



## FEATURES

- **J1939** CANBus option to connect to the industry standard SAE J1939 'Eco friendly' engine management systems providing engine protection and instrumentation without requiring additional senders.
- Full Power monitoring instrumentation and powerful auto-sync functions as standard. The inclusion of auto sync allows the OEM to offer the choice of clean break or 'Bumpless' no break soft ramping transfers to and from the genset. No need for complex sync panels etc. Simply use the 5520 with it's built in governor and AVR control functions (No break transfer requires connection to a suitable electronic governor and AVR)
- Comprehensive remote communication via optional RS232 port. Provides RS232 Modem link to PC via either PSTN line or GSM network (using a suitable modem). The module can also signal Engineers via their cell phones using the GSM SMS messaging system to advise of system alarms.
- Optional RS485 'Modbus' output. Using industry standard communication protocol allows full system integration into new and existing building management and control schemes.
- PIN number protected front panel programming of selected trip points and timers, allows field changes to be made to the module settings.
- Clear engine diagnostic information removes the need for both service equipment and cryptic diagnostic lamp (when used in conjunction with J1939 engines)
- Built in exercise timer, that can be set for weekly or monthly intervals.
- LCD 4-line text based display to provide 'at-a-glance' diagnosis of fault conditions, instrumentation and operating state.

- Front panel configuration utility as well as comprehensive PC configuration and status monitoring using the 55xx PC software.
- Multiple LCD languages (English, French, Spanish, German etc.) possible.
- Nine configurable auxiliary inputs for connection to external fault detection equipment.
- Five configurable outputs to help produce demanding applications.
- Automatic and Manual operation modes.
- Voltage measurement ranges of up to 22,000 volts can be achieved utilising the provided Voltage Transformer inputs (VT's).
- Independent mains and generator load switching buttons, providing the 'all in one box' solution.

## DESCRIPTION

The Model 5520 is an *Automatic Mains Failure Control Module*. The module is used to monitor a mains supply and automatically start a standby generator set. The module also provides indication of operational status and fault conditions, automatically shutting down the genset and indicating failures by means of an LCD display, and appropriate flashing LED on the front panel.

Selected timers and alarms can be altered by the customer from the front panel. Alterations to the system are made using the 810 interface and a PC. This interface also provides real time diagnostic facilities.

It is also possible to monitor the operation of the system either locally or remotely.

**Easy push button control**

Operation of the module is via pushbutton controls (with security locking facility) mounted on the front panel with STOP/RESET, MANUAL, TEST and START pushbuttons. The first four pushbuttons feature LED 'selected' indications. Further pushbuttons provide LCD DISPLAY SCROLL, LAMP TEST, MUTE functions and LOAD switching control.

**Instrumentation and Alarms**

The 5520 module provides **metering and alarm facilities** via the LCD display and includes the following instrumentation displays, accessed via the INFORMATION and DISPLAY SCROLL push-buttons :

**Instrumentation list :**

Engine Speed  
Engine Oil pressure  
Coolant temperature  
Battery voltage  
Charge alt volts  
Engine run time  
Number of starts  
Next maintenance (if enabled)  
Fuel level  
Generator volts (L1-N, L2-N, L3-N)  
Generator volts (L1-L2, L2-L3, L3-L1)  
Gen Hz  
Generator Amps  
Generator earth current  
Generator kW (L1,L2,L3)  
Generator total kW  
Generator pf (L1,L2,L3)  
Generator average pf  
Generator kVAR (L1,L2,L3)  
Generator total kVAR  
Generator kWh  
Generator kVAh  
Generator kVArh  
Generator phase sequence  
Synchroscope (when enabled)  
Mains volts (L1-N, L2-N, L3-N)  
Mains volts (L1-L2, L2-L3, L3-L1)  
Mains Hz  
Mains phase sequence  
Generator kVA (L1,L2,L3)  
Generator total kVA

Engine ECU diagnostics information via industry standard SAE J1939 interface.

Enhanced metering via J1939 when connected to a suitably equipped engine.

The instrumentation displays are supplemented further by LCD display pages, which can be set to pages or single list, with auto scroll feature, covering operating status and alarms.

**LED indication**

4 uncommitted LEDs allow the user to configure the module to provide other status indications from either internal states or from external digital inputs.

*Description continues overleaf...*

## DESCRIPTION CONTINUED

The module accepts the following **digital inputs**:

Emergency Stop Input – A normally closed DC positive input.  
Fully configurable warning or shutdown inputs.

With the exception of the Emergency Stop, these inputs are configurable for either N/C or N/O contacts, and are operated by connection to the -ve DC. The nine fully configurable auxiliary inputs can be selected to be indication, warning or shutdown inputs, either immediate or held off during start up, to allow for use as protection expansion inputs. Alternatively they may be configured to control extra functions such as Manual Load Switching, Lamp Test or Remote Start input as well as many others - refer to appropriate manuals for details.

