Deep Sea Electronics Plc

MODEL 603

AUTOMATIC MAINS FAILURE SENSING

AND

ENGINE MANAGEMENT SYSTEM

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INTRODUCTION

The Deep Sea Electronics Model **603** 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.

The **DSE 603** Automatic Mains Failure Module has been primarily designed to start a generator on a main's failure, transfers the load when the engine's operating criteria have been met, then shut down the engine on restoration of the mains.

Once activated the **603** unit carries out all the start and stop procedures of 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. This information is displayed by an alphanumeric display and is duplicated by a flashing high intensity LED, which when accepted is set in the continuous mode.

Selective operational sequences and text can be altered by the customer. The adjustable parameters are displayed on the screen when the **EDIT** mode is selected. Alterations 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 poly-carbonate fascia, giving the unit an IP 65 rating. The push buttons have a tactile feel with audible indication when pressed. Connections to the unit are via four locking plugs and sockets mounted on the rear. This module is designed for front panel mounting and measures W300mm x H217mm x D110mm.

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.**
ã	**DEEP SEA ELECTRONICS PLC own the copyright to this manual, which cannot be copied, reproduced or disclosed to a third party without prior written permission.**

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 mains failure or a default parameter 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 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** pushbutton will accept the fault and reset the alarm output. All other fault conditions are blocked. The LED will stay illuminated in a constant mode and the display will show the fault message and the alarm will be muted.

When the engine fires, the starter motor is disengaged and locked out by a pre-set frequency derived from a magnetic pickup mounted on the flywheel housing. Should this signal not be present after the starter has been engaged, the system will shut down and display "**ENGINE REV 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 editor **"VALUE EDIT MODE".**

After the engine has started, the internal protection timer is activated, allowing oil pressure to build up without triggering the fault input. When engine speed and alternator voltage have reached their pre-set levels the load will be transferred. Before transferring the load, the unit will check the 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 = 50/60 Hz".**

On return of the mains supply, the display will indicate **"MAINS AVAILABLE"** and the return timer will start it's countdown. After this period, the load will be transferred back to the mains.

After the load has been transferred, the run on timer starts it's countdown allowing the engine a running off load period before shutting down. Should the mains fail during this period, then transfer of the load back to the alternator will take place.

Should the engine run overspeed or the signal from the magnetic pickup is lost then the engine will be shutdown and the relevant message and LED will be displayed.

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

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

TEST MODE OF OPERATION

To activate the **TEST** sequence, the system must first be set in the **AUTO** mode. Press the **TEST** pushbutton and the text on the display will read **"WARNING TEST SELECTED"**, then **"TEST SELECTED PRESS AGAIN"**. When the test pushbutton is pressed the second time the test sequence will commence. If the **TEST** pushbutton is not pressed 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 period 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** pushbutton 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 with the alarm muted.

When the engine fires the starter motor is disengaged and locked out by a pre-set frequency derived from a magnetic pickup. Should this signal not be present after the starter has engaged, the engine will shut down and display **"ENGINE REVOLUTIONS NOT DETECTED"**.
Should a magnetic pickup not be available the module can be set to derive it's frequency signals from the alternator output. This is selected in the editor **"VALUE EDIT MODE".**

After the engine has started, the internal protection timer is activated allowing oil pressure to build up without triggering the fault input. When engine speed and alternator voltage have reached their pre-set levels the load will be transferred. Before transferring the load, the unit will check the oil pressure switch, if the switch has not been opened the load will not be accepted until the oil pressure has built up. When the engine is running and all parameters met the mains contactor/breaker will be opened. After a delay period the generator contactor/breaker will close and accept the load.
The display will read **"GENERATOR ON LOAD / FREQUENCY = 50.00HZ".**
To complete the test sequence press the **AUTO** pushbutton and the mains return timer will be activated. This countdown is shown on a display. After the time period has elapsed the load will be transferred back to the mains supply. After the load has been transferred, the run on timer starts it's countdown allowing the engine a running off load period before shutting down. Should the mains fail during this period, the transfer of the load back to the alternator will take place.

MANUAL MODE OF OPERATION

For manual operation of the generator, press the pushbutton marked **MANUAL**, this activates all pushbuttons associated with the manual operation.

The text on the display will read **MANUAL SELECTED PRESS START**.
To start the engine press the **START** pushbutton. The crank cycle will commence without the start delay period. When the engine starts and all the pre-set parameters have been met the **TO GEN** pushbutton is activated, pressing the **TO GEN** pushbutton will transfer the load from the mains to the generator. To return the load to the mains press the **TO MAINS** pushbutton, during this transfer the time period between the disengagement and engagement of the contactors/breakers cannot be overridden.

