

Deep Sea Electronics Plc

MODEL 606 OPERATING MANUAL

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INTRODUCTION

The **DSE 606** 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, transfer the load to the generator either manually or automatically. The user also has facility to view all the system operating parameters via the LCD display.





Once started the **DSE 606** module 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 LED and other simultaneous faults by a steady LED. This information is also indicated by the LCD display on the front panel.

Selective operational sequences, timers and alarm trips can be altered by the customer via either the front panel controls or via a PC.

Access to critical operational sequences and timers for use by qualified engineers, are barred by a security code.

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

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 which could result in injury to personnel or loss of life if not followed correctly.
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1. OPERATION

1.1 CONTROL

Control of the **DSE 606** module is via a series of 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 used. Should further information such as engine parameters be needed then this can be obtained from the smaller LCD control pushbuttons as detailed later in this document.

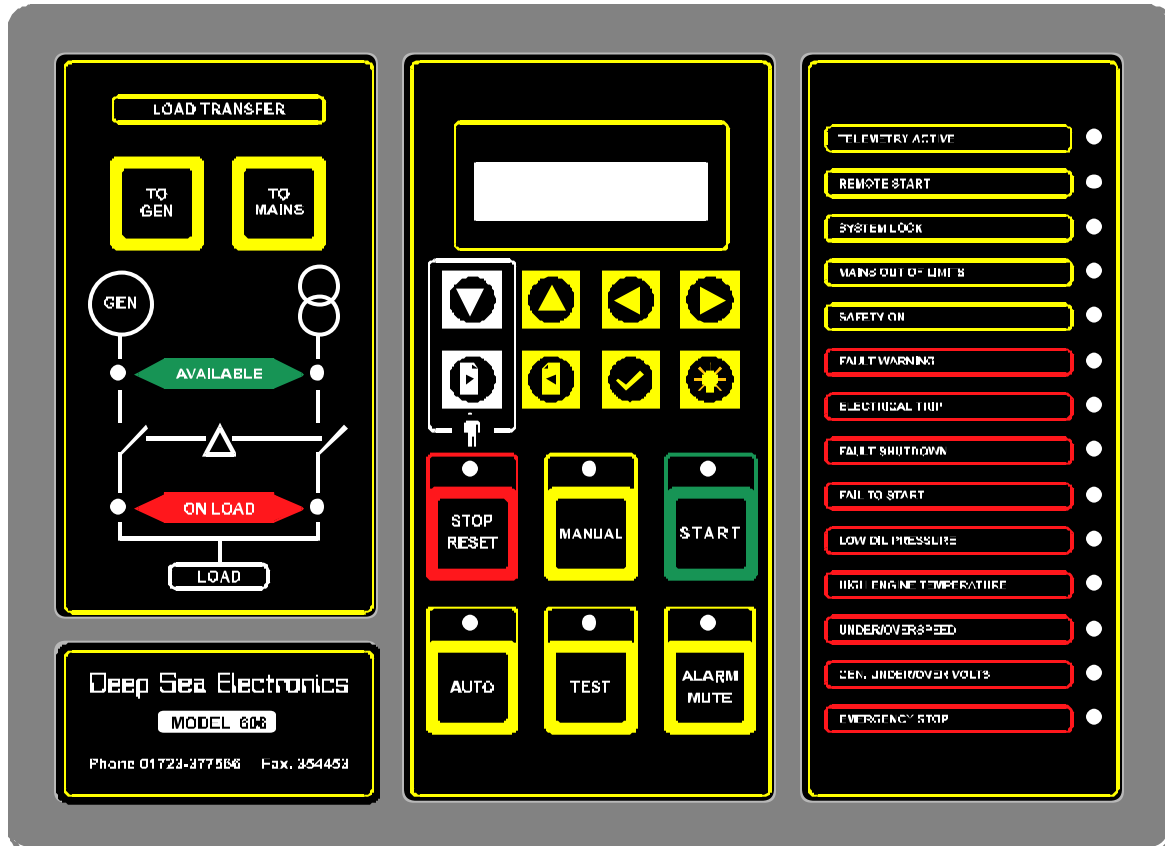


FIG 1

1.2 NORMAL MANUAL OPERATION

To initiate a start sequence press the **MANUAL** push-button. The LCD display will indicate '**MANUAL CONTROL**'.

Then, press and hold the **START** push-button, once the module has commenced the start sequence the button may then be released.

If the **pre-heat** output option is selected this timer is then initiated, and the auxiliary output selected is energised.

After the pre-heat timer has expired the module will de-energise the pre-heat output and commence engine starting; the following sequence occurs. The **Fuel Solenoid** is energised, then the **Starter Motor** is engaged.

The engine is cranked for the duration of the crank timer or 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 speed detection.

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. Once this has expired the module will once again attempt to start the engine. This will be repeated until either the engine fires or the pre-set number of attempts to start have been completed, in this instance the module will indicate a **'Fail to start'** alarm.

 **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.**

After the starter motor has disengaged, the **Safety On** timer is activated, allowing Oil Pressure, High Engine Temperature, Underspeed, 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 this being indicated by illumination of the **'SAFETY ON'** LED.

Once the generator is running at the correct speed and up to voltage the **'GENERATOR AVAILABLE'** LED will illuminate on the mimic diagram to indicate that a transfer of the load to the generating set may now take place.

Pressing the **STOP/RESET PUSHBUTTON** will de-energise the **Fuel Solenoid** and bring the engine to rest.

1.3 AUTOMATIC MAINS FAILURE/REMOTE ON LOAD OPERATION

If the module is placed in **'AUTO'** mode by pressing the **'AUTO' PUSHBUTTON**, it will monitor both the incoming mains supply and also monitor the auxiliary inputs for a **'REMOTE START ON LOAD'** signal. Should either the incoming mains supply fail (or fall outside of pre-set limits) or the **'REMOTE START ON LOAD'** signal be detected, 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 the failure is not just a momentary dip in the supply. Once this timer has expired the module will continue with its normal start sequence.

If the **pre-heat** output option is selected this timer is then initiated, and the auxiliary output selected is energised.


Should either the mains return or the remote start signal be removed during either of the above two timers, the module will terminate its start sequence and return to its standby **'AUTO'** state until such time as a start is signalled again.

After the pre-heat timer has expired the module will de-energise the **pre-heat** output and commence engine starting; the following sequence occurs. The **Fuel Solenoid** is energised, then the **Starter Motor** is engaged.

The engine is cranked for the duration of the crank timer or 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 speed detection.

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. Once this has expired the module will once again attempt to start the engine. This will be repeated until either the engine fires or the pre-set number of

attempts to start have been completed, in this instance the module will indicate a '**Fail to start**' alarm.

 **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.**

After the starter motor has disengaged, the **Safety On** timer is activated, allowing Oil Pressure, High Engine Temperature, Underspeed, 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 this being indicated by illumination of the '**SAFETY ON**' LED.

Once the generator is running at the correct speed and up to voltage the '**GENERATOR AVAILABLE**' LED will illuminate on the mimic diagram to indicate that a transfer of the load to the generating set may now take place.

Once the generator is available the module will open the **mains contactor/ACB** and wait for a pre-set break time before closing the **generator contactor/ACB** .

The generator is now up and running and is selected to supply the load. The mains supply is unavailable and has been disconnected from the load.

