



Deep Sea Electronics Plc

555 Operators Manual

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INTRODUCTION

The **DSE 555** Module, has been designed to allow the OEM to meet most of the industry's complex specifications. It has been primarily designed to allow the user to start and stop the generator, and if required, transfer the load to the generator either manually or automatically, or in the event of the module detecting a mains failure. The user also has facility to view all the system operating parameters via the LCD display.

The **DSE 555** module monitors the incoming AC mains supply for under or over voltage/ under or over frequency and instructs the generating set to start and to supply the load.

The **DSE 555** module also monitors the engine, indicating the operational status and fault conditions; automatically shutting down the engine and giving a true first up fault condition of an engine failure by a flashing COMMON ALARM LED. Exact failure mode information is indicated by the LCD display on the front panel.

The powerful 32-Bit Micro-processor contained within the module allows for a range of complex features to be incorporated as standard;

- *Full Multi-lingual LCD display (including non-western character fonts).*
- *Up to eight different languages held on-board the module.*
- *True RMS voltage monitoring.*
- *Optional Power measurement facility.*
- *Optional Communications capability (RS485 or RS232 including GSM/SMS functions)*
- *Optional Check Sync capability*
- *Optional Automatic Sync capability V3.00*
- *Fully configurable inputs for use as alarms or a range of different functions.*
- *Extensive range output functions using built in relay outputs or relay expansion available .*

Selective operational sequences, timers and alarm trips can be altered by the customer via a PC using the P810 For Windows™ software and 810 interface

Access to critical operational sequences and timers for use by qualified engineers, are barred by a security code. Module access is barred by PIN code. V3.00 Limited operator selections, such as display language, can be changed from the module front panel.

The module is housed in a robust plastic case suitable for panel mounting. Connections to the module are via locking plug and sockets.

CLARIFICATION OF NOTATION USED WITHIN THIS PUBLICATION.



Highlights an essential element of a procedure to ensure correctness.



Indicates a procedure or practice which, if not strictly observed, could result in damage or destruction of equipment.



Indicates a procedure or practice which could result in injury to personnel or loss of life if not followed correctly.

V2.00

Indicates facility is only available on V2.00 or later modules. If in doubt check 'V' number on power up display.

V3.00

Indicates facility is only available on V3.00 or later modules. If in doubt check 'V' number on power up display.



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1. OPERATION

1.1 CONTROL

Control of the **DSE 555** module is via push-buttons mounted on the front of the module with **STOP/RESET**, **MANUAL**, **START**, **AUTO**, **TEST** and **ALARM MUTE** functions. For normal operation these are the only controls which need to be operated. The smaller push-buttons are used to access further information such as engine instruments. Details of their operation is detailed later in this document.

The following descriptions detail the sequences followed by a module containing the standard 'factory configuration'. Always refer to your configuration source for the exact sequences and timers observed by any particular module in the field.

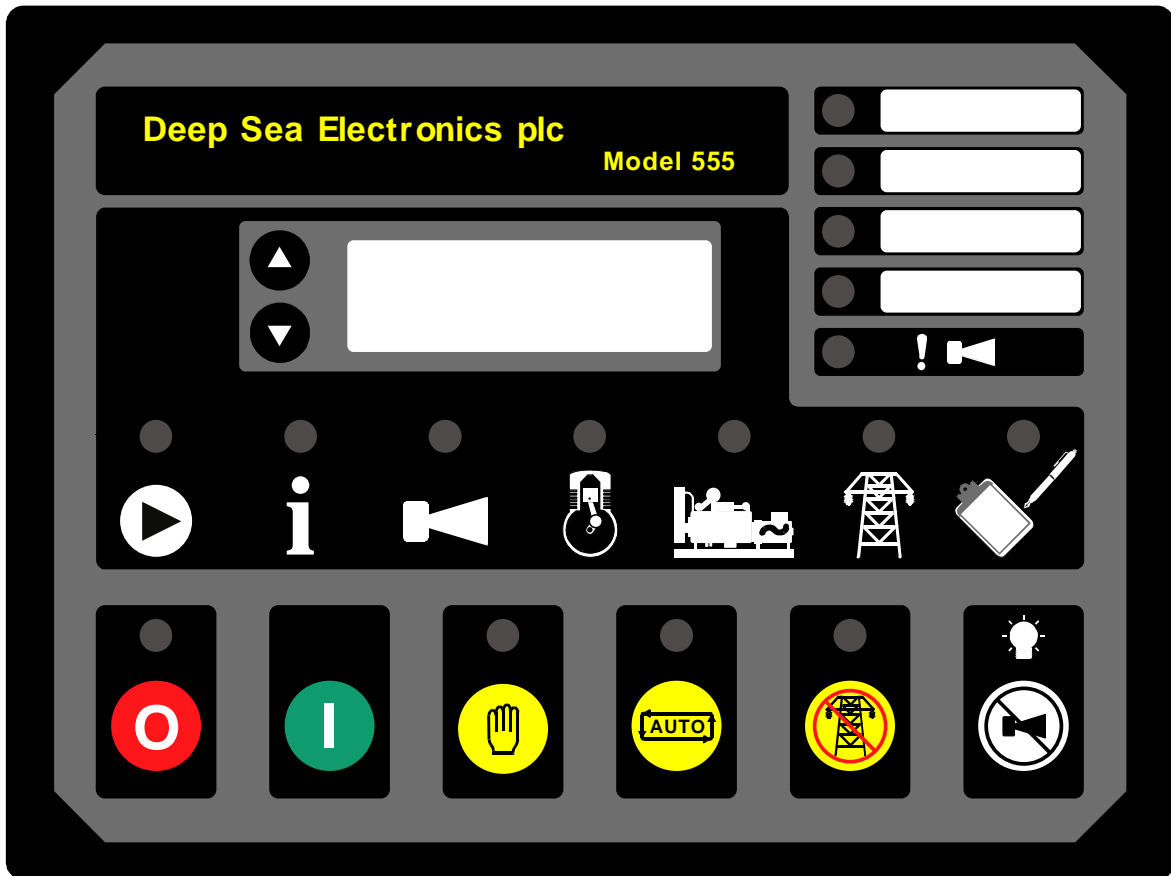



FIG 1

1.2 NORMAL MANUAL OPERATION

Operation	Detail
To initiate a start sequence, press the 'Manual' push-button.	
The LED above the button will illuminate and the LCD display will briefly indicate:	MANUAL MODE


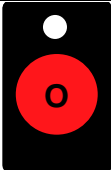
Operation	Detail
The LED above the button will illuminate and the LCD display will then indicate:	GENERATOR AT REST
Then, press and hold the START push-button, once the module has commenced the start sequence the button may then be released. <i>(However, it is possible to configure the module such the start-button must be held pressed to maintain engine cranking until disconnect speed is reached - Refer to your configuration Source)</i>	
The LED above the button will illuminate and the LCD display will briefly indicate:	START
If the pre-heat output option is configured, the Pre-heat timer is then initiated, and the auxiliary output selected is energised.	PRE-HEATING 00:09
After the pre-heat timer has expired the module will de-energise the pre-heat output and commence engine starting; the following sequence occurs.	PRE-HEATING 00:00
The Fuel Solenoid is energised, then after a 1 second delay the Starter Motor is engaged	FUEL ON
The engine is cranked for the duration of the crank timer	CRANKING ATTEMPT.1 00:08

When the engine fires, the starter motor is disengaged and locked out at a pre-set frequency from the Alternator output. Alternatively a Magnetic Pickup mounted on the flywheel housing can be used for terminating cranking, along with options of Charge alternator voltage and oil pressure. If a Magnetic Pick-up is utilised it is also possible to configure the module so that if the starter motor fails to engage on the first attempt, the starter relay will be de-energised and the a second attempt to engage will be made. For further details on this function please refer to the P810 for Windows™ configuration manual.

Operation	Detail
Should the engine not fire on the first attempt and the crank timer expires, the module will rest the starter for the duration of the crank rest timer.	CRANK REST. 1 00:04
Once this has expired the module will once again attempt to start the engine.	CRANKING ATTEMPT 2 00:07

This will be repeated until either the engine fires or the pre-set number of attempts to start have been completed...

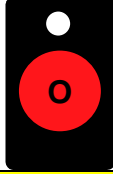
Operation	Detail
In this instance the module will indicate a 'Fail to start' alarm.	SHUTDOWN FAILED TO START

<p> NOTE:- Should a 'Fail to start' alarm occur the module must be placed into STOP/RESET mode by pressing the STOP/RESET PUSHBUTTON. Determine why the engine failed to fire before making any further attempts to start.</p>	
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If the engine start is successful, the following sequence occurs:-

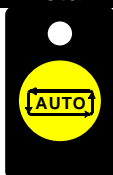
Operation	Detail
After the starter motor has disengaged, the Safety On timer is activated.	WAITING FOR SAFETY ON 00:08

This timer allows Oil Pressure, High Engine Temperature, Underspeed, Undervolts, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

Operation	Detail
Once the engine is running and the Safety on timer has expired, full fault protection is made available.	GENERATOR AVAILABLE IN MANUAL
Pressing the STOP/RESET PUSHBUTTON will de-energise the Fuel Solenoid and bring the engine to rest.	
The LCD screen will acknowledge the button press...	STOP/RESET
While the engine runs down the module will start it's 'Fail to stop' timer.	STOPPING 00:24
If the engine is still running when the 'Fail to stop' Timer expires the module will alarm.	SHUTDOWN FAIL TO STOP
Should the engine come to rest within the time allowed by the fail to stop timer the screen will revert to ...	GENERATOR AT REST

NOTE:- The Load Transfer Output will not normally become active during a 'Manual' start. However, if the 'Remote Start' input is activated once the engine is running then the Load Transfer Output will be activated and remain active until the engine is stopped.

1.3 AUTOMATIC (MAINS FAILURE/REMOTE) OPERATION

Operation	Detail
If the module is placed in ' AUTO ' mode by pressing the ' AUTO ' PUSHBUTTON, it will monitor the auxiliary inputs for a ' REMOTE START ' signal. In addition the module will monitor the incoming AC mains supply.	
The LCD display will briefly indicate	AUTO MODE
The LCD display will then indicate	GENERATOR AT REST

Should the '**REMOTE START**' signal be detected, or the Mains supply become outside of acceptable limits, the following sequence will occur...

The module will start its 'Start Delay' timer, this is used to ensure that the start event is really required and not just a momentary transient signal.	START DELAY 00:09
--	------------------------------------

Once this timer has expired the module will continue with its normal start sequence as detailed below. Should the remote start signal be removed or the mains return to within limits during either the start delay timer or pre-heat timer, the module will terminate its start sequence and return to its standby '**AUTO**' state until such time as a start is signalled again.

Operation	Detail
If the pre-heat output option is configured, then the pre-heat timer is then initiated, and the auxiliary output selected is energised.	PRE-HEATING 00:09
After the pre-heat timer has expired the module will de-energise the pre-heat output and commence engine starting; the following sequence occurs.	PRE-HEATING 00:00
The Fuel Solenoid is energised, then after a 1 second delay the Starter Motor is engaged	FUEL ON
The engine is cranked for the duration of the crank timer	CRANKING ATTEMPT. 1 00:06

When the engine fires, the starter motor is disengaged and locked out at a pre-set frequency from the Alternator output. Alternatively a Magnetic Pickup mounted on the flywheel housing can be used for terminating cranking, along with options of Charge alternator voltage and oil pressure. If a Magnetic Pick-up is utilised it is also possible to configure the module so that if the starter motor fails to engage on the first attempt, the starter relay will be de-energised and the a second attempt to engage will be made. For further details on this function please refer to the P810 For Windows™ configuration manual.

Operation	Detail
Should the engine not fire on the first attempt and the crank timer expires, the module will rest the starter for the duration of the crank rest timer.	CRANK REST. 1 00:04
Once this has expired the module will once again attempt to start the engine.	CRANKING ATTEMPT 2 00:07

This will be repeated until either the engine fires or the pre-set number of attempts to start have been completed...

Operation	Detail
In this instance the module will indicate a ' Fail to start ' alarm.	SHUTDOWN FAIL TO START

NOTE:- Should a '**Fail to start**' alarm occur the module must be placed into **STOP/RESET** mode by pressing the **STOP/RESET PUSHBUTTON**. Determine why the engine failed to fire before making any further attempts to start.



If the engine start is successful, the following sequence occurs:-

Operation	Detail
After the starter motor has disengaged, the Safety On timer is activated.	WAITING FOR SAFETY ON 00:09

This timer allows Oil Pressure, High Engine Temperature, Underspeed, Undervolts, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault. Once the engine is running and the safety on timer has expired, full fault protection is made available.

Operation	Detail
Once the generator is running at the correct speed and up to voltage the Warm-up timer is then initiated	WARMING UP 00:08

Should the remote start signal be removed or the mains return to within limits during either of the cranking or warm-up timers, the module will terminate its normal auto start sequence will initialise its 'Cooling Timer' and eventually return to its standby '**AUTO**' state until such time as a start is signalled again.

Operation	Detail
After the warm-up timer has expired the module will open the mains contactor relay.	GENERATOR AVAILABLE IN AUTO
After a short transfer delay to allow the mains contactor to open the generator contactor will close.	GENERATOR AVAILABLE

The generator is now up and running and is selected to supply the load.

Operation	Detail
Should the remote start signal be removed, or the mains return the module will first initiate a return timer to ensure that it is safe to stop the generator.	GENERATOR AVAILABLE 00:06

Should the remote start input become active again or the mains fall outside of acceptable limits again within this time the module will continue to run the generator on load and ignore the fluctuating remote start signal or mains supply until such time as it remains in-active for the duration of the stop delay timer.

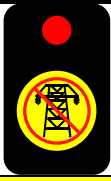

Once the return timer has expired, the module will de-energise the **Load Transfer** output.

Operation	Detail
The module will then commence its cooling timer, this allows the engine to run off load to ensure that it has adequately cooled before being brought to a standstill.	COOLING DOWN 2:34
Once the cooling timer has expired the module will de-energise the fuel solenoid and the engine will be brought to rest.	STOPPING 00:27
If the engine is still running when the 'Fail to stop' Timer expires the module will alarm.	SHUTDOWN FAIL TO STOP
Should the engine come to rest within the time allow by the fail to stop timer the screen will revert to	GENERATOR AT REST

Note:- V2.00 It is possible that the module has been configured to perform regular exercise runs automatically. This may be used to exercise the engine periodically in standby applications or to assist in peak-lopping arrangements. Therefore even though the remote start input is not active and the mains supply is healthy, it is possible that if the system is in the 'Auto' mode the engine may start unexpectedly if a scheduled run is configured to occur.

WARNING!:- Before commencing work on the generating set it is important to take steps to ensure that a scheduled run cannot start the engine unexpected. The system should at a minimum be taken out of the 'Auto' mode and 'Stop' selected. Depending on the nature of the work to be performed - further steps to ensure safety while working may be necessary.

1.4 TEST (SIMULATE MAINS FAILURE) OPERATION

Operation	Detail
To place the module into 'TEST' mode press 'TEST' PUSHBUTTON. This mode is used to simulate an automatic start and will start the generator and transfer the load.	
The LCD display will briefly indicate	TEST MODE
The LCD display will then indicate	GENERATOR AT REST
Then, press and hold the START push-button, once the module has commenced the start sequence the button may then be released. <i>(However, it is possible to configure the module such that the start-button must be held pressed to maintain engine cranking until disconnect speed is reached - Refer to your configuration Source)</i>	
The LED above the button will illuminate and the LCD display will briefly indicate:	START
If the pre-heat output option is configured, the Pre-heat timer is then initiated, and the auxiliary output selected is energised.	PRE-HEATING 00:09
After the pre-heat timer has expired the module will de-energise the pre-heat output and commence engine starting; the following sequence occurs.	PRE-HEATING 00:00
The Fuel Solenoid is energised, then after a 1 second delay the Starter Motor is engaged	FUEL ON
The engine is cranked for the duration of the crank timer	CRANKING ATTEMPT.1 00:08

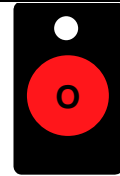
When the engine fires, the starter motor is disengaged and locked out at a pre-set frequency from the Alternator output. Alternatively a Magnetic Pickup mounted on the flywheel housing can be used for terminating cranking, along with options of Charge alternator voltage and oil pressure. If a Magnetic Pick-up is utilised it is also possible to configure the module so that if the starter motor fails to engage on the first attempt, the starter relay will be de-energised and the a second attempt to engage will be made. For further details on this function please refer to the 810 configuration manual.