To stop the engine press the **STOP** pushbutton. This will stop the engine immediately. Should a mains failure occur while the system is operating in **MANUAL** the generator will accept the load but will not return the load to the mains without manual transfer or pressing the **AUTO** pushbutton. To stop the generator with a cool down period press the **AUTO** pushbutton.

MOUNTING AND OPERATING INSTRUCTIONS

MOUNTING

The model **603** Automatic Mains Failure 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.

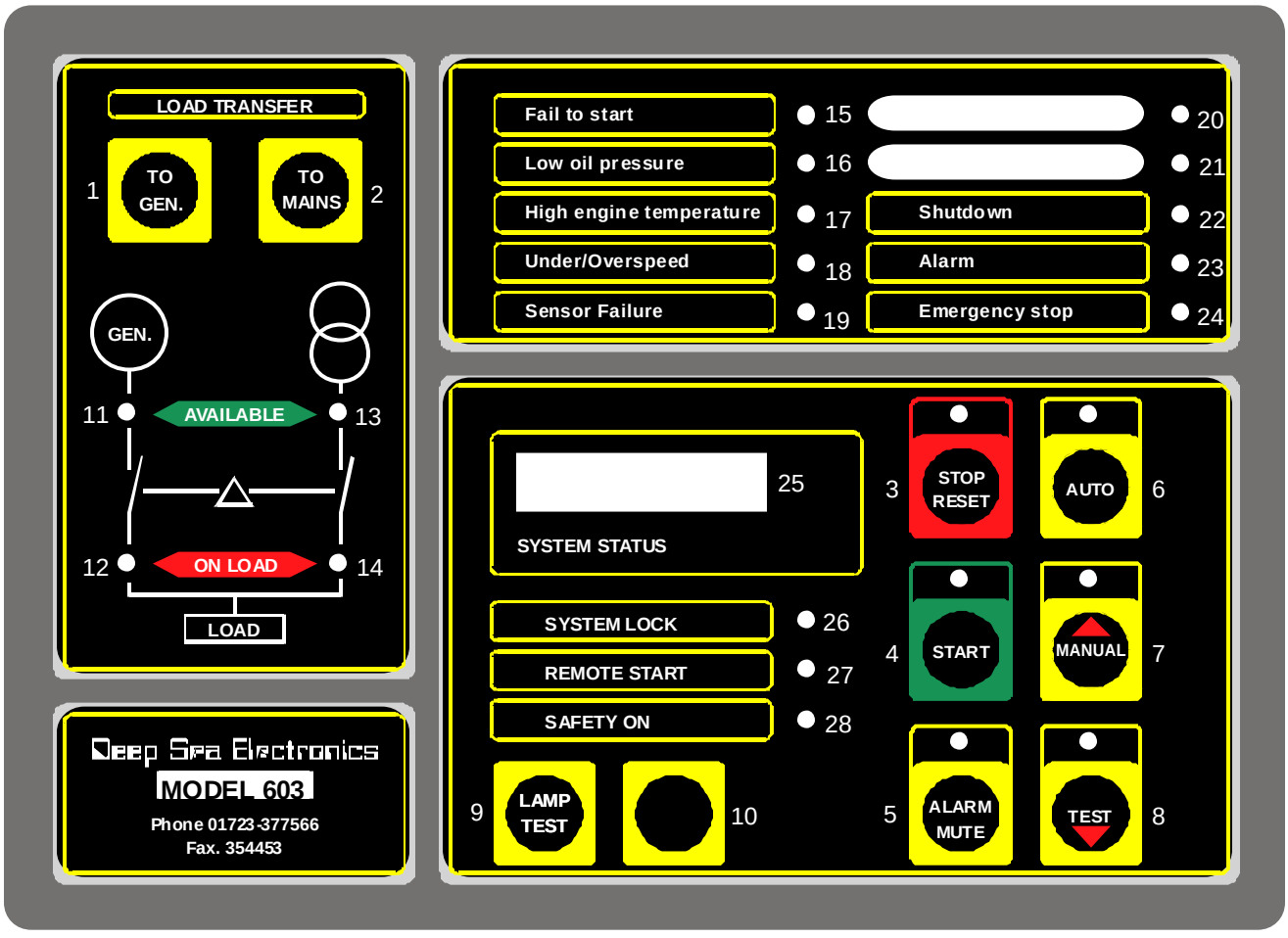
FIG 1.1 All dimensions are in mm.