Should the mains supply return or the remote start signal be removed the module will first initiate a return timer to ensure that the mains has returned in a stable state. Should the mains fail again within this time the module will continue to run the generator on load and ignore the fluctuating mains supply until such time as it remains available for the duration of the return timer.


Once the return timer has expired, the module will open the **generator contactor/ACB** and wait for a pre-set break time before closing the **mains contactor/ACB**. This will transfer the load from the generator to the mains.

The module will then commence its run on timer, this timer is used to allow the engine to run off load to ensure that it has adequately cooled before being brought to a standstill.

Once the run on timer has expired the module will de-energise the **fuel solenoid** and the engine will be brought to rest.

1.4 TEST MODE OPERATION.

The **test mode** is used to simulate a mains failure as above. If the **test mode** is initiated the module will start the engine as above, obeying all timing sequences which would be observed during a true mains failure. Once the generator is available the module will transfer the load to the gen-set.

 **CAUTION!:- If the test mode is initiated then a transfer to the generating set will occur. This will lead to a momentary break in supply, therefore do not operate the module in 'Test' mode unless it is safe to break the supply.**

Test mode is entered by operating the '**TEST**' push-button, however to confirm that 'Test' mode is required the module will not enter 'Test' mode until the '**START**' push-button is operated and held. Once the unit is in 'Test' mode operation will be as detailed above in 'Auto' mode during a mains failure. The module will transfer the load to the generator and this will remain transferred until either the generator is stopped or the module is placed in 'Auto' mode once more. In the case of the latter the module will operate as if the mains has just returned and observe all timing sequences.

2. PROTECTIONS

The module features a dual indication method for displaying alarm conditions, this comprises of the right hand **LED** panel which is used to indicate specific alarms and operating states, and also is used to indicate warnings or shutdowns which do not have their own **LED**.



The second method for displaying alarms is via the centre mounted **LCD** display. This gives textual information to the user detailing the exact nature of the fault, operating states and monitored values.

The **LED**'s will indicate the fault condition, the first up fault is indicated by a flashing **LED**, subsequent faults which happen simultaneously are indicated by a steady **LED**. Warnings are also indicated by a steady **LED**. The **LCD** display will also indicate the first up fault with subsequent faults being logged also in the form of a list which can then be accessed from the from panel buttons.


The module also features an event logging facility (*if fitted*), this allows the operator to view the history of the generating set back from the most current event.

VIEWING ALARMS


If the module is operation in the normal '**STATUS PAGE**' display any alarm condition will automatically be displayed. If the user is viewing instrumentation, then the alarm will not automatically be displayed and must be viewed by the operator.

To view an alarm operate the  button to return to the status page. Then operate the  (**WHITE**) button to view the alarm page.


If more than one alarm has occurred these will be automatically displayed one after another.

Alternatively the operator can be view the alarms by operating the  (**WHITE**) to scroll down the list of alarms.

Each alarm must be accepted and cleared before the module can be restarted.

Operating the '**ALARM MUTE BUTTON**' will accept the alarm. Pressing the  will then clear the alarm if the triggering condition no longer exists. Should the alarm fail to clear, this indicates that the triggering condition is still present and further investigation is required.

 **NOTE:-** Operation of the '**STOP/RESET BUTTON**' will also clear the alarms. However this will occur on a global basis so un-viewed alarm conditions will not be seen.

Using the  will only clear the alarm condition current displayed, therefore every alarm must be viewed to be accepted.

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 '**CHARGE FAIL**' on the LCD. The **FAULT WARNING 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 '**LO BATT VOLTS**' on the LCD. The **FAULT WARNING 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 '**HI BATT VOLTS**' on the LCD. The **FAULT WARNING LED** will also illuminate.

LOW FUEL LEVEL, if the module detects that the fuel level has fallen below the low fuel setting level , the module will display '**LOW FUEL LEVEL**' on the LCD. The **FAULT WARNING LED** will also illuminate.

HIGH FUEL LEVEL, if the module detects that the fuel level has risen above the high fuel level setting level , the module will display '**HI FUEL LEVEL**' on the LCD. The **FAULT WARNING LED** will also illuminate.

FUEL SENDER OPEN CIRCUIT, if the module detects that the signal from the fuel sender has been lost (become open circuit), the module will display '**FUEL SENDER OPEN CIRCUIT**' on the LCD. The **FAULT WARNING LED** will also illuminate.

GENERATOR LOADING FAIL, Normally the status on the change-over device as displayed on the mimic diagram is derived by the module software, however if required the module can be programmed to actually monitor the auxiliary contacts on the change-over device. In this instance the mimic diagram will indicate the actual status of the contacts. Additionally if this type of feedback is being utilised the module is able to indicate alarms if the changeover device has not operated as expected. If the module detects that the generator change-over device has not closed when instructed , the module will display '**GEN LOADING FAIL**' on the LCD. The **FAULT WARNING LED** will also illuminate.


MAINS LOADING FAIL, If the module detects that the mains change-over device has not closed when instructed , the module will display '**MAINS LOADING FAIL**' on the LCD. The **FAULT WARNING LED** will also illuminate.

OIL PRESSURE SWITCH, the module can be programmed to only attempt to crank the engine if the Oil Pressure is initially low, (engine at rest, not running). Also possible that the Oil Pressure switch is faulty if engine not running. The module will display '**OIL PRESSURE NOT LOW**' on the LCD. The **FAULT WARNING LED** will also illuminate.

AUXILIARY INPUTS, if an auxiliary input has been configured as a warning the appropriate LCD message will be displayed and the **FAULT WARNING 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, 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 '**FAIL TO START**' and both the **FAULT SHUTDOWN** and **FAIL TO START LED's** 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 '**EMERGENCY STOP**' and both the **EMERGENCY STOP** and **FAULT SHUTDOWN LED's** will flash.

 **NOTE:- The Emergency Stop 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 setting level after the **Safety On** timer has expired, a shutdown will occur. The LCD will indicate '**LOW OIL PRESSURE**' and both the **FAULT SHUTDOWN** and **Low Oil Pressure LED's** will flash.

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

HIGH OIL TEMPERATURE, if the module detects that the engine oil temperature has exceeded the high oil temperature setting level after the **Safety On** timer has expired, a shutdown will occur. The LCD will indicate '**HI OIL TEMP**' and the **FAULT SHUTDOWN LED** will flash.

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

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 '**UNDERSPEED SHUTDOWN**' and both the **FAULT SHUTDOWN** and **UNDER/OVERSPEED LED's** 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 '**GEN HI FREQ**' and the **FAULT SHUTDOWN 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 below the pre-set trip after the **Safety On** timer has expired, a shutdown is initiated. The LCD will indicate '**GEN LO FREQ**' and the **FAULT SHUTDOWN 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 HI VOLTS**' and both the **FAULT SHUTDOWN** and **GEN HIGH/LOW VOLTS LED's** 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 below the pre-set trip after the **Safety On** timer has expired, a shutdown is initiated. The LCD will indicate '**GEN LO VOLTS**' and both the **FAULT SHUTDOWN** and **GEN HIGH/LOW VOLTS LED's** 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 OPEN CIRCUIT**' and the **FAULT SHUTDOWN 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 '**EARTH FAULT**' and the **FAULT SHUTDOWN LED** will flash.