Operation	Detail
Should the engine not fire on the first attempt and the crank timer expires, the module will rest the starter for the duration of the crank rest timer.	CRANK REST. 1 00:04
Once this has expired the module will once again attempt to start the engine.	CRANKING ATTEMPT 2 00:07

This will be repeated until either the engine fires or the pre-set number of attempts to start have been completed...

Operation	Detail
In this instance the module will indicate a 'Fail to start' alarm.	SHUTDOWN FAIL TO START

NOTE:- Should a 'Fail to start' alarm occur the module must be placed into STOP/RESET mode by pressing the STOP/RESET PUSHBUTTON. Determine why the engine failed to fire before making any further attempts to start.




If the engine start is successful, the following sequence occurs:-

Operation	Detail
After the starter motor has disengaged, the Safety On timer is activated.	WAITING FOR SAFETY ON 00:09

This timer allows Oil Pressure, High Engine Temperature, Underspeed, Undervolts, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault. Once the engine is running and the safety on timer has expired, full fault protection is made available.

Operation	Detail
Once the generator is running at the correct speed and up to voltage the Warm-up timer is then initiated	WARMING UP 00:08
After the warm-up timer has expired the module will energise it's Load Transfer Output.	GENERATOR AVAILABLE IN MANUAL

The generator is now up and running and is selected to supply the load. To test the generator stopping sequence press the 'Auto' pushbutton.

Operation	Detail
If the module is placed in 'AUTO' mode by pressing the 'AUTO' PUSHBUTTON, it will monitor the auxiliary inputs for a 'REMOTE START' signal. In addition the module will monitor the incoming AC mains supply.	
The LCD display will briefly indicate	AUTO MODE
Should the remote start signal not be present, or the mains is within limits, the module will first initiate a return timer to ensure that it is safe to stop the generator.	GENERATOR AVAILABLE 00:06




Should the remote start input become active again within this time the module will continue to run the generator on load and ignore the fluctuating remote start signal until such time as it remains inactive for the duration of the stop delay timer.

Once the return timer has expired, the module will de-energise the **Load Transfer** output.

Operation	Detail
The module will then commence its cooling timer, this allows the engine to run off load to ensure that it has adequately cooled before being brought to a standstill.	COOLING DOWN 2:34
Once the cooling timer has expired the module will de-energise the fuel solenoid and the engine will be brought to rest.	STOPPING 00:27
If the engine is still running when the 'Fail to stop' Timer expires the module will alarm.	SHUTDOWN FAIL TO STOP
Should the engine come to rest within the time allow by the fail to stop timer the screen will revert to	GENERATOR AT REST

2. PROTECTIONS

The module will indicate that an alarm has occurred in several ways;


The Audible Alarm will sound. This can be silenced by pressing the 'Mute' button	
The "Common alarm" LED will illuminate (Warning = Steady, Shutdown = Flashing [steady when Muted])	
The LCD display will jump from the 'Information page' to display the Alarm Page and the LED above the page icon will illuminate	
The LCD will the display	ALARM
Followed by the appropriate alarm text	SHUTDOWN LOW OIL PRESSURE

If no alarms are present the LCD will display the following message and will then return to the 'Information Display' page;






NO ALARM PRESENT



The LCD will display multiple alarms E.g. "High Engine Temperature shutdown", "Emergency Stop" and "Low Coolant Warning" alarms have been triggered. These will automatically scroll round in the order that they occurred;

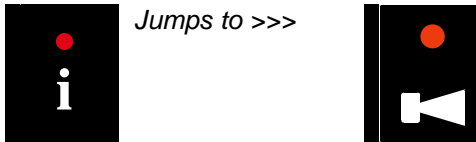
ALARM	
SHUTDOWN HIGH ENGINE TEMP	
SHUTDOWN EMERGENCY STOP	
WARNING LOW COOLANT LEVEL	

It is also possible to manually scroll to display the different alarms;

Initial display	>>>>>>	ALARM
Pressing the DOWN button the LCD will then show...		SHUTDOWN HIGH ENGINE TEMP
Pressing the DOWN button again the LCD will then show...		SHUTDOWN EMERGENCY STOP
Pressing the DOWN button again the LCD will then show...		WARNING LOW COOLANT LEVEL
Pressing the DOWN button again the LCD will then show...		ALARM
Pressing the UP button the LCD will then show... etc, etc, etc.		WARNING LOW COOLANT LEVEL

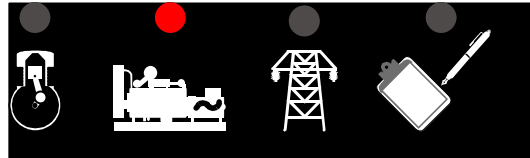
VIEWING ALARMS


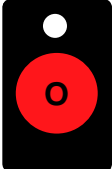
If the module is operating in the normal 'INFORMATION PAGE' display any alarm condition will automatically be displayed.



If the user is viewing instrumentation, e.g.

Then the alarm page will not automatically be displayed and must be viewed by the operator.



To view an alarm operate the page button to move to the 'Alarm' page.	
To clear an alarm the original triggering conditions must be removed before the alarm can be reset. Alarms are reset by pressing the 'Stop/Reset' pushbutton.	

2.1 WARNINGS

Warnings are non-critical alarm conditions and do not affect the operation of the generator system, they serve to draw the operators attention to an undesirable condition.

BATTERY CHARGE FAILURE, if the module does not detect a voltage from the warning light terminal on the auxiliary charge alternator, the module will display '**WARNING CHARGE ALT FAILURE**' on the LCD. The **COMMON ALARM LED** will also illuminate.

BATTERY LOW VOLTAGE, if the module detects that the plant DC supply has fallen below the low volts setting level , the module will display '**WARNING LOW BATTERY VOLTAGE**' on the LCD. The **COMMON ALARM LED** will also illuminate.

BATTERY HIGH VOLTAGE, if the module detects that the plant DC supply has risen above the high volts setting level , the module will display '**WARNING HIGH BATTERY VOLTAGE**' on the LCD. The **COMMON ALARM LED** will also illuminate.

OIL PRESSURE SENDER/SWITCH, the module can be configured to only attempt to crank the engine if the Oil Pressure is initially low, (engine at rest, not running). The module will display '**FAIL TO STOP**' on the LCD. The **COMMON ALARM LED** will also illuminate.

LOW OIL PRESSURE, if the module detects that the engine oil pressure has fallen below the low oil pressure pre-alarm level after the **Safety On** timer has expired, a warning alarm will occur. The LCD will indicate '**WARNING LOW OIL PRESSURE**' and the **COMMON ALARM LED** will illuminate.

HIGH ENGINE TEMPERATURE, if the module detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm level after the **Safety On** timer has expired, a warning alarm will occur. The LCD will indicate '**WARNING HI COOLANT TEMP.**' and the **COMMON ALARM LED** will illuminate.

OVERSPEED, if the engine speed exceeds the pre-alarm level a warning is initiated. The LCD will indicate '**WARNING OVERSPEED**' and the **COMMON ALARM LED** will illuminate.


UNDERSPEED, if the engine speed falls below the pre-alarm level after the **Safety On** timer has expired, a warning alarm is initiated. The LCD will indicate '**WARNING UNDERSPEED**' and the **COMMON ALARM LED** will illuminate.

GENERATOR HIGH FREQUENCY, if the module detects a generator output frequency in excess of the pre-alarm level a warning is initiated. The LCD will indicate '**WARNING GEN HIGH FREQUENCY**' and the **COMMON ALARM LED** will illuminate.

GENERATOR LOW FREQUENCY, if the module detects a generator output frequency below the pre-alarm level after the **Safety On** timer has expired, a warning is initiated. The LCD will indicate '**WARNING GEN LOW FREQUENCY**' and the **COMMON ALARM LED** will illuminate.

GENERATOR HIGH VOLTAGE, if the module detects a generator output voltage in excess of the pre-alarm level a warning is initiated. The LCD will indicate '**WARNING GEN HIGH VOLTAGE WARNING**' and the **COMMON ALARM LED** will illuminate.

GENERATOR LOW VOLTAGE, if the module detects a generator output voltage below the pre-alarm level after the **Safety On** timer has expired, a warning is initiated. The LCD will indicate '**WARNING GEN LOW VOLTAGE WARNING**' and the **COMMON ALARM LED** will illuminate.


MAINS PHASE SEQUENCE WRONG , if the module detects a generator phase rotation error a warning is initiated. The LCD will indicate '**MAINS PHASE SEQ WRONG**' and the **COMMON ALARM LED** will illuminate.

MAINTENANCE DUE ALARM, ^{V2.00} if the engine exceed the allowed running hours or time between periodic maintenance a warning is initiated. The LCD will indicate '**MAINTENANCE NOW DUE**' and the **COMMON ALARM LED** will illuminate. To clear the alarm a 'MAINTENANCE RESET' must be performed (refer to config source or P810 for Windows software manual for more detail)

AUXILIARY INPUTS, if an auxiliary input has been configured as a warning the appropriate LCD message will be displayed and the **COMMON ALARM LED** will illuminate.

2.2 SHUTDOWNS

Shutdowns are latching and stop the Generator. The alarm must be accepted and cleared, and the fault removed to reset the module.

 **NOTE:-** The alarm condition must be rectified before a reset will take place. If the alarm condition remains it will not be possible to reset the unit (The exception to this is the Low Oil Pressure alarm and the like, as the oil pressure will be low with the engine at rest).

FAIL TO START, if the engine does not fire after the pre-set number of attempts has been made a shutdown will be initiated. The LCD will indicate '**SHUTDOWN FAIL TO START**' and the **COMMON ALARM** and **LED** will flash.


EMERGENCY STOP, removal of the **+ve DC** Supply from the Emergency Stop input initiates the following sequence, firstly it will initiate a controlled shutdown of the Generator and prevent any attempt to restart the Generator until the Emergency Stop push-button has been reset. Secondly it removes the **+ve DC** supply from both the Fuel Solenoid and Starter Solenoid. The LCD will indicate '**SHUTDOWN EMERGENCY STOP**' and the **COMMON ALARM LED** will flash.

 **NOTE:-** The Emergency Stop +Ve signal must be present otherwise the unit will shutdown.

LOW OIL PRESSURE, if the module detects that the engine oil pressure has fallen below the low oil pressure trip setting level after the **Safety On** timer has expired, a shutdown will occur. The LCD will indicate '**SHUTDOWN LOW OIL PRESSURE**' and the **COMMON ALARM LED** will flash.

HIGH ENGINE TEMPERATURE, if the module detects that the engine coolant temperature has exceeded the high engine temperature trip setting level after the **Safety On** timer has expired, a shutdown will occur. The LCD will indicate '**SHUTDOWN HIGH COOLANT TEMP**' and the **COMMON ALARM LED** will flash.

OVERSPEED, if the engine speed exceeds the pre-set trip a shutdown is initiated. The LCD will indicate '**SHUTDOWN OVERSPEED**' and the **COMMON ALARM LED** will flash. Overspeed is not delayed, it is an **immediate shutdown**.

 **NOTE:-** However during the start-up sequence the overspeed trip logic can be configured to allow an extra trip level margin, this is used to prevent nuisance tripping on start-up - Refer to the P810 for Window™ Configuration Manual under heading 'Overspeed Overshoot' for details.

UNDERSPEED, if the engine speed falls below the pre-set trip after the Safety On timer has expired, a shutdown is initiated. The LCD will indicate '**SHUTDOWN UNDERSPEED**' and the **COMMON ALARM LED** will flash.


GENERATOR HIGH FREQUENCY, if the module detects a generator output frequency in excess of the pre-set trip a shutdown is initiated. The LCD will indicate '**SHUTDOWN GEN HIGH FREQUENCY**' and the **COMMON ALARM LED** will flash. High frequency is not delayed, it is an **immediate shutdown**.


GENERATOR LOW FREQUENCY, if the module detects a generator output frequency below the pre-set trip after the Safety On timer has expired, a shutdown is initiated. The LCD will indicate '**GEN LOW FREQUENCY**' and the **COMMON ALARM LED** will flash.

GENERATOR HIGH VOLTAGE, if the module detects a generator output voltage in excess of the pre-set trip a shutdown is initiated. The LCD will indicate '**GEN HIGH VOLTAGE**' and the **COMMON ALARM LED** will flash. High voltage is not delayed, it is an **immediate shutdown**.

GENERATOR LOW VOLTAGE, if the module detects a generator output voltage below the pre-set trip after the Safety On timer has expired, a shutdown is initiated. The LCD will indicate '**GEN LOW VOLTAGE**' and the **COMMON ALARM LED** will flash.

OIL PRESSURE SENDER OPEN CIRCUIT, if the module detects a loss of signal from the oil pressure sender (open circuit) a shutdown is initiated. The LCD will indicate '**OIL PRESS SENDER FAULT**' and the **COMMON ALARM LED** will flash. Sender failure is not delayed, it is an **immediate shutdown**.

GENERATOR EARTH FAULT , if the module detects a generator earth fault current in excess of the pre-set trip a shutdown is initiated. The LCD will indicate '**GEN EARTH FAULT**' and the **COMMON ALARM LED** will flash.

GENERATOR PHASE SEQUENCE WRONG , if the module detects a generator phase rotation error a shutdown is initiated. The LCD will indicate '**GEN PHASE SEQ WRONG**' and the **COMMON ALARM LED** will flash.


AUXILIARY INPUTS, if an auxiliary input has been configured as a Shutdown the appropriate LCD message will be displayed and the **COMMON ALARM LED** will flash.



= Enhanced Instrumentation Versions only

2.3 ELECTRICAL TRIPS

Electrical trips are latching and stop the Generator but in a controlled manner. On initiation of the electrical trip condition the module will de-energise the 'Load Transfer' Output to remove the load from the generator. Once this has occurred the module will start the Cooling timer and allow the engine to cool, off-load before shutting down the engine. The alarm must be accepted and cleared, and the fault removed to reset the module.

GENERATOR REVERSE POWER , if the module detects a generator reverse power current in excess of the pre-set trip a shutdown is initiated. The LCD will indicate '**GEN REVERSE POWER**' and the **COMMON ALARM LED** will flash.

GENERATOR OVER CURRENT, if the module detects a generator output current in excess of the pre-set trip a shutdown is initiated. The LCD will indicate '**GEN OVER CURRENT**' and the **COMMON ALARM LED** will flash.

GENERATOR SHORT CIRCUIT, if the module detects a generator fault current in excess of the pre-set trip a shutdown is initiated. The LCD will indicate '**GEN SHORT CIRCUIT**' and the **COMMON ALARM LED** will flash.

AUXILIARY INPUTS, if an auxiliary input has been configured as an Electrical Trip the appropriate LCD message will be displayed and the **COMMON ALARM LED** will illuminate.



 = Enhanced Instrumentation Versions only

2.4 PRE-ALARMS AND OPTIONS

During module configuration it is possible to select pre-alarm levels for all of the above shutdowns and electrical trips to give a warning that the trip value is being approached. This allows the operator to take steps to prevent the shutdown from ultimately occurring by rectifying the triggering condition.

If the module is fitted with the optional RS232 communication board, then the following alarm is available:-

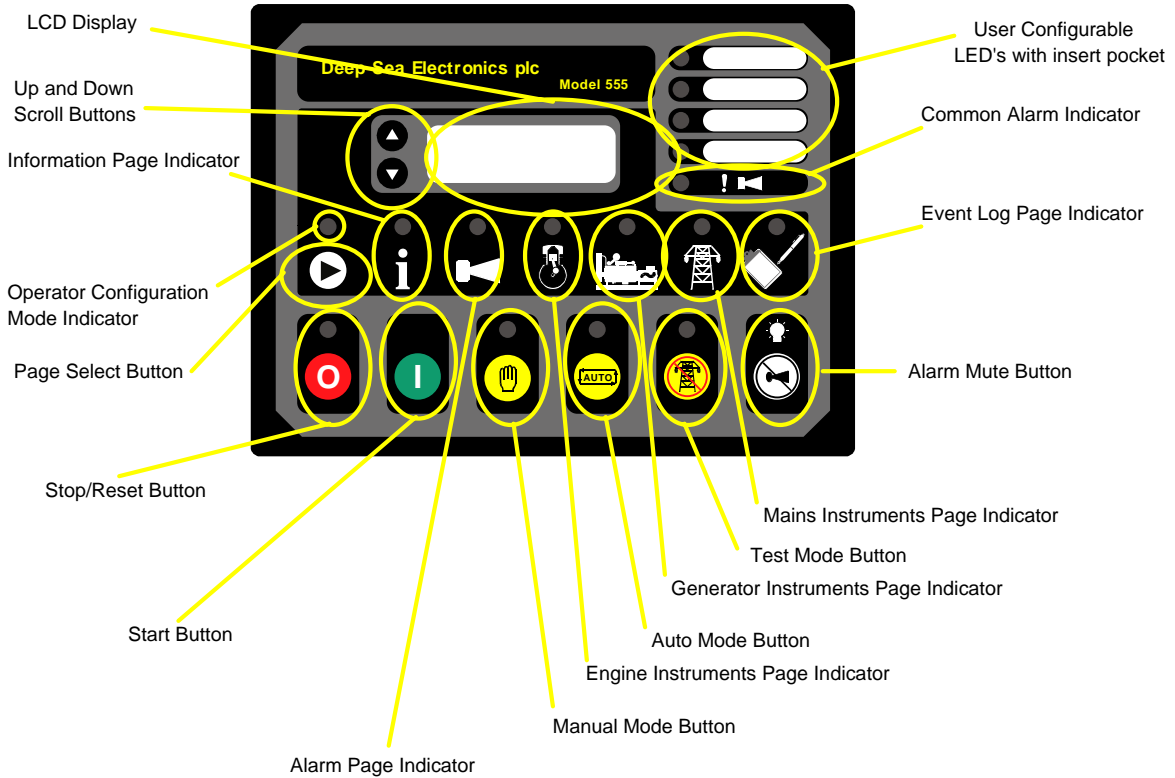
MODEM POWER FAULT, if the module detects a modem supply current in excess of 350mA warning is initiated. The LCD will indicate '**MODEM POWER FAULT**' and the **COMMON ALARM LED** will illuminate. The power supply to the modem will be removed until the alarm is reset.