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. TO GEN pushbutton switches the generator contactor/breaker on line but is only active in certain modes of operation

2. TO MAINS pushbutton switches the mains contactor/breaker on line but is only active in certain modes of operation.

3. STOP/RESET stops the engine, switches off the system, or resets any latched fault condition that has been accepted.

4. START will start the engine cranking and is only active in the manual mode of operation.

5. ALARM MUTE cancels the alarm and changes the flashing LED of the incoming fault into a constant mode of illumination.

6. AUTO selects the automatic mode of operation.

7. MANUAL switches the system into the manual mode of operation.

8. TEST switches the system into a simulated mains failure mode of operation.

9. LAMP TEST illuminates all the LED's and the display LED back light. Also displays the engine hour run time.

10. BLANK used in conjunction with other pushbuttons for System Test, Text Editor and Calibration Editor.

LED INDICATORS

11. GENERATOR AVAILABLE LED is amber, illuminating when generator voltage is within the pre-set voltage limits.

12. GENERATOR ON LOAD LED is green, illuminating when a negative signal is received. This signal is present when the generator contactor/breaker auxiliary contact has closed.

13. MAINS AVAILABLE LED is amber, illuminating when mains voltage is within the pre-set limits.

14. MAINS ON LOAD LED is green, illuminating when a negative signal is received. This signal is present when the mains contactor/breaker auxiliary contact has closed.

15. FAIL TO START LED is red, illuminating in the flashing mode to indicate that the system has failed to start after the set number of engine start cycles has expired, illuminating in a steady mode on operation of the MUTE pushbutton.

16. LOW OIL PRESSURE LED is red, illuminating in the flashing mode to indicate that the system has been shut down because of low oil pressure, illuminating in a steady mode on operation of the **MUTE** pushbutton.

17. HIGH ENGINE TEMPERATURE LED is red illuminating in the flashing mode to indicate that the system has been shut down because engine temperature has exceeded the permitted tolerance. The indicator illuminates in a steady mode on the operation of the **MUTE** pushbutton.

18. UNDER/OVERSPEED LED is red, illuminating in the flashing mode to indicate that the system has been shut down because the engine speed is either below or above the permitted pre-set parameters for engine **R.P.M.** The display will indicate which fault has set the alarm condition. The indicator illuminates in a steady mode on operation of the **MUTE** pushbutton.

19. SENSOR FAILURE LED is red, illuminating 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 ALARM Input 4 LED is red, illuminating 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 of the following 4 options:-
(1) delayed shutdown **(2)** immediate shutdown
(3) delayed alarm **(4)** immediate alarm
The LED illuminates in a steady mode on operation of the **MUTE** pushbutton.

21. AUXILIARY SHUTDOWN OR ALARM Input 5 LED is red, illuminating in the flashing mode to indicate that the system has accepted a fault on this input, which is customer programmable for the same 4 options as detailed in 20 above.
The LED illuminates in a steady mode on operation of the **MUTE** pushbutton.

22. SHUTDOWN Inputs LED is red, illuminating in flashing mode to indicate that the system has been shut down by one of the 7 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 a steady mode on operation of the **MUTE** pushbutton.

23. ALARM Inputs LED is red, illuminating in flashing mode to indicate that the system has accepted a warning condition on one of the 7 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 a steady mode on operation of the **MUTE** pushbutton.

24. EMERGENCY STOP LED is red, illuminating in the flashing mode to indicate that the system has been shut down by operation of the emergency stop button. The LED illuminates in a steady mode on operation of the **MUTE** pushbutton.