**Engine analogue inputs** are provided for Oil Pressure, Engine Temperature and Fuel Level. These connect to conventional engine-mounted resistive sender units (such as VDO or Datcon Type) to provide accurate monitoring and protection facilities. Alternatively they can be configured to interface with digital switch-type inputs for Low Oil Pressure and High Engine Temperature shutdowns. A further eight digital and two analogue inputs can be provided by means of the P130 Input Expansion Module (please refer to Deep Sea Electronics for further details).

**Relay outputs** Five DC positive outputs are provided, one for Fuel Solenoid and one for Start output, the remaining three being user configurable. Additionally two volt free contacts for mains and generator switching device control are also provided. The configurable relay functions can be selected from a range of 100+ different functions, conditions or alarms. Additional output relays can be added by means of up to two 157 Relay Expansion Modules. A total of 21 outputs are available with full expansion of the 5520 Module. This allows the module system to be incorporated into existing telemetry or Building Management Schemes via volt-free contacts.

*Refer to appropriate manuals for details.*

**Multiple alarm channels** are provided. Alarms are indicated by an LCD Message, LED illumination and Audible Alarm, to monitor the following.

- Under/Over Generator Volts
- Over-current
- Under / Over Generator Frequency
- Under / Over speed
- Charge Fail
- Emergency Stop
- Low oil pressure
- High engine temperature
- Fail to Start
- Low/High DC Battery Volts
- Generator Short Circuit Protection
- Fail to stop
- Reverse Power
- Generator Phase rotation error
- Earth Fault Protection
- Loss of speed sensing signal
- Fail to Sync / Out of Sync
- MPU Open circuit failure along with any configurable input alarms as selected.

## TIMERS AND INPUT FUNCTIONS

- Start delay timer
- Stop delay timer
- Crank/Crank rest timers
- Engage attempt and manual crank limit timers
- Safety on delay timer
- Warm-up timer
- Cooling timer
- 'Energise to stop' hold timer
- Pre-heat timer / Pre-heat bypass timer
- Smoke limiting control timers
- Fail to stop timer
- Over-speed overshoot timer
- Breaker pulse control timers
- DC Battery alarm delay timers
- Sync/Fail to Sync timer

## SPECIFICATION

### DC Supply:

8 to 35 V Continuous.

### Cranking Dropouts:

Able to survive 0 V for 50 mS, providing supply was at least 10 V before dropout and supply recovers to 5V. *This is achieved without the need for internal batteries.*

### Max. Operating Current:

460mA at 12 V. 245 mA at 24 V.

### Max. Standby Current:

375 mA at 12 V. 200 mA at 24 V.

### Alternator Input Range:

15 V(ph-N) to 277 V(ph-N) AC (+20%)

### Alternator Input Frequency:

50 - 60 Hz at rated engine speed  
(Minimum: 15V AC Ph-N)

### Magnetic Pick-up Voltage Input Range:

+/- 0.5 V to 70 V Peak

**Magnetic Input Frequency:** 10,000 Hz (max)

### Mains Sensing Input Range:

15V(ph-N) to 277V(ph-N) AC (+20%)

### Mains Sensing Input Frequency:

50 - 60 Hz (Minimum: 15V AC Ph-N)

### Start Relay Output:

16 Amp DC at supply voltage.

### Fuel Relay Output:

16 Amp DC at supply voltage.

### Auxiliary Relay Outputs:

Three outputs 5 Amp DC at supply voltage.

Two outputs volt free 8 Amp at 250V AC

### Generator loading Relay Output:

8 Amp AC 250V.

### Mains loading Relay Output:

8 Amp AC 250V

### Charge Fail / Excitation Range:

0 V to 35 V

### Operating Temperature Range:

-30 to +70 °C

### Built in Governor Control

Fully Isolated

Minimum Load Impedance:

1000 Ω

Gain Volts 0 – 10V DC

Offset Volts +/- 10V DC

### Built in AVR Control

Fully Isolated

Minimum Load Impedance:

1000 Ω

Gain Volts 0 – 10V DC

Offset Volts +/- 10V DC



An Automatic Start multi set version of the 5520 is also available:  
Model 5510.  
Please refer to Deep Sea Electronics for details

## TELEMETRY

The 5520 module provides the user with the option of full telemetry facilities via the optional communications software. The module can be either connected to the PC using the 810 interface or via a suitable modem. RS232 or RS485 available.

The PC software is MS-Windows™ based, and allows the operator to control the module from a remote location.

The remote operator can also view the instrumentation, alarm and data log details, and the relay and input status.

All access is password controlled so unauthorised operators cannot log onto the system.