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

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 operate the change-over device to remove the load from the generator. Once this has occurred the module will start the engine run-on 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 OVER CURRENT, if the module detects that the load is drawing a current in excess of the pre-set trip an electrical trip will be initiated. The LCD will indicate '**OVERCURRENT**' and the **ELECTRICAL TRIP LED** will flash.

GENERATOR REVERSE POWER, if the module detects that the generator is being fed by from an external source and this exceeds the pre-set trip level an electrical trip will be initiated. The LCD will indicate '**REVERSE POWER**' and the **ELECTRICAL TRIP 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 **ELECTRICAL TRIP LED** will illuminate.

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.

It is also possible to configure the module such that electrical trips can be made to shutdown the set or operate as warnings only, shutdowns can be made into electrical trips or warnings. Warnings can be made into shutdowns or electrical trips. This gives the module a great degree of flexibility.

Finally it is possible to inhibit any of the above alarms from the configuration setting. Therefore it is possible that the operator may not have all the above protections enabled. If you are unsure of the exact alarm status, refer to the source of you module configuration.

3. DESCRIPTION OF CONTROLS

The following section details the function and meaning of the user control on the module.

3.1 LCD DISPLAY

STATUS PAGE


The LCD display normally indicates the status of the generator such as '**CONTROL IN AUTO**', '**ENGINE RUNNING**', etc. This is the default display and is always automatically returned to after a pre-set period of operator inactivity.


ALARM PAGE



The LCD also displays the exact nature of any alarm condition which have occurred such as '**LOW OIL PRESSURE SHUTDOWN**'. 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.

INSTRUMENT PAGE

The LCD panel is also used to display the various monitored parameters allowing the operator to monitor the generators performance and monitor values.


The instrumentation page is accessed from the status page by operating the  (*WHITE*) button. This will then automatically scroll through the monitored instruments continuously.

The individual instruments can also be viewed by operating the  (*WHITE*) button.


To return to the status page operate the  (*WHITE*) or the  button.

EVENT LOG PAGE *(If fitted - see note below)*


The LCD panel can display the recorded events allowing the operator to view the history of the generating set. The event log details the type of event and the time and date of occurrence.

The event log page is accessed from the status page by operating the  (*WHITE*) button twice (The first operation displays the instrument page.). This will then display the most recently recorded event.

19
Apr 98 14:34:14

To view the history of the generator event by event operate the  (*WHITE*) button (this will effectively take you back in time from most recent event).

1 Apr 98 10:12:43
LOW FUEL LEVEL

To view the oldest event press the  button.

To return to the most recent event operate the  button. The  button may be used to move forward from the currently displayed event to the most recent event.

To return to the status page operate the  (*WHITE*) or the  button.

NOTE:- If the following screen is displayed when attempting to view the event log, this indicates one of three possibilities:-
The module does not have the hardware fitted necessary for event logging.
The module has not recorded any events.
The event logging has been disabled during configuration.



CONFIGURATION PAGES

Finally the LCD panel is used to display the various configuration pages used to set-up the module. The configuration pages are restricted to authorised personnel only and are outside the scope of this operators manual.

3.2 LED INDICATORS

TELEMETRY ACTIVE LED

This LED indicates activity on the RS232 telemetry link it has three states.

- '*OFF*' - no telemetry active.
- '*FLASHING*' - A telemetry link has been established but access to the module has not yet been granted. The module needs to receive the correct telemetry password to provide access.
- '*STEADY*' - The telemetry link is active and the remote PC has access to the module. The module pushbutton have been locked out and no local control is possible, this is also indicated by the flashing system lock LED. Should it be necessary for the local operator to stop the generator in this state, operation of the Emergency stop control will stop the set.

REMOTE START

This LED indicates that the module is receiving a '*Remote Start*' signal from an exterior monitoring device. If the module is in 'AUTO' mode then a remote start will occur and the generator run until the remote start signal is removed.

SYSTEM LOCK

This LED when illuminated in a '*Steady*' mode indicates that the operator is locked out from the module to prevent unauthorised button operation. All mode control pushbuttons will not respond when operated and the module will remain in which ever mode it was placed before the lock signal was applied. It is possible however for the operator to view the instrumentation on the LCD using the appropriate buttons. If the LED is illuminated in a '*Flashing*' mode this indicates that the module is operating under remote control and the local operator does not have access to the unit. In this instance all buttons are inhibited.

MAINS OUT OF LIMITS

This LED indicates that the modules mains failure detect circuit has showing that the incoming mains supply (if applicable) is outside of pre-set limits. If the module is in 'AUTO' mode then a AMF start will occur and the generator run until the mains returns to within limits.

SAFETY ON

This LED indicates that the module has completed its safety on time delay. Once the LED illuminates full protections are enabled and any '*Delayed*' alarm conditions still present at this time will trigger an alarm.

FAULT WARNING

This LED indicates that a warning alarm has occurred. The exact nature of the warning will be displayed on the LCD display. For further details refer to the '*Protections*' section of this manual.

ELECTRICAL TRIP

This LED indicates that an electrical trip alarm has occurred. The exact nature of the electrical trip will be displayed on the LCD display. For further details refer to the 'Protections' section of this manual.

FAULT SHUTDOWN

This LED indicates that a shutdown alarm has occurred. The exact nature of the shutdown will be displayed on the LCD display. For further details refer to the 'Protections' section of this manual.

FAIL TO START

This LED indicates that the module has attempted to start the engine. Once all attempts to start have been made without success this LED will illuminate. For further details refer to the 'Protections' section of this manual.

LOW OIL PRESSURE

This LED indicates that a low oil pressure alarm has occurred. The exact nature of the warning will be displayed on the LCD display. For further details refer to the 'Protections' section of this manual.

HIGH ENGINE TEMPERATURE

This LED indicates that a high engine temperature alarm has occurred. The exact nature of the warning will be displayed on the LCD display. For further details refer to the 'Protections' section of this manual.

UNDER/OVERSPEED

This LED indicates that an underspeed or overspeed alarm has occurred. The exact nature of the warning will be displayed on the LCD display. For further details refer to the 'Protections' section of this manual.

GEN. UNDER/OVER VOLTS

This LED indicates that a generator under voltage or over voltage alarm has occurred. The exact nature of the warning will be displayed on the LCD display. For further details refer to the 'Protections' section of this manual.

EMERGENCY STOP

This LED indicates that an emergency stop alarm has occurred. The exact nature of the warning will be displayed on the LCD display. For further details refer to the 'Protections' section of this manual.

STOP/RESET

This LED indicates that the module is operating in 'Stop/Reset' mode. For further details refer to the 'PUSH-BUTTONS' section later in this manual.

MANUAL

This LED indicates that the module is operating in 'Manual' mode. For further details refer to the 'PUSH-BUTTONS' section later in this manual.

START

This LED indicates that the module is receiving a start pushbutton command. For further details refer to the 'PUSH-BUTTONS' section later in this manual.

AUTO

This LED indicates that the module is operating in 'Stop/Reset' mode. For further details refer to the 'PUSH-BUTTONS' section later in this manual.

TEST

This LED indicates that the module is operating in 'Test' mode. For further details refer to the 'PUSH-BUTTONS' section later in this manual.

