log	Show Date and Time- ☐ = Event log will only display Event and Hours Run. ☒ = Will display Date and Time together with Event and Hours Run

READ EVENT LOG

To interrogate the module's onboard event log the 'Read Event log' button must be operated. The module will then send the contents of its Event log to the PC.

PRINT LOG

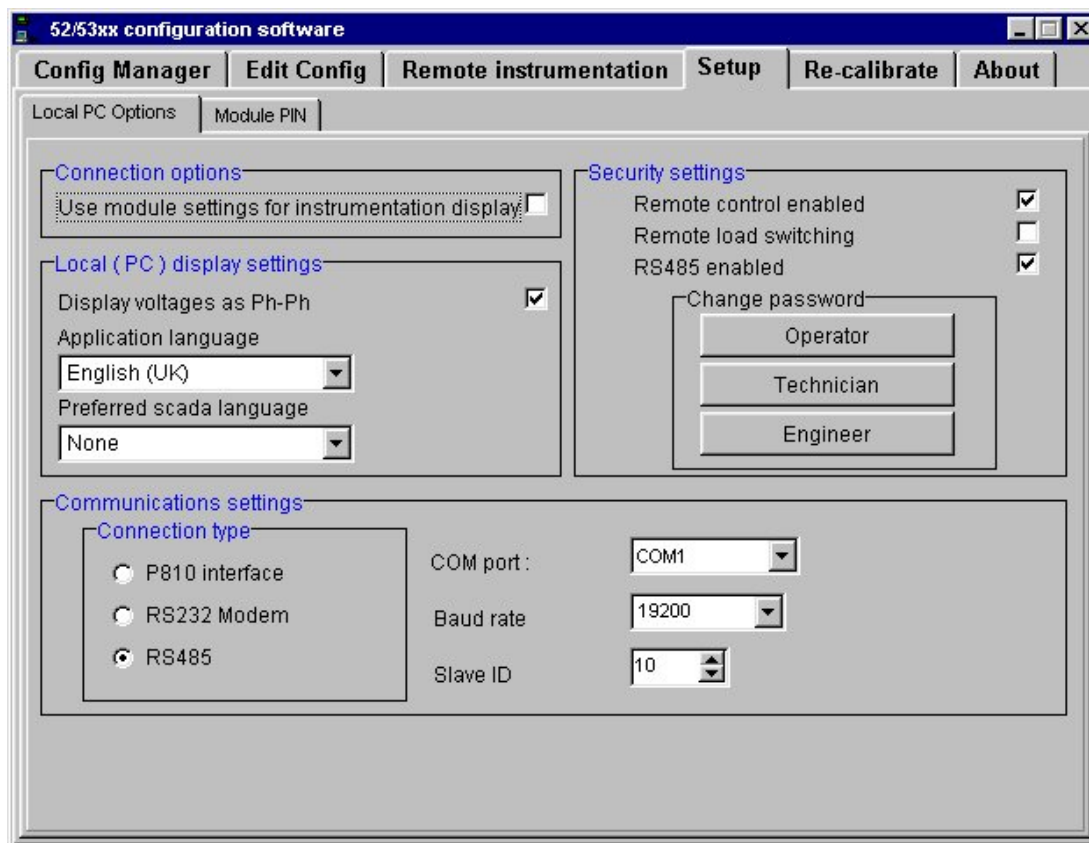
This button will generate a printout of the displayed event log.

NOTE: - The event log display is only updated when the 'Read Event Log' button is operated. Any subsequent events stored in the module will not appear on the PC unless an update is requested. To prevent possible user confusion the event log display is cleared whenever a different Tab in 5xxx series software is selected, or if the link to the module is lost.
It is not possible to 'Clear' the module event log.

5 SETUP

5.1 LOCAL PC OPTIONS

This menu is used to access the software configuration file, to customise the way the software operates with the PC system. When selected the following is displayed:



Set-up	Function
Communications Settings	Communications settings configure how the software is to communicate with the module. P810 interface: This option configures the software to use the P810 interface (connected into the module's 810 port) to communicate with the 5xxx series controllers. RS232 modem: This option configures the software to communicate with the controller via an RS232 modem using either a fixed land line telephone system (PSTN) or GSM modem over the GSM network. RS485: This option configures the software to communicate with the controller over an RS485 cable connection. Change COM Port (COM2) - This menu option is used to configure the software to use the appropriate COM port on the PC. The COM ports are the RS232/RS485 interface terminals normally located on the rear of the PC; the module configuration software can use any one of these ports. A check should be made to ensure that the ports are not already in use by other sources such as mouse drivers or modems. Normally COM2 is the spare port with COM1 being used by a mouse. This can vary from PC to PC, so it is recommended that you check your configuration by referring to the documentation supplied with your PC or by contacting your PC support personnel. Should you still experience problems contact DEEP SEA ELECTRONICS for assistance. When using the USB version of P810 interface the USB driver will create a 'virtual COM port' (i.e. COM6). This must be selected in the set-up tab for the P810 USB to operate. The 'virtual COM port' may only be visible when the P810 USB is connected to the PC. Baud rate (RS485 only): The baud rate over which the RS485 communications will take place. Slave ID (RS485 only): The Modbus™ Slave ID of the controller you wish to communicate with. Telephone number of module (RS232 only): The telephone number to dial (via modem) in order to communicate with the module.  NOTE: - A quick check of correct communication with the module can be made by selecting the Remote instrumentation tab, if no 'Heartbeat' is displayed this indicates that a communications link has not been established. Check the COM port setting as described above.

Set-up This Software	Function
Local (PC) display settings	These options are used to set up certain display features affecting the way the 52/53xx series software displays information to the user. Display 3ph 4wire voltage settings as ph-ph ☐ = On Edit Generator voltage tab the voltage settings are all referred to as Phase to Neutral values if the module is set for three phase four wire. ☒ = On the Edit Generator voltage tab the voltage settings are all referred to as Phase to Phase if the module is set for three phase four wire. Display Oil pressure in kPa- ☐ = On the SCADA instrument page the Oil pressure will be displayed as PSI and BAR. ☒ = On the SCADA instrument page the Oil pressure will be displayed as kPa.
Connection Options	Use modules setting for SCADA display - ☐ = Basic generic SCADA display is used. ☒ = When connection is made the module will transmit its current settings for use by the SCADA display. The SCADA display can then correctly identify the functions of user configured inputs and outputs etc.
Security Settings	These options are used to set up certain security features, which will affect users with lower level passwords. Remote Control Enabled- ☐ = If the remote control facility is disabled then the facility is removed from the 'Mimic' diagnostic SCADA display in all password levels. ☒ = If the remote control facility is enabled then a set of control buttons will be displayed in the 'Mimic' diagnostic SCADA display in all password levels. If these are operated, <i>(by using the mouse and clicking on them)</i> then the appropriate command is sent via the P810 interface to the 52xx/53xx module. Remote Load Switching Enabled- ☐ = If the load switching facility is disabled then the facility is removed from the 'Mimic' diagnostic SCADA display in all password levels. ☒ = Allows to remotely control the loading breaker(s) when a stable supply is available. RS485 Enabled- ☐ = RS485 functions in the 52/53xx software are disabled (default). ☒ = RS485 functions such as Slave ID and Baud rate are enabled in the 5xxx software, allowing connection to a module using an RS485 link.

Operator Password

This option is used to change the operator level password used to access the software. In operator only limited changes can be made to the module configuration (Timer settings only), existing config files cannot be overwritten only new ones created.

The operator level password can only be changed if the Engineering level password is known; this is to prevent unauthorised password changes being made.

NOTE: - The passwords are only to give access to the software for configuring the module, not for access to the module itself.

When the option is selected the following will be displayed:

A dialog box titled "Change Password" with a blue header bar. It contains two text input fields. The first field is labeled "Enter new password :" and contains seven asterisks. The second field is labeled "Re-enter new password :" and also contains seven asterisks. At the bottom, there are two buttons: "OK" with a green checkmark icon and "Cancel" with a red X icon.

Type in the NEW password, this password is limited to 20 characters maximum; any combination of numbers and letters can be used. The software IS case sensitive.

Re-enter the NEW password, press the 'OK' button.

The passwords will be verified and if they do not match the screen will display:

An "Information" dialog box with a blue header bar. It features an information icon (a lowercase 'i' in a circle) on the left. To the right of the icon, the text reads "New passwords are not the same. Please try again". At the bottom center, there is an "OK" button with a green checkmark icon.

TECHNICIAN Password

This option is used to change the TECHNICIAN level password used to access the software. In Technician level access is limited to the module configuration only, the module sender calibration, internal clock and hour run counter cannot be adjusted.

The technician level password can only be changed if the Engineering level password is known; this is to prevent unauthorised password changes being made.

NOTE: - The passwords are only to give access to the software for configuring the module, not for access to the module itself.

When the option is selected the following will be displayed:

A dialog box titled "Change Password" with a blue header bar. It contains two text input fields. The first field is labeled "Enter new password :" and the second is labeled "Re-enter new password :". Both fields contain masked text represented by asterisks. At the bottom, there are two buttons: "OK" with a green checkmark icon and "Cancel" with a red X icon.