If the module is fitted with the option of Check Sync  or Auto Sync  , then the following alarm is available:-

FAILED TO SYNCHRONISE, if the module cannot synchronise within the timer allowed by the Synchronising timer a warning is initiated. The LCD will indicate '**FAILED TO SYNC**' and the **COMMON ALARM LED** will illuminate.

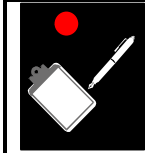
3. DESCRIPTION OF CONTROLS

The following section details the function and meaning of the various controls on the module.



3.1 LCD DISPLAY

	<p>INFORMATION PAGE The LCD display normally indicates the status of the generator such as 'GENERATOR AT REST', 'PRE-HEATING', 'GENERATOR AVAILABLE', etc. This is the default display and is always automatically returned to after a pre-set period of operator inactivity.</p>
	<p>ALARM PAGE The LCD also displays the exact nature of any alarm condition which have occurred such as 'SHUTDOWN LOW OIL PRESSURE'. This allows very specific alarm conditions to be brought to the operators' attention. Refer to the 'Protections' section of this manual for details of how to interact with the alarm page.</p>
	<p>ENGINE INSTRUMENTS PAGE The LCD displays the various engine parameters such as 'ENGINE SPEED', 'OIL PRESSURE', 'HOURS RUN', etc.</p>
	<p>GENERATOR INSTRUMENT PAGE The LCD displays the various generator output values such as 'GENERATOR VOLTAGE', 'GENERATOR CURRENT', etc. If the enhanced instrumentation option is fitted the LCD will also display the values of 'GENERATOR KW', 'GENERATOR pF', 'GENERATOR KVAR', etc.</p>
	<p>MAINS INSTRUMENT PAGE The LCD displays the various mains supply values such as 'MAINS VOLTAGE', 'MAINS FREQUENCY', etc.</p>



EVENT LOG PAGE

In the event of a shutdown alarm occurring the triggering alarm will be recorded in the Event Log Memory. The Memory will record the last 25 such shutdowns. Subsequent alarms will then over-write the oldest previous alarm. This feature allows service engineers arriving on site a detailed look at the recent history of the gen-set or plant.

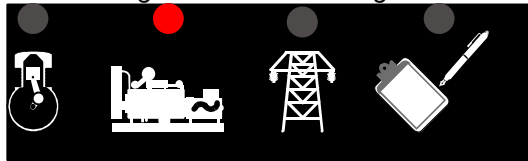
VIEWING THE INSTRUMENT AND EVENT LOG PAGES

To view a particular instrument operate the “Page” button to move to the required page. Each press of the button will move the page indicator LED along. The LCD will also indicate the page title.



i.e. To view the Engine Coolant temperature move to the ‘Engine Instruments Page’.

The LCD will display the page title and then will automatically commence scrolling down the various instrument . These will automatically scroll round, on reaching the last instrument the LCD display will then jump back to the page title and resume scrolling down the page. This sequence will be repeated until either the user moves off the page or after a period of inactivity the module will revert to the ‘Information Page’



ENGINE INSTRUMENTATION
ENGINE SPEED 1503 RPM
ENG OIL PRESSURE 2.5Bar 56psi
COOLANT TEMP 78deg C 105deg f
BATTERY VOLTAGE 24.5 V
CHARGE ALT VOLTAGE 27.5 V
ENGINE RUN TIME 50H 36M
NUMBER OF STARTS 67
NEXT MAINTENANCE 123 HOURS

V200

It is also possible to manually scroll to display the different instruments, once selected the instrument will remain on the LCD display until the user selects a different instrument or page, or after a period of inactivity the module will revert to the ‘Information Page’.

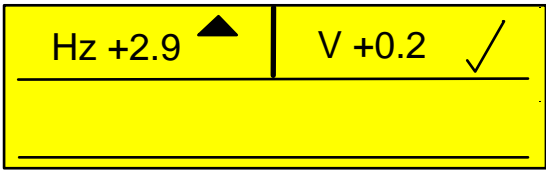
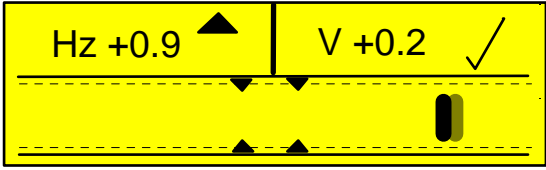
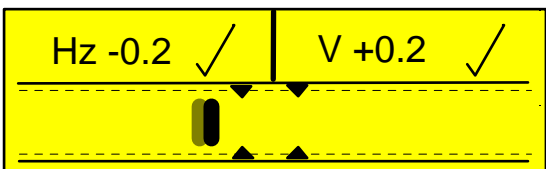
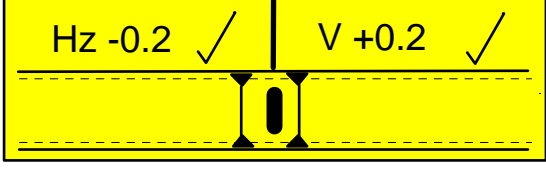
NOTE:-This description of operation is also true for the other instrument pages and for viewing the records in the event log.

Manually Selecting an Instrument

Initial display	>>>>>>	ENGINE INSTRUMENTS
Pressing the DOWN button the LCD will then show...	▼	ENGINE SPEED 1503 RPM
Pressing the DOWN button again the LCD will then show...	▼	ENG OIL PRESSURE 2.5Bar 56psi
Pressing the DOWN button again the LCD will then show...	▼	COOLANT TEMP 78deg C 105deg f
Pressing the DOWN button again the LCD will then show...	▼	BATTERY VOLTAGE 24.5 V
Pressing the DOWN button again the LCD will then show...	▼	CHARGE ALT VOLTAGE 27.5 V
Pressing the UP button the LCD will then show... etc, etc, etc.	▲	BATTERY VOLTAGE 24.5 V











If the **DOWN** button is pressed while the LCD display is showing 'ENGINE RUN TIME' then the display will jump round to the top of the page and display the page title; 'ENGINE INSTRUMENTS'. Pressing the **DOWN** button again will then display; 'ENGINE SPEED'






SYNCHROSCOPE OPERATION (IF FITTED)

Display	Detail
	<p>V2.00 Initial stage of Synchronising display will only show the difference between the Mains Supply and the Generator Output. Here the display is showing a frequency mis-match of +2.9Hz - The gen-set frequency is too high and should be reduced (indicated by the arrow). The voltage is +0.2 volts high, but is within the limits set for synchronising.</p>
	<p>Once the difference between the Mains supply and the Generator output has been reduced the 'Synchroscope' display will become active. The moving bar will roll from left to right or right to left depending on the mis-match between the Mains supply and the generator output. The area in the centre of the scope indicates the set limits for synchronising to occur.</p>
	<p>Synchronising will only occur when both the Frequency and the voltage differences are within acceptable limits - Indicated by 'Tick' marks on the top of the display. Then the moving bar display will show the phase difference. The engine speed should be adjusted until the moving bar enters the centre of the scope.</p>
	<p>Once the Mains and the generator are synchronised the moving bar will be in the centre of the scope and the bar will be 'locked' into the synchronising window. While the bar is 'locked' the module will initiate a breaker close to load the generator onto the Mains. Should synchronism be broken the moving bar will pass out of the synchronising window and the 'locked' indication will clear.</p>

OPERATOR CONFIGURATION MODE

This configuration mode allows the operator limited customising of the way the module operates.

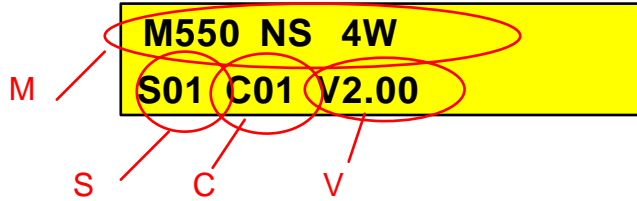
Operation	Detail
To enter the ' Operator configuration mode ' press both the UP and DOWN scroll buttons together.	
The module will enter ' Operator Configuration mode ' and the ' Operator configuration mode indicator ' will illuminate above the PAGE button.	
The LCD will then display:	CONFIGURATION
To view the different configuration functions press the PAGE button.	
The LCD will then display:	LANGUAGE ENGLISH
Pressing the UP or DOWN Button will then change the selected language.	
The LCD will then display the new language:	LANGUAGE FRENCH
Repeat until the required language is displayed.	LANGUAGE GERMAN
To view the next function press the PAGE button.	
The LCD will then display:	CONTRAST 
Pressing the UP or DOWN Button will move the sliding bar UP (<i>Darker</i>) or DOWN (<i>Lighter</i>) - set this to the desired position.	
When correct, to view the next function press the PAGE button.	
The LCD will then display:	AUTO SCROLL TIME 3.0 Seconds
This is the duration each instrument will be displayed for during the automatic scrolling. Use the UP and DOWN buttons to set this to the required value.	
When correct, to view the next function press the PAGE button.	

Operation	Detail
The LCD will then display:	INDICATIONS ON LCD YES
Digital inputs configured as indications can be viewed on the LCD by pressing the UP or DOWN button when the ' Information Page ' is active. To disable this function set to ' NO ' by pressing the UP or DOWN button.	
When correct, to view the next function press the PAGE button.	
The LCD will then display:	ABANDON CHANGES AND EXIT
To exit the ' Operator configuration mode ' <u>with-out storing any changes</u> made press the UP or DOWN button.	
If you wish to save the changes you have made to the configuration press the PAGE button.	
The LCD will then display:	SAVE CHANGES AND EXIT
To exit the ' Operator configuration mode ' and <u>store the changes</u> you have made press the UP or DOWN button.	

The module will then return to the '**Information Page**' display and the '**Operator Configuration Mode Indicator**' will extinguish.

POWER UP LCD DISPLAY


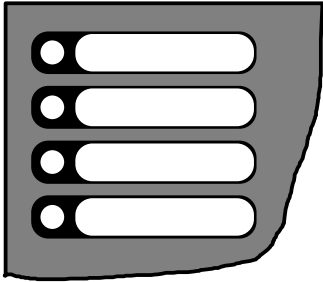
On application of the DC supply the module LCD will display information about the module.



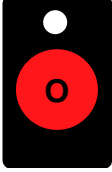



Code Letter	Meaning	Options	Detail
M	Module Type	550 NS 4W	Auto-start Module Variant with no Sync option, 4 wire (3ph+N) connection.
		550 CS 4W	Auto-start Module Variant with Check Sync option, 4 wire (3ph+N) connection.
		550 AS 4W	Auto-start Module Variant with Auto Sync option, 4 wire (3ph+N) connection.
		550 NS 3W	
		550 CS 3W	
		550 AS 3W	
		555 NS 4W	Automatic Mains Failure Module Variant with no Sync option, 4 wire (3ph+N) connection.
		555 CS 4W	Automatic Mains Failure Module Variant with Check Sync option, 4 wire (3ph+N) connection.
		555 AS 4W	Automatic Mains Failure Module Variant with check Sync option, 4 wire (3ph+N) connection.
		555 NS 3W	
		555 CS 3W	
		555 AS 3W	
S	System Options	00	Basic Metering Version
		01	Enhanced Metering Version
C	Custom Options	00	No options fitted
		01	RS232 Comms Board Fitted
		02	RS485 Comms Board Fitted
		09	RS232 Comms Board + Load Share (CAN-bus) Fitted
		10	RS485 Comms Board + Load Share (CAN-bus) Fitted
		13	
		14	

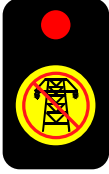

Code Letter	Meaning	Options	Detail
V	Software Version	X.XX	<p>Details internal firmware revision (FLASH Version)</p> <div style="border: 1px solid black; padding: 5px;"> <p>▲NOTE:- V2.00 Some features are only available on V2.00 or later modules.</p> <p>V3.00 Some feature are only available on V3.00 or later modules.</p> </div>

3.2 LED INDICATORS

<p>COMMON ALARM LED</p> <p>This LED indicates when an alarm condition is present. The Alarms Page on the LCD will detail the exact nature of the alarm.</p> <ul style="list-style-type: none"> • 'OFF' - no alarm active. • 'FLASHING' - A shutdown alarm is present, but has not been muted. • 'STEADY' - A warning alarm is present or a shutdown alarm which has been muted is present. 	
<p>USER CONFIGURABLE LED's</p> <p>These LED can be configured by the user to indicate any one of 100+ different functions based around the following:-</p> <ul style="list-style-type: none"> • INDICATIONS - Monitoring of a digital input and indicating associated functioning user's equipment - <i>Such as Battery Charger On or Louver's Open, etc.</i> • WARNINGS and SHUTDOWNS - Specific indication of a particular warning or shutdown condition, backed up by LCD indication - <i>Such as Low Oil Pressure Shutdown, Low Coolant level, etc.</i> • STATUS INDICATIONS - Indication of specific functions or sequences derived from the modules operating state - <i>Such as Safety On, Pre-heating, Panel Locked, Generator Available, etc.</i> 	

3.3 CONTROL PUSH-BUTTONS

<p>STOP/RESET</p> <p>This push-button places the module into it's Stop/reset mode. This will clear any alarm conditions for which the triggering criteria have been removed. If the engine is running and this push-button is operated, the module will automatically instruct the change-over device to un-load the generator (<i>'Load transfer' becomes in-active (if used)</i>). The fuel supply will be removed and engine will be brought to a standstill. Should a remote start signal be present while operating in the mode, a remote start will <u>not</u> occur.</p>	
<p>MANUAL</p> <p>This push-button is used to allow manual control of the generator functions. Entering this mode from any other mode will initially not cause any change of operating state, but allows further push-buttons to be used to control the generator operation. For example once in Manual mode it is possible to manually start the engine by using the 'START' push-button. If the engine is running off-load in the Manual mode and a remote start signal becomes present, the module will automatically instruct the change-over device to place the generator on load (<i>'Load transfer' becomes active (if used)</i>). Should the remote start signal then be removed the generator will remain on load until either the 'STOP/RESET' or 'AUTO' push-buttons are operated.</p>	
<p>START</p> <p>This push-button is used to manually start the engine. The module must first be placed in the 'MANUAL' mode of operation. The 'START' button should then be operated. The engine will then automatically attempt to start. Should it fail on the first attempt it will re-try until either the engine fires or the pre-set number of attempts have been made. To stop the engine the 'STOP/RESET' button should be operated. It is also possible to configure the modules such that the start push-button must be held to maintain engine cranking.</p>	
<p>NOTE:-Different modes of operation are possible - Please refer to your configuration source for details.</p>	
<p>AUTO</p> <p>This push-button places the module into it's 'Automatic' mode. This mode allows the module to control the function of the generator automatically. The module will monitor the remote start input and once a start condition is signalled the set will be automatically started and placed on load (<i>'Load transfer' becomes active (if used)</i>). If the starting signal is removed the module will automatically transfer the load from the generator and shut the set down observing the stop delay timer and cooling timer as necessary. The module will then await the next start event. <i>For further details please see the more detailed description of 'Auto Operation' earlier in this manual.</i></p>	

<p>TEST</p> <p>This push-button places the module into it's 'Test' mode. This mode is used to test the function and timing of the generator start and load sequence. The mode is initiated by pressing the 'Start Button and the set will be automatically started and placed on load. The set will run on load continuously. To test the off-loading and stopping sequence return the set to the 'Auto' mode, the module will automatically transfer the load from the generator and shut the set down observing the stop delay timer and cooling timer as necessary. The module will then await the next start event. <i>For further details please see the more detailed description of 'Test Operation' earlier in this manual.</i></p>	
<p>ALARM MUTE</p> <p>This push-button is used to silence the internal alarm sounder and also any external sounder devices fed from the audible alarm output. Any further alarm conditions will re-activate the sounder. Once the alarm has been muted and investigated it may then be cleared. <i>Refer to the 'Protections' section of this manual for details.</i></p> <p>When the Alarm Mute is operated a Lamp test function will also be implemented and all LED indicators will be illuminated.</p>	

3. INSTALLATION INSTRUCTIONS

The model **DSE 555** Module has been designed for front panel mounting. Fixing is by 4 spring loaded clips for easy assembly.