ALARM MUTE

This LED indicates that the module is alarm circuit has been muted, the triggering alarm however still remains and has not been cleared. For further details refer to the 'PUSH-BUTTONS' section later in this manual.

GENERATOR AVAILABLE

This LED indicates that the generator is running and is producing an output sufficient to feed the load. Therefore the generator can be selected to supply the load. If in auto mode the load will automatically be supplied once the generator is available.

GENERATOR ON LOAD

This LED indicates that the changeover device has selected the generator to supply the load.

MAINS ON LOAD

This LED indicates that the changeover device has selected the incoming mains supply to feed the load.

MAINS AVAILABLE

This LED indicates that the incoming mains supply is within acceptable limits and is available to supply the load.

3.3 PUSH-BUTTONS

STOP/RESET

This push-button places the module into it's reset mode. This will clear any alarm conditions for which the triggering criteria have cleared. If the engine is running and this pushbutton is operated the engine will be brought to a standstill. Should a mains failure occur or a remote start signal become present, these will be ignored.

MANUAL

This push-button is used to gain access to manual control of the generator function. 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 and place the generator on load by using the '**START**' and '**TO GEN**' push-buttons. If the engine is running off-load in the manual mode and a mains failure or remote start become present, the module will automatically instruct the changeover device to place the generator on load. Should the mains then be restored the generator will remain on load until either the '**TO MAINS**' or '**AUTO**' push-buttons are operated.

START

This push-button is used to manually start the engine. The module must first be placed in the '**MANUAL**' or '**TEST**' mode of operation. The '**START**' button should then be operated and held. Once the LCD indicates that starting is in progress the button may be released. This ensures that an inadvertent button press does not start the engine, a deliberate and sustained operation is required. 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.

AUTO

This push-button places the module into it's 'Automatic' mode. This mode is used to allow the module to control the function of the generator automatically. The module will monitor the remote start input and, in the case of a 606, the incoming mains supply. Once a start condition is signalled the set will be automatically started and placed on load. Once the starting signal is removed the module will automatically transfer the load from the generator and shut the set down. The module will then await the next start event. For further details please see the fuller description of 'Auto Operation' earlier in this manual.

TEST

This push-button places the module into its 'Test' mode. This is used to verify the operation of all timers and sequences which are observed during a real mains failure or remote start event. The module will start the engine and ultimately load the generating set. It will then remain in this condition until either the set is stopped or the Auto pushbutton is operated. Once 'TEST' mode has been selected it is necessary to operate the 'START' pushbutton to initiate the test sequence.

ALARM MUTE

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. Refer to the 'Protections' section of this manual for details.

TO GEN

This push-button will only operate if two criteria are met. The module must be in **MANUAL** mode and the generator output must be within acceptable voltage and frequency limits, the latter being indicated by the **GENERATOR AVAILABLE LED** being illuminated on the Mimic diagram. The button is used to manually transfer the load from the mains to the generator. When operated the mains change-over device will open and then following a short delay the generator change-over device will close and the load is transferred to the generator. Operation of the sequence is indicated by the '**ON LOAD**' LED's on the mimic diagram.

TO MAINS

This push-button will only operate if two criteria are met. The module must be in **MANUAL** mode and the mains supply must be within acceptable limits, the latter being indicated by the **MAINS AVAILABLE LED** being illuminated on the Mimic diagram. The button is used to manually transfer the load from the generator to the mains. When operated the generator change-over device will open and then following a short delay the mains change-over device will close and the load is transferred to the mains. Operation of this sequence is indicated by the '**ON LOAD**' LED's on the mimic diagram. The generator may now be stopped.

UP & DOWN(WHITE) ARROW KEYS

These push-buttons are used to scroll the display up or down through a list. For the operator there are two possible uses for these:-

When viewing the instrumentation (identified by '*ins*' on the top right of the LCD) using the Up or Down arrow will move up or down the list of instruments. i.e. pressing the down button when the LCD is displaying oil pressure will change the display to engine temperature repeated pressing would continue down the list showing Oil temperature, fuel level, etc. Pressing the up arrow button would return up through the list of instruments.

i.e.:-

Display shows:-

OIL PRESSURE
ins

Pressing :  (WHITE)

Would show:-

ENGINE TEMP ins
86.8 Deg.

The other occasion that an operator would find the keys useful is when viewing the alarm list in the case of simultaneous multiple alarms. Once the displayed alarm has been muted the up & down keys can be used to view the list of alarms logged at the same time.

i.e.:-

Display shows:-

**EMERGENCY STOP
ALARM PRESENT**

Pressing :  (WHITE)

Would show:-

**LOW OIL
PRESSURE**

NOTE:- Both of the above described lists are 'endless' in that if the operator started at the oil pressure gauge and repeatedly operated the down arrow to scroll down the list of instrumentation, they would eventually return to the oil pressure gauge again.

Left  & Right  Arrow Keys

These push-buttons have no function for the operator and therefore need not be used.

Page Forward (WHITE)  & Page Backward  keys

These push-buttons are used to gain access to other pages. For example to view the instrumentation when currently in the status page ('**GENERATOR ON LOAD**' displayed on LCD.) pressing the page forward (*page left*) key will change the display to the instrumentation page (identified by '*ins*' being displayed at the top right of the LCD). This list of instruments can then be viewed using the up and down arrow keys. When finished viewing, pressing the page forward key again will return to the status page.

If while the instrumentation is displayed an alarm occurs this can be viewed by pressing the page forward button twice, the first operation returns to the status page, the second operation changes the display to the alarm page.

Tick  Key

This push-button serves a number of functions but in operator level this is reduced to two uses. The first use of the tick key is to return to the status page when in the instrumentation page. This causes a similar action to pressing the page forward key.

The second use of the tick key is for accepting and clearing individual alarms. Once an alarm is displayed it may be accepted and muted by pressing either the Alarm mute pushbutton or the tick key. The LCD will display '**MUTED**' after the alarm. Pressing the tick once the alarm has been muted will clear the alarm (if the triggering criteria have been removed). Subsequent alarms will then be displayed. Operating the tick key will clear each alarm until the LCD displays '**ALL ALARMS CLEAR**'. A further operation of the tick key will return the display to the status page.

Lamp Test  Key

This push-button is used to test the operation of all the indication LED's on the module front panel. When operated all the LED's should illuminate briefly, then extinguish in groups. Any LED's which fail to illuminate should be investigated. The lamp test key also serves as the '**WAKE UP**' key. If sleep mode is being used, or the module has just had DC power connected, it will be necessary to wake up the module. Once the unit is out of sleep mode normal operation is restored.

4. INSTALLATION INSTRUCTIONS

The model **DSE 606** Module has been designed for front panel mounting. Fixing is by 4 spring loaded clips for easy assembly.