Type in the NEW password, this password is limited to 20 characters maximum; any combination of numbers and letters can be used. The software IS case sensitive.

Re-enter the NEW password, press the 'OK' button.

The passwords will be verified and if they do not match the screen will display:

An "Information" dialog box with a blue header bar. It features an information icon (a lowercase 'i' in a circle) on the left. The text inside reads "New passwords are not the same. Please try again". At the bottom, there is an "OK" button with a green checkmark icon.

Engineering Password

This option is used to change the engineering level password used to access the software.

If the software is accessed using the engineering password, all values are available for modification including the complete module configuration and sender calibration, internal clock and hours run counter.

NOTE: - The passwords are only to give access to the software for configuring the module, not for access to the module itself. The default passwords are blank and when a password is requested press the enter button.

When the option is selected the following will be displayed:

A dialog box titled "Change Password" with a blue header bar. It contains two text input fields. The first field is labeled "Enter new password :" and contains seven asterisks. The second field is labeled "Re-enter new password :" and also contains seven asterisks. At the bottom, there are two buttons: "OK" with a green checkmark icon and "Cancel" with a red X icon.

Type in the NEW password, this password is limited to 20 characters maximum; any combination of numbers and letters can be used. The software IS case sensitive.

Re-enter the NEW password, press the 'OK' button.

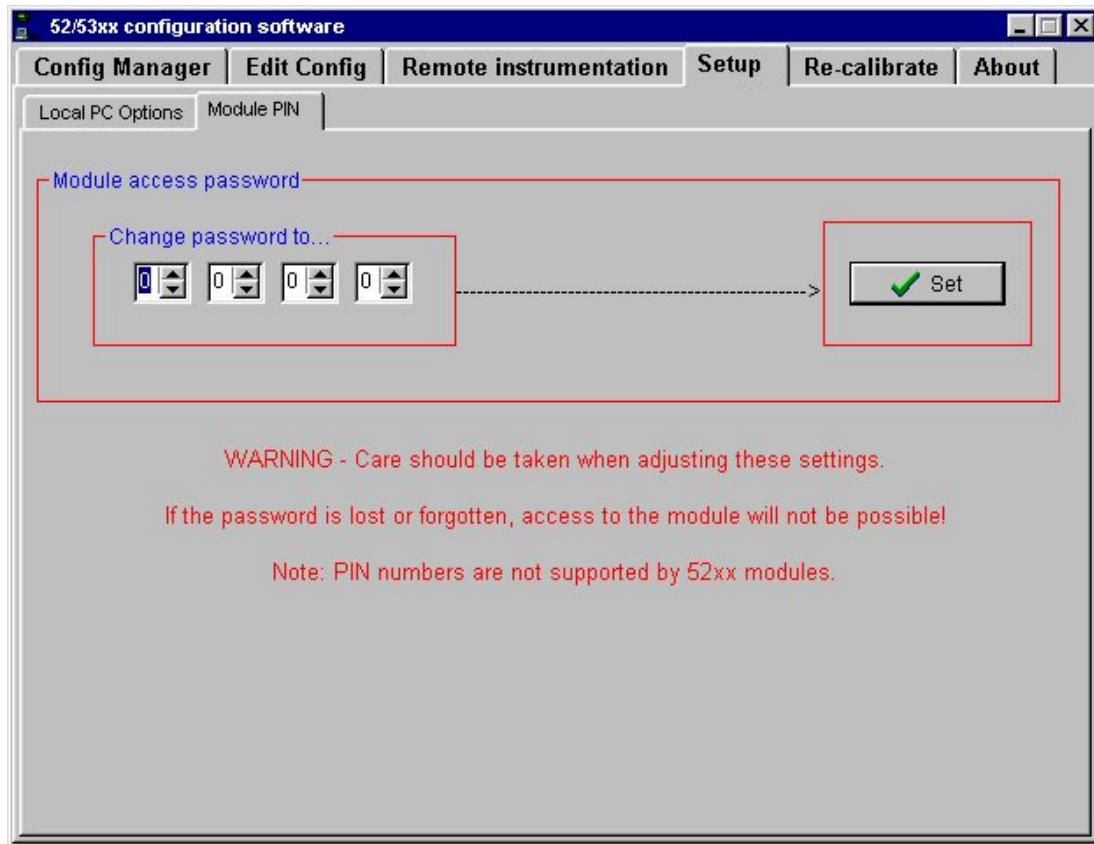
The passwords will be verified and if they do not match the screen will display:

An "Information" dialog box with a blue header bar. It features an information icon (a lowercase 'i' in a circle) on the left. To the right of the icon, the text reads "New passwords are not the same. Please try again". At the bottom center, there is an "OK" button with a green checkmark icon.

