

Deep Sea Electronics Plc

MODEL 604

AUTOMATIC START

AND

ENGINE MANAGEMENT SYSTEM

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TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
INTRODUCTION.....	4
CLARIFICATION OF NOTATION USED WITHIN THIS PUBLICATION.	4
OPERATION.....	5
AUTOMATIC MODE OF OPERATION.....	5
CONTACTOR CONTROL	6
TEST MODE OF OPERATION	7
MANUAL MODE OF OPERATION.....	7
MOUNTING AND OPERATING INSTRUCTIONS.....	9
MOUNTING	9
COOLING.....	9
FRONT PANEL LAYOUT.....	11
FRONT PANEL DESCRIPTION.....	12
MOMENTARY ACTION PUSHBUTTONS.....	12
LED INDICATORS.....	12
REAR PANEL LAYOUT AND DIMENSIONS	15
CONNECTION DETAILS	16
PLUG 'A'. 20 WAY PIN	16
PLUG 'B'. 15 WAY PIN	16
PLUG 'C'. 13 WAY PIN	17
AUXILIARY PLUG. 12 WAY PIN.....	17
CONNECTOR FUNCTIONAL DESCRIPTIONS.....	18
PLUG 'A'.....	18
PLUG 'B'.....	19
PLUG 'C'.....	19
AUXILIARY PLUG	20
ALARM CONDITIONS.....	21
ERROR/WARNING MESSAGES.....	21
SHUTDOWN CONDITIONS	26
VALUE EDIT MODE	28
ENTERING THE VALUE EDIT MODE	28
(BUTTON IDENTIFICATION DIAGRAM)	28
THE EDITOR	28
USING THE EDITOR.....	28
ACCESSING THE EDITOR.....	29
ADJUSTING A PARAMETER.....	29
SAVING A NEW SETTING	30
ILLEGAL VALUES.....	30
LEAVING THE EDITOR.....	30
EDITABLE VALUES	31
TEXT EDITOR.....	38
ENTERING THE TEXT EDITOR.....	38
(BUTTON IDENTIFICATION DIAGRAM)	38
MODIFYING AND GENERATING MESSAGES	38
ACCEPTING THE NEW TEXT	38
EXITING THE TEXT EDITOR MODE.....	39
SYSTEM MODE	39
(BUTTON IDENTIFICATION DIAGRAM)	39

VERIFYING SYSTEM PARAMETERS.....	39
CHECKING THE INPUTS TO THE UNIT.....	40
CHECKING THE SYSTEM PARAMETERS.....	40
PUSHBUTTON CHECK.....	40
LEAVING THE SYSTEM MODE.....	40
COMMISSIONING.....	41
PRE-COMMISSIONING CHECK.....	41
FAULT FINDING.....	42
APPENDIX.....	44

INTRODUCTION

The Deep Sea Electronics Model 604 in its basic form has been designed to be programmed to meet most of the industry's complex specifications. Variations of the unit allow many other functions such as the serial output for operating a number of generators together - communicating with building management systems - or remote starting and data transfer by modem.

The Deep Sea Electronics 604 model has been primarily designed to start to generator when required to do so, by an external signal, and switch the generator's output supply when the engine operating criteria and other external functions (i.e. synchronising) have been met.

Once activated the 604 unit carries out all the start and stop procedures of the generator, indicating the operational status and fault conditions : automatically shutting-down the generator and giving a true first-up fault condition of a failure. The information is displayed by an alphanumeric display and is duplicated by a flashing high intensity LED, which when accepted is set I the continuous mode.

Selective operational sequences and text can be set and altered by the user. The adjustable parameters are displayed on the screen when t he EDIT mode is selected. Alternations to the system are made simple to adjust by the data displayed on the screen.

A second set of operational sequences and timers for use by qualified engineers are provided, but access to these critical parameters is barred by a security code number.

The module is mounted in a steel enclosure with a reverse printed polycarbonate facia, giving the unit an IP65 rating. The pushbuttons have a tactile feel with audible indication when pressed. Connections to the unit are via 4 locking plugs and sockets mounted on the rear. This module is designed for front panel mounting and measures 300mm W x 217mm H x 110mm D.

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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OPERATION

On connection of the **DC** power supply to the module, the “**STOP/RESET**” LED will be illuminated.

AUTOMATIC MODE OF OPERATION

The unit is activated by selecting the AUTO position on the front panel. When a remote start input is detected, the start delay period begins. After this delay the starter motor is engaged for a pre-set time period then disengaged for the reset period. Should this sequence continue beyond the set number of cycles (normally 3 attempts), the fault will be shown on the display and FAIL TO START LED will illuminate in a flashing mode. Pressing the MUTE push button will accept the fault and cancel the alarm output. All other fault conditions will be blocked. The LED will stay illuminated in a constant mode and the display will show the fault message and alarm muted.

When the engine fires, the starter motor is disengaged and locked out by a pre-set frequency derived for the Alternator or the magnetic pickup normally mounted on the flywheel housing. Should this signal not be present after the starter has attempted to engage then the starter will be disengaged and a further attempt to engage will take place. If after the pre-set number of attempts to ENGAGE the unit still does not detect any frequency the engine will shut down and display NO ENGINE REVS.

Should a magnetic pickup not be available then the module can be set to derive its frequency signals for the alternator output. This is selected in the Value Edit Mode.

After the engine has started, the internal protection timer is activated which allows the oil pressure to build up without triggering the fault input. When the engine speed and the alternator voltages have reached their pre-set levels, the stabilisation timer is activated to allow the engine to warm up before taking load. When this time period has expired the unit will check the low oil pressure switch. If the switch has not been opened then the load will not be accepted until the oil pressure has built up. This protection is used to minimise the wear on the engine should the oil pressure be slow to build up. Should the oil pressure remain low the unit will shut down and display LOW OIL PRESSURE. When the engine is running the display will read GENERATOR ON LOAD FREQUENCY = 50.0 1500RPM.

With all the running parameters present the fail to synch timer will start running. If after a pre-set time period, the unit has failed to receive a signal for the synchroniser the engine will be shut down, the shutdown led will flash and the message FAIL TO SYNCH will be displayed.

If the synch signal is received before the fail to synch timer times out then the Contactor/Breaker will be signalled by the unit to close and the load will be accepted.

On removal of the remote start input a return timer will be activated (0-30 minutes) after this time period the Contactor/Breaker will be opened and the cool down timer will start its countdown. After this period, the generator will be stopped.



NOTE: If the unit is not required to be used for paralleling then connect the synch input to negative.

To reset a fault condition, press **OFF/RESET** button for 1 second.

CONTACTOR CONTROL

With the engine running and all the relevant parameters met the system would normally look at the synch signal then close the Contactor/Breaker. However if there is a negative signal on terminal 3 BREAKER OPEN the synch timer will not be activated and the generator will not accept the load. Removal of this signal will allow the Contactor/Breaker to close. Reconnection of this input when the generator is on load will cause the Contactor/Breaker to open but will leave the generator running until the remote start input is also removed. When the breaker input is activated a message is displayed on the display BREAKER OPEN.



NOTE: All sequences of operation, load status and fault conditions are displayed on the screen.

To reset any shutdown fault conditions, press the OFF/RESET push-button for a one second period.

TEST MODE OF OPERATION

To activate the TEST sequence the system must first be set in the AUTO mode. Press the TEST push-button and the text on the display will read WARNING TEST SELECTED, then TEST SELECTED PRESS AGAIN.

When the TEST push-button is pressed the second time the test sequence will commence. If the TEST push-button is not pressed within four seconds then the system will revert back to the AUTO mode. This is a safety feature to guard against accidental operation of the test function.

On activation of the test sequence the start delay begins. After this delay the starter motor is engaged for a pre-set time period then disengaged for the rest period. Should this sequence continue beyond the set number of cycles (normally 3 attempts), the fault will be shown on the display and FAIL TO START LED will illuminate in a flashing mode. Pressing the MUTE push-button will accept the fault and reset the alarm output. All other fault conditions will be blocked. The LED will stay illuminated in a constant mode and the display will show the fault message and alarm muted.

When the engine fires, the starter motor is disengaged and locked out by a pre-set frequency derived from the Alternator the magnetic pickup normally mounted on the flywheel housing. Should this signal not be present after the starter has attempted to engage then the starter will be dis-engaged and a further attempt to engage will take place. If after the pre-set number of attempts to ENGAGE the unit still does not detect any frequency the engine will shut down and display ENGINE REVOLUTIONS NOT DETECTED.

Should a magnetic pickup not be available then the module can be set to derive its frequency signals from the alternator output. This is selected in the Value Edit Mode.

After the engine has started, the internal protection timer is activated which allows the oil pressure to build up without the fault input. When the engine speed and the alternator voltages have reached their pre-set levels, the stabilisation timer is activated to allow the engine to warm up before taking load. When this time period has expired the unit will check the low oil pressure switch is open. The engine is inhibited from accepting the load if the oil pressure is low. (The engine will shut down after protection time period if the oil pressure remains low).

With all the running parameters present the fail to synch timer will start running. If after a pre-set time period, the unit has failed to receive a signal from the synchroniser the engine will be shut down, the shutdown led will flash and the message FAIL TO SYNCH will be displayed.

If the synch signal is received before the fail to synch timer times out then the Contactor/Breaker will be signalled by the unit to close and the load will be accepted.

 **NOTE: If the unit is not required to be used for paralleling then connect the synch input to negative.**

To complete the Test sequence press the AUTO push-button and the Contactor/Breaker will be removed, this will activate the run on timer and starts its countdown. This allows the engine a running off load period to cool down before stopping. Should the remote start input be activated during the run on period and the synch signal is present then the Contactor/Breaker will re-close.