Additionally in the event of the module detecting an alarm condition, it will initiate a modem dial out to the host PC to inform the remote operator of the problem, giving identification of the module followed by the alarm event and the time and date of occurrence.

If using a GSM modem, the module is also able to send text messages to a GSM cell phone to indicate gen-set, site and alarm condition.

## EVENT CAPTURE

The standard module features **event capture facilities**, this records the last 25 shutdown alarms allowing the operator to view the recent operating history of the module to assist in fault finding, etc.



Event Log:

Event Log
19 Jan 2005 16:12:44
Low Water Level

## CONFIGURATION

Many settings can be adjusted by means of the module front panel configuration utility.

The PC based configuration software allows for fast, simple and secure configuration of module parameters. Utilising the P810 interface to provide a safe isolated link to the PC, changes can easily be made to the system by authorised personnel. Access is PIN number protected.

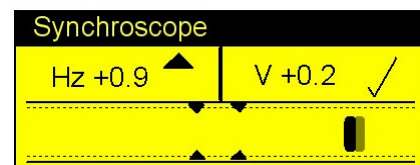
Complex configurations can be saved and loaded from disk or output to a printer for reference. Diagnostic facilities allow for fault finding and monitoring during test and installation.

## BUILT-IN FUNCTIONS

- Alternator Under/Over Volts Warning/Shutdown
- Alternator Under/Over Freq. Warning/Shutdown
- Under/Over Speed Warning/Shutdown
- Low Oil Pressure Warning/Shutdown
- High Engine Temp Warning/Shutdown
- High/Low Battery Volts Warning
- Over-current Warning/Electrical Trip/Shutdown
- Reverse Power Electrical Trip/Shutdown.
- Phase sequence Electrical Trip/Shutdown.
- Earth Fault Shutdown.
- Short Circuit Fault Electrical Trip/Shutdown
- Adjustable crank cycle/attempts
- Maintenance due alarm function
- External remote start input (On load/Off load/on load demand)
- Built in Exercise Scheduler
- Magnetic Pick-up or Alternator speed monitoring
- Event Logging of Shutdown Alarms
- Full Remote Control and Telemetry.
- Graphic LCD Display for true Multi-lingual use
- Multiple Language Display options available.
- 9 Digital inputs - Fully user configurable
- 5 Configurable relay outputs (100+ Control functions)
- LCD Back-lighting for low light level operation
- System lock input
- Load switching control push-button inputs
- Security via PIN Number restricted access
- SMS messaging capability with suitable GSM Modem
- Limited configuration from front panel - including user language selection

## SYNCHRONISING AND LOAD CONTROL

- Synchroscope with auto sync control.
- Volts and Frequency matching
- Phase angle and Phase rotation indication.
- Dead bus sensing
- Multi-set load demand operation
- KW and Kvar load sharing with multiple generators.
- Direct communication from the module to the governor and AVR.
- KW export when in parallel with the mains supply.



## ENVIRONMENTAL TESTING STANDARDS

**Electromagnetic Compatibility**  
BS EN 50081-2 EMC *Emission Standard for the Industrial Environment*

BS EN 50082-2 EMC *Immunity Standard for the Industrial Environment*

**Vibration**  
BS EN 60068-2-6 Ten sweeps (up and back down) at 1 octave/minute in each of the three major axes.  
5Hz to 8 Hz @ +/-7.5mm constant displacement.  
8Hz to 500 Hz @ 2gn constant acceleration

**Temperature**  
Cold:  
BS EN 60068-2-1-to -30° C  
Hot:  
BS EN 60068-2-2 to 70° C

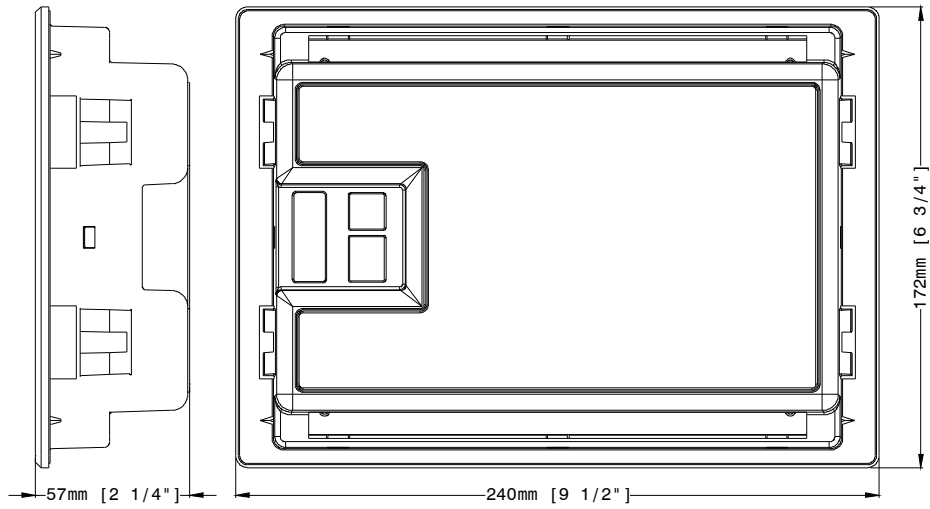
**Humidity**  
BS EN 2011 part 2.1 93% RH @ 40° C for 48 hours

**Shock**  
BS EN 60068-2-27 Three half sine shocks in each of the three major axes 15gn amplitude. 11mS duration.

**Electrical Safety**  
BS EN 60950 Low Voltage Directive/Safety of information technology equipment, including electrical business equipment.