5.1.1 MODULE PIN

(53xx modules only)

Permission to adjust the module's configuration settings is controlled by module PIN number. This is a four digit numeric code to protect both writing of a configuration file using the PC software, and access to the configuration using the front panel editor.



Enter the required security PIN number and click the SET button. The controller must be correctly connected to a DC Supply and to the PC via the P810 interface lead.

NOTE: - Care should be taken when setting the PIN number. If the number is lost or forgotten, access to the module will not be possible!

NOTE: - To disable the PIN number enter 0 0 0 0. When the PIN is set to 0 0 0 0, no request for PIN will be made by the controller or the configuration software.

NOTE: - To change an existing PIN number, enter the new PIN number and click SET. If a PIN is already set in the module, this will be asked for before changing.

NOTE: - Once the PIN has been entered correctly, the configuration software will 'remember' your selection for the duration of the session. If the PC software is closed down, the PIN number selection is 'forgotten' and must be re-entered in order to gain access to the module again.

The module will allow three attempts to enter the PIN number – If this is exceeded it will stop responding to attempts for a period of 60 seconds. The following message will be displayed: -



After this period the module will start checking the PIN numbers again, a further two attempts will be granted. If these are both incorrect the module will again stop responding for double the previous period. This will continue to a maximum wait period between retries of 64 minutes. This is to prevent a more determined attack on the security of the module via a remote link.

! CAUTION! - Ensure that you make a note of the PIN number when you allocate it to a module. Without the correct PIN number it will be impossible to gain configuration access to the module. If the PIN number is lost the module will need to be returned to DSE to be re-initialised – All module settings will however be lost in this operation.

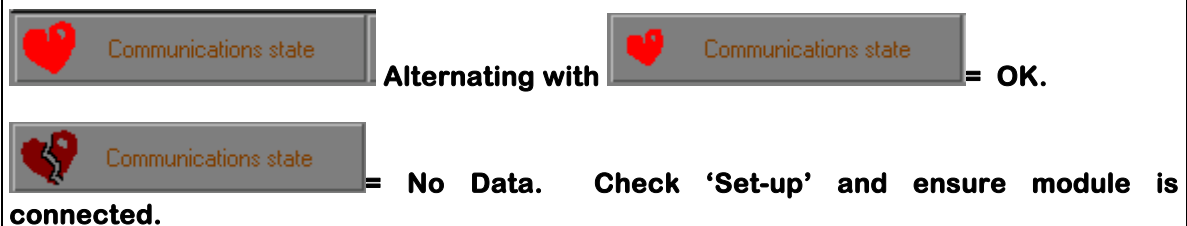
! CAUTION! - Setting a PIN number in the module will stop all access to the module via the 5xxx software. Therefore, it is important to ensure that any field service personnel who are likely to need access to the module configuration as advised of the PIN number prior to visiting site. Without the correct PIN number, the module will not allow changes to its configuration. This PIN number is also used for access the configuration from the front panel of the module.

6 RE-CALIBRATE

This menu is used for three purposes; the first is to configure the module to read the Oil pressure and coolant temperature senders correctly. The second function to allow the engineer to set the module's internal clock and run counter. The third is to allow the operator to perform a software maintenance reset in the event of the module maintenance alarm being active.