MANUAL MODE OF OPERATION

For manual operation of the generator press the push-button marked MANUAL, which activates all pushbuttons associated with the manual operation. The text on the display will now read MANUAL SELECTED PRESS START.

To start the engine press the START push-button. The crank cycle will commence without the start delay period. When the engine has started and all the pre-set parameters have been met the CLOSE push-button is activated

Pressing the CLOSE push-button will only allow the generator to accept the load if the synch signal is present. To remove the generator off load press the OPEN push-button. Should no synch signal be present when the CLOSE push-button is pressed the unit will sound a warning and the display will read SYNCH INHIBITED.

To stop the engine press the STOP push-button. This will stop the engine immediately. Should a shutdown fault condition occur when the generator is on line then the Contactor/Breaker will automatically be opened and the set shut down.

To stop the engine with cool down period, select AUTO and the engine will run on for the reset cool down period.

MOUNTING AND OPERATING INSTRUCTIONS

MOUNTING

The model **604** Automatic Start Module has been designed for front panel mounting. Fixing is by four spring loaded clips for easy assembly.

The panel cut-out dimensions are as shown on **FIG 1.1** below.

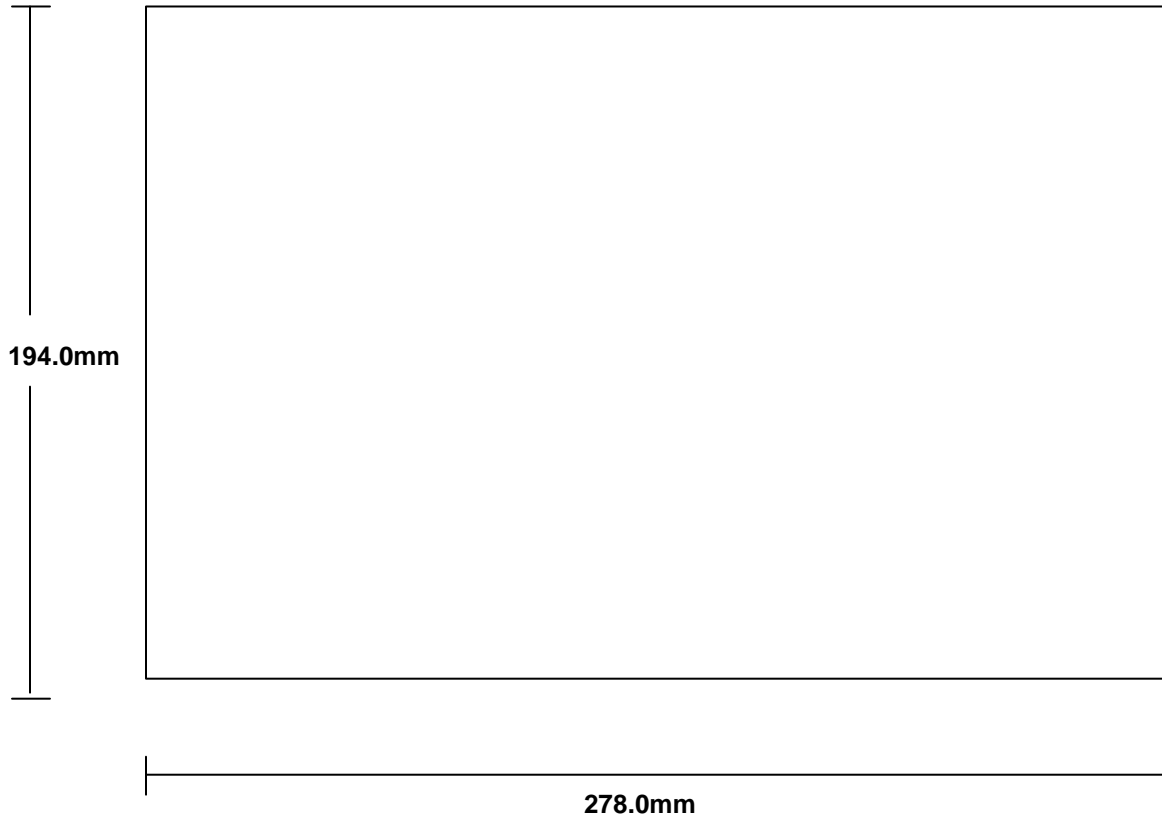


FIG 1.1 All dimensions are in mm.

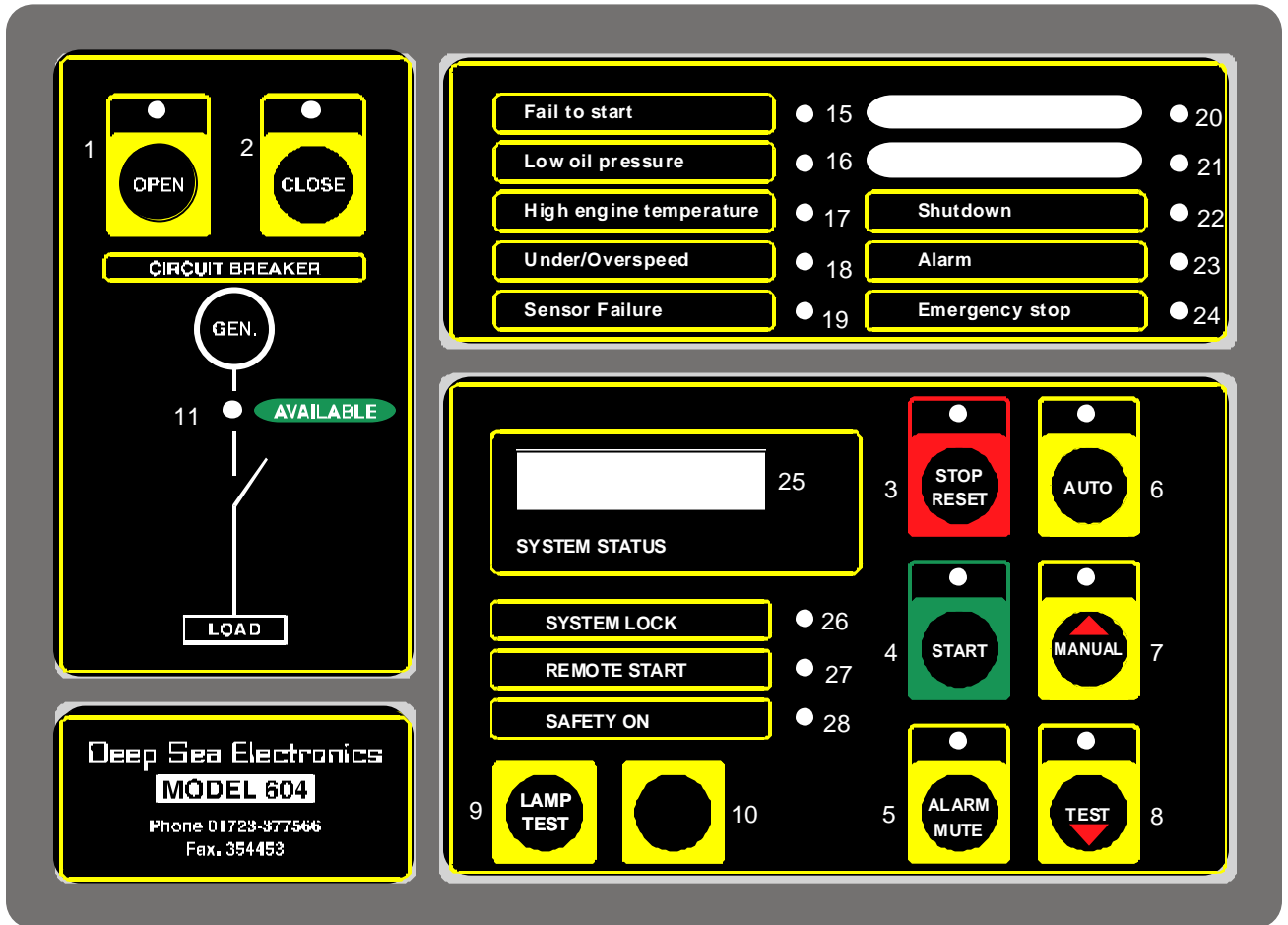
In conditions of excessive vibration the module should be mounted on suitable anti-vibration mountings.

COOLING

The module has been designed to operate over a wide temperature range of **-10C** to **+50C**. However, allowances should be made for a temperature rise within the cabinet. Care should be taken **NOT** to mount possible heat sources near the module unless adequate ventilation is provided.

The relative humidity inside the enclosure should not exceed **85%**.