3.1 PANEL CUT-OUT

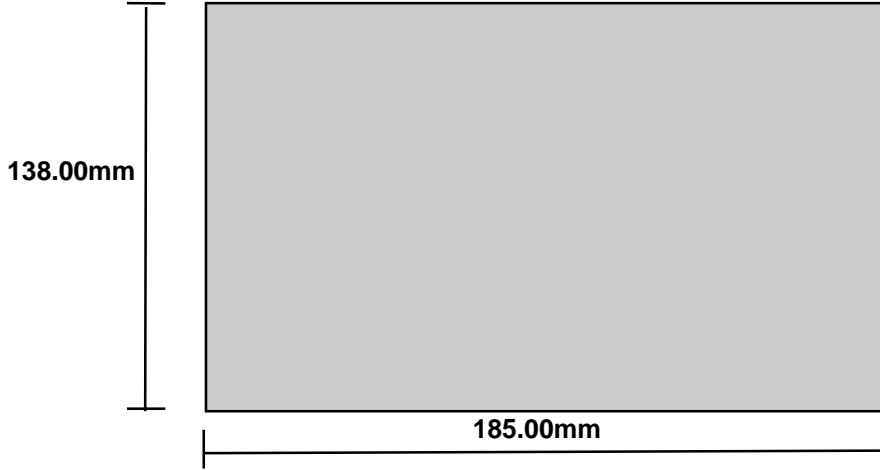


FIG 3

In conditions of excessive vibration the module should be mounted on suitable anti-vibration mountings.

3.2 COOLING

The module has been designed to operate over a wide temperature range **-30 to +70° C**. However allowances should be made for the temperature rise within the control panel enclosure. Care should be taken **NOT** to mount possible heat sources near the module unless adequate ventilation is provided. The relative humidity inside the control panel enclosure should not exceed **93%**.

3.3 UNIT DIMENSIONS

All dimensions in mm.

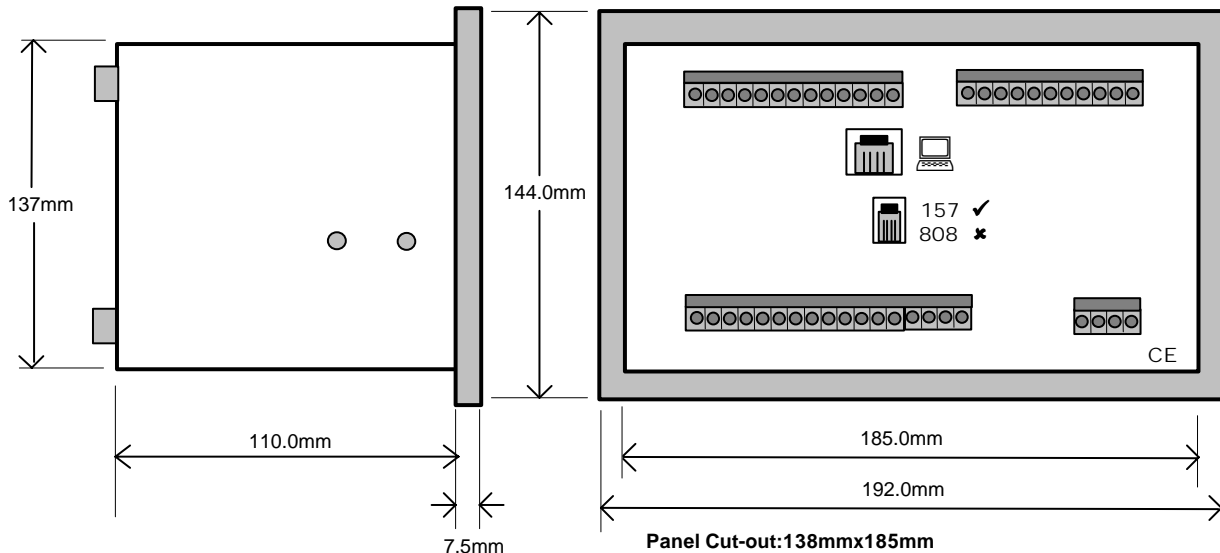


FIG 4

3.4 FRONT PANEL LAYOUT

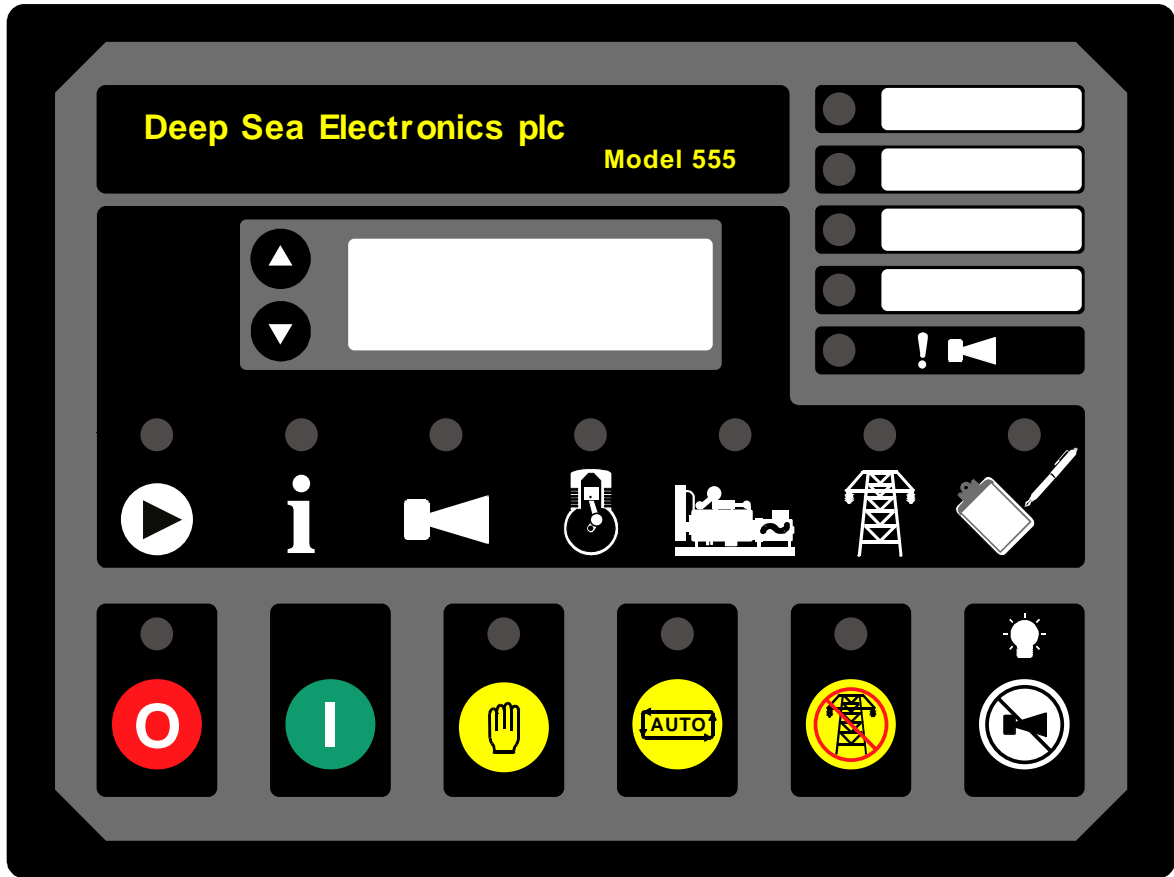


FIG 5

3.5 REAR PANEL LAYOUT

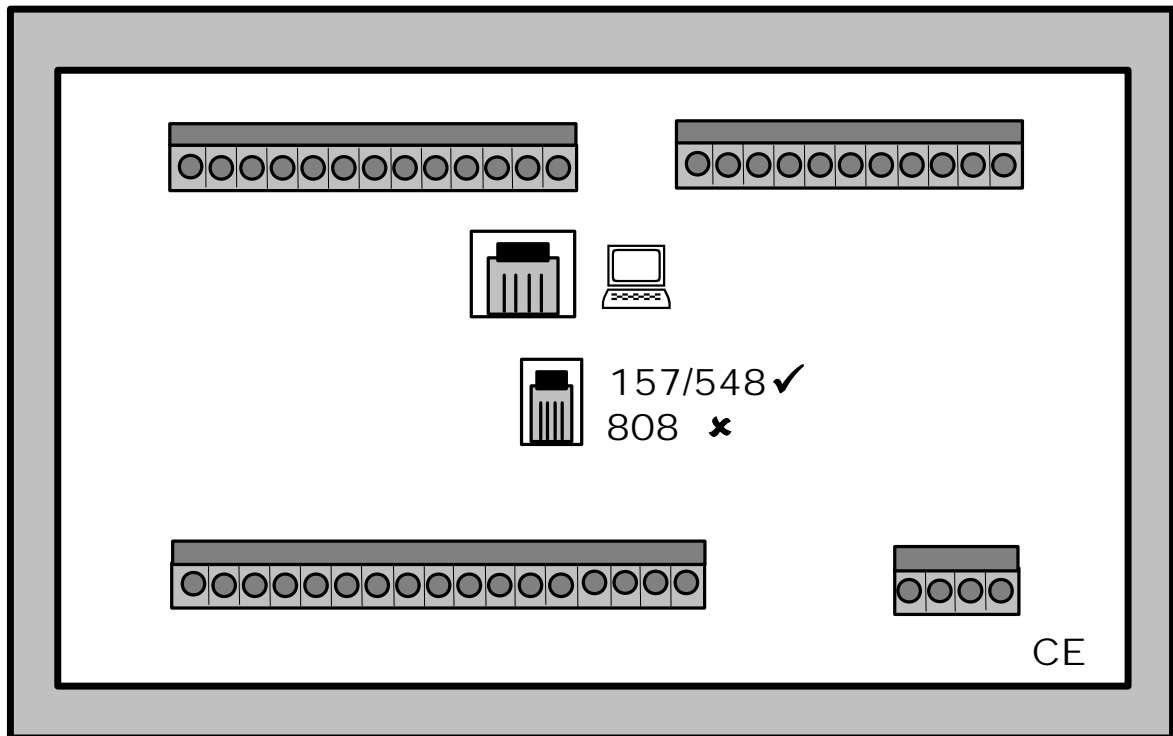


FIG 6

4. ELECTRICAL CONNECTIONS

Connections to the Module are via plug and sockets.

4.1 CONNECTION DETAILS


The following describes the connections and recommended cable sizes to the 3 plugs and sockets on the rear of the Module. See rear panel layout **FIG 5**.

PLUG "A" 13 WAY

PIN No	DESCRIPTION	CABLE SIZE	NOTES
1	DC Plant Supply Input (-ve)	2.5mm	
2	DC Plant Supply Input (+ve)	2.5mm	(Recommended Fuse 21A Max.)
3	Emergency Stop Input	2.5mm	Plant Supply +ve. Also supplies fuel & start outputs. (Recommended Fuse 32A Max.)
4	Fuel relay Output	2.5mm	Plant Supply +ve from pin 3. 16 Amp rated.
5	Start relay Output	2.5mm	Plant Supply +ve from pin 3. 16 Amp rated.
6	Auxiliary Output relay 1	1.0mm	Plant Supply +ve. 5 Amp rated.
7	Auxiliary Output relay 2	1.0mm	Plant Supply +ve. 5 Amp rated.
8	Charge Fail Input/ Excitation Output	1.0mm	Must NOT be connected to plant supply -ve.
9	Auxiliary Input 1	0.5mm	Switch to -ve
10	Auxiliary Input 2	0.5mm	Switch to -ve
11	Auxiliary Input 3	0.5mm	Switch to -ve
12	Auxiliary Input 4	0.5mm	Switch to -ve
13	Auxiliary Input 5	0.5mm	Switch to -ve

PLUG "B" 17 WAY

PIN No	DESCRIPTION	CABLE SIZE	NOTES
14	Auxiliary Input 6	0.5mm	Switch to -ve
15	Auxiliary Input 7	0.5mm	Switch to -ve
16	Auxiliary Input 8	0.5mm	Switch to -ve
17	Auxiliary Input 9	0.5mm	Switch to -ve
18	Auxiliary Output relay 3	1.0mm	Plant Supply +ve. 5 Amp rated.
19	Auxiliary Output relay 4	1.0mm	Plant Supply +ve. 5 Amp rated.
20	Magnetic Pickup Input (+ve)	0.5mm	Connect to Magnetic Pickup device
21	Magnetic Pickup Input (-ve)	0.5mm	Connect to Magnetic Pickup device
22	Oil Pressure Input	0.5mm	Connect to Oil pressure sender
23	Coolant Temperature Input	0.5mm	Connect to Coolant Temperature sender
24	Sender Common Return	0.5mm	Return feed for senders**.
25	CT secondary for L1	2.5mm	Connect to secondary of L1 monitoring CT
26	CT secondary for L2	2.5mm	Connect to secondary of L2 monitoring CT
27	CT secondary for L3	2.5mm	Connect to secondary of L3 monitoring CT
28*	CT secondary common	2.5mm	Connect to secondary of all monitoring CT's
29*	Neutral CT secondary	2.5mm	Connect to Neutral CT secondary and Earth
30	Functional Earth	2.5mm	Connect to a good clean earth point

 **NOTE**:-** If using single terminal sender refer to connection diagram. If using earth return type senders connect return terminals to pin 24 and earth pin 24.

! CAUTION!:- Refer to Typical wiring Diagram for 3 CT and 4 CT wiring differences

⚠ WARNING!:- Do not disconnect plug 'B' when the gen-set is running. Disconnection will open circuit the secondary of the CT's and dangerous voltages may then develop. Always ensure the gen-set is at rest before making or breaking connections to the module.

PLUG "C" 4 WAY

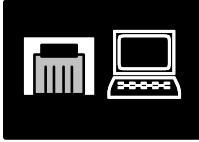
PIN No	DESCRIPTION	CABLE SIZE	NOTES
31	Generator L1 Voltage Monitoring Input	1.0mm	Connect to generator L1 output (AC) (Recommend 2A Fuse Max.)
32	Generator L2 Voltage Monitoring Input	1.0mm	Connect to generator L2 output (AC) (Recommend 2A Fuse Max.)
33	Generator L3 Voltage Monitoring Input	1.0mm	Connect to generator L3 output (AC) (Recommend 2A Fuse Max.)
34	Generator Neutral Input	1.0mm	Connect to generator Neutral output (AC)

PLUG "D" 11 WAY

PIN No	DESCRIPTION	CABLE SIZE	NOTES
35	Generator Loading Relay Contact	2.5mm	Connect to generator contactor coil.
36	Generator Loading Relay Contact	2.5mm	Connect to generator contactor coil feed supply.
37	NOT USED		Do not connect.
38	Mains Loading Relay Normally Closed Contact	2.5mm	Connect to mains contactor coil feed supply.
39	Mains Loading Relay Change-over contact	2.5mm	Connect to mains contactor coil.
40	Mains loading Relay Normally Open contact	2.5mm	Used in conjunction with mains breakers. Not required if using mains contactor.
41	NOT USED		Do not connect.
42	Mains L1 Voltage Monitoring Input	1.0mm	Connect to Mains L1 supply (AC) (Recommend 2A Fuse Max.)
43	Mains L2 Voltage Monitoring Input	1.0mm	Connect to Mains L2 supply (AC) (Recommend 2A Fuse Max.)
44	Mains L3 Voltage Monitoring Input	1.0mm	Connect to Mains L3 supply (AC) (Recommend 2A Fuse Max.)
45	Mains Neutral Input	1.0mm	Connect to Mains Neutral supply (AC)

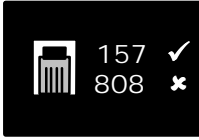
⚠ NOTE:- Screened cable must be used for connecting the Magnetic Pickup, ensuring that the screen is earthed at one end ONLY.