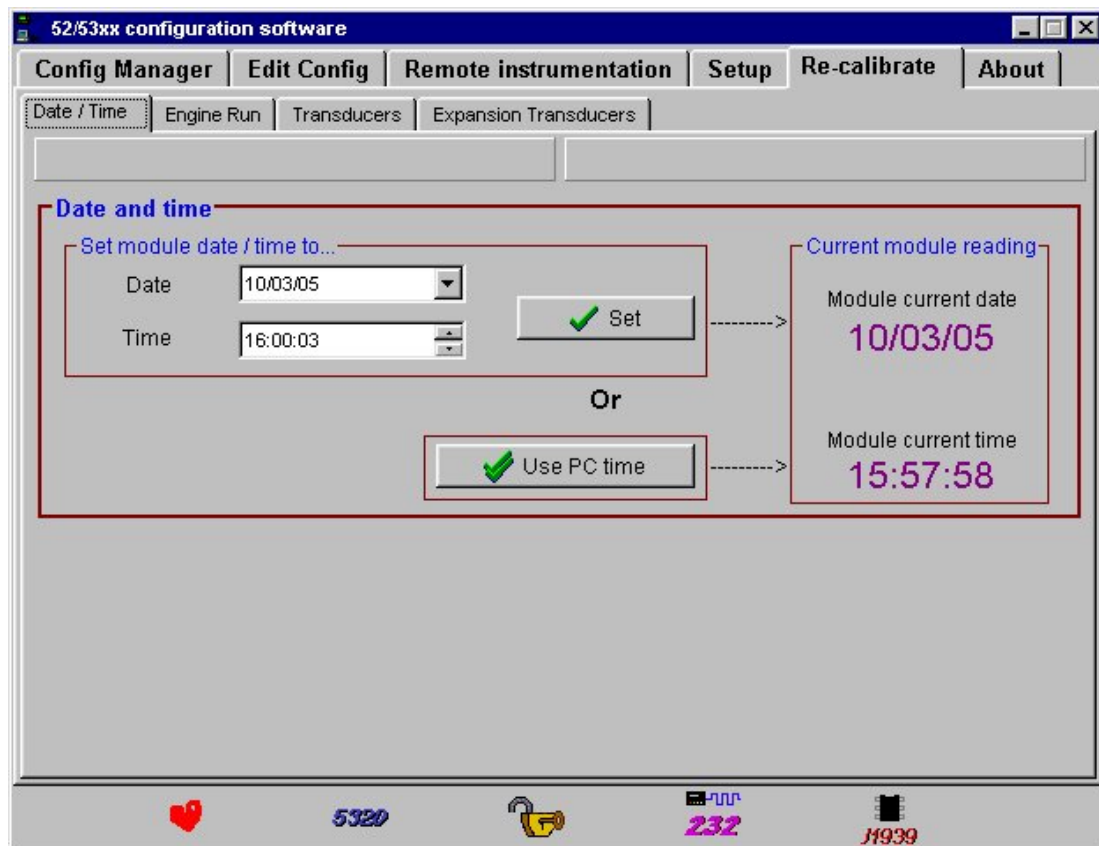
NOTE: - The re-calibration display screens are updated by information sent from the module; if the link to the module is lost the information displayed could be incorrect and is therefore 'greyed out'. A small icon in the bottom right of each diagnostic display indicates that the link to the module is healthy.

When communicating with an RS232 or RS485 enabled 52xx/53xx controller, a connection to the module must first be made using the Connect button. For details of configuring the communications options, see section entitled "Set-up this software".



When selected the following is displayed:

6.1.1 DATE / TIME



This option will allow the engineer to re-calibrate the modules' internal clock

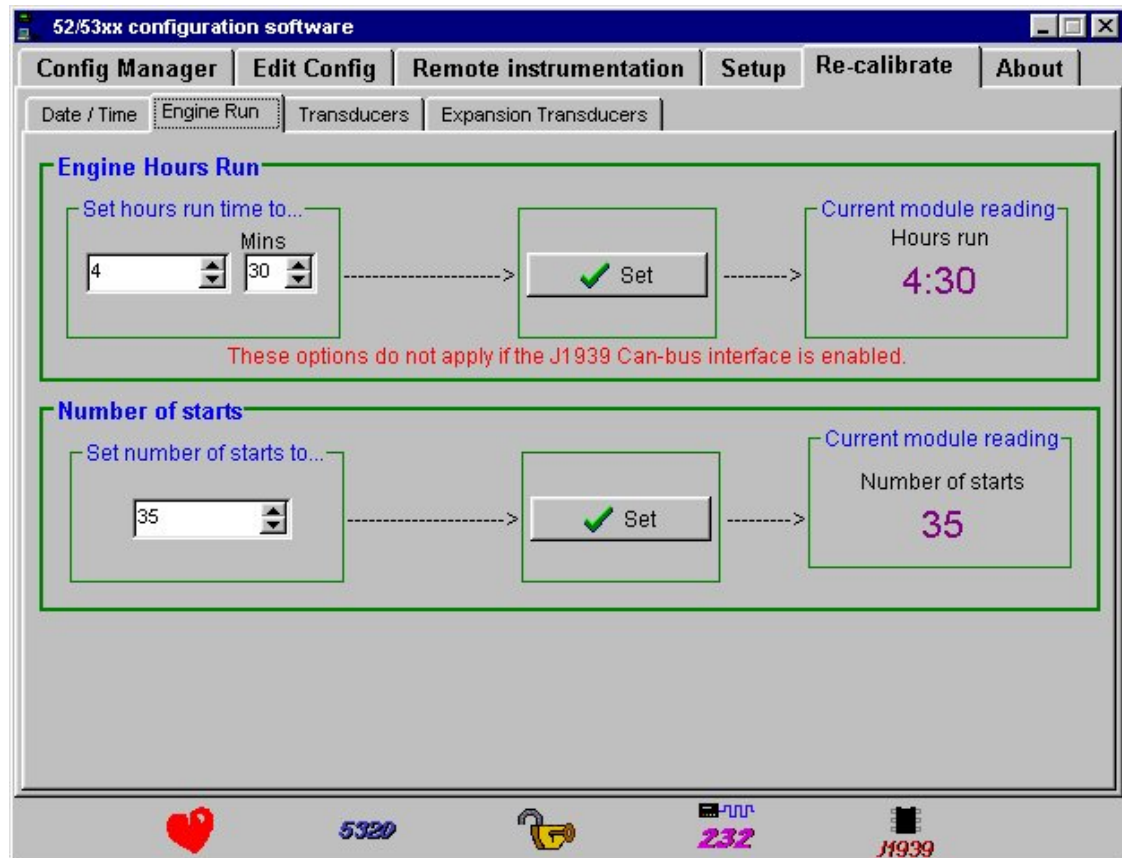
DATE AND TIME

There are two possible ways to set the module time and date: -

- 1) Using the 'Date' and 'Time' tools on the screen, set the required module time and date and then press the 'SET' button. The time and date set will then be transferred to the module and the '*Current module setting*' display will change to reflect this.
- 2) If you wish to match the module time and date to the same settings as used by your PC simply press the 'Use PC time' button. The current time and date will be taken from your PC clock and sent to the module. Again the '*Current module setting*' display will change to reflect this.

6.1.2 ENGINE RUN

NOTE: - Engine runtime adjustment will have no effect on CAN modules connected to engine ECUs.



This option will allow the engineer to re-calibrate the modules' hours run and number of starts counter.

ENGINE HOURS RUN

It is possible to set the module engine hours run counter to the required value, for instance if the control system is to be used with an existing generating set, the hours run reading can be transferred to the new control system, thereby maintaining the history of the generating set. Alternatively, the hours run counter on a new generator could be reset to zero following testing.

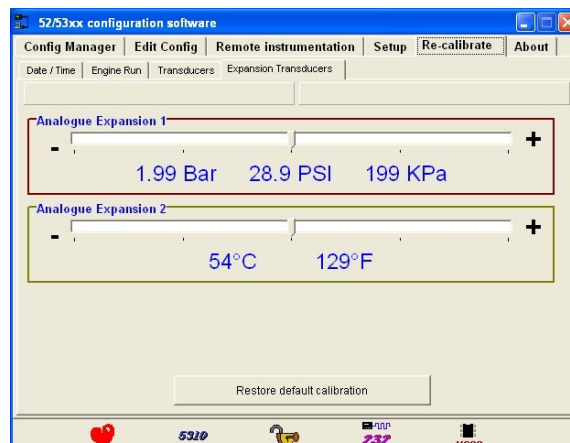
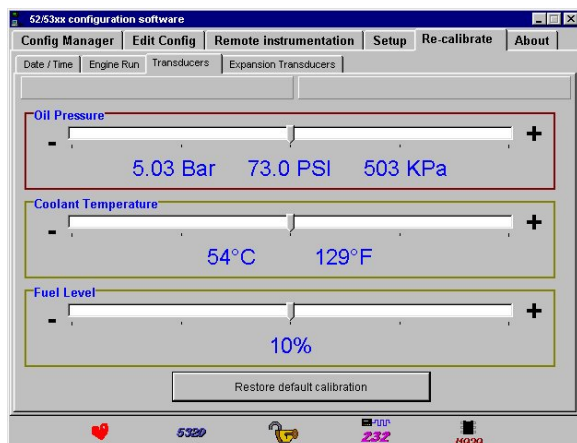
To set the hours run simply set the accumulated time in the tool provided and press the 'SET' button. The hours run value entered will be sent to the module. The '*Current module reading*' display will change to reflect this.

NUMBER OF STARTS

It is possible to set the module number of starts counter to the required value, for instance if the control system is to be used with an existing generating set, the starts reading can be transferred to the new control system, thereby maintaining the history of the generating set. Alternatively, the starts counter on a new generator could be reset to zero following testing.

6.1.3 TRANSDUCERS / EXPANSION TRANSDUCERS

NOTE: - Transducer recalibration of Oil pressure and Coolant temperature senders will have no effect on CAN modules connected to engine ECUs.



This option will allow the engineer to re-calibrate the module transducers and expansion transducers such that it will read correctly the values. This action may be necessary as the senders used for sensing the levels are electromechanical devices and as such suffer from a degree of inaccuracy. The ability to re-calibrate the senders is akin to turning the adjustment screw on a conventional engine gauge.

CAUTION! To re-calibrate the senders a known good, accurate sensing device must be used and the module reading adjusted to match.