FRONT PANEL LAYOUT



FRONT PANEL DESCRIPTION

MOMENTARY ACTION PUSHBUTTONS

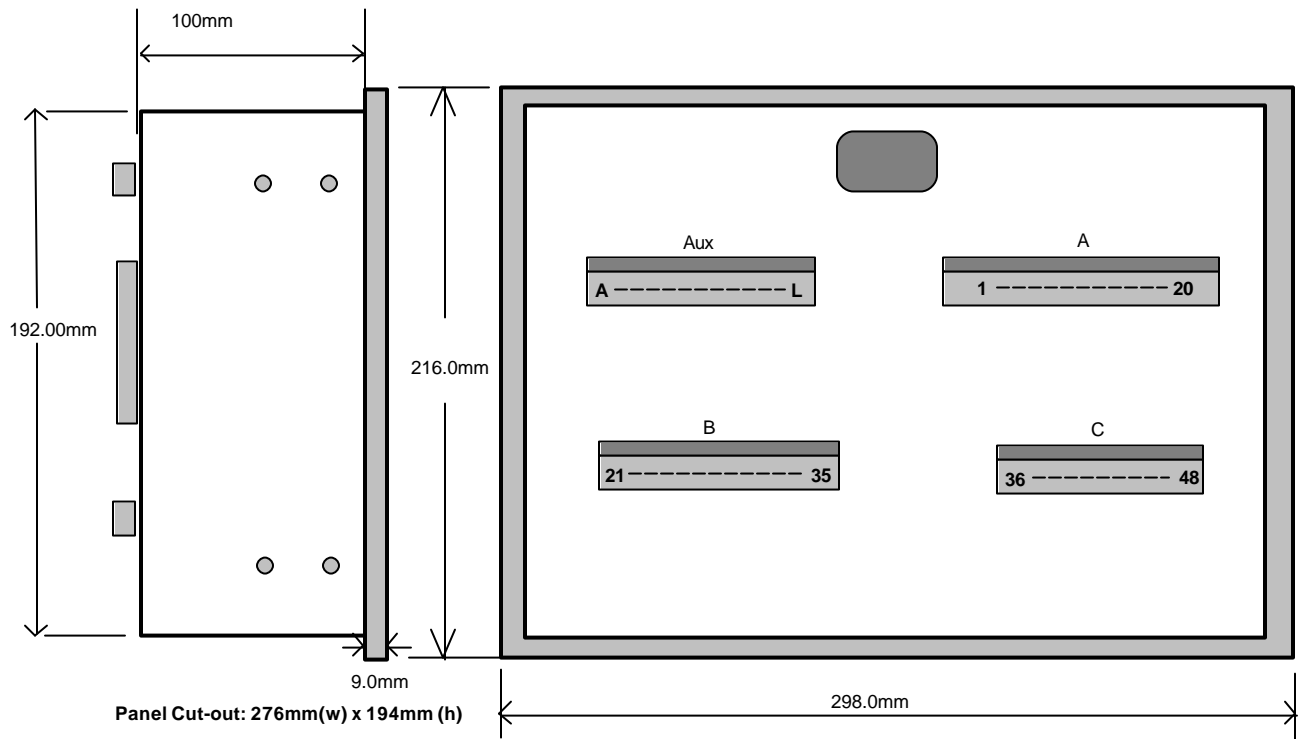
1. **OPEN** is a momentary action push-button that opens the generator Contactor/Breaker. This push-button is only active in Manual mode of operation.
2. **CLOSE** is a momentary action push-button that closes the generator Contact/Breaker when all the operating parameters are correct. This push-button is only active in Manual mode of operation.
3. **STOP/RESET** is a momentary action push-button that stops the engine, switches OFF the system, or resets any latched fault that has been accepted.
4. **START** is a momentary action push-button that when pressed will start the engine cranking. This push-button is only active in the manual mode of operation.
5. **ALARM MUTE** is a momentary action push-button that when pressed cancels the alarm and changes the flashing LED associated with the incoming fault into a constant mode of illuminated.
6. **AUTO** is a momentary action push-button that when pressed selects the automatic mode of operation.
7. **MANUAL** is a momentary action push-button that when pressed switches the system into the manual mode of operation.
8. **TEST** is a momentary action push-button that when pressed switches the system into an on load run mode of operation.
9. **LAMP TEST** is a momentary action push-button that when pressed illuminates all the LED and the display LED back light. Also displays the engine hours run time (optional)
10. **BLANK** is a momentary action push-button that is used in conjunction with other pushbuttons for System Test, Text Editor and Calibration Editor.

LED INDICATORS

11. **GENERATOR AVAILABLE** is an amber indicator that illuminates when the generator voltage is within the voltage limits set by the module.
- 12-14. Not Used
15. **FAIL TO START** is a red indicator that illuminates in the flashing mode to indicate that the system has failed to start after the set number of engine start cycles has expired. The indicator illuminates in a steady mode on operation of the MUTE push-button.
16. **LOW OIL PRESSURE** is a red indicator that illuminates in the flashing mode to indicate that the system has been shut down because of low oil pressure. The indicator illuminates in a steady mode on operation of the MUTE push-button.
17. **HIGH ENGINE TEMPERATURE** is a red indicator that illuminates in the flashing mode to indicate that the system has been shut down because the engine temperature has exceeded the permitted tolerance. The indicator illuminates in a steady mode on operation on the MUTE push-button.

18. **UNDER/OVER SPEED** is a red indicator that illuminates in the flashing mode to indicate that the system has been shut down because the engine speed either decreased below or exceeded the permitted engine RPM that the Module was set for. The display will indicate which fault has set the alarm condition. The indicator illuminates in a steady mode on operation of the MUTE push-button.
19. **SENSOR FAILURE** is a red indicator that illuminates in the flashing mode to indicate that the system has been shut down because the module is not receiving pulses from the magnetic pickup/alternator Hz. The display will read NO ENGINE REVS if the unit does not receive signals during crank, or will display SENSOR FAULT if the signal is lost when the engine is running.
20. **AUXILIARY SHUTDOWN OR WARNING INPUT 4** is a red indicator that illuminates in the flashing mode to indicate that the system has accepted a fault on this input, which is programmable and can be set for any one or the following 4 options:-
 - 1, Delayed shutdown 2, Immediate shutdown 3, Delayed warning 4, Immediate warning.
21. **AUXILIARY SHUTDOWN OR WARNING INPUT 5** is a red indicator that illuminates in the flashing mode to indicate that the system has accepted a fault on this input, which is customer programmable and can be set for any one or the following 4 options:-
 - 1, Delayed shutdown 2, Immediate shutdown 3, Delayed warning 4, Immediate warning.
22. **SHUTDOWN INPUTS** is a red indicator that illuminates in the flashing mode to indicate that the system has been shut down by one of the 9 inputs which are available for pre-programming by the customer. The text displayed on the LCD is chosen and programmed by the customer for each one of the separate inputs. The LED illuminates in the steady mode on operation of the mute push-button.
23. **ALARM** is a red indicator that illuminates in the flashing mode to indicate that the system has accepted an alarm condition on one of the 9 inputs which are available for pre-programming by the customer. The text displayed on the LCD is chosen and programmed by the customer for each one of the separate inputs. The LED illuminates in the steady mode on operation of the mute push-button.
24. **EMERGENCY STOP** is a red indicator that illuminates in the flashing mode to indicate that the system has been shut down by operation of the emergency stop button. The indicator illuminates in a steady mode on operation of the MUTE push-button.
25. **SYSTEM STATUS** is an alphanumeric LCD display that is illuminated by an LED backlight. This display gives a step by step report on the status of the system and its operating parameters. The display also reports all alarm and fault conditions.

REAR PANEL LAYOUT AND DIMENSIONS



CONNECTION DETAILS

The following describes the functions of the four plug and sockets on the rear of the 604 controller. See rear panel layout.

PLUG 'A'. 20 WAY PIN

Pin	Function	Notes
1	Alternator contactor auxiliary input	
2	Auto Reset	
3	Breaker Open	
4	Synch Permitted.	
5	System Lock	
6	Remote Start	
7	Shutdown or Warning 1 }	<i>Indicated by the relevant Common LED</i>
8	Shutdown or Warning 2 } >>>>	<i>either:- Shutdown (22) or Alarm (23) on</i>
9	Shutdown or Warning 3 }	<i>front panel and on the LCD display.</i>
10	Shutdown or Warning 4 } >>>>	<i>Indicated by LED 20 on front panel on LCD display</i>
11	Shutdown or Warning 5 } >>>>	<i>Indicated by LED 21 on front panel on LCD display</i>
12	Shutdown or Warning 6 }	<i>Indicated by the relevant Common LED</i>
13	Shutdown or Warning 7 } >>>>	<i>either:-</i>
14	Shutdown or Warning 8 } >>>>	<i>Shutdown (22) or Alarm (23) on</i>
15	Shutdown or Warning 9 }	<i>front panel and on the LCD display.</i>
16	High temperature input >>>>	<i>Indicated by LED 17 on the front panel and on LCD</i>
17	Low oil pressure input >>>>	<i>Indicated by LED 16 on the front panel and on LCD</i>
18	Emergency Stop input >>>>	<i>Indicated by LED 24 on the front panel and on LCD</i>
19	Magnetic Pick-up (+)	
20	Magnetic Pick-up (-)	

PLUG 'B.' 15 WAY PIN


Pin	Function	Notes
21	Alternator contactor control relay L	<i>Volt free contact 15 amps</i>
22	Alternator contactor control relay N	<i>Volt free contact 15 amps</i>
23	Off Auto control relay	<i>Volt free contact 15 amps</i>
24	Off Auto control relay	<i>Volt free contact 15 amps</i>
25	Alternator AC neutral input	
26	Alternator AC phase L1 input	
27	Alternator AC phase L2 input	
28	Alternator AC phase L2 input	
29	No Connection	
30	No Connection	
31	Undervolts trip relay	<i>Volt free contact 15 amps</i>
32	Undervolts trip relay	<i>Volt free contact 15 amps</i>
33	Alternator shunt trip relay	<i>Volt free contact 15 amps</i>
34	Alternator shunt trip relay	<i>Volt free contact 15 amps</i>
35	No connection	