PC CONFIGURATION INTERFACE CONNECTOR



8-way connector allows connection to PC via 810 configuration interface. Module can then be re-configured utilising the P810 for windows™ software.

EXPANSION INTERFACE CONNECTOR



4-way connector allows connection to the 157 relay expansion module or 548 LED expansion modules. A maximum of 2 relay or LED expansion modules may be connected in series to this port.

V3.00

Auto-sync versions of the 55x can also control the P122 digital resistance module via this port. These can be fitted in addition the any 157 relay modules required. See caution note below.

! CAUTION!:- Do not connect the 808 configuration interface to this port, as it is not possible to use the 808 software to configure the 555 module.

! CAUTION!: When used in conjunction with the P122 Digital Resistance Modules, only P157 Relay Expansion modules with Part Number 81xxxxx MUST be used. Please refer to the relevant 55x Manuals for details.

4.2 CONNECTOR FUNCTION DETAILS

The following describes the functions of the 4 connectors on the rear of the module. See rear panel layout FIG 5.

PLUG “A” 13 WAY

PIN No	DESCRIPTION
1	DC Supply -ve. System DC negative input. (Battery Negative).
2	DC Supply +ve. System DC positive input. (Battery Positive).
3	Emergency Stop input. Internally linked to Starter and Fuel outputs. If this input is not connected to positive the module will be locked out, and if the engine is running it will shutdown immediately. Positive Supply also removed from Starter and Fuel therefore only a single pole Emergency Shutdown button is required.
4	Fuel Relay output. Plant Supply +ve from pin 3. Used to control the fuel solenoid or engine fuel control system.
5	Starter Relay output. Plant Supply +ve from pin 3. Used to control the Starter Motor.
6	Auxiliary Relay output 1. Plant Supply +ve. Configurable output, see Calibration Manual for options available.
7	Auxiliary Relay output 2. Plant Supply +ve. Configurable output, see Calibration Manual for options available.
8	Charge Fail input / Excitation output. Supplies excitation to the Plant Battery Charging Alternator, also an input for the Charge Fail detection circuitry.
9	Auxiliary input 1. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
10	Auxiliary input 2. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
11	Auxiliary input 3. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
12	Auxiliary input 4. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
13	Auxiliary input 5. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.

PLUG “B” 17 WAY

PIN No	DESCRIPTION
14	Auxiliary input 6. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
15	Auxiliary input 7. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
16	Auxiliary input 8. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
17	Auxiliary input 9. This is a negative switched configurable input, see Calibration Manual for options available. It is possible to configure the input to be a normally closed signal or a normally open signal.
18	Auxiliary Relay output 3. Plant Supply +ve. Configurable output, see Calibration Manual for options available.
19	Auxiliary Relay output 4. Plant Supply +ve. Configurable output, see Calibration Manual for options available.
20	Magnetic Input +ve. An AC signal from the magnetic pickup +ve for speed sensing.
21	Magnetic Input -ve. An AC signal from the magnetic pickup -ve for speed sensing.
22	Oil Pressure sensing input. Connect to resistive type oil pressure sender. Refer to connection diagram for details.
23	Coolant Temperature sensing input. Connect to resistive type coolant temperature sender. Refer to connection diagram for details.
24	Sender Common connection. Return feed from sender units - refer to connection diagram for details.
25	Generator L1 current transformer connection.
26	Generator L2 current transformer connection. If single phase is used do not connect this pin.
27	Generator L3 current transformer connection. If single phase is used do not connect this pin.
28*	Generator current transformer common connection.
29*	Generator current transformer Neutral connection and CT earth connection.
30	Functional Earth - Ensure connection to a good clean earth point.

⚠ CAUTION!:- Refer to Typical wiring Diagram for 3 CT and 4 CT wiring differences

⚠ WARNING!:- Do not disconnect plug ‘B’ when the gen-set is running. Disconnection will open circuit the secondary of the CT’s and dangerous voltages may then develop. Always ensure the gen-set is at rest before making or breaking connections to the module.

PLUG “C” 4 WAY

PIN No	DESCRIPTION
31	Generator L1 sensing input. Connect to alternator L1 output.
32	Generator L2 sensing input. Connect to alternator L2 output. If using single phase only do not connect this terminal.
33	Generator L3 sensing input. Connect to alternator L3 output. If using single phase only do not connect this terminal.
34	Generator N sensing input. Connect to alternator N output.

PLUG “D” 11 WAY

PIN No	DESCRIPTION
35	Generator Loading Relay, Normally open, Volts free contacts to 36. Used to connect to Generator contactor or circuit breaker.
36	Generator Loading Relay , Normally open, Volts free contacts to 35. Used to connect to Generator contactor or circuit breaker.
37	DO NOT USE
38	Mains Loading Relay, Normally Closed Change-over, Volts free contacts to 39 Used to connect to Mains contactor or circuit breaker.
39	Mains Loading Relay, Change-over, Volts free contacts to 38 and 40. Used to connect to Mains contactor or circuit breaker.
40	Mains Loading Relay, Normally open Change-over, Volts free contacts to 39. Used to connect to Mains contactor or circuit breaker.
41	DO NOT USE
42	Mains L1 sensing input. Connect to Mains L1 supply.
43	Mains L2 sensing input. Connect to Mains L2 supply. If using single phase only do not connect this terminal.
44	Mains L3 sensing input. Connect to Mains L3 supply. If using single phase only do not connect this terminal.
45	Mains N sensing input. Connect to Mains N supply.

5. SPECIFICATION


DC Supply	9.0 to 35 V Continuous.
Cranking Dropouts	Able to survive 0 V for 50 mS, providing supply was at least 10 V before dropout and supply recovers to 5V . <i>This is achieved without the need for internal batteries.</i>
Max. Operating Current	513mA at 12 V. 263 mA at 24 V.
Max. Standby Current	370 mA at 12 V. 210 mA at 24 V
Typical Standby Current	363mA at 12 V. 190 mA at 24 V.
Alternator Input Range	15V - 277(ph-N) 3 Phase 4wire AC (+20%)
Alternator Input Frequency	50 - 60 Hz at rated engine speed (Minimum 15V AC Ph-N)
Magnetic Input Range (if fitted)	+/- 0.5 V to 70 V Peak
Magnetic Input Frequency	10,000 Hz (max) at rated engine speed.
Start Relay Output	16 Amp DC at supply voltage.
Fuel Relay Output	16 Amp DC at supply voltage.
Auxiliary Relay Outputs	5 Amp DC at supply voltage.
Dimensions	192 X 144 X 138
Charge Fail / Excitation Range	0 V to 35 V
Operating Temperature Range	-30 to +70°C
CT Burden	2.5VA
CT Secondary	5A
CT Class	Class 1 Recommended (Basic Instrumentation) Class 1 Required (Enhanced Instrumentation)
Mains Input Voltage Range	15V - 277(ph-N) 3 Phase 4wire AC (+20%)
Mains Input Frequency	50 - 60 Hz (Minimum 15V AC Ph-N)
Mains / Gen Loading Relays	8 Amp AC RMS rated
Electromagnetic Compatibility	BS EN 50081-2 EMC Generic Emission Standard (Industrial) BS EN 50082-2 EMC Generic Emission Standard (Industrial)
Electrical Safety	BS EN 60950
Cold Temperature	BS EN 60068-2-1 to -30 °C
Hot Temperature	BS EN 60068-2-2 to +70°C
Humidity	BS2011-2-1 to 93% RH@40°C for 48 Hours
Vibration	BS EN60068-2-6 10 sweeps at 1 octave/minute in each of 3 major axes. 5Hz to 8Hz @ +/-7.5mm constant displacement 8Hz to 500Hz @ 2gn constant acceleration
Shock	BS EN 60068-2-27 3 Half sine shocks in each of 3 major axes 15gn amplitude, 11mS duration

6. COMMISSIONING

6.1 PRE-COMMISSIONING

Before the system is started, it is recommended that the following checks are made:-

- 6.1. The unit is adequately cooled and all the wiring to the module is of a standard and rating compatible with the system.
- 6.2. The unit **DC** supply is fused and connected to the battery and that it is of the correct polarity.
- 6.3. The Emergency Stop input is wired to an external normally closed switch connected to **DC** positive.


 **NOTE:- If Emergency Stop feature is not required link this input to the DC Positive. The module will not operate unless either the Emergency Stop is fitted correctly OR Pin 3 is connected to DC positive (+ve)**

- 6.1. To check the start cycle operation take appropriate measures to prevent the engine from starting (disable the operation of the fuel solenoid). After a visual inspection to ensure it is safe to proceed, connect the battery supply. Press the “**MANUAL**” pushbutton, then press the ‘**START**’ pushbutton for a short time. The unit start sequence will commence.
- 6.2. The starter will engage and operate for the pre-set crank period. After the starter motor has attempted to start the engine for the pre-set number of attempts the LCD will display ‘*Shutdown Failed to start*’. Press the **STOP/RESET** pushbutton to reset the unit.
- 6.3. Restore the engine to operational status (reconnect the fuel solenoid), again select “**MANUAL**” and operate the ‘**START**’ pushbutton, this time the engine should start and the starter motor should disengage automatically. If not then check that the engine is fully operational (fuel available, etc.) and that the fuel solenoid is operating. The engine should now run up to operating speed. If not, and an alarm is present, check the alarm condition for validity, then check input wiring. The engine should continue to run for an indefinite period. It will be possible at this time to view the engine and alternator parameters - refer to the ‘Description of Controls’ section of this manual.
- 6.4. Select “**AUTO**” on the front panel, the engine will run for the pre-set cooling down period, then stop. The generator should stay in the standby mode. If not check that there is not a signal present on the **Remote Start** input.
- 6.5. Initiate an automatic start by supplying the remote start signal. The start sequence will commence and the engine will run up to operational speed. Once the generator is available a load transfer will take place, the Generator will accept the load. If not, check the wiring to the Generator Contactor Coil (*if used*). Check the Warming timer has timed out.
- 6.6. Remove the remote start signal, the return sequence will start. After the pre-set time period, the load will be removed from the generator. The generator will then run for the pre-set cooling down period, then shutdown into it’s standby mode.
- 6.7. If despite repeated checking of the connections between the **555** and the customer’s system, satisfactory operation cannot be achieved, then the customer is requested to contact the factory for further advice on:-

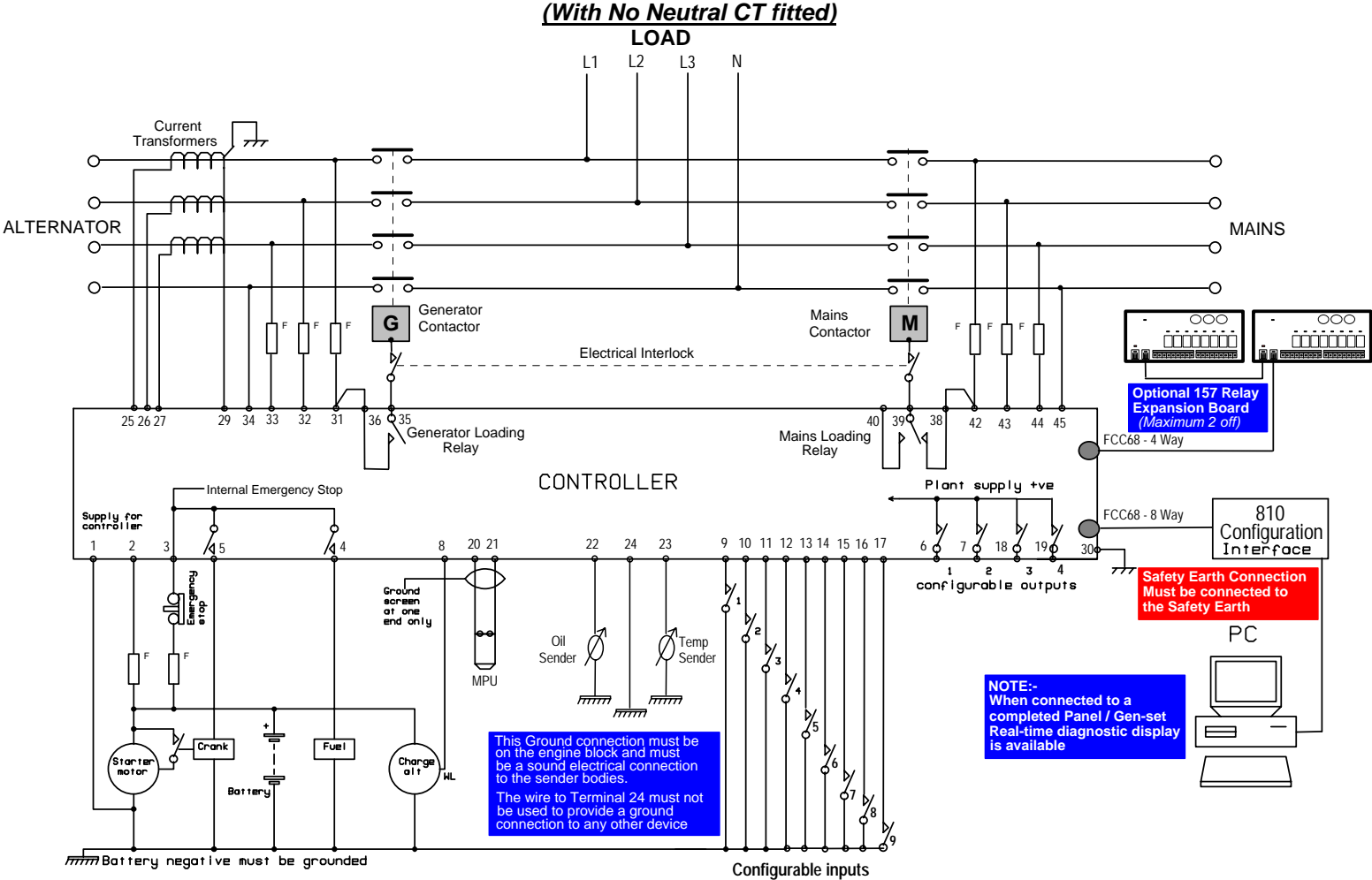
INTERNATIONAL TEL: 44 (0) 1723 377566
INTERNATIONAL FAX: 44 (0) 1723 354453
E-mail: Support@Deepseapl.com