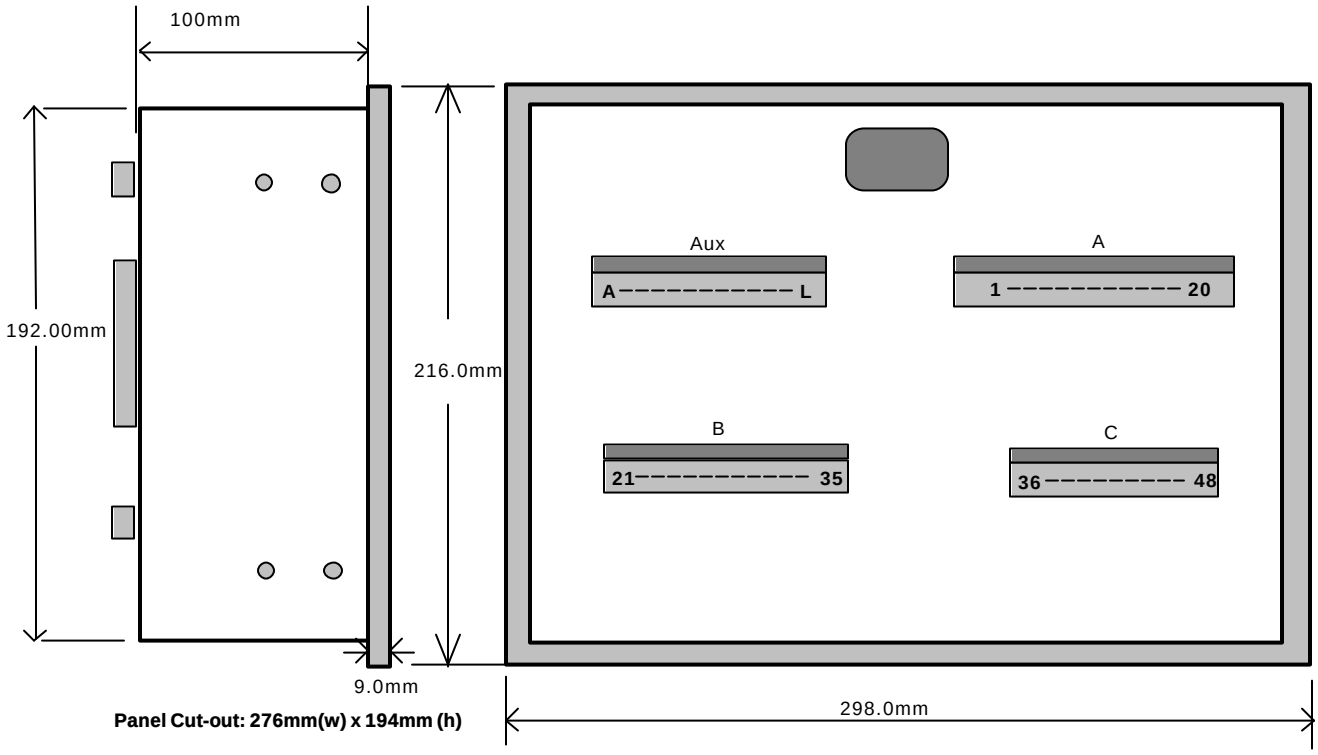
25. SYSTEM STATUS An alphanumeric LCD, illuminated by an LED back light. This LCD gives a step by step report on the status of the system and it's operating parameters. It also reports all alarm and fault conditions.

26. SYSTEM LOCK LED is red, illuminating when a negative signal is received on terminal 5. All push buttons except lamp test and mute are then locked our, preventing changes of system status being made via the front panel.

27. REMOTE START LED is red, illuminating when a negative signal is received on terminal 6. To remotely start the Gen-set.

28. SAFETY ON LED is red, illuminating once the Protection hold off timer has timed out. All delayed protections are then active.

REAR PANEL LAYOUT AND DIMENSIONS



Panel Cut-out: 276mm(w) x 194mm (h)

CONNECTION DETAILS

The following describes the functions of the four plug and sockets on the rear of the 603 controller. See rear panel layout.

PLUG 'A'. 20 WAY PIN

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

PLUG 'B.' 15 WAY PIN

Pin	Function	*Notes*
21	Alternator contactor control relay L	*Volt free contact 15 amps*
22	Alternator contactor control relay N	*Volt free contact 15 amps*
23	Mains contactor control relay	*Volt free contact 15 amps*
24	Mains contactor control relay	*Volt free contact 15 amps*
25	Mains AC neutral input	
26	Mains AC phase L1 input	
27	Mains AC phase L2 input	
28	Mains AC phase L2 input	
29	Alternator AC neutral input	
30	Alternator AC phase L1 input	
31	Mains shunt trip relay	*Volt free contact 15 amps*
32	Mains shunt trip relay	*Volt free contact 15 amps*
33	Alternator shunt trip relay	*Volt free contact 15 amps*
34	Alternator shunt trip relay	*Volt free contact 15 amps*
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	*Volt free contact 15 amps*
39	Louvre or Pre-heat control relay	*Volt free contact 15 amps*
40	Common Shutdown alarm relay	*Volt free contact 15 amps] Not Mute-able*
41	Common Shutdown alarm relay	*Volt free contact 15 amps] Not Mute-able*
42	Starter Control relay	*Volt free contact 15 amps*
43	Starter Control relay	*Volt free contact 15 amps*
44	Fuel Control relay	*Volt free contact 15 amps*
45	Fuel Control relay	*Volt free contact 15 amps*
46	Alarm control relay	*Volt free contact 15 amps] Mute-able*
47	Alarm control relay	*Volt free contact 15 amps] Mute-able*
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 603 that the alternator contactor has closed.

2. Mains Contactor Auxiliary. A negative closing auxiliary contact on the mains contactor. i.e. if this input is at negative it signals to the 603 that the mains contactor has closed.

3. Auto Start Inhibit. If this line is connected to negative the system will be prevented from starting in the auto position. This inhibit only applies to auto mode. The engine will be shutdown after cool down period if this signal is supplied while running in auto.

4. Manual Restoration. If this line is connected to negative it prevents automatic transfer back to mains. Used to enable manual transfer on mains restoration. Auto and test modes only.

5. System Lock. If this line is connected to negative it prevents any changes of system status being made via the front panel keys.