PLUG 'C'. 13 WAY PIN

Pin	Function	Notes
36	DC supply input (-)	
37	DC supply input (+)	
38	Louvre or Pre-heat control relay	<i>Volt free contact 15 amps</i>
39	Louvre or Pre-heat control relay	<i>Volt free contact 15 amps</i>
40	Alarm 2 relay	<i>Volt free contact 15 amps] Not Mute-able</i>
41	Alarm 2 relay	<i>Volt free contact 15 amps] Not Mute-able</i>
42	Starter Control relay	<i>Volt free contact 15 amps</i>
43	Starter Control relay	<i>Volt free contact 15 amps</i>
44	Fuel Control relay	<i>Volt free contact 15 amps</i>
45	Fuel Control relay	<i>Volt free contact 15 amps</i>
46	Alarm 1 control relay	<i>Volt free contact 15 amps] Mute-able</i>
47	Alarm 1 control relay	<i>Volt free contact 15 amps] Mute-able</i>
48	No connection	

AUXILIARY PLUG. 12 WAY PIN

- A Fail to start output. (LED 15)
- B Low oil pressure output. (terminal 17 LED 16)
- C High engine temperature output. (Terminal 16 LED 17)
- D Under/Overspeed output. (LED 18)
- E Emergency stop output. (Terminal 18 LED 24)
- F Common Warning outputs. (Terminals 7 to 9 & 12 to 15. LED 23)
(Warning selected by customer from PIP1-3, and 6-9)
- G Sensor fail output. (LED 19)
- H Common Shutdown outputs .(Terminals 7 to 9 & 12 to 15. LED 22)
(Shutdown selected by customer from PIP 1-3, and 6-9)
- I Warning or Shutdown 2 output. (Terminal 11. LED 21, PIP5)
- J Warning or Shutdown 1 output. (Terminal 10. LED 20, PIP 4)
- K DC supply output. (+).
- L DC supply output. (-).

 **NOTE:**
PIP= Programmable InPut.

When any input 7 - 9 and 12 - 15 (PIP 1-3 and 6-9) are designated WARNING or SHUTDOWN then the appropriate auxiliary output will be used.

i.e. if 7, 8 and 9 (PIP 1-3) were programmed as “shutdowns” then upon activation of any of these inputs a signal would be present on output H.


i.e. if 7, 8, 9 and 12 (PIP 1-3 and 6) were programmed as “warnings” then upon activation of any of these inputs a signal would be present on output F.

CONNECTOR FUNCTIONAL DESCRIPTIONS.

PLUG 'A'

1. Alternator Contactor Auxiliary. A negative closing auxiliary contact on the alternator contactor. i.e. if this input is at negative it signals to the 604 that the alternator contactor has closed.
2. Auto Reset. If this input is connected to negative after a fault condition has shutdown the engine, then the fault will be cancelled and the unit reset to Auto.
3. Breaker Open. If this line is connected to negative the Contactor/Breaker will be inhibited from closing, or if the Contactor/Breaker is already closed then it will be opened.
4. Sync Permitted. If this line is connected to negative (normally via an auto check sync unit) it will allow the Contactor/Breaker to close. The auto sync timer is also cancelled by this input.
5. System Lock. If this line is connected to negative it prevents any changes of system status being made via the front panel keys. Operation of the 'mute' and 'lamp test' buttons is NOT inhibited.
6. Remote Start. If this line is connected to negative then the generator will start. Used to start the generator from a remote location.
7. Shutdowns or Warnings 1. If this line is connected to negative it will accept a fault condition and either shutdown the generator or indicate a warning. Has user programmable LCD message. LED 22 or 23 on front panel.
8. Shutdowns or Warnings 2. As 7 above. LED 22 or 23 on front panel.
9. Shutdowns or Warnings 3. As 7 above. LED 22 or 23 on front panel.
10. Shutdown or Warning 4 via LED 20. If this line is connected to negative it will accept a fault condition and either shutdown the generator or indicate a warning. Has user programmable LCD message. LED 20 on front panel.
11. Shutdown or Warning 5 via LED 21. If this line is connected to negative it will accept a fault condition and either shutdown the generator or indicate a warning. Has user programmable LCD message. LED 21 on front panel.
12. Shutdowns or Warnings 6. As 7 above. LED 22 or 23 on front panel.
13. Shutdowns or Warnings 7. As 7 above. LED 22 or 23 on front panel.
14. Shutdowns or Warnings 8. As 7 above. LED 22 or 23 on front panel.
15. Shutdowns or Warnings 9. As 7 above. LED 22 or 23 on front panel.
16. High Engine Temperature. If this line is connected to negative it signals to the unit that the engine temperature is too high. LED 17 on front panel.
17. Low Oil Pressure. If this line is connected to negative it signals to the unit that the oil pressure is too low. LED 16 on front panel.
18. Emergency Stop. If this line is NOT connected to negative the engine will stop. LED 24 on front panel.
19. Mag Pickup +Ve. An AC signal from the speed sensing magnetic pickup. (+).

20. Mag Pickup -Ve. An AC signal from the speed sensing magnetic pickup. (-).The -Ve is not grounded in the unit.

 **NOTE:- It is recommended that the magnetic pickup cable is screened and connected to negative at one end only. Connection of the cable at both ends causes earth loops and acts as an aerial, picking up stray signals.**

PLUG 'B'

21. Alt Contactor/Circuit Breaker. Normally open volts free contact. Closes to 22. Used to control the alternator contactor. **15 amp rated.**

22. Alt Contactor/Circuit Breaker. Normally open volts free contact. Closes to 21.

23. Off Auto. Normally closed volts free contact. Closes to 24. Used for indication that system is not in auto mode. **15 amp rated.**

24. Off Auto. Normally closed volts free contact. Closes to 23. Used for indication that system is not in auto mode. 15 Amp rated.

25. Alternator Neutral. Alternator AC neutral input. Used as part of the alternator sensing function.

26. Alternator L1. Alternator AC phase L1 Input. Used to detect the voltage level of Alternator phase L1.

27. Alternator L2. Alternator AC phase L2 Input. Used to detect the voltage level of Alternator phase L2.

28. Alternator L3. Alternator AC phase L3 Input. Used to detect the voltage level of Alternator phase L3.

29. No Connection

30. No Connection

31. Alternator Undervolts Trip. Normally open volts free contact. Closes to 32. Used to trip the alternator circuit breaker **15 amp rated.**

32. Alternator Undervolts Trip. Closes to 31.

33. Alternator Shunt Trip. Normally closed, volt free contact. Closes to 34. Used to trip the alternator circuit breaker. **15 amp rated.**

34. Alternator Shunt Trip. Closes to 33.

35. No Connection.

PLUG 'C'

36. DC Supply -Ve. System DC negative input. (battery negative).

37. DC Supply +Ve. System DC positive input. (battery positive).

38. Louvre/Preheat. Normally open volts free contact. Closes to 39. Used to control Louvre flaps or preheat as specified by user. In edit value mode. **15 amp rated.**

39. Louvre/Preheat. Normally open volts free contact. Closes to 38.

40. Alarm 2. Normally open volts free contact. Closes to 41. These contacts will close on any shutdown fault condition and will only open again on fault clearance. Pressing “**ALARM MUTE**” has no effect. **15 amp rated.**

41. Alarm 2. Normally open volts free contact. Closes to 40.

42. Starter. Normally open volts free contact. Closes to 43. Used to control starter motor relay. **15 amp rated.**

43. Starter. Normally open volts free contact. Closes to 42.

44. Fuel. Normally open volts free contact. Closes to 45. Used to control fuel rack relay. **15 amp rated.**

45. Fuel. Normally open volts free contact. Closes to 44.

46. Alarm 1. Normally open volts free contact. Closes to 47. Used to control audible warning alarm. Muting the alarm will open these contacts. **15 amp rated.**

47. Alarm 1. Normally open volts free contact. Closes to 46.

AUXILIARY PLUG

These outputs are a mimic of the front panel LED's, enabling a remote indication of the condition stated for each output. All the outputs (except K and L) on the auxiliary plug are open collector type. i.e. when activated will be grounded to negative. Each output will sink up to **200mA**. If external relays are used then suitable diodes must be fitted across the relay coils to prevent large voltage spikes on contact closure from coming back into the 604.

- A Fail To Start. The engine has failed to start.
- B Low Oil. Oil pressure is too low.
- C High Engine Temp. Water temperature is too high.
- D Under/Overspeed. Engine speed has exceeded limits.
- E Emergency Stop. Emergency stop has been activated.
- F Warning Alarms. Any programmed Input (PIP) Warning alarm LED 23 active.
- G Sensor Fail. Magnetic pickup has failed. (Engine revs not detected)
- H Shutdown Alarms. Any programmed Input (PIP) Shutdown alarm LED 22 active.
- I Shutdown or Warning Alarm LED 20 Active.
- J Shutdown or Warning Alarm LED 21. Active.
- K DC Positive Out. A system DC (12v - 24v) positive output. Can be used as DC feed for remote indication relays. Maximum current available is 1 amp. This is NOT fused.
- L DC Negative Out. A system DC negative output. Maximum current available is 1 amp. This is NOT fused.

NOTE

The Auxiliary outputs mimic the front panel LED'S so will flash when activate, and be steady when the Alarm is muted. The Outputs are also active when the “LAMP TEST” is pressed, so must NEVER be used for any purpose, other than for indication only.

It is recommended that a DIN rail mounted relay expansion unit or annunciator, both manufactured by Deep Sea Electronics, be used for the above outputs. A Delayed Relay Board is available if a steady indication is required.

ALARM CONDITIONS ERROR/WARNING MESSAGES

**Checksum error
USING DEFAULTS**

One or more values in the value editor do not agree with the backup values held in the backup memory. Default values for **ALL** settings will be used unless adjustment is made by the operator.

To cancel this message press the **OFF/RESET** pushbutton. The unit will still fully function once the **STOP/RESET** button has been pressed. This message will recur after a shutdown fault or if the power to the unit is switched off and back on, until values are correctly reprogrammed.