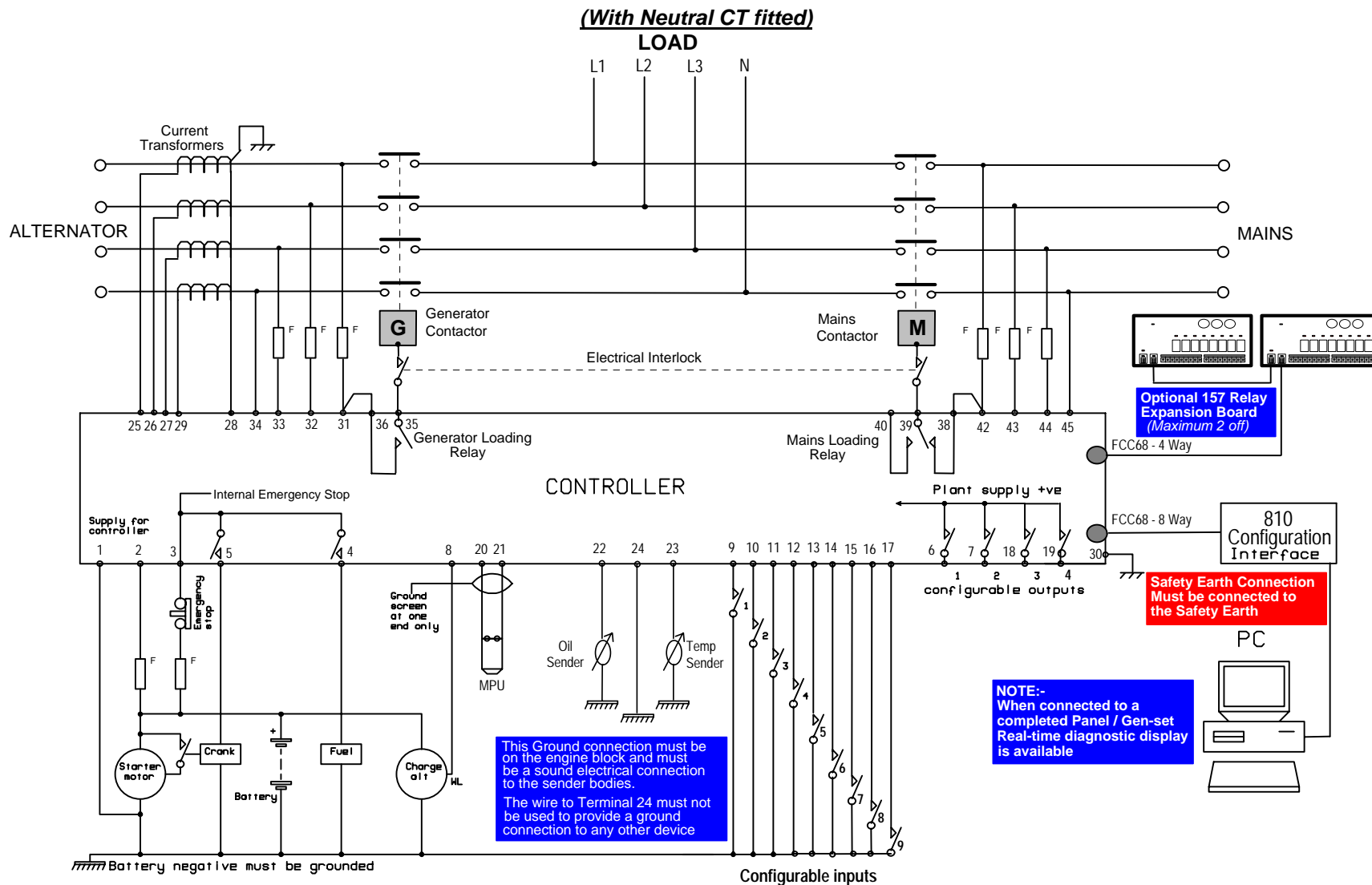
7. FAULT FINDING

SYMPTOM	POSSIBLE REMEDY
Unit is inoperative	Check the battery and wiring to the unit. Check the DC supply. Check the DC fuse.
Unit shuts down	Check DC supply voltage is not above 35 Volts or below 9 Volts Check the operating temperature is not above 55 °C. Check the DC fuse.
Unit locks out on Emergency Stop	If an Emergency Stop Switch is not fitted, ensure that a positive is connected to the Emergency Stop input. Check emergency stop switch is functioning correctly. Check Wiring is not open circuit.
Intermittent Magnetic Pick-up sensor fault	Ensure that Magnetic pick-up screen is only connected at one end, if connected at both ends this enables the screen to act as an aerial and will pick up random voltages.
Low oil Pressure fault operates after engine has fired	Check engine oil pressure. Check oil pressure switch/sender and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sender is compatible with the 555 Module.
High engine temperature fault operates after engine has fired.	Check engine temperature. Check switch/sender and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sender is compatible with the 555 Module.
Shutdown fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Warning fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Fail to Start is activated after pre-set number of attempts to start	Check wiring of fuel solenoid. Check fuel. Check battery supply. Check battery supply is present on the Fuel output of the module. Check the speed sensing signal is present on the 555 inputs. Refer to engine manual.
Continuous starting of generator when in AUTO	Check that there is no signal present on the "Remote Start" input. Check configured polarity is correct.
Generator fails to start on receipt of Remote Start signal or under mains failure conditions.	Check Start Delay timer has timed out. If remote start fault, check signal is on "Remote Start" input. Confirm input is configured to be used as "Remote Start".
Pre-heat inoperative	Check wiring to engine heater plugs. Check battery supply. Check battery supply is present on the Pre-heat output of module. Check pre-heat has been selected in your configuration.
Starter motor inoperative	Check wiring to starter solenoid. Check battery supply. Check battery supply is present on the Starter output of module. Ensure that the Emergency Stop input is at +Ve.
Engine runs but generator will not take load	Check Warm up timer has timed out. Ensure generator load inhibit signal is not present on the module inputs.

 **NOTE:-** The above fault finding is provided as a guide check-list only. As it is possible for the module to be configured to provide a wide range of different features always refer to the source of your module configuration if in doubt.

8. TYPICAL WIRING DIAGRAMS





9 FACTORY DEFAULT CONFIGURATION

Edit 5xx for Windows. Configuration for 550 module.

Page 1 of 3

Configuration description

1 Default Factory Settings

2 Miles Revell

3 17/6/99

4

Created by - Miles Revell on 29/06/99

Filename - 550a

Miscellaneous settings

Display load transfer state No

Display indications on LCD No

Use oil pressure for engine at rest Yes

Start button must be held down to crank No

Alarm prior to starting engine No

Fast loading Yes

All warnings are latched No

Alternator fitted Yes poles 4

Magnetic pickup fitted No

Module language English

Immediate mains dropout No

Mains Fail detection Yes

Input settings

Low oil pressure input VDO match, 0-10 bar

High coolant temp input VDO match, 120 degC

Trip Restore

Low oil pressure pre-alarm 17.0 PSI 18.0 PSI

Low oil pressure shutdown 15.1 PSI

High coolant temp pre-alarm 115 DegC 110 DegC

High coolant temp shutdown 120 DegC

Digital inputs

1 Remote start Close to activate

2 User configured Auxiliary Input 2 Close to activate Warning Always active

3 User configured Auxiliary Input 3 Close to activate Warning Active from safety on

4 User configured Auxiliary Input 4 Close to activate Shutdown Always active

5 User configured Auxiliary Input 5 Close to activate Shutdown Active from safety on

6 User configured Auxiliary Input 6 Close to activate Electrical trip Always active

7 User configured Auxiliary Input 7 Close to activate Electrical trip Active from safety on

8 User configured Auxiliary Input 8 Close to activate Indication Always active

9 Panel lock Close to activate

Output Settings

Module relays

1 Energise Preheat (during pre-heat timer)

2 Energise Common alarm

3 Energise Close generator

4 Energise System in auto mode

5 De-energise Close Mains

6 Energise Close Generator

Expansion A

1 Energise Output not used

2 Energise Output not used

3 Energise Output not used

4 Energise Output not used

5 Energise Output not used

6 Energise Output not used

7 Energise Output not used

8 Energise Output not used

Expansion B

1 Energise Output not used

2 Energise Output not used

3 Energise Output not used

4 Energise Output not used

5 Energise Output not used

6 Energise Output not used

7 Energise Output not used

8 Energise Output not used

Edit 5xx for Windows. Configuration for 550 module.

Page 2 of 3

Configuration description

1 Default Factory Settings

2 Miles Revell

3 17/6/99

4

Created by - Miles Revell on 29/06/99

Filename - 550a

LED Settings

1 Lit Output not used

2 Lit Output not used

3 Lit Output not used

4 Unlit Output not used

Timer Settings

Starting timers

Start delay 05s

Pre-heat 00s

Pre-heat bypass 00s

Cranking time 10s

Crank rest time 10s

Manual crank limit 30s

Smoke limit 00s

Smoke limit off 00s

Safety on delay 10s

Overspeed overshoot 00s

Load timers

Warming up time 05s

Breaker close pulse 00.0s

Breaker trip pulse 00.0s

Contact feedback has not been enabled

Stopping timers

Return delay 30s

Cooling time 30s

ETS solenoid hold 00s

Fail to stop delay 30s

Other timers

Battery low volts delay 01m 00s

Battery high volts delay 01m 00s

LCD auto scroll timer 02s

LCD page timer 05m 00s

Edit 5xx for Windows. Configuration for 550 module. Page 3 of 3

Configuration description

1 Default Factory Settings

2 Miles Revell

3 17/6/99

4

Created by - Miles Revell on 29/06/99

Filename - 550a

Generator Settings

Voltage and frequency settings Trip Restore

Under volts pre-alarm 196 V 207 V

Under volts trip 184 V

Over volts pre-alarm 265 V 253 V

Over volts trip 276 V

Under frequency pre-alarm 42.0 Hz 45.0 Hz

Under frequency trip 40.0 Hz

Over frequency pre-alarm 55.0 Hz 52.0 Hz

Over frequency trip 57.0 Hz

Power settings Trip Curve Action

Delayed over current 100 % 36 Electrical trip

Short circuit 3.0 pu 6 Shutdown

Earth fault 0.10 pu 1000 Shutdown

Reverse power 100 KW Shutdown

Engine Settings

Crank disconnect

Crank dis' from generator freq. 21.0 Hz

Check oil pressure prior to starting Yes

Speed settings Trip Restore

Plant battery settings Trip Restore

Under volts warning 8.0 V 9.0 V












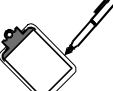
Over volts warning 33.0 V 32.0 V

Mains Settings

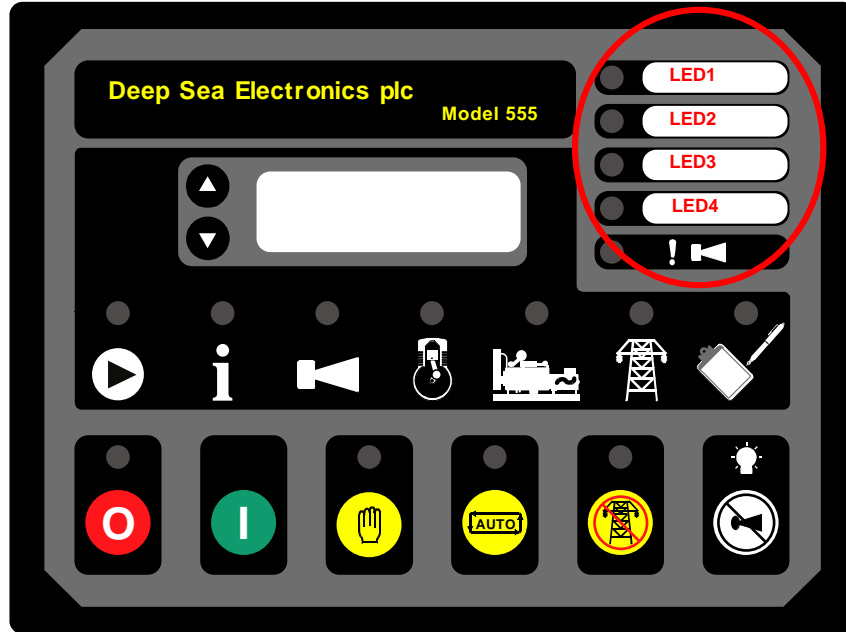
	<i>Trip</i>	<i>Restore</i>
<i>Under volts trip</i>	<i>184 V</i>	<i>207 V</i>
<i>Over volts trip</i>	<i>276 V</i>	<i>253 V</i>
<i>Under frequency trip</i>	<i>450 V</i>	<i>480 V</i>
<i>Over frequency trip</i>	<i>550 V</i>	<i>520 V</i>

10. ICONS AND LED IDENTIFICATION

10.1 ICON DESCRIPTIONS

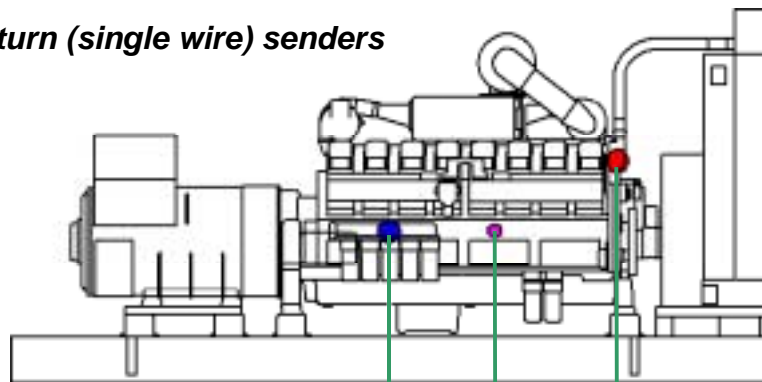
Symbol	Meaning	Description
	Stop/Reset	Stop the generator and reset any alarm conditions. Refer to Section 1 of this Manual.
	Start	Start the generator (if in an appropriate mode).
	Auto	The controller will automatically start the generator when given a remote start command.
	Manual	The controller will start the generator under manual control. <i>(Separate Start command may be necessary)</i>
	Common Alarm	An alarm condition has been detected. (Warning = Steady, Shutdown = Flashing)
	Mains Failure Simulation (Test)	On AMF modules this is used to simulate a mains failure event. (On load test)
	Alarm Mute	Silences the audible warning device.
	Lamp Test	Causes all indicating LED's to illuminate to test for correct operation
	Engine Instruments	Instruments page for engine details such as Oil pressure, Engine temperature.
	Generator Instruments	Instruments page for generator details such as frequency and voltage
	Mains Instruments	Instruments page for mains supply details such as frequency and voltage.
	Event Log	Details recorded history of generator operation.

10.2 LED IDENTIFICATION DIAGRAM



10.3 SENDER WIRING RECOMMENDATIONS

Using Earth return (single wire) senders



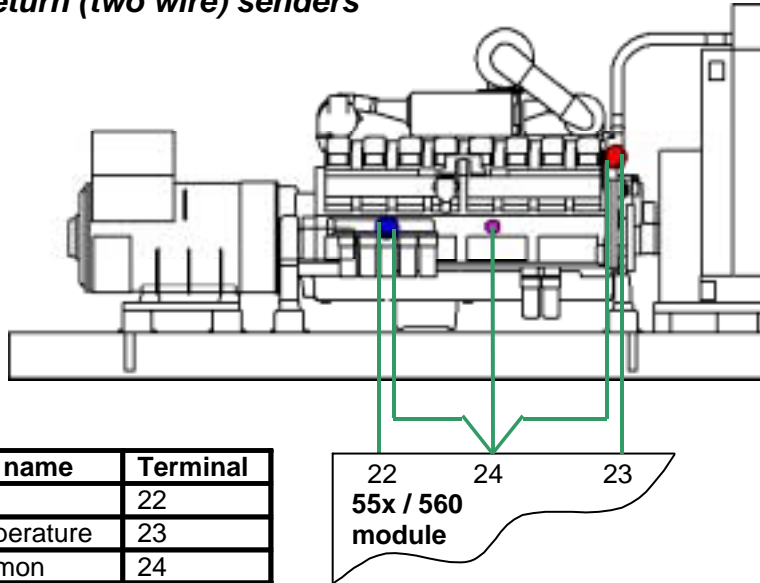
Connection name	Terminal
Oil pressure	22
Coolant temperature	23
Sender common	24

22 24 23
55x / 560
module

NOTE: - It is important that terminal 24 (sender common) is soundly connected to an earth point on the ENGINE BLOCK, not within the control panel, and must be a sound electrical connection to the sender bodies.

NOTE: - If you use PTFE insulating tape on the sender thread when using earth return senders, ensure you do not insulate the entire thread as this will prevent the sender body from being earthed via the engine block.