6. Remote Start. If this line is connected to negative then the generator will start with the mains healthy. Used to start the generator from a remote location.

7. Shutdowns or Warnings 3 to 9. 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 3 to 9. As 7 above. LED 22 or 23 on front panel.

9. Shutdowns or Warnings 3 to 9. As 7 above. LED 22 or 23 on front panel.

10. Shutdown or Warning 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 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 3 to 9. As 7 above. LED 22 or 23 on front panel.

13. Shutdowns or Warnings 3 to 9. As 7 above. LED 22 or 23 on front panel.

14. Shutdowns or Warnings 3 to 9. As 7 above. LED 22 or 23 on front panel.

15. Shutdowns or Warnings 3 to 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. Mains Contactor/Circuit Breaker. Normally closed volts free contact. Closes to 24. Used to control the mains contactor. **15 amp rated**.

24. Mains Contactor/Circuit breaker. Normally closed volts free contact. Closes to 23.

25. Mains N. Mains AC neutral input. Used as part of the mains sensing function.

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

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

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

29. Alt AC neutral Input. Used as part of the alternator sensing function.

30. Alt L1. Alternator AC phase L1 Input. Used to detect the voltage level of alternator phase L1.

31. Mains Shunt Trip. Normally open volts free contact. Closes to 32. On mains failure closes to trip mains breaker. On mains return opens to remove shunt trip signal from mains breaker
15 amp rated.

32. Mains Shunt Trip. Closes to 31.

33. Alternator Shunt Trip. Normally closed, volt free contact. Closes to 34. On mains failure opens to remove shunt trip signal from alternator breaker. On mains return closes to trip alternator 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. Common Alarm. 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. Common alarm. 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. 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. 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 603.

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.

MAINS VOLTAGE TRIP> RET ERROR

MAINS RET/TRIP DIFFER TOO SMALL *(min 5v)*

GEN VOLTAGE TRIP>LOAD ERROR *(min 5v)*

GEN LOAD/TRIP DIFFER TOO SMALL *(min 5v)*

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.

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.

TRANSFER ERROR LOW ALT VOLTS

This indicates the alternator output voltage is too low to allow load transfer. Occurring when the generator is running and the unit attempts to transfer to alternator with insufficient alternator volts. The transfer to alternator is not allowed. If the fault continues for more than 120 seconds then the unit will go out on a fault condition. The generator will be shut down and LED 22 on the front panel will light. If during this 120 seconds the hold off timer times out and the alternator frequency is less than the underspeed setting then the unit would go out on underspeed.

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 this is not a mistake the user is requested to repeat the command. Starting up in "test" automatically transfers contactors to the alternator and hence mains power will be lost during the transfer time, even though mains is present.

INTERNAL BATTERY TOO LOW

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

EXT BATTERY TOO LOW FOR CRANK

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

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.