4.1 PANEL CUT-OUT

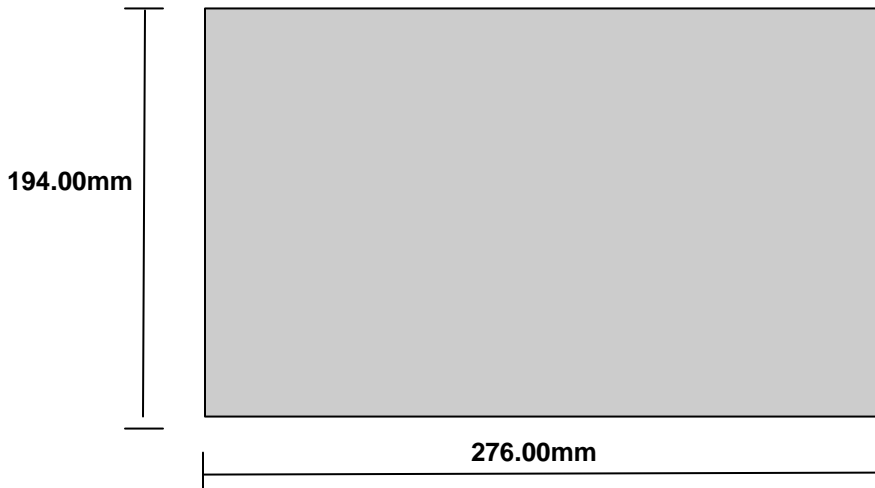


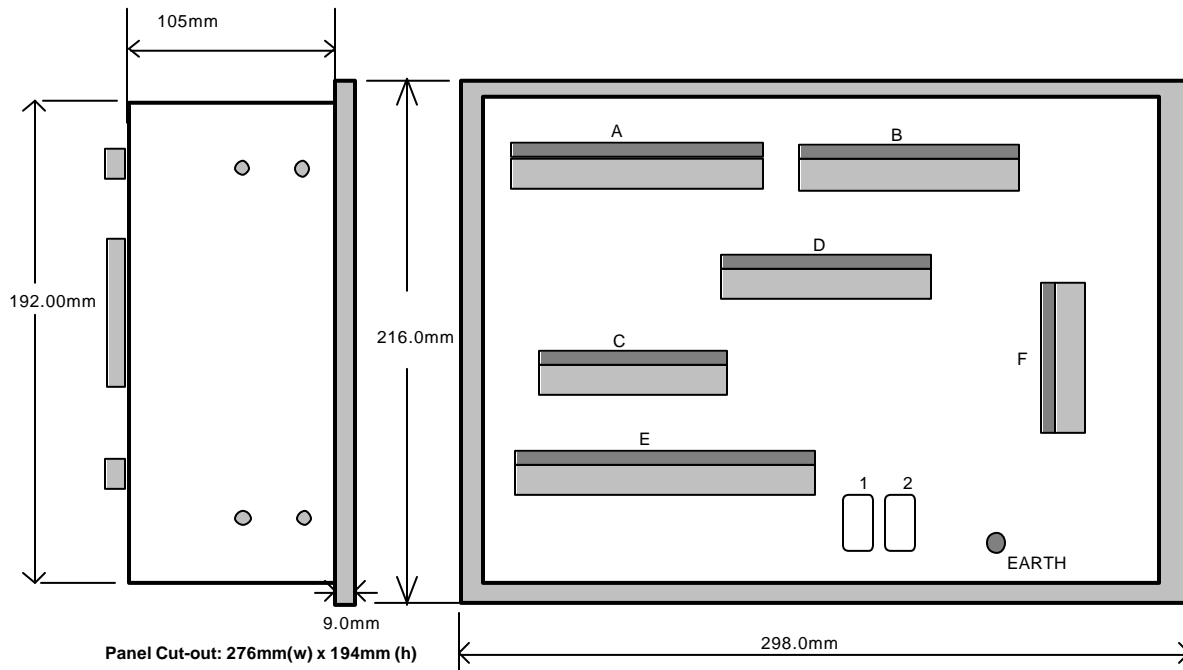
FIG 2

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

4.2 COOLING

The module has been designed to operate over a wide temperature range **-15 to +55° 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 **85%**.

4.3 UNIT DIMENSIONS



All dimensions in mm.