The only way to remove this error, is to edit a value in the "**VALUE EDITOR**". This procedure verifies that the settings sent to the processor have not been corrupted.

**msg chsm errors
USING DEFAULTS**

One or more of the messages in the "Text Editor" do not agree with their backup value. The faulty messages are replaced with a default message and the unit continues to work as normal. Any "faulty" text will have to be reprogrammed.

**PARAMETER
ERROR**

**GOING TO
ERROR**

This occurs if user has set up one of the conditions listed below i.e. the user has tried to programme an illegal value into unit. e.g. **A MAINS RETURN VOLTAGE SET LOWER THAN THE TRIP VALUE.** Having done this, the user has then turned the power off to the unit in an attempt to get round this protection. The unit will return to the "Value Editor" to force the user to correct the illegal condition.

**UNABLE TO EXIT
EDITOR**

**INCORRECT VALUES
ENTERED**

This message occurs if user attempts to exit the "Value Editor" with one or more of the variables below set to an illegal value. The user must correct the values using the "Value Editor". Switching unit off and on again will not bypass this protection. The system will detect the illegal value on power up, returning to the "Value Edit Mode" automatically.

GEN VOLTAGE TRIP>LOAD ERROR	<i>(min 5v)</i>
---	-----------------

GEN LOAD/TRIP DIFFER TOO SMALL	<i>(min 5v)</i>
---	-----------------

WAITING FOR OIL PRESSURE TO DROP

This can occur before a crank. The unit will only crank the generator if the oil pressure is initially low. If the oil pressure fails to go low after 30 seconds then the following shutdown message will be displayed:-

OIL PRESSURE FAILED TO GO LOW
--

The unit then goes through a shutdown sequence.

WAITING FOR OIL PRESSURE TO RISE

This condition occurs when the generator has started but the oil pressure has not risen. The unit will not transfer the load and will wait for up to 30 seconds for the pressure to rise and then fail on **LOW OIL PRESSURE**. Once the oil pressure rises then the unit will continue as normal.

GEN TRIP FAIL TRIPPED AT ?V
--

This indicates that the alternator voltage is too low to allow the 604 to close the contactor/breaker. This fault condition is delayed until the protection hold off timers out.

WARNING: TEST SELECTED

PRESS TEST AGAIN TO SELECT

The unit is in 'Auto' and the user has requested to start the generator in 'Test' mode. To ensure that this is not a mistake the user is requested to repeat the command. Starting in 'Test' mode will automatically transfer the load to the generator.

**INT BATTERY TOO
LOW**

Before a start attempt is made, if the external battery is 15V or less a check is made to ensure that the internal battery has sufficient charge to power the internal circuitry during cranking. If the internal battery is too discharged there will be no attempt to crank and the unit will wait for the external battery to rise above 15V or for the internal battery to rise above 8V. During crank the external battery voltage may drop below a level needed to power the internal electronics, causing the unit to reset and prevent the generator from starting, hence the need to ensure adequate charge level prior to attempting to crank.

**EXT BATTERY TOO
LOW FOR CRANK**

External battery requires charging. Insufficient charge to even turn the starter motor.

EXT BATTERY HIGH

Warns that the external battery is above the "high" limit set in the "Value Editor". Useful for checking overcharged batteries.

EXT BATTERY LOW

Warns that the external battery is below the "low" limit set in the "Value Editor". Useful for checking undercharged batteries.

INT BATTERY LOW

This warning indicates that there is something wrong with the internal battery - probably flat and requiring recharging. This happens automatically if power to the unit is left on. This condition can occur if the unit is left un-powered for a considerable length of time - i.e. 3 months or longer, depending upon climatic conditions - or if several start attempts are made in quick succession and the plant battery is low, especially on 12 volt systems during say commissioning tests.

INT BATTERY O/C

This warning indicates there is something wrong with the internal battery and that it's voltage is greater than 12 volts. Check the wiring in the battery compartment in the rear of the unit.

**WARNING MESSAGE
1 TO 9**

**SHUTDOWN MESSAGE
1 TO 9**

Any 1 or more of the 9 inputs can be user defined and programmed as warning messages. Any 1 or more of the 9 inputs programmed as shutdowns and going active will shut down the generator and display one of the user defined shutdown messages.

SYSTEM ERROR XXX

Indicates a system error. XXX is the numerical code of the error. The construction of the no. is the addition of the following:

SYSTEM CHECK	OK	FAULTY	
Ram Battery status	0	1	i.e. if ram battery (1)
Ram Memory status	0	2	and ram memory (2) are
Rom Memory status	0	4	faulty the code is 3 (1+2)

EMERGENCY STOP

If activated the engine shuts down or is inhibited from starting.

VALUE LOCKED

This message occurs in the "Value Editor" if an attempt is made to change the frequency range from integer to a non-integer range. This can happen when being used in alt. freq. pickup mode. In mag. pickup mode the different frequency ranges are available.

SHUTDOWN CONDITIONS

FAILED TO START

The unit has tried unsuccessfully to start the generator the set number of times in the NO OF ATTEMPTS in the "Value Editor".

OVERSPEED FAIL

Overspeed is detected, compared to value set in "Value Editor".

UNDERSPEED FAIL

Underspeed is detected, compared to value set in "Value Editor".

SENSOR FAIL

The unit has failed to detect pulses from the mag/alt pickup when the generator is or should be running.

NO ENGINE REVS

The unit has failed to detect pulses from the mag/alt pickup when the generator is or should be cranking.

LOW OIL PRESSURE

The unit has detected low oil pressure after the protection hold off timer has timed out.

BREAKER IN

This warning message will only occur in the manual mode of operation, when the unit is running off-load although the breaker feedback indicates that it is on-load

BREAKER OPEN

This warning message will only occur in the manual mode of operation, when the unit is running on-load although the breaker feedback indicates that it is off-load

O SPEED WARNING

This warning message will occur when the overspeed warning limit has been exceeded.

O VOLTS WARNING

This warning message will occur when the overvolts warning limit has been exceeded.

BREAKER TRIPPED

This warning message will occur in the manual mode when the generator is running on-load when the breaker feedback indicates that the breaker has tripped.

FAILED TO SYNC

This shutdown message will occur when the system is in auto when the sync input has not gone active when the sync timer expires.

BREAKER FAULT

This shutdown message will occur when the module is running on load and the breaker then opens for some reason. The unit will display the warning breaker tripped message and then run on and stop the generator with the shutdown message.

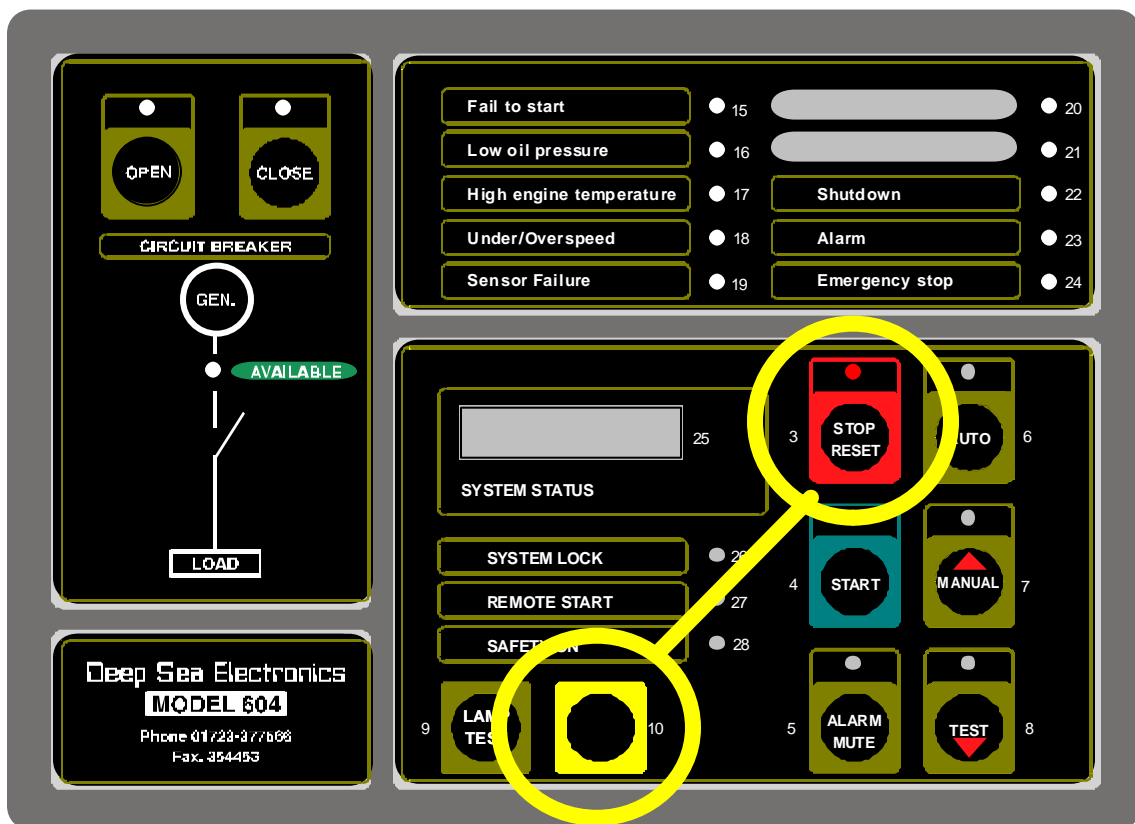
VALUE EDIT MODE

Because of the comprehensive adjustment facilities available to the operator, the editor is completely menu driven and will not allow illegal parameters to be entered. If an attempt is made to programme an illegal parameter a warning will be displayed on the display and the illegal parameter will not be accepted. Some of the values have restricted access to prevent unauthorised modification to certain set values. Access is gained by entering a security code number.