NOTE: - Expansion analogue inputs are only available on the 53xx controllers when used in conjunction with the P130 input expansion module.

OIL PRESSURE

The reading shown below the adjustable slider is the current module reading. Read the actual Oil pressure off the accurate sensing device and then by moving the slider up or down adjust the value displayed to match that of the accurate sensing device. Once matched release the slider, the new value will be stored in the module.

COOLANT TEMPERATURE

The reading shown below the adjustable slider is the current module reading. Read the actual coolant temperature off the accurate sensing device and then by moving the slider up or down adjust the value displayed to match that of the accurate sensing device. Once matched release the slider, the new value will be stored in the module.

FUEL LEVEL

The reading shown below the adjustable slider is the current module reading. Read the actual Fuel Level off the accurate sensing device and then by moving the slider up or down adjust the value displayed to match that of the accurate sensing device. Once matched release the slider, the new value will be stored in the module.

EXPANSION TRANSDUCERS

The reading shown below the adjustable slider is the current module reading. Read the actual measurement off the accurate sensing device and then by moving the slider up or down adjust the value displayed to match that of the accurate sensing device. Once matched release the slider, the new value will be stored in the module.

 NOTE: - Expansion analogue inputs are only available on the 53xx controllers when used in conjunction with the P130 input expansion module.
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If at any time you wish to return the settings to standard and remove the re-calibration applied to the senders simply press the '*Restore default calibration*' button. This could be used for example if the sender calibration appeared inaccurate and was modified, then a panel wiring fault was traced as being the cause of the inaccuracy.

7 COMMUNICATIONS OPTION CONNECTIONS

The 52xx/53xx Modules can be obtained with a communications board fitted. This can be either RS232 or RS485 output.

DESCRIPTION

The 52/53xx series configuration software allows the 52xx/53xx family of modules to communicate with a PC. The computer can be connected to the module either directly (P810), via a modem (RS232)* or via an RS485 link**.

The operator is then able to remotely control the module, starting or stopping the generator, selecting operating modes, etc. The various operating parameters (such as output volts, oil pressure, etc.) on the remote generator can also be viewed.

The information contained in this manual should be read in conjunction with the appropriate module documentation. This manual only details the operation of the communications software and how it should be used. The operation of the module is detailed in its own relevant manual.

NOTE: - *If modem communications is a requirement, then it is important to order the correct 52xx/53xx module with the RS232 communications board fitted. This provides a 9-way D-type connector suitable for connection to the modem. Please refer to the connection section of this manual for details of how the system should be configured.

****If RS485 communications is required, then it is important to order the correct 52xx/53xx module with the RS485 communications board fitted. This provides a 3-way terminal block for connection of the RS485 link.**

MODEM TO CONTROLLER CONNECTION

To connect a 52xx/53xx to a modem the following items are required: -

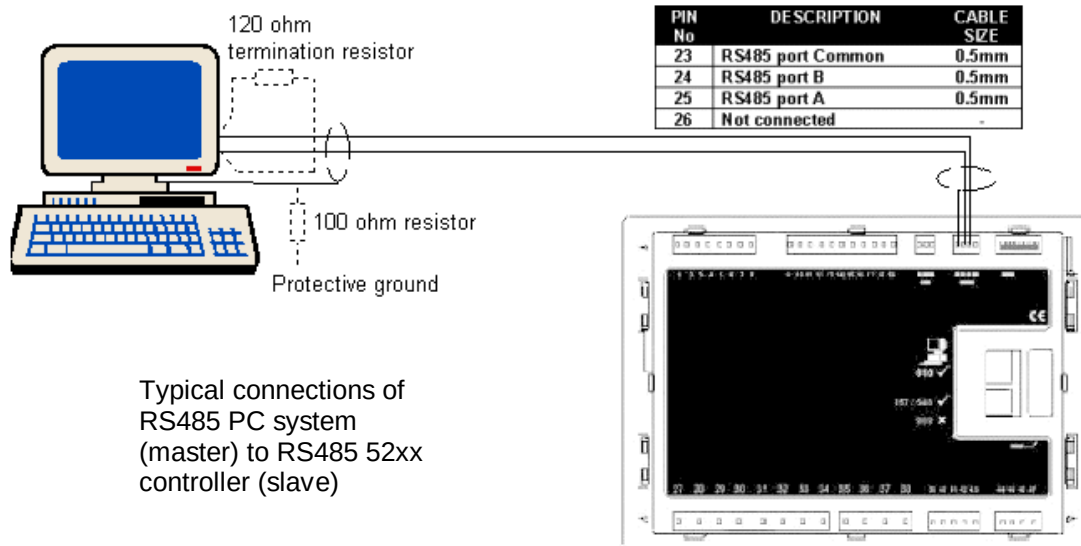
CAUTION! - The modem must be powered from a suitably stabilised supply, preferably supplied with the modem (see below). Failure to ensure continuity of supply will result in communication difficulties at such times as Mains failure or during cranking. An uninterruptible power supply arrangement is recommended (AC or DC depending on modem power requirement).