FIG 3

4.4 FRONT PANEL LAYOUT

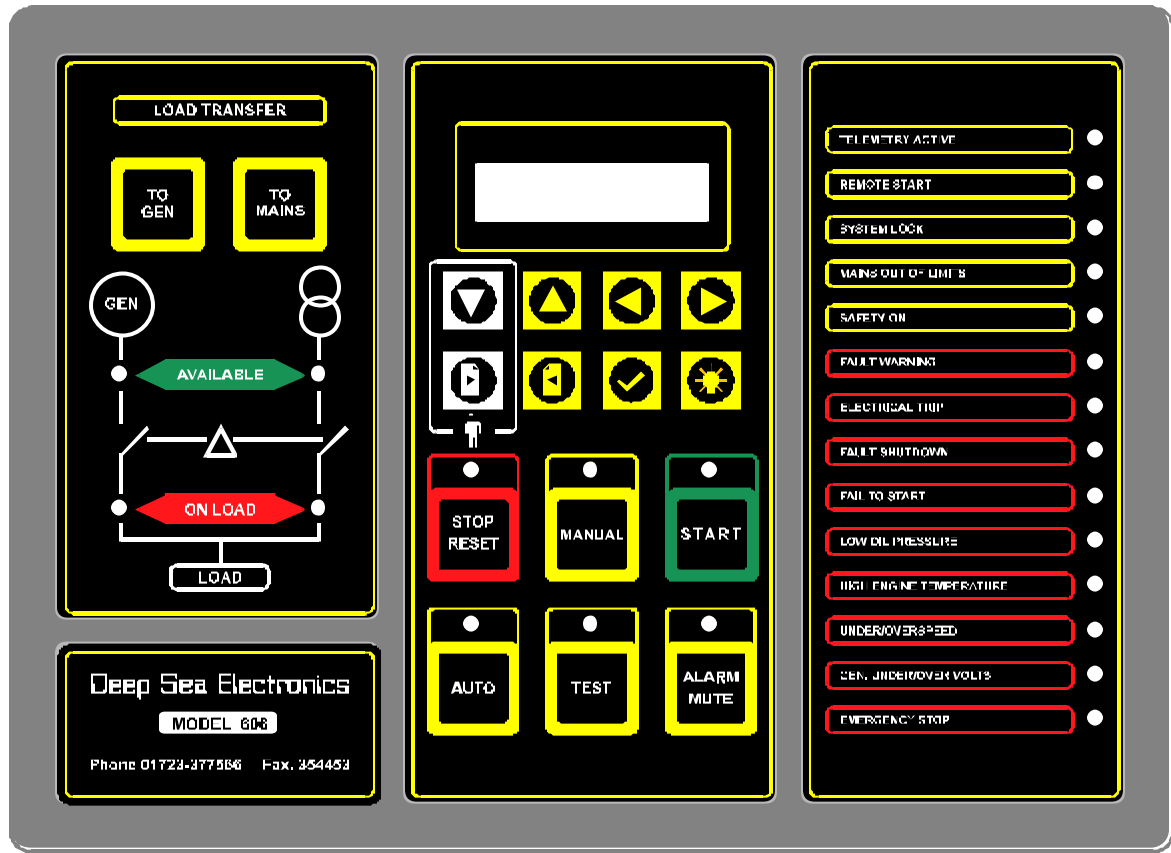


FIG 4

4.5 REAR PANEL LAYOUT

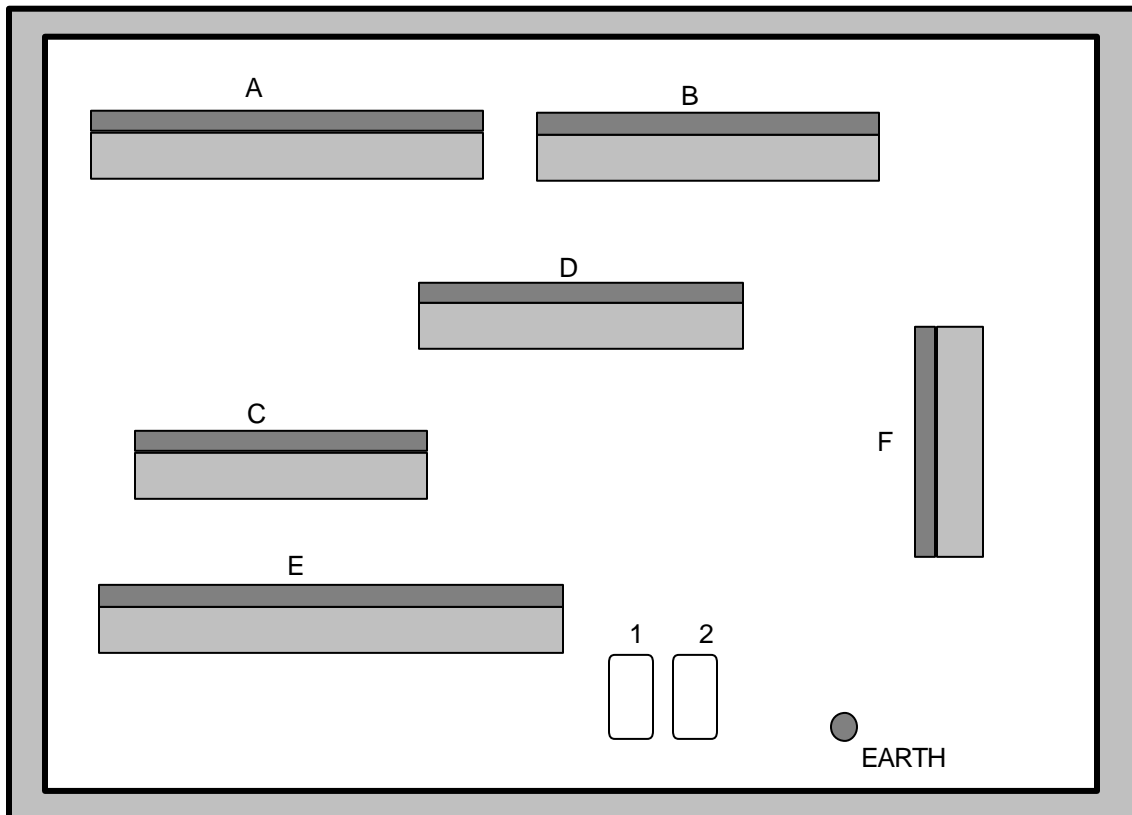


FIG 5

5. ELECTRICAL CONNECTIONS

Connections to the Module are via plug and sockets.

5.1 CONNECTION DETAILS

The following describes the connections and recommended cable sizes to the 6 plugs and sockets on the rear of the Module. See rear panel layout **FIG 5**.

PLUG “A” 18 WAY

PIN No	DESCRIPTION	CABLE SIZE*	NOTES
1	Oil Pressure sender +ve	0.5mm	or digital pressure switch connection.
2	Oil Pressure sender -ve	0.5mm	
3	Oil Pressure sender -ve feed	0.5mm	for use with insulated return type senders
4	Fuel level sender +ve	0.5mm	or digital fuel level switch connection
5	Fuel level sender -ve	0.5mm	
6	Fuel level sender -ve feed	0.5mm	for use with insulated return type senders
7	Engine Coolant Temp. +ve	0.5mm	or digital temperature switch input
8	Engine Coolant Temp. -ve	0.5mm	
9	Engine Coolant Temp. -ve feed	0.5mm	for use with insulated return type senders
10	Engine Oil Temp. +ve	0.5mm	or digital temperature switch input
11	Engine Oil Temp. -ve	0.5mm	
12	Engine Oil Temp. -ve feed	0.5mm	for use with insulated return type senders
13	DO NOT USE		Ensure no connection is made to this pin
14	Generator CT on L1	2.5mm	Do not fit resistors to CT's
15	Generator CT on L2	2.5mm	if single phase then not used
16	Generator CT on L3	2.5mm	if single phase then not used
17	CT common if Neutral CT fitted	2.5mm	only use if neutral CT fitted
18	Neutral CT if fitted	2.5mm	If no neutral CT fitted use as CT common

PLUG “B” 15 WAY

PIN No	DESCRIPTION	CABLE SIZE*	NOTES
19	Output 8 Normally closed	0.5mm	Normally spare auxiliary output unless using breaker control. Then used for mains ACB close connection
20	Output 8 Common connection	0.5mm	“ “ “
21	Output 8 Normally open	0.5mm	“ “ “
22	DO NOT USE		Ensure no connection is made to this pin
23	Output 7 Normally closed	0.5mm	Normally spare auxiliary output unless using breaker control. Then used for mains shunt trip or UV coil feed.
24	Output 7 Common connection	0.5mm	“ “ “
25	Output 7 Normally open	0.5mm	“ “ “
26	DO NOT USE		Ensure no connection is made to this pin.
27	Output 6 Normally closed	0.5mm	Normally Generator contactor control unless using breaker control. Then used for generator ACB close connection
28	Output 6 Common connection	0.5mm	“ “ “

29	Output 6 Normally open	0.5mm	“	“	“
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PIN No	DESCRIPTION	CABLE SIZE*	NOTES
30	DO NOT USE		Ensure not connection is made to this pin
31	Output 5 Normally closed	0.5mm	Normally used for mains contactor control unless using breaker control. Then used for generator ACB shunt trip or UV coil feed.
32	Output 5 Common connection	0.5mm	“ “ “
33	Output 5 Normally open	0.5mm	“ “ “

PLUG “C” 12 WAY

PIN No	DESCRIPTION	CABLE SIZE*	NOTES
34 35	Output 1 Volt Free	0.5mm	Normally configured for Common alarm output. Refer to the source of your module configuration for full details.
36 37	Output 2 Volt Free	0.5mm	Normally configured for Engine Pre-heater output. Refer config source.
38 39	Output 3 Volt Free	0.5mm	Normally configured for engine intake air-flap output. Refer config source.
40 41	Output 4 Volt Free	0.5mm	Normally configured for fuel transfer control output. Refer config source.
42 43	Output 9 Volt Free	0.5mm	Normally configured for common shutdown alarm output. Refer config source.
44 45	Output 10 Volt Free	0.5mm	Normally configured for common warning alarm output. Refer config source.

PLUG “D” 13 WAY

PIN No	DESCRIPTION	CABLE SIZE*	NOTES
46	RS485 line A	2core-	For use with future developments
47	RS485 line B	-screen-	“ “ “
48	RS485 Screen	-cable.	“ “ “
49	DO NOT CONNECT		Ensure no connection is made to this pin
50	Plant Battery -ve input	2.5mm	
51	Plant Battery +ve input	2.5mm	Feed via 2A rated fuse.
52	Charge alternator input	0.5mm	Connect to WL terminal on charge alternator
53	-ve Modem Power output	0.5mm	Output to modem
54	+ve Modem Power output	0.5mm	Output to modem
55	DO NOT USE		Ensure no connection is made to this pin
56	Fuel solenoid output	2.5mm	Fed internally from EM Stop input
57	Starter solenoid output	2.5mm	Fed internally from EM stop input
58	Emergency stop +ve input	2.5mm	Feed via 15A max. rated fuse. Internally connect to fuel and crank outputs.