ENTERING THE VALUE EDIT MODE

This facility can only be accessed when the **604** is in the **STOP/RESET** mode. To gain access to the **VALUE EDIT MODE** press the **STOP/RESET** and the **UNMARKED** pushbuttons together. The display will now flash and the message **VALUE EDIT MODE** will be displayed for 2 seconds.

(BUTTON IDENTIFICATION DIAGRAM)



THE EDITOR

The function of the editor is to allow the user to adjust the operating parameters of the 604 to match the system which it is to control. Because of the comprehensive adjustment facilities available to the operator, the editor is completely menu driven and will not allow illegal parameters to be entered without giving a warning on the display.

USING THE EDITOR

The editor can only be accessed when the **604** is in the **STOP/RESET** mode.

ACCESSING THE EDITOR

To enter the editor environment, hold down the “UNMARKED” (edit) key and the “STOP/RESET” key on the front panel of the 604. After a short delay this message will appear on the display.

VALUE EDIT MODE

The message is displayed for 2 seconds, then changes to:-

START DELAY S
MM : SS

The editor is now in 'scan' mode.

This is the first operating parameter in the editor menu, however if it is not required to adjust this, then the next parameter may be selected by pressing the push button marked with the down arrow on the front panel. The push buttons marked with the up and down arrows are used to select the required parameter function from the menu. The editor will automatically scroll round at the top or bottom of the menu.

ADJUSTING A PARAMETER

This section describes how to adjust any parameter in the system by use of the front panel push buttons. Assuming the editor has just been entered then the display should read:-

START DELAY S
MM : SS

This indicates the start delay time variable, with MM indicating minutes and SS seconds. The S at the right of the display indicates that the adjustments will be in seconds.

To change the value of the start delay time press the unmarked (edit) push button on the front panel, the display changes to:-

EDIT VALUE

This message is displayed for 2 seconds, then changes back to:-

START DELAY S
MM : SS

 **Note: The display is now flashing, this indicates that the start delay can now be adjusted.**

To adjust the start delay time use the pushbutton marked with the up and down arrows on the front panel until the required time is displayed on the bottom line of the display.

To speed up the process of an adjustment, the required up or down push button may be held pressed, after 10 seconds the system will multiply the single key press value by 10. i.e. if a single button press changes the displayed value by 1, then after 10 seconds the displayed value will start to change by 10. Releasing the button for 1 second will restore the single push button press change.

SAVING A NEW SETTING

When an adjustment has been made to a parameter it has to be entered into the system for it to become valid. To do this simply press the **“UNMARKED”** (edit) pushbutton on the front panel, the display will change to:-

SAVING VALUE

This message is displayed for 2 seconds, then changes back to:-

**START DELAY S
MM : SS**

The editor is now back in the menu 'scan' mode and the next parameter may be selected by use of the arrow push buttons.

ILLEGAL VALUES

The 604 has incorporated into it certain rules regarding the setting of mains and alternator voltages.

1. Mains trip voltage cannot be greater than mains return voltage.
2. Alternator trip voltage cannot be greater than alternator on load voltage.

Should values that break these rules try to be entered into the system, then the 604 will give a warning message on the display and prevent any attempt to exit the editor until valid voltages are entered. If the DC voltage is removed from the 604 while an illegal value is in the editor it will return to the editor mode automatically when DC power is restored until valid voltages are entered.

Two more rules apply to voltage settings which if set incorrectly will cause the same result as above.

1. Mains return voltage is greater than mains trip, but the difference is less than 5 volts.
2. Alternator on load voltage is greater than alternator trip voltage but the difference is less than 5 volts.

The reason for this is to prevent any noise on the AC supply from 'rattling' the contactors when changeover occurs.

LEAVING THE EDITOR

To leave the editor, press the STOP/RESET pushbutton when the editor is in 'scan' mode.

Exiting the editor is not allowed while a value is being changed.

EDITABLE VALUES

Using the method described above, the following list of parameters may be adjusted to suit any particular system requirements.

START DELAY.

FUNCTION:- *Delay time between a mains failure and the set starting.*

Display indicates:

START DELAY S MM : SS
--

Range: *1 second to 2 minutes*

step value: *1 second.*

RUN ON.

FUNCTION:- *Time period for cool down after mains restoration.*

Display indicates:

RUN ON S MM : SS

Range: *5 seconds to 30 minutes*

step value: *30 seconds.*

SECURITY CODE.

FUNCTION:- *Prevents unauthorised access to the following parameters.*

Display indicates:

SECURITY CODE XXXX

4 digit security number is required to be entered before being able to proceed to the following parameters.

CRANK PERIOD.

FUNCTION:- *Time of crank period.*

Display indicates:

CRANK PERIOD S MM : SS

Range: *3 to 60 seconds*

step value: *1 second.*

CRANK REST.

FUNCTION:- *Time of rest period between cranks.*

Display indicates:

CRANK REST S MM : SS

Range: *3 to 60 seconds*

step value: *1 second.*

START ATTEMPTS.

FUNCTION:- *Number of crank attempts before fail to start.*

Display indicates:

NO. OF ATTEMPTS
A

Range: 1 to 9

step value: 1.

CRANK ENGAGE ATTEMPTS.

FUNCTION:- *Number of attempts to engage starter for each crank attempt.*

Display indicates:

ENGAGE ATTEMPTS
A

Range: 1 to 6

step value: 1.

GENERATOR STABLE DELAY.

FUNCTION:- *Delay time before generator is switched on-line.*

Display indicates:

GEN STABLE DLY S
MM : SS

Range: 1 to 2 minutes

step value: 1 second.

GENERATOR PHASE/NEUTRAL TRIP.

FUNCTION:- *Sets voltage at which generator is switched off line and shutdown.*

Display indicates:

GEN TRIP P/N V
VVV

Range: 80 to 280 volts

step value: 1 volt.

GENERATOR PHASE/NEUTRAL LOAD.

FUNCTION:- Sets voltage at which generator is switched on line.

Display indicates:

GEN LOAD P/N V
VVV

Range: 80 to 280 volts

step value: 1 volt.

GENERATOR OVER VOLTS.

FUNCTION:- Sets voltage at which generator is detected Overvolts.

Display indicates:

GEN OVER P/N V
VVV

Range: 100 to 300 volts

step value: 1 volt.

HOLDOFF TIME.

FUNCTION: Time before delayed inputs become active.

Display indicates:

HOLDOFF TIME S
MM : SS

Range: 8 to 50 seconds

step value: 1 second.

GENERATOR UNDERVOLTS DELAY TIMER.

FUNCTION:- Delay before the Undervolts detection circuit becomes active and shuts down the generator on an Undervolts condition. Useful for when excessive loads are being switched and there is a slow response time from the AVR.

Display indicates:

GEN TRIP TIME S
MM:SS

Range: 1 to 20 seconds

step value: 1 second

GENERATOR OVERVOLTS DELAY TIMER.

FUNCTION:- Delay before the Overvolts detection circuit becomes active and shuts down the generator on an Overvolts condition. Useful for when excessive loads are being switched and there is a slow response time from the AVR.

Display indicates:

GEN OVER TIME S
MM:SS

Range: 1 to 20 seconds

step value: 1 second

FLYWHEEL TEETH.

FUNCTION:- Sets number of flywheel teeth to correspond with engine.

Display indicates:

FLYWHEEL TEETH
TTTT

Range: 5 to 1000 teeth

step value: 1 tooth.

NORMAL ENGINE RPM.

FUNCTION:- Sets normal engine speed. Usually 1500 or 1800 rpm.

Display indicates:

RPM
RRRR

Range: 500 to 4000 rpm

step value: 1 rpm.

NORMAL AC FREQ.

FUNCTION:- Sets AC frequency. Usually 50 or 60 Hz.

Display indicates:

NOM FREQ HZ
FF

Range: 25 to 65 Hz

step value: 1 Hz.

CRANK DISCONNECT.

FUNCTION:- Sets crank disconnect as a percentage of nominal engine rpm.

Display indicates:

CRANK DISC %
%%%

Range: 15 to 50 %

step value: 1 %.

GENERATOR ON LOAD.

FUNCTION:- Sets generator on load as a % age of nominal engine rpm

Display indicates:

LOAD %
%%%

Range: 80 to 100 %

step value: 1 %.

OVERSPEED.

FUNCTION:- Sets generator overspeed as % age of nominal engine rpm

Display indicates:

OVERSPEED %
%%%

Range: 105 to 130 %

step value: 1 %.

NOTE:- These parameters are used internally by the 604 and must be set up for the engine/alternator combination in use. They have no external effect on the engine/alternator.

UNDERSPEED.

FUNCTION:- Sets generator Underspeed as % age of nominal engine R.P.M.

Display indicates:

UNDERSPEED %
%%%

Range: 30 to 95 %

step value: 1%.

UNDERSPEED DELAY TIMER.

FUNCTION:- Delay before the Underspeed detection circuit becomes active and shuts down the generator on an Underspeed condition. Useful for when excessive loads are being switched and there is a slow response time from the Governor.

UNDERSPD TIME S
MM:SS

Range: 1 to 20 seconds

step value: 1 second

FREQ DISPLAY MODE.