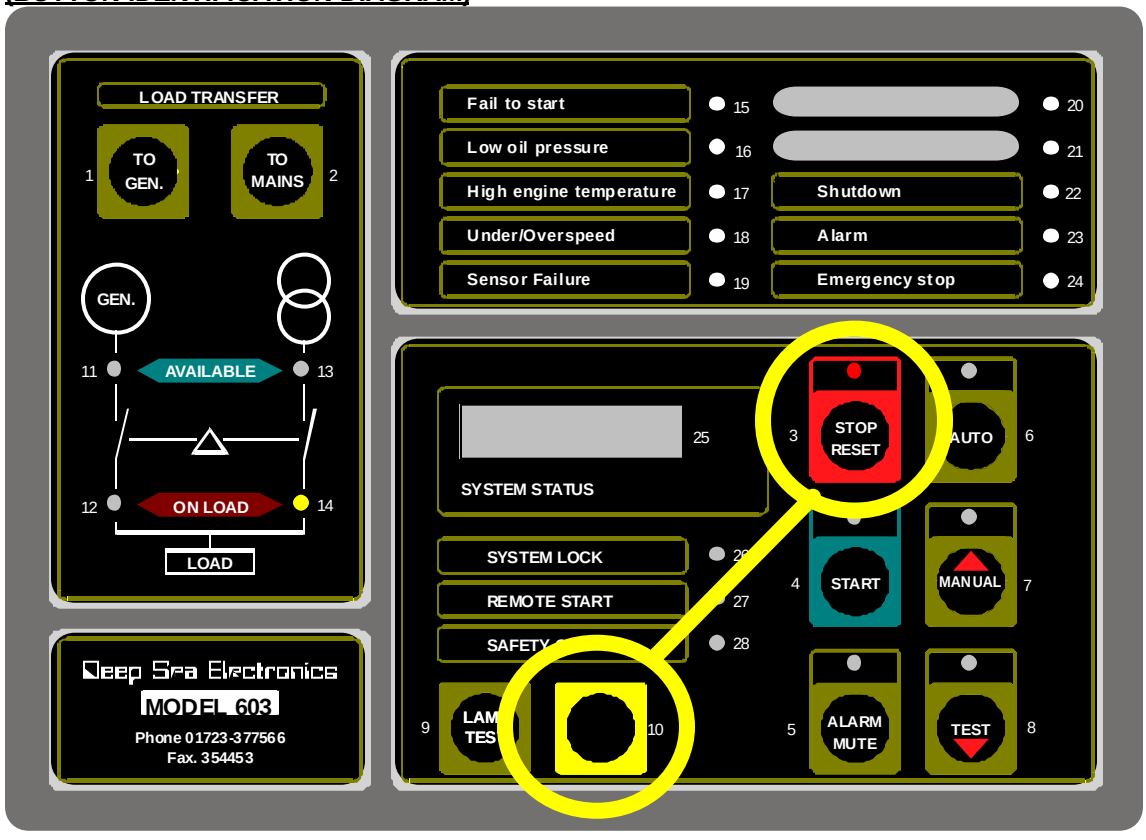
VALUE EDIT MODE

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 **603** 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 603 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 **603** 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 603. 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 603 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 603 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 603 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.*

MAINS RETURN.
FUNCTION:- *Delay time from mains return to contactor changeover.*
Display indicates:

MAINS RETURN S **MM : SS**

Range: *5 seconds to 30 minutes* step value: *5 seconds.*

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.*

MAINS PHASE/NEUTRAL TRIP.
FUNCTION:- *Sets voltage at which mains is designated to have failed.*
Display indicates:

MAINS TRIP P/N V **VVV**

Range: *80 to 280 volts* step value: *1 volt.*

MAINS PHASE/NEUTRAL RETURN.
FUNCTION:- *Sets voltage at which mains is designated to have returned.*
Display indicates:

MAINS RET P/N V **VVV**

Range: *80 to 280 volts* step value: *1 volt.*

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 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 STABLE DELAY.
FUNCTION:- *Delay before generator is switched on line.*
Display indicates:

GEN STABLE DLY S **MM : SS**

Range: *1 to 2 minutes* 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*

CONTACTOR DELAY.
FUNCTION:- *Delay time between contactor changeover.*
Display indicates:

CONT_DLY S **MM : SS**

Range: *1 to 2 minutes* 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 603 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 inputs1 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 type*s.

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

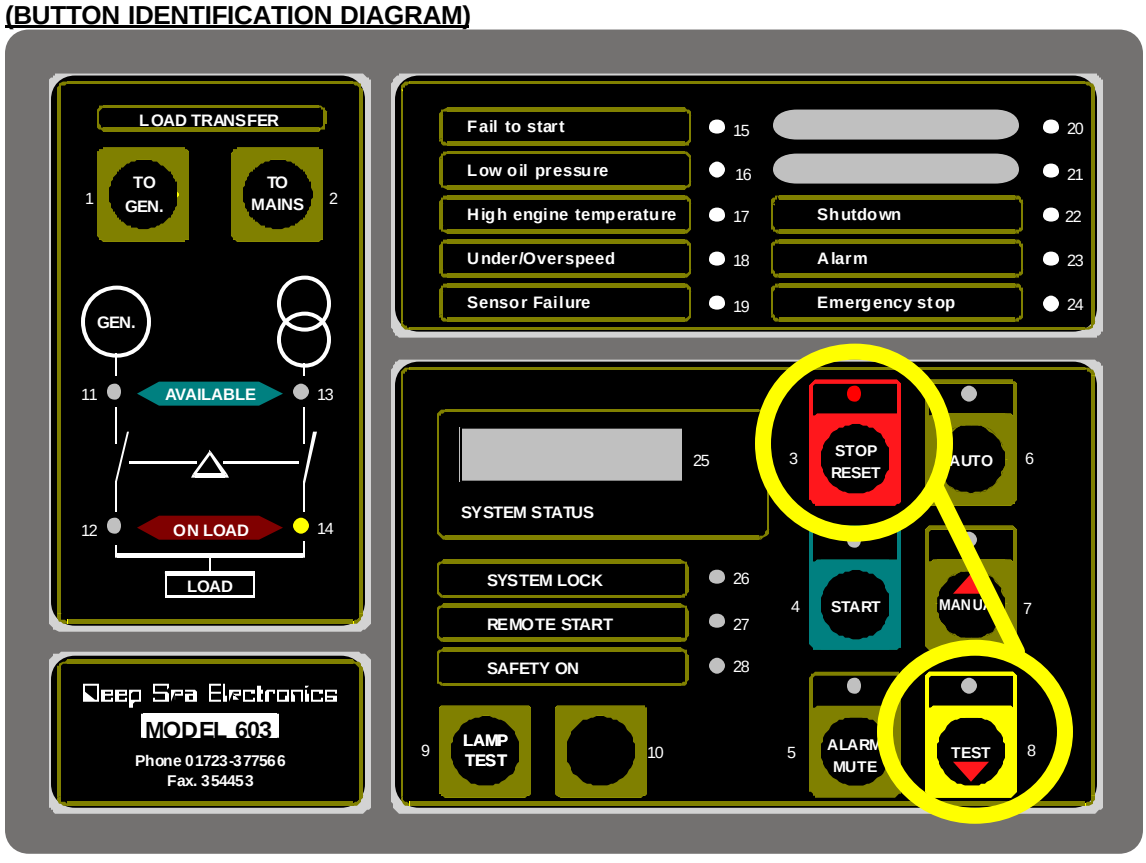
The text editor allows the user to alter or add messages to additional shutdown and alarm inputs. i.e. Shutdown 1 could be altered to display **EARTH FAULT** on the front panel display.