PLUG “E” 20 WAY

PIN No	DESCRIPTION	CABLE SIZE*	NOTES
59	Auxiliary input 1	0.5mm	Normally Remote start. *Also Wake up input.* Refer to config source.
60	Auxiliary input 2	0.5mm	Normally Immediate Shutdown. Refer config source.
61	Auxiliary input 3	0.5mm	Normally Delayed Shutdown. Refer config source.
62	Auxiliary input 4	0.5mm	Normally Immediate Electrical Trip. Refer config source.
63	Auxiliary input 5	0.5mm	Normally Immediate Warning. Refer config source.
64	Auxiliary input 6	0.5mm	Normally Delayed Warning. Refer config source.
65	Auxiliary input 7	0.5mm	Normally Gen on load input fed from change-over device auxiliary. Refer config source.
66	Auxiliary input 8	0.5mm	Normally mains on load input fed from change-over device auxiliary. Refer config source.
67	Auxiliary input 9	0.5mm	Normally Immediate mains dropout selector input. Refer config source.
68	Auxiliary input 10	0.5mm	Normally Low coolant level warning input. Refer config source.
69	Auxiliary input 11	0.5mm	Normally Low coolant temp warning input. Refer config source.
70	Auxiliary input 12	0.5mm	Normally Auto-start inhibit input. Refer config source.
71	Auxiliary input 13	0.5mm	Normally Auto stop inhibit input. Refer config source.
72	Auxiliary input 14	0.5mm	Normally generator load inhibit. Refer config source.
73	Auxiliary input 15	0.5mm	Normally external mute input. Refer config source.
74	Auxiliary input 16	0.5mm	Normally system lock input. Refer config source.
75	DO NOT USE		Ensure no connection is made to this pin
76	Mag. Pickup device input	2 core-	Connect to MPU
77	Mag. Pickup device input	-screen-	Connect to MPU
78	Mag. Pickup device screen	-cable.	Connect cable screen at one end only.

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

PLUG "F" 10 WAY

PIN No	DESCRIPTION	CABLE SIZE*	NOTES
79	Generator L1 input	0.5mm	Feed via 2A typical rated fuse
80	Generator L2 input	0.5mm	Feed via 2A fuse. Not used if single phase
81	Generator L3 input	0.5mm	Feed via 2A fuse. Not used if single phase
82	Generator N input	0.5mm	
83	DO NOT USE		Ensure no connection is made to this pin
84	DO NOT USE		Ensure no connection is made to this pin
85	Mains L1 input	0.5mm	Feed via 2A fuse
86	Mains L2 input	0.5mm	Feed via 2A fuse. Not used if single phase
87	Mains L3 input	0.5mm	Feed via 2A fuse. Not used if single phase
88	Mains N input	0.5mm	

 **NOTE:-** Cable size* = Is recommended cable size only. Exact cable size will depend on circuit application and length of cable run. Information above is supplied as a guide only.

RS232 -1 (FEMALE)

Not normally used - Refer to DSE for details.

RS232 -2 (MALE)

Telemetry lead connection for direct connection to telemetry PC software or for connection to modem for remote telemetry. Standard Null Modem Cable.

5.2 CONNECTOR FUNCTION DETAILS

The following describes the functions of the 6 connectors on the rear of the module. See rear panel layout FIG 5.

PLUG "A" 18 WAY

PIN No	DESCRIPTION
1	Oil pressure sender +ve connection. If a digital oil pressure switch is being used instead, connect to this pin and ground the other side of the switch.
2	Oil pressure sender -ve connection. Only use if using analogue sender
3	Oil pressure sender -ve feed. Connect to pin 2 if using insulated return type senders.
4	Fuel level sender +ve. If a digital fuel level switch is being used instead, connect to this pin and ground the other side of the switch.
5	Fuel level sender -ve connection. Only use if using analogue sender
6	Fuel level sender -ve feed. Connect to pin 2 if using insulated return type senders.
7	Engine coolant temp sender +ve connection. If a digital temperature switch is being used instead, connect to this pin and ground the other side of the switch.
8	Engine coolant temp sender -ve connection. Only use if using analogue sender
9	Engine coolant temp sender -ve feed. Connect to pin 2 if using insulated return type senders.
10	Engine oil temp sender +ve connection. If a digital temperature switch is being used instead, connect to this pin and ground the other side of the switch.
11	Engine oil temp sender -ve connection. Only use if using analogue sender
12	Engine oil temp sender -ve feed. Connect to pin 2 if using insulated return type senders.
13	DO NOT USE
14	Generator L1 current transformer connection.
15	Generator L2 current transformer connection. If single phase is used do not connect this pin.
16	Generator L3 current transformer connection. If single phase is used do not connect this pin.
17	Generator current transformer common connection, only to be used if a neutral CT is fitted.
18	Generator current transformer Neutral connection. If no neutral CT is fitted use this pin as CT Common.

PLUG "B" 15 WAY

PIN No	DESCRIPTION
19	Output 8 Normally closed change-over contact. Normally a spare auxiliary output. However if breaker control scheme is being used this is used for the Mains ACB close connection.
20	Output 8 Common change-over contact.
21	Output 8 Normally open change-over contact
22	DO NOT USE
23	Output 7 Normally closed change-over contact. Normally a spare auxiliary output. However if breaker control scheme is being used this is used for the Mains ACB shunt trip or UV coil connection.
24	Output 7 Common change-over contact.
25	Output 7 Normally open change-over contact.
26	DO NOT USE
27	Output 6 Normally closed change-over contact.
28	Output 6 Common change-over contact.

PIN No	DESCRIPTION
29	Output 6 Normally open change-over contact.
30	DO NOT USE
31	Output 5 Normally closed change-over contact. Normally mains contactor control output. However if breaker control scheme is being used this is used for the Generator ACB shunt trip or UV coil connection.
32	Output 5 Common change-over contact.
33	Output 5 Normally open change-over contact.

PLUG "C" 12 WAY

PIN No	DESCRIPTION
34 35	Output 1 Volt free contacts. Normally configured to close on common alarm. However these are user configurable, refer to the source of your configuration for the exact function of this and all other outputs.
36 37	Output 2 Volt free contacts. Normally configured to close to activate engine Pre-heaters. Refer config source.
38 39	Output 3 Volt free contacts. Normally configured to close to activate engine air-flap output on over-speed or emergency stop operation. Refer config source.
40 41	Output 4 Volt free contacts. Normally configured to close to activate fuel transfer pump. Refer config source.
42 43	Output 9 Volt free contacts. Normally configured to close to indicate a shutdown alarm has occurred. Refer config source.
44 45	Output 10 Volt free contacts. Normally configured to close to indicate a warning alarm has occurred. Refer config source.