- 52xx/53xx Module with RS232 Communications Interface
- Compatible RS232 Modem (PSTN or GSM)
- Suitable connection leads
- Power supply for the modem
- 5xxx series configuration software (Supplied on DSE software CD).
- Access to a PSTN Line or GSM network.

RS485 LINK TO CONTROLLER

The RS485 enabled 52xx/53xx modules are able to communicate with a PC or other RS485 enabled device over a standard RS485 connection. Typical uses of RS485 are:

- Direct connection to a remote PC running the 5xxx series configuration software. RS485 is capable of communication over a distance of 1.2km where suitable 120Ω RS485 cable is installed.
- Connection to a building management to allow mains, generator and engine parameters/alarm conditions to be displayed along with information from other devices (air conditioning, fire alarm system etc).

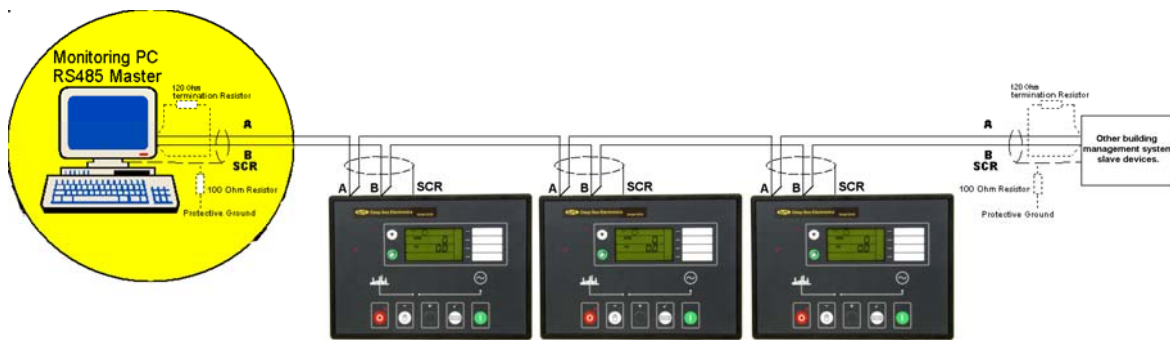


NOTE: - The RS485 system will comprise of one MODBUS master (typically a PC) and up to 31 MODBUS slaves. The 52xx/53xx modules are always MODBUS slave devices. To ensure correct operation a suitable 120Ω terminal resistor must be fitted to each end of the RS485 connection bus.

Caution! - The A and B lines of the 485 network should be terminated at each end with a 120Ω resistor.

Some RS485 devices (PC cards in particular) are already fitted with a terminating resistor. However if they are not installed as an 'end of line' device then such terminating resistors must be removed. Other RS485 devices may be fitted with a 'switchable' resistor, again this must be switched out if the device is not installed as an 'end of line' device.

Typical Building Management scheme using RS485 MONITORING



! CAUTION! - RS485 cabling must be 120Ω impedance cable, specified for use with RS485. 120Ω terminating resistors must be fitted to the first and last devices on the bus. Some PC RS485 cards are already fitted with this resistor, and in this case should not be fitted externally. If in doubt, consult the supplier of your PC RS485 card. If the 52xx/53xx controller is the 'last' device on the bus, then it's RS485 connection must be suitably terminated with a 120Ω resistor as detailed in the specification laid out in the RS485 standard.

**Recommended cable BELDEN 9841 120Ω RS485 cable.
DSE part number 016-030.**

NOTE: - The RS485 output uses 'MODBUS' protocol. It is possible to use third party software to monitor and control the 52xx/53xx module via this protocol. Please refer to Deep Sea Electronics Plc for details.

MODBUS™

The RS485 output uses Modbus™ communications protocol. This uses a master-slave technique to communicate. Only the Master can initiate a packet transaction, called a 'query'. When appropriate the slave (52xx/53xx Module) responds to the query and provides the information requested by the master.

All supported data can be read and written as specified in the register table (documentation is available from Deep Sea Electronics Plc.).

When the 52xx/53xx Module receives a query it will respond by either supplying the requested register data or performing the requested action. A slave device (the 52xx/53xx module) will never initiate communications on the Modbus™ link. The 52xx/53xx can only be configured as a slave device. The Master can only query individual slaves. Refer to the Modbus™ protocol document for more details.