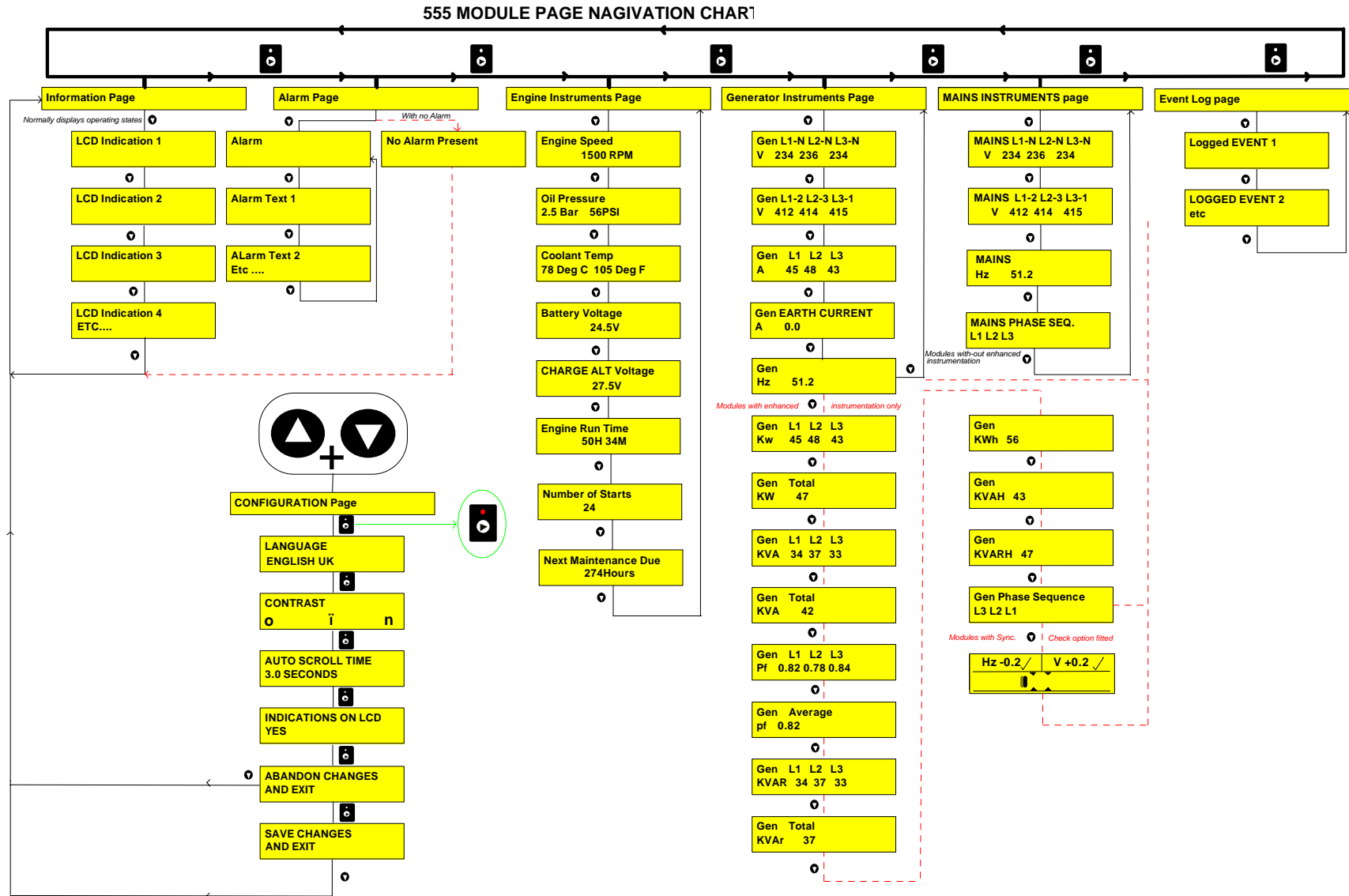
Using insulated return (two wire) senders



Connection name	Terminal
Oil pressure	22
Coolant temperature	23
Sender common	24

▲ NOTE:- . It is important that terminal 24 (sender common) is soundly connected to an earth point on the ENGINE BLOCK, not within the control panel .

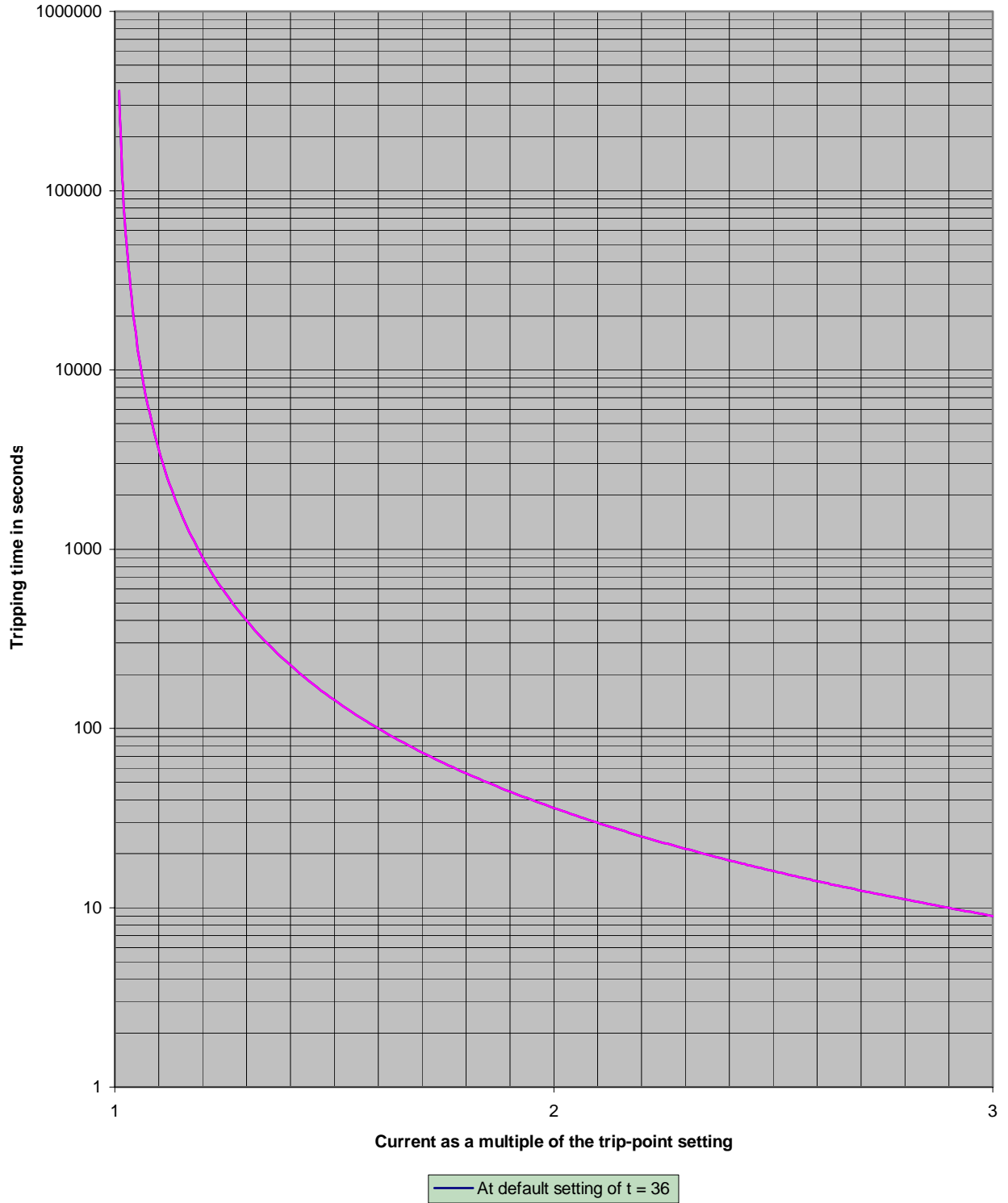
11. NAVIGATION CHART



12. APPENDIX

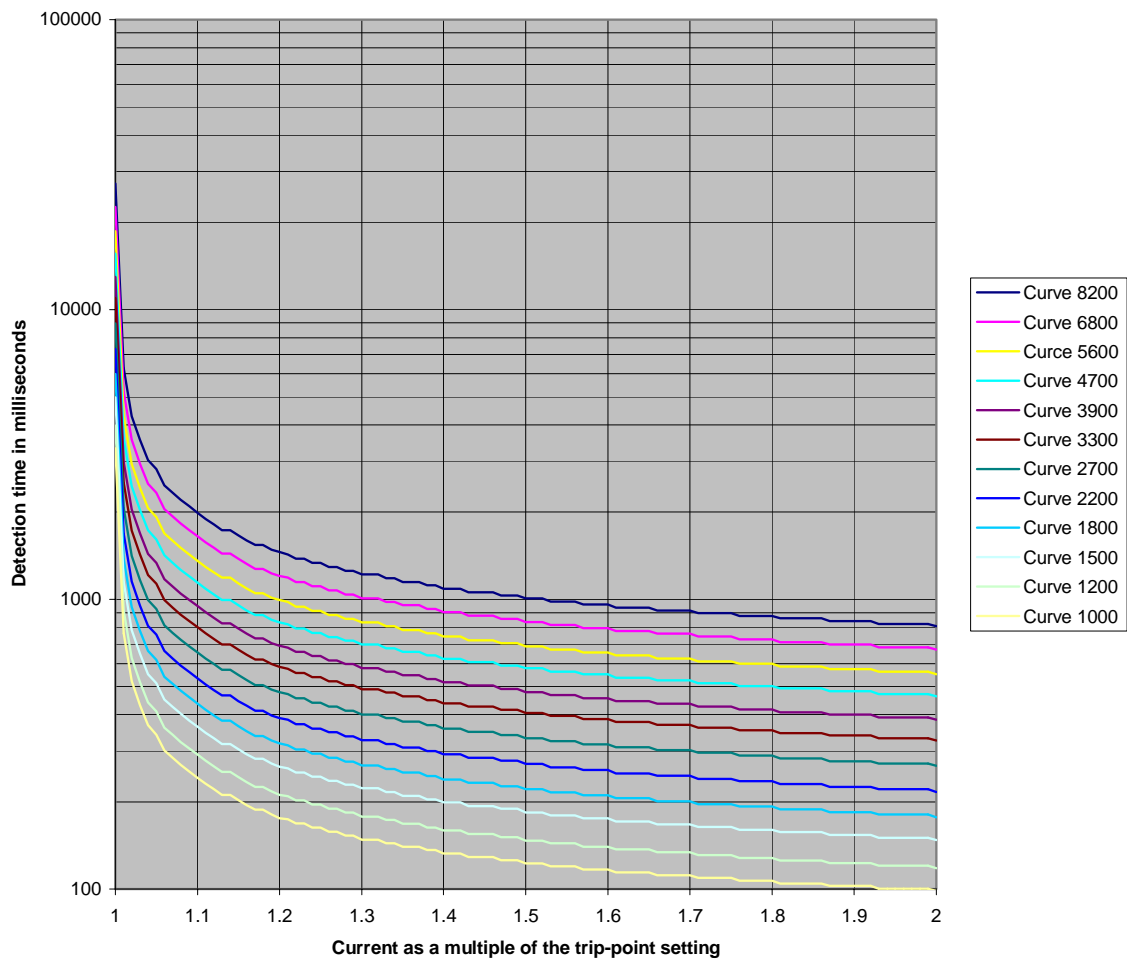
12.1 55X IDMT TRIPPING CURVES (TYPICAL)

55x Delayed over-current protection



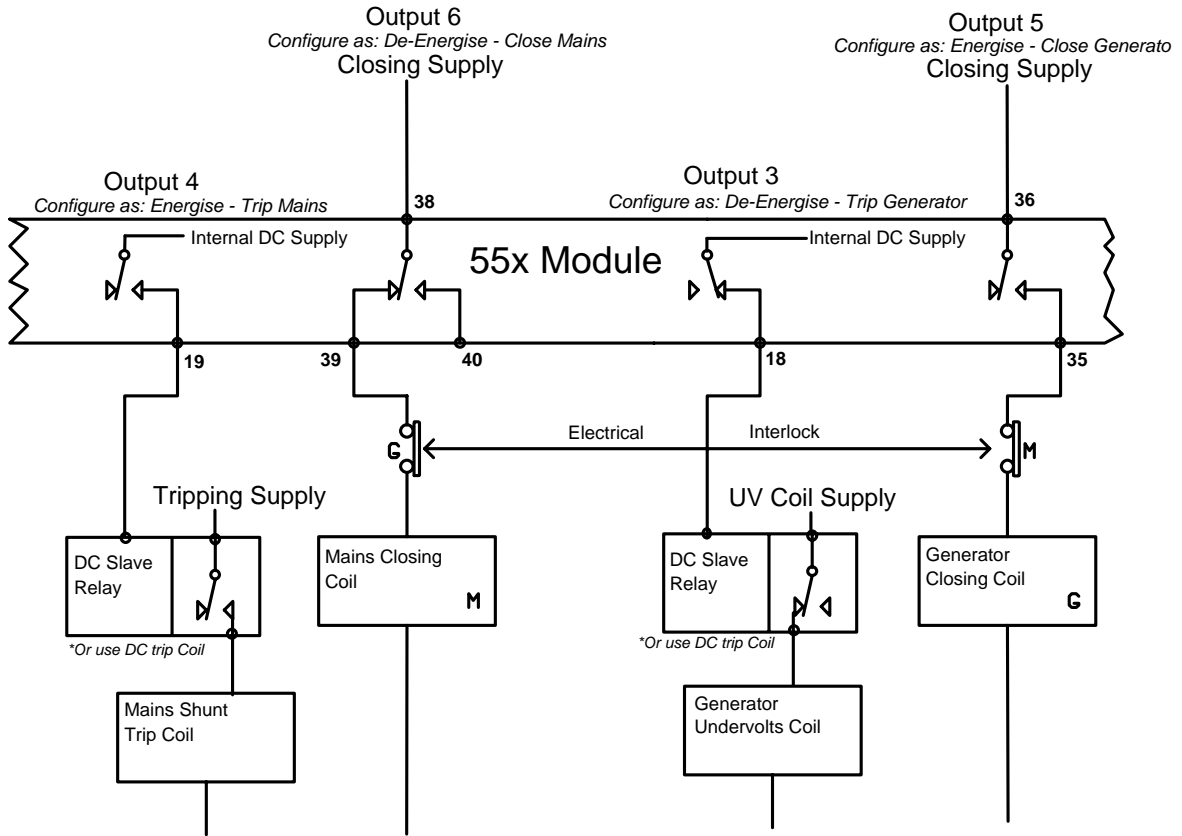
12.2 55X SHORT CIRCUIT TRIPPING CURVES (TYPICAL)

Model 55x Short circuit & Earth fault curves for a 3 phase fault @ 50 Hz



12.3 USING THE 55X MODULE WITH ACB'S

The standard configuration allows the 55x module to be connected to contactors and the like. However, it may be required to connect the to 55x module to breakers such as ACB's, etc. If so the following connection scheme is recommended as considered a 'fail-safe' method.



12.4 OUTPUT EXPANSION

There are several methods of output expansion available for the 55x module:-

12.4.1 RELAY OUTPUT EXPANSION (157)

An expansion module is available, which connects to the configuration socket, and enables the 55x to use eight additional relays on the 157 relay module, providing Volt-free contacts for customer connection. A maximum of 2 off 157 relays modules can be connected, there are identified as 'A' and 'B' and give a total of 16 extra relay outputs.

! CAUTION!:- When used in conjunction with the P122 Digital Resistance Modules, only P157 Relay Expansion modules with Part Number 81xxxxx MUST be used. The digital resistance requires a different set of data commands to operate and the 55x module will change the data output by the 808 port to suit the P122 when selected. The older P157 relay modules (Part No. 80xxxxx) will only function if the P122 module is not configured for use by the 555.

Refer to technical data sheet on the 157 relay module for further details.

12.4.2 LED OUTPUT EXPANSION (548)

An expansion module is available, which connects to the configuration socket, and enables the 55x to use eight additional LED's on the 548 module, providing remote LED's indication up to 50 metres away. A maximum of 2 off 548 LED modules can be connected, there are identified as 'A' and 'B' and give a total of 16 extra LED outputs.

! CAUTION!:- When used in conjunction with the P122 Digital Resistance Modules, only P548 Relay Expansion modules with Part Number 81xxxxx MUST be used. The digital resistance requires a different set of data commands to operate and the 55x module will change the data output by the 808 port to suit the P122 when selected. The older P548 relay modules (Part No. 80xxxxx) will only function if the P122 module is not configured for use by the 555.

Refer to technical data sheet on the 548 LED module for further details.

It is possible to use a mix of 157 and 548 modules to give both relay and LED expansion if required (Please refer to our Technical Support department for details.).

12.5 INPUT EXPANSION

It is possible to increase the number of monitored inputs available by utilising a DSE 54x Protection Expansion/Annunciator. Please refer to our Technical department for details.

13. SYNCHRONISING NOTES

13.1 CHECK SYNC VERSIONS

V2.00 A special version of the module provides the function of Check Sync relay and Synchroscope display. The module will control the operation of the load switching device to allow parallel operation with the mains supply only when the two supplies are in Sync. These functions can be used to provide manual Peak lopping/ Peak shaving and short duration no-break or bump-less transfers back to the mains supply following a mains failure.


13.2 AUTO SYNC VERSIONS

V3.00 A special version of the module provides the function of Automatic synchronising. The module features all the functions associated with the Check sync version and in addition it provides control signals to the Engine Governor and the Alternator AVR to control the speed and voltage output from the generating set.

These functions can be used to provide peak lopping/ peak shaving (without load share control) and true no-break or bump-less transfers back to the mains supply following a mains failure.

The Auto-sync 55x module provides the ability to control the generator by adjusting the speed (frequency) and voltage being output. Several method of providing this control are available. The following pages give typical examples of interfacing with the engine governor and alternator AVR.

Refer to the P810 software manual for further details.