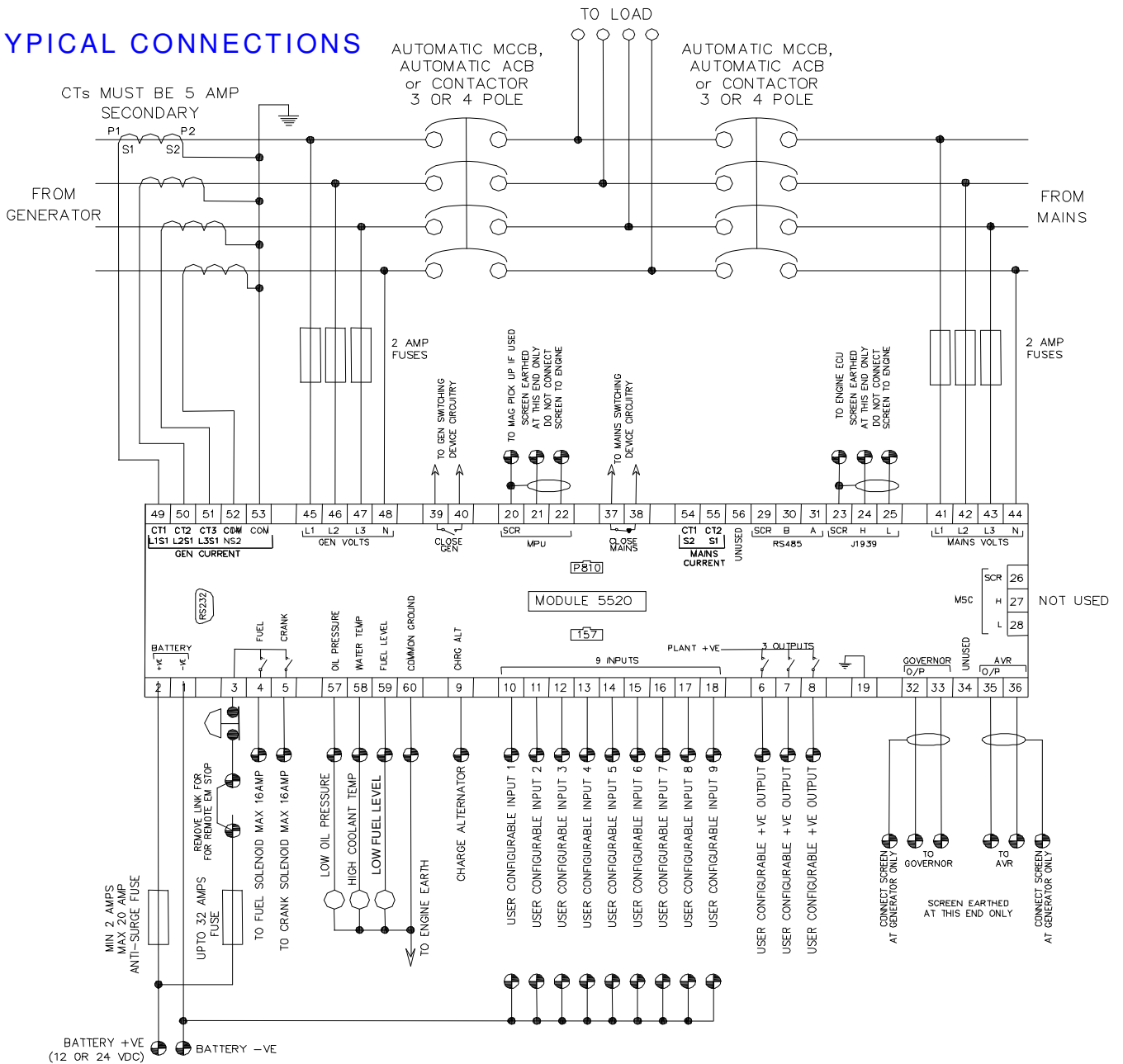
Deep Sea Electronics reserve the right to change specification without prior notice.

# CASE DIMENSIONS



Panel cut-out 220mm x 160mm (8.7" x 6.3")

## TYPICAL CONNECTIONS



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