FUNCTION:- Sets type of frequency display on front panel LCD. There are 7 options to choose from, numbered 1 - 7. They display the following information dependent upon which option is selected:-

- 1= Integer frequency i.e. 50Hz/60Hz
- 2= Frequency to 1 decimal place i.e. 50.1Hz
- 3= Frequency to 2 decimal places i.e. 50.11Hz
- 4= R.P.M.
- 5= Raw input frequency of magnetic pickup pulses
- 6= Generator Hz(Integer only) and volts
- 7= Generator RPM and volts

Display indicates:

FREQ MODE
T

Range: 1 to 7

step value: 1.

FREQ SENSE MODE.

FUNCTION:- *Selects magnetic pickup or alt AC for speed sensing.*

Display indicates:

MAG / ALT MODE
MAG PICKUP FREQ

Range: *Toggles between mag pickup and alt ac.*

OUTPUT MODE.

FUNCTION:- *Selects louvre or pre-heat output mode.*

Display indicates:

LOUVRE / PRE HEAT
LOUVRE ACTIVE

Range: *Toggles between louvre or pre heat output.*

INPUT MODE 1 TO 9.

FUNCTION:- *Selects warning/shutdown - immediate/delayed on inputs 1 to 9. The system allows you to scroll through all 9 inputs selecting the type of shutdown or warning you require for each individual input. Units are supplied with inputs 1, 2 and 3 pre-set to operate as warnings, the other 6 inputs pre-set to operate as shutdowns.*

Display indicates:

INPUT 1 MODE
IMMED WARNING

TO

INPUT 9 MODE
DELAYED SHUTDOWN

Range: *Toggles between types.*

BLEEP SPEED.

FUNCTION:- *Selects the time-scale at which the audible "Bleep" is repeated.*

Display indicates:

BLEEP SPEED
S

Range: *1/20th sec. to 4 min. 10 sec.*

step value: *1/20th sec. 1 to 5000*

EXTERNAL BATTERY LOW VOLTS.

FUNCTION:- *Indicates low plant battery volts.*

Display indicates:

EXT BATTERY LO V
VV

Range: *8 to 36 volts.*

step value: *1 volt.*

EXTERNAL BATTERY HIGH VOLTS.

FUNCTION:- *Indicates high plant battery volts.*

Display indicates:

**EXT BATTERY HI V
VV**

Range: *8 to 50 volts.*

step value: *1 volt.*

MACHINE IDENT NUMBER.

FUNCTION:- *Identification number for plant.*

Display indicates:

**MACHINE NUMBER
NN**

Range: *1 to 99*

step value: *1.*

TEXT EDITOR

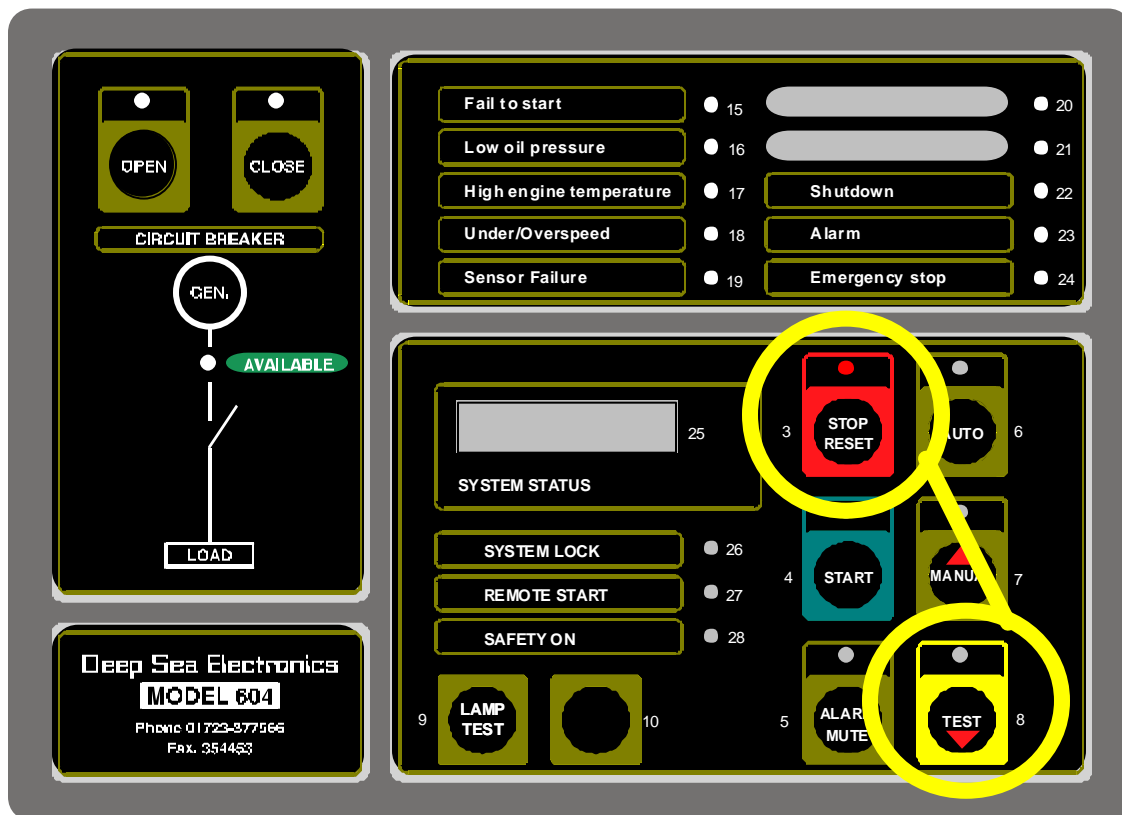
The text editor allows the user to alter or add messages to additional shutdown and alarm inputs. i.e. Shutdown 1 could be altered to display **EARTH FAULT** on the front panel display.

NOTE: Only the text displayed on the extra 9 shutdown or alarm input messages can be altered by the text editor.

ENTERING THE TEXT EDITOR

This facility can only be accessed when the **604** is in the **STOP/RESET** mode. To gain access to the **TEXT EDITOR** press the **STOP/RESET** and the **TEST** pushbutton together. The message **TEXT EDITOR** will then be displayed for 2 seconds.

(BUTTON IDENTIFICATION DIAGRAM)



MODIFYING AND GENERATING MESSAGES

The arrow keys will allow the user to scroll through the text messages stored in the system memory. i.e. press the “up” arrow key (**Manual Pushbutton**) to show the next message. To scroll back press the “down” arrow key (**Test Pushbutton**) or simply hold down the “up” arrow key and the messages will scroll down continuously until the first message is displayed again.

Stop at the message you require to modify - the top line of text will read **VIEW MESSAGE**. To modify or replace the text, press the **BLANK** pushbutton. The text displayed on the top line will change to **EDIT MESSAGE**. On the bottom line of text the first character will be flashing. To scroll through the alphabet, 0-9 and other useful symbols simply press the “up” or “down” keys, when the required character is displayed press the **AUTO** pushbutton, this will move the cursor to the next character on the display, then repeat the process. To insert a space the procedure is the same as for a character. The selection of a space is a common option, therefore a further option to increase the speed of programming is provided. To select a space press the **ALARM MUTE** pushbutton.

ACCEPTING THE NEW TEXT

When the message shown on the bottom line of the display is in the required format the message has to be stored. To store a new message press the **BLANK** pushbutton.

EXITING THE TEXT EDITOR MODE

To exit the Text Editor mode press the **STOP/RESET** pushbutton.

NOTE: When editing a message you cannot exit the Text Editor without first storing the message.

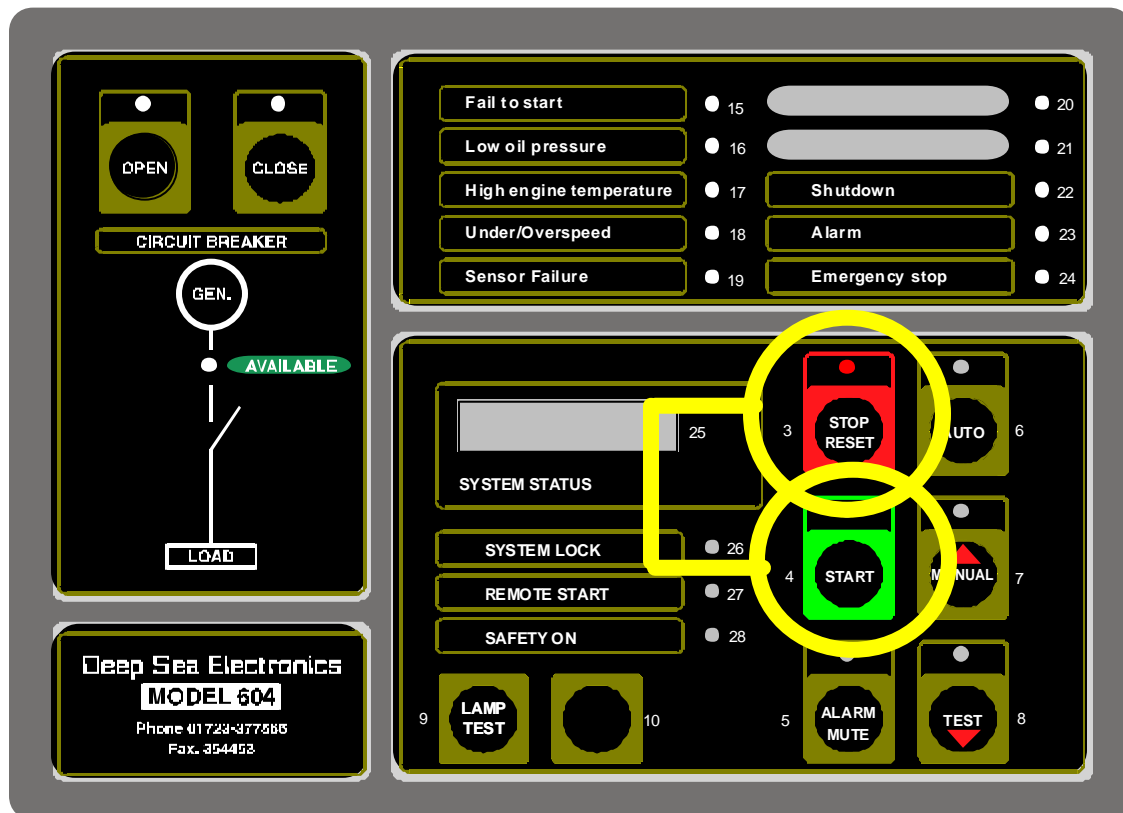
SYSTEM MODE

The system mode allows the user to test all or selective input connections, both DC and AC voltage levels, all pushbuttons on the front panel and check out all the system parameters. Allowing verification of the system before a live test is conducted, saving considerable time in the "Test Bays".