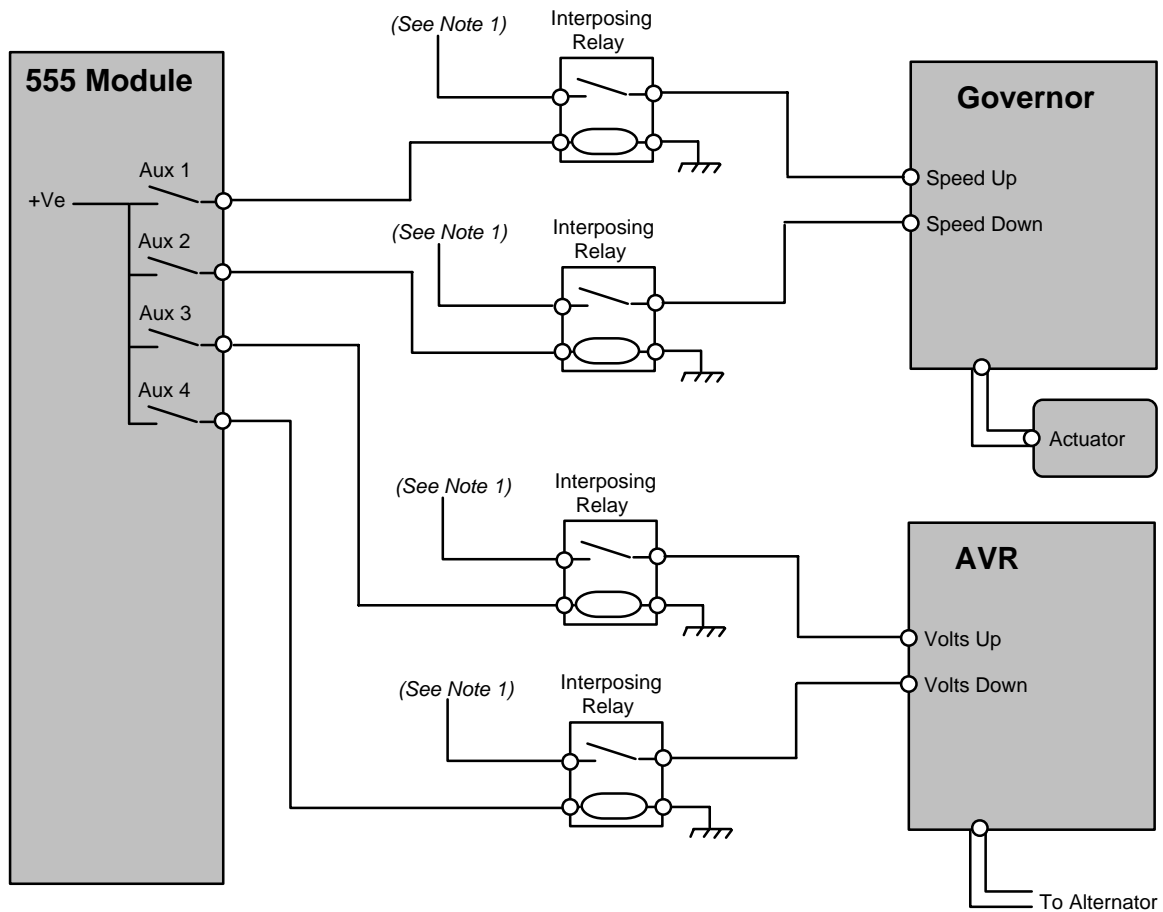
 **NOTE:- To verify if your particular 55x module has any of the above special features fitted please refer to page 26 for the Power Up LCD display information.**

13.2.1 GOVERNOR AND AVR CONTROL USING INTERNAL RELAYS DIRECTLY.

This scheme uses the 55x modules own internal relays to control the speed and voltage output. It is only possible to use this system of control if the Governor or AVR in question supports speed up/speed down and volts up/volts down via control input.

⚠ CAUTION!:- It is essential to use only the modules own internal relays for this type of control (Auxiliary outputs 1-4). Use of the 157 relay expansion module outputs to do the same could result in instability due to the much slower response of the 157 expansion modules control relays.

TYPICAL CONNECTIONS



⚠ Note 1:- Interposing relay should connect to recommended polarity and voltage for Governor/AVR input. Refer to Governor or AVR manufacturer for details.

MODULE CONFIGURATION SETTING FOR 555 AUXILIARY RELAYS

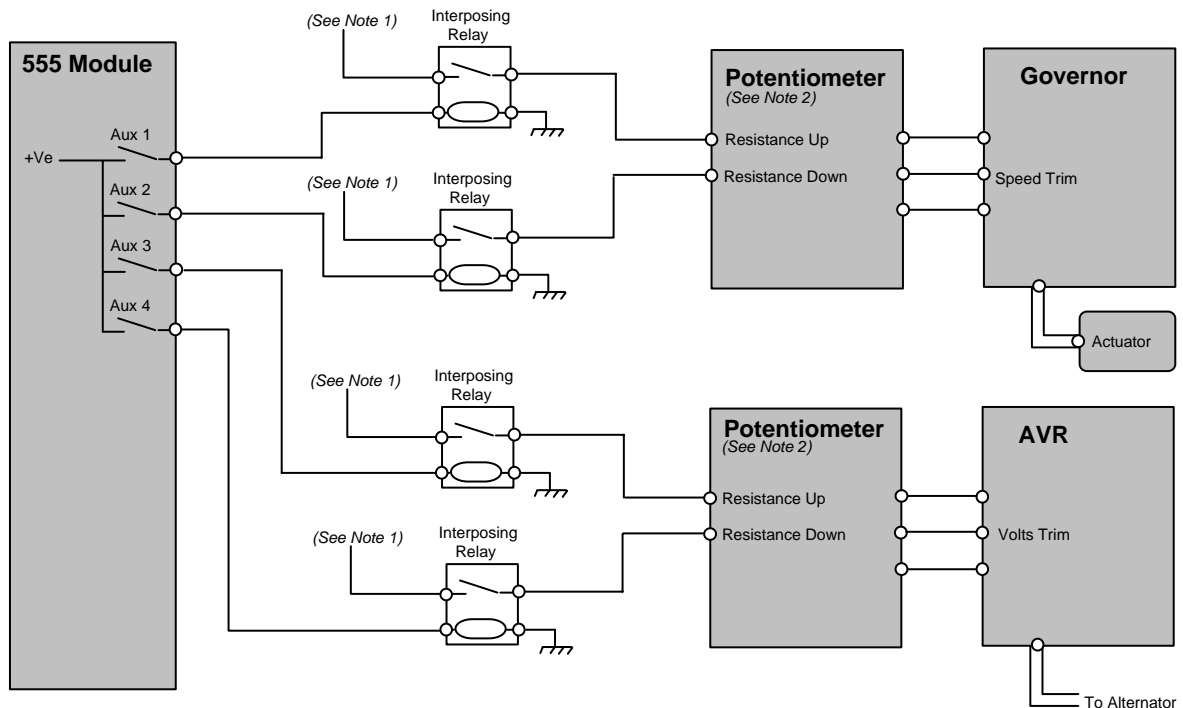
Aux 1	Energise	Speed Raise Relay
Aux 2	Energise	Speed Lower Relay
Aux 3	Energise	Voltage Raise Relay
Aux 4	Energise	Voltage Lower Relay

13.2.2 GOVERNOR AND AVR CONTROL USING INTERNAL RELAYS TO DRIVE MOTORISED/ELECTRONIC POTENTIOMETER.

This scheme uses the 55x modules own internal relays to control the speed and voltage output via an external motorised or electronic potentiometer. It is only possible to use this system of control if the Governor or AVR in question supports speed or voltage control via an external potentiometer.

⚠ CAUTION!:- It is essential to use only the modules own internal relays for this type of control (Auxiliary outputs 1-4). Use of the 157 relay expansion module outputs to do the same could result in instability due to the much slower response of the 157 expansion modules control relays.

TYPICAL CONNECTIONS



⚠ Note 1:- Interposing relay should connect to recommended polarity and voltage for potentiometer input. Refer to potentiometer manufacturer for details.

⚠ Note 2:- The Potentiometer output should be a suitable resistance as recommended by the Governor/AVR manufacturer.

MODULE CONFIGURATION SETTING FOR 555 AUXILIARY RELAYS

Aux 1	Energise	Speed Raise Relay
Aux 2	Energise	Speed Lower Relay
Aux 3	Energise	Voltage Raise Relay
Aux 4	Energise	Voltage Lower Relay

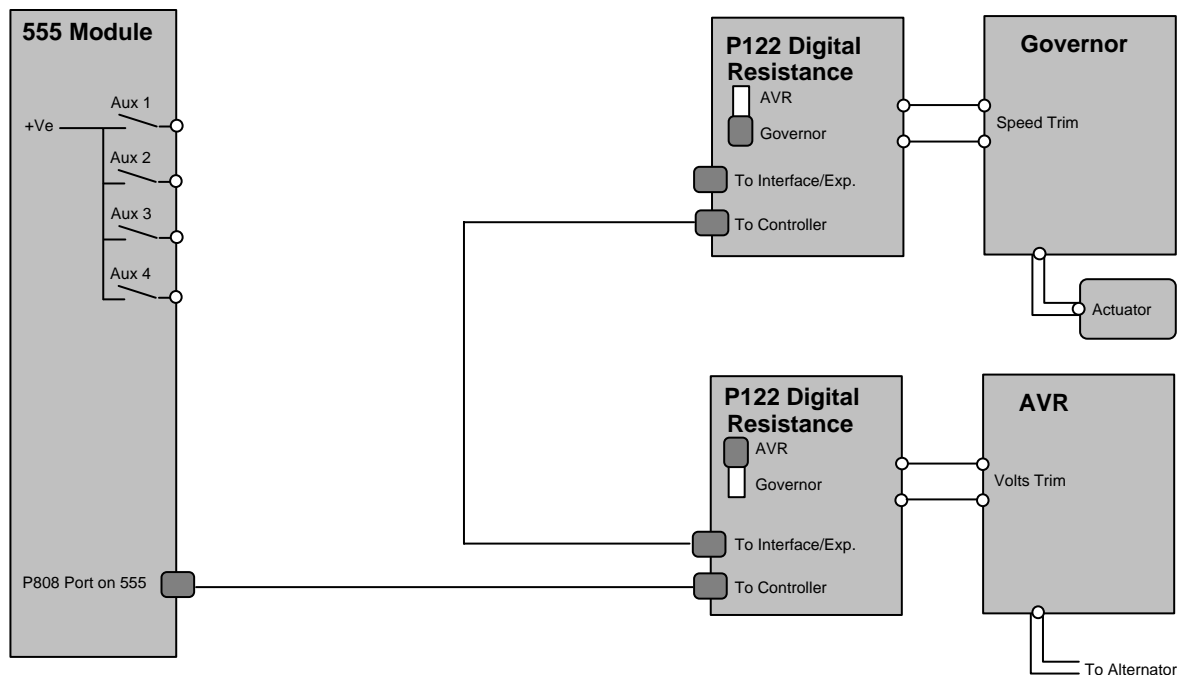
13.2.3 GOVERNOR AND AVR CONTROL USING P122 DIGITAL RESISTANCE MODULES

This scheme uses the 55x modules to control the speed and voltage output via the P122 (Governor and AVR) digital resistance boxes. This device gives a simple modular approach to solving the problem of interfacing to the Governor and AVR. This also negates the need to fit interposing relays and motorised potentiometers and have the additional benefit of leaving the modules own internal relays available for other functions. It is only possible to use this system of control if the Governor or AVR in question supports speed or voltage control via an external potentiometer.

! CAUTION!:- When used in conjunction with the P122 Digital Resistance Modules, only P157 Relay Expansion modules with Part Number 81xxxxx MUST be used. The digital resistance requires a different set of data commands to operate and the 55x module will change the data output by the 808 port to suit the P122 when selected. The older P157 relay modules (Part No. 80xxxxx) will only function if the P122 module is not configured for use by the 555.

! CAUTION!:- When used in conjunction with the P122 Digital Resistance Modules, only P548 Relay Expansion modules with Part Number 81xxxxx MUST be used. The digital resistance requires a different set of data commands to operate and the 55x module will change the data output by the 808 port to suit the P122 when selected. The older P548 relay modules (Part No. 80xxxxx) will only function if the P122 module is not configured for use by the 555.

TYPICAL CONNECTIONS



! CAUTION :- The P122 digital resistance output should be a suitable resistance as recommended by the Governor/AVR manufacturer. This should be specified on ordering from DSE.
The P122 digital resistance has a selector switch for AVR or Governor connection, this should be set to the correct position, otherwise auto-sync control will not be possible. Refer to the diagram above.

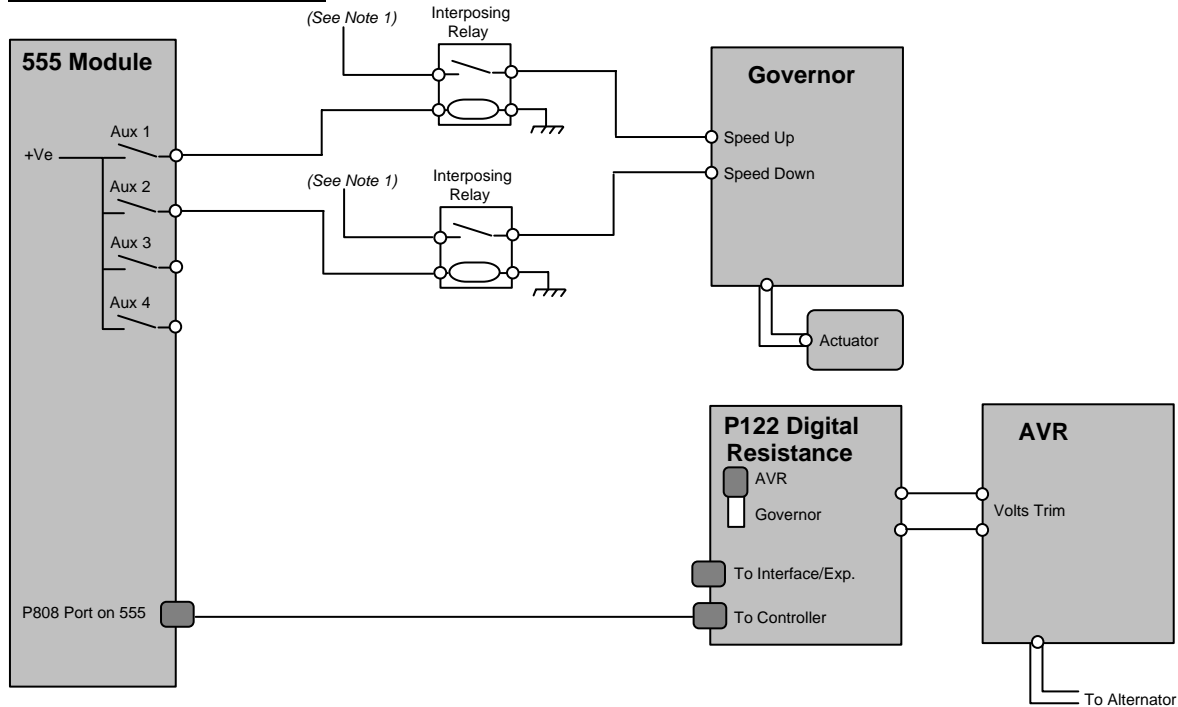
13.2.4 DIRECT GOVERNOR CONTROL AND AVR CONTROL USING P122 DIGITAL RESISTANCE MODULES

This scheme uses a mixture of the possible control options from the 55x modules to control the speed and voltage output via the P122 (Governor and AVR) digital resistance boxes. This method gives a cost effective solution to interfacing to the Governor and AVR. It is only possible to use this system of control if the Governor supports speed up/down inputs and the AVR in question supports voltage control via an external potentiometer.

⚠ CAUTION!:- When used in conjunction with the P122 Digital Resistance Modules, only P157 Relay Expansion modules with Part Number 81xxxxx MUST be used. The digital resistance requires a different set of data commands to operate and the 55x module will change the data output by the 808 port to suit the P122 when selected. The older P157 relay modules (Part No. 80xxxxx) will only function if the P122 module is not configured for use by the 555.

When used in conjunction with the P122 Digital Resistance Modules, only P548 Relay Expansion modules with Part Number 81xxxxx MUST be used. The digital resistance requires a different set of data commands to operate and the 55x module will change the data output by the 808 port to suit the P122 when selected. The older P548 relay modules (Part No. 80xxxxx) will only function if the P122 module is not configured for use by the 555.

TYPICAL CONNECTIONS



⚠ CAUTION :- The P122 digital resistance output should be a suitable resistance as recommended by the AVR manufacturer. This should be specified on ordering from DSE. The P122 digital resistance selector switch for AVR or Governor connection, should be set to the correct position. Refer to the diagram above.

⚠ Note 1:- Interposing relay should connect to recommended polarity and voltage for Governor input. Refer to Governor manufacturer for details.

MODULE CONFIGURATION SETTING FOR 555 AUXILIARY RELAYS

Aux 1	Energise	Speed Raise Relay
Aux 2	Energise	Speed Lower Relay