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 **603** 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 MESSAGES.** 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.

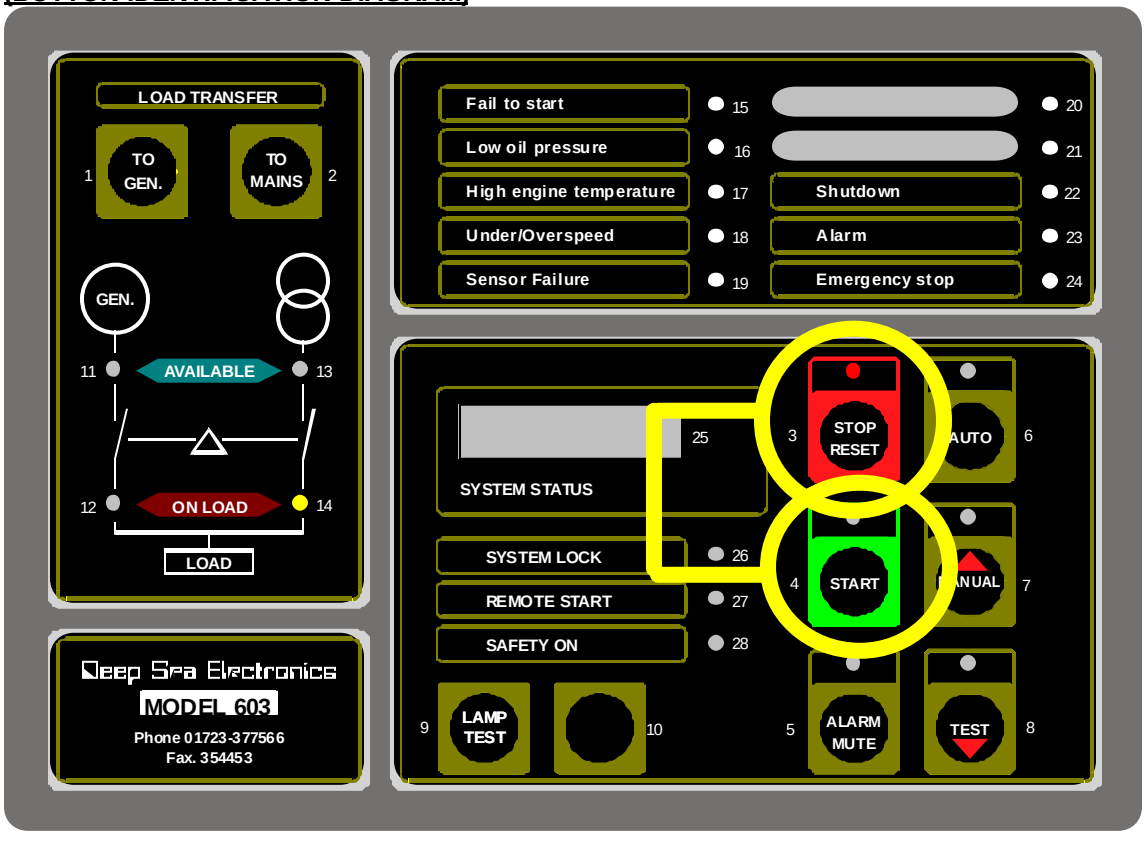
SYSTEM MODE

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 603 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.