Entering the System Mode

This facility can only be accessed when the 604 is in the **STOP/RESET** mode. To gain access to the System Mode press the **STOP/RESET** and the **START** pushbuttons together. The message **SYSTEM MODE** will then be displayed for 2 seconds.

(BUTTON IDENTIFICATION DIAGRAM)



VERIFYING SYSTEM PARAMETERS

The arrow keys will allow the user to scroll through the system parameters starting at the bottom of the list, i.e. press the “**up**” arrow key (**Manual pushbutton**) to show the next parameter. To scroll back to any previous parameter press the “**down**” arrow key (**Test pushbutton**). The scrolling will stop at the top and bottom of the parameter list.

CHECKING THE INPUTS TO THE UNIT

To check the state of an input, scroll to the selective input and the operational state of that input will be displayed.

i.e. OIL PRESS NORMAL would indicate that the oil pressure switch is open. LOW OIL PRESSURE would indicate that the oil pressure switch is closed.

CHECKING THE SYSTEM PARAMETERS

The system mode allows voltage levels to be checked such as generator and mains AC input voltages. Internal and external battery voltages and displays the software version. These parameters would be automatically displayed as you scroll through the menu.

PUSHBUTTON CHECK

The pushbutton check allows verification that the pushbuttons on the front panel are working. On the display is a mimic of the pushbutton layout, on pressing a pushbutton the appropriate rectangle will fill in black.

LEAVING THE SYSTEM MODE

To leave System Mode at any time press the **STOP/RESET** pushbutton. The pushbutton display is activated firstly and a slightly longer period will be Required to exit system mode.

COMMISSIONING

PRE-COMMISSIONING CHECK

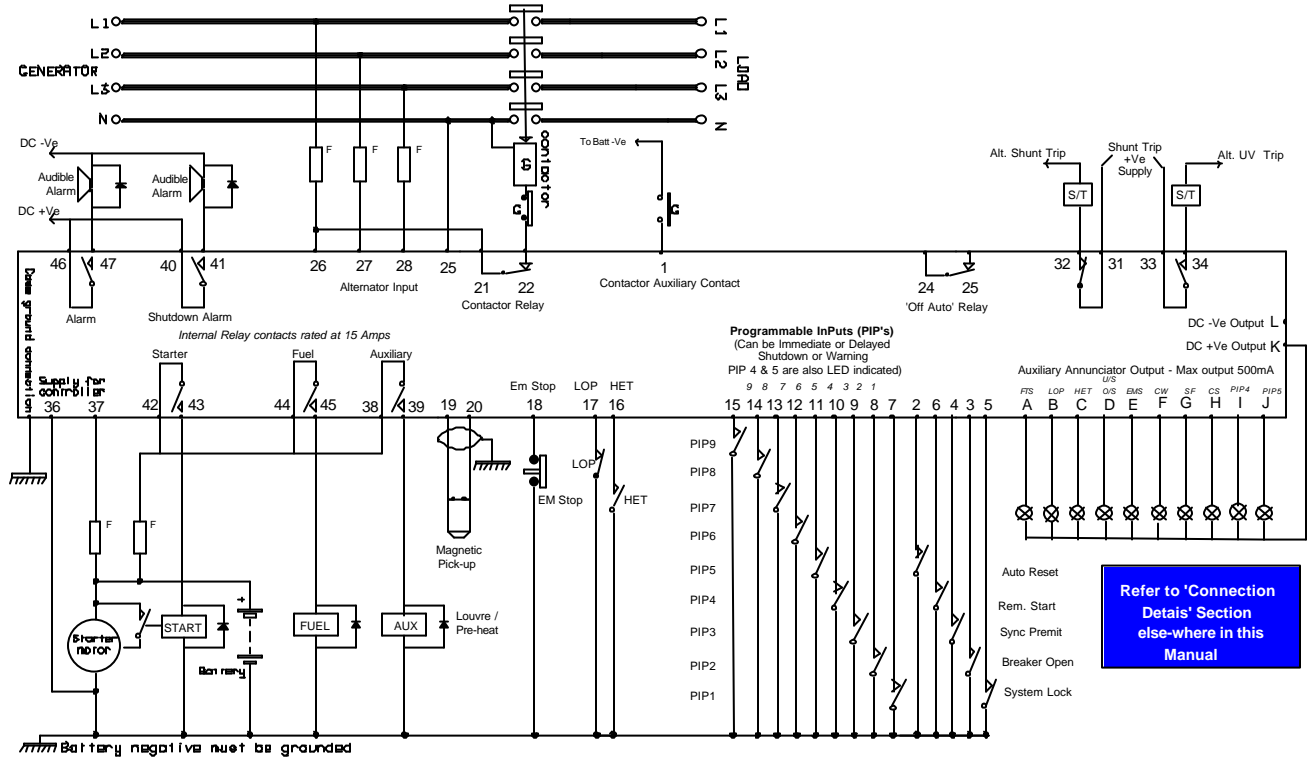
Before the system is started it is recommended that the following checks are made:-

1. The unit is adequately cooled and all wiring to the module is of a standard and rating compatible with the system.
2. The unit **DC** supply is connected directly to the battery and of the correct polarity.
3. The emergency stop input is wired to an external stop switch. **IF NOT**, link this input to the negative rail.
4. Enter the **SYSTEM MODE** and test all input connections, **AC** and **DC** voltage levels. Check all pushbuttons on the front panel and check out all system parameters, verifying the system before a live test is conducted.
5. To check the start cycle take appropriate measures to stop the engine (disable the operation of the fuel solenoid). After a visual inspection to ensure it is safe to proceed, connect the battery supply. Select the manual on the front panel and press the **START** button. The unit start sequence will commence.
6. The start delay timer and pre-heat relay will be activated on selection of manual run. After the pre-heat period 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 fail to start indicator will flash and the alarm will sound. Press the mute button to silence the alarm and then press the stop/reset button on the front panel.
7. Restore the engine to operational status (reconnect the fuel solenoid), again select the manual mode and this time the engine should fire 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 operational speed. If not, and any alarm is present, check the alarm condition for validity, then check input wiring. The engine should run for an indefinite period and the alternator available LED will be illuminated to indicate a voltage is being generated.
8. Select **AUTO** on the front panel, the engine will run for the pre-set period then shut down. The set should stay in the standby mode. If not, check the mains are present on all 3 inputs. (For single phase operation link all 3 phases together.)
9. Remove 1 of the phases. The start sequence will commence and the engine will run up to operational speed. The alternator available LED will light and the alternator contactor will accept the load. If not, check the wiring to the alternator contactor coil. Check the engine has reached it's operational **RPM**. Check that the alternator output voltage is correct.
10. Return the mains; the mains available LED will light and the mains return will start. After the pre-set mains return period the load will be transferred back to the mains supply, the engine will run for the pre-set run on period then shut down. If not, then check that all 3 phases are present. Check the wiring to the mains contactor coil.
11. All internal timers should now be adjusted to the customers specifications or to engine manufacturers recommendations.
12. If, despite repeated checking of the connections between the engine management unit and the customer's system, satisfactory operation cannot be achieved, then the customer is requested to contact the factory for further advice.

FAULT FINDING

SYMPTOM	POSSIBLE REMEDY
Unit is inoperative	Select AUTO button on front panel. Check battery and wiring to unit. Check DC voltage
Unit shuts down intermittently	Check input DC is not above 40 volts. Check the operating temperature is not above 50°C.
Unit trips on emergency stop.	Check a negative is present on this input. Check that Emergency stop has been operated and is latched open. Check wiring on emergency stop switch or switches.
Intermittent sensor fault	Magnetic pickup screen connected at both ends enables 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 & wiring.
High engine temperature fault operates after engine has fired.	Check engine temperature. Check switch and wiring.
Shutdown fault operates	Check relevant switch and wiring.
Alarm continuously activated	Check relevant switch and wiring
Fail to start is activated after multi-attempts	Check wiring and operation of fuel solenoid. Check battery. Refer to engine manual.
Continuous starting of Generator	Check mains voltage is correct and present on all phase inputs. Check for incorrect setting of the mains under-voltage trip. Check that no -Ve signal is present on remote start input.
Pre-heat inoperative	Check wiring to engine heater plugs. Check battery supply. Check internal relay contacts for continuity.
Starter motor inoperative	Check wiring to starter solenoid. Check battery supply. Check internal relay contacts for continuity.
Engine runs but load will not	If alt. available LED is NOT lit, check the following:- Check engine is attaining operating speed. Check correct voltage level is setting of alternator voltage return setting. If alternator available LED is illuminated, check the percentage setting of load transfer speed.

WIRING DIAGRAM



Refer to 'Connection Details' Section else-where in this Manual

APPENDIX