PLUG "D" 13 WAY

PIN No	DESCRIPTION
46	RS485 output (Line A). Currently not used, for use with future developments.
47	RS485 output (Line B). Currently not used, for use with future developments.
48	RS485 output cable screen connection.
49	DO NOT USE
50	Connect to plant battery negative.
51	Connect to plant supply positive.
52	Charge alternator WL connection. Supplies alternator excitation current and also monitors charger alternator output for charge fail indication.
53	Integral modem power supply DC negative output. Connect to modem DC power connector.
54	Integral modem power supply DC positive output. Connect to modem DC power connector.
55	DO NOT USE
56	Fuel solenoid output - 16A rated positive DC output. Connect to engine fuel solenoid or EFC 'run' terminal. Internally fed from Emergency stop input.
57	Starter solenoid output - 16A rated positive DC output. Connect to starter solenoid. Internally fed from Emergency stop input.
58	Emergency stop positive input. Connect to plant positive via normally closed EM stop pushbutton. If EM stop is operated, removes the positive supply from the fuel and starter outputs.

PLUG "E" 20 WAY

PIN No	DESCRIPTION
59	Auxiliary input 1. Negative signal input. Normally used for Remote start on load (N/O contact). **Also used as module wake up input if sleep mode is used.** Refer to the source of your configuration for details of the function of this and other inputs.
60	Auxiliary input 2. Negative signal input. Normally used as an immediate shutdown input (N/O contact). Refer config source.
61	Auxiliary input 3. Negative signal input. Normally used as a delayed shutdown input (N/O contact). Refer config source.
62	Auxiliary input 4. Negative signal input. Normally used as an immediate electrical trip input (N/O contact). Refer config source.
63	Auxiliary input 5. Negative signal input. Normally used as an immediate warning input (N/O contact). Refer config source.
64	Auxiliary input 6. Negative signal input. Normally used as a delayed warning input (N/O contact). Refer config source.
65	Auxiliary input 7. Negative signal input. Normally used for Generator contactor feedback fed from generator change-over device auxiliary. Refer config source.
66	Auxiliary input 8. Negative signal input. Normally used for mains contactor feedback fed from mains change-over device auxiliary. Refer config source.
67	Auxiliary input 9. Negative signal input. Normally used to select Immediate mains drop-out mode. In the event of a mains failure and the signal is absent, the module will allow the mains contactor to remain closed until the generator is available. However if it is required that the mains be dropped as soon as it goes out of limits, then the signal should be applied to open the mains contactor. Refer config source.
68	Auxiliary input 10. Negative signal input. Normally used to provide a Low coolant level warning (N/O contact). Refer config source.
69	Auxiliary input 11. Negative signal input. Normally used to provide a Low coolant temperature warning (N/O contact). Refer config source.
70	Auxiliary input 12. Negative signal input. Normally used to provide a Mains failure start inhibit facility. If this input is present module will ignore the start command in the event of a mains failure. Should the input be removed the module will then react to a mains failure.
71	Auxiliary input 13. Negative signal input. Normally used to provide an auto-stop inhibit facility. IF this input is present mains failure transfer will occur to the generator, but re-transfer back to the mains will be inhibited until the input is removed.
72	Auxiliary input 14. Negative signal input. Normally used to provide a generator load inhibit facility. If this input is present the generator contactor will be prevented from closing. Removal of the signal will allow the contactor to close.
73	Auxiliary input 15. Negative signal input. Normally used to provide a remote alarm mute or alarm accept input.
74	Auxiliary input 16. Negative signal input. Normally used to provide a system lock facility. When the input is present the system lock LED will illuminate and operation of all mode control pushbuttons will be inhibited. Removal if the input will re-enable pushbutton operation.
75	DO NOT USE
76	Connect to engine speed magnetic pick-up device (if used).
77	Connect to engine speed magnetic pick-up device (if used).
78	Magnetic pickup cable screen connection. Ensure cable screen is earthed at one end only

PLUG "F" 10 WAY

PIN No	DESCRIPTION
79	Generator L1 sensing input. Connect to alternator L1 output.
80	Generator L2 sensing input. Connect to alternator L2 output. If using single phase only do not connect this terminal.
81	Generator L3 sensing input. Connect to alternator L3 output. If using single phase only do not connect this terminal.
82	Generator N sensing input. Connect to alternator N output.
83	DO NOT USE
84	DO NOT USE
85	Mains L1 sensing input. Connect to mains L1 on live side of incoming mains supply contactor.
86	Mains L2 sensing input. Connect to mains L2 on live side of incoming mains supply contactor. If using single phase only do not connect this terminal.
87	Mains L3 sensing input. Connect to mains L3 on live side of incoming mains supply contactor. If using single phase only do not connect this terminal.
88	Mains N sensing input. Connect to mains N of incoming mains supply.

6. SPECIFICATION

DC Supply	8.0 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
Max. Operating Current	800mA@12V, 390mA@24V
Typical Standby Current	500mA@12V, 260mA@24V
Typical Running Current	580mA@12V, 300mA@24V
Typical Sleep Current	<1ma with no Datalog hardware fitted 12mA with Datalog hardware fitted
Alternator Input Range (if fitted)	15 - 300 V ac RMS
Alternator Input Frequency	50 - 60 Hz at rated engine speed.
Magnetic Input Range (if fitted)	0.5 V to 70 V Peak to Peak
Magnetic Input Frequency	62Hz to 10,000 Hz 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	8 Amp or 5 Amp DC at supply voltage.
Dimensions	298mmX216mmX105mm
Charge Fail / Excitation Range	0 V to 35 V
Operating Temperature Range	-15 to +55°C

7. COMMISSIONING

PRE-COMMISSIONING

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

- 7.1. The unit is adequately cooled and all the wiring to the module is of a standard and rating compatible with the system.
- 7.2. The unit **DC** supply is fused and connected direct to the battery and of correct polarity.
- 7.3. 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.**

- 7.4. To check the start cycle 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 and hold the **‘START’** pushbutton for a short time. The unit start sequence will commence.
- 7.5. 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 **“FAILED TO START”** **LED** will be illuminated and the LCD will display ‘Failed to start’. Press the **STOP/RESET** pushbutton to reset the unit.
- 7.6. 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 Pushbuttons/Instrumentation section of this manual.
- 7.7. Select **AUTO** on the front panel, the engine will run for the pre-set cooling down period, then shutdown. The generator should stay in the standby mode. If not check that there is not a signal present on the **Remote Start** input or the incoming mains supply is out of limits.
- 7.8. Initiate an automatic start by failing the incoming AC mains supply. 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. Check the Warming timer has timed out.
- 7.9. Restore the incoming AC mains supply, 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.
- 7.10. If despite repeated checking of the connections between the **606** and the customers 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

8. FAULT FINDING

SYMPTOM	POSSIBLE REMEDY
Unit is inoperative	Operate the Lamp test pushbutton. 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 8 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 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 and wiring. Check configured polarity is correct.
High engine temperature fault operates after engine has fired.	Check engine temperature. Check switch and wiring. Check configuration of input i.e. Normally Open or Normally Closed.
Shutdown fault operates	Check relevant switch and wiring of LCD indicated fault sensor. Check configuration of input.
Warning fault operates	Check relevant switch and wiring of LCD indicated fault sensor. Check configuration of input.
Fail to Start is activated after pre-set number of multi 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 606 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 mains supply is within limits and all feeder fuses are intact. Verify mains is present on the 606 inputs.. 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.
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 feature always refer to the source of your module configuration if in doubt.

10. APPENDIX