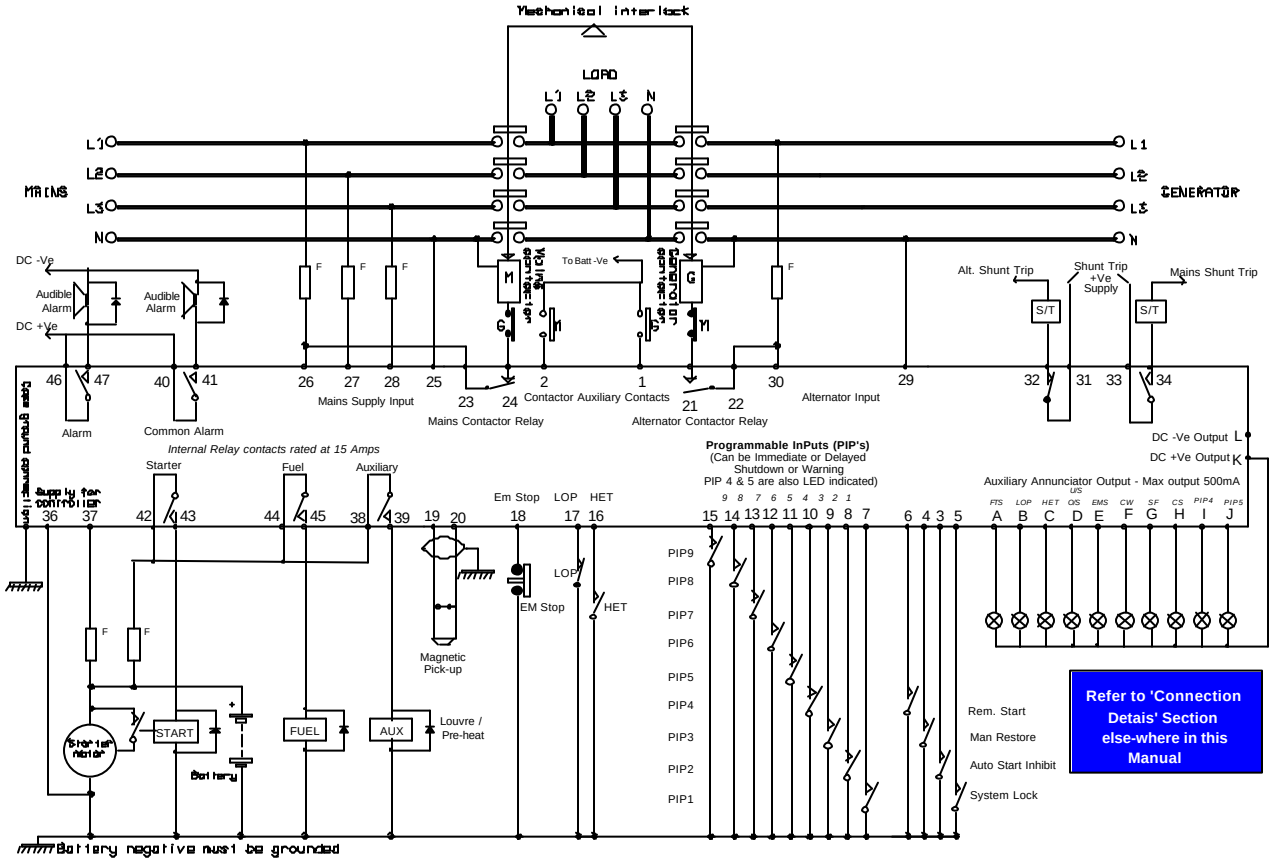
11. All internal timers should now be adjusted to the customers specifications or to engine manufacturers recommendations.

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



APPENDIX

There are various versions of software available for the 603 Module and these are detailed below:

603 - 01
Standard 603 as detailed in this manual.

603 - 02
Standard 603 but with Low Oil Pressure & High Engine Temperature input sensing opposite way round.
i.e. Engine Temp is normally closed when healthy, opens on fault and Oil Pressure is normally open when engine at rest, closes when operating at normal pressure and opens on fault.
There is no delay timer on Generator Under Volts and Underspeed. Only on Generator Overvolts.

603 - 03
This version has Over Voltage sensing on the Mains. Does not include the Delay timers on Generator Under Voltage and Over Voltage or Underspeed.

603 - 04
This version uses shunt trip contacts to give following signals:
Alt Shunt Trip Contacts 33 & 34 - Open when unit is in Auto.
Mains Shunt Trip Contacts 31 & 31 - Closed when Mains Available.
Does not include the Delay timers on Generator Under Voltage and Over Voltage or Underspeed.

603 - 05
This version has Over Voltage on mains.
PIP 9 is used as an **On Load Remote Start Input**.
Delay timers as per standard 603, and in addition delay timers on Under and Over Voltage on Mains and Delay timer for PIP 9.
On a Mains out of limits condition or PIP 9 activated, the mains contactor is removed immediately, when the 603 is in **OFF, AUTO, TEST OR MANUAL** positions.