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Operation and Maintenance Manual

6.0 kVA Air Cooled Diesel Generator

Build No: HRD060D

Publication No 498-1084

Change Control

Date	Version	Author	Mod No	Reason for change
Feb 18	Provi	MC	-	Draft for Review by AP
Apr 18	A	MC	401673	Upd and released following review

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HRD060D
3000 RPM

Diesel Generator

Certification

In accordance with ISO/IEC 17050-1:2010 Conformity Assessment - Suppliers' Declaration of Conformity

EU DECLARATION OF CONFORMITY

We:	HGI Harrington Generators International Ltd. Ravenstor Road Wirksworth, Derbyshire DE4 4FY
Declare that Equipment:	6 kVA diesel
Model name /Number :	HRD060 Series
Electrical Power P_{el} :	4.8kW (6.0 kVA)
Measured Sound Power Level:	94 dB(A)
Guaranteed Sound Power Level	94 dB(A)

Conforms to the protection requirements of the following EC Council Directives:

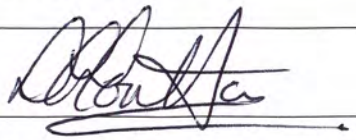
2006/42/EC	Machinery Directive
2014/35/EU	Low Voltage Directive
2014/30/EU	EMC Directive
2000/14/EC	Noise Emission in the Environment by Equipment for use Outdoors Directive Annex VIII
2016/1628	Emission limits and type-approval for internal combustion engines for non-road mobile machinery

And has been designed and manufactured to the following Standards:

BS5000 Part 3	Rotating electrical machines of particular types or for particular applications. Generators to be driven by reciprocating internal combustion engines.
EN60204-1	Safety of machinery. Electrical equipment of machines. General requirements
EN12601	Reciprocating internal combustion engine driven generating sets. Safety
BS EN 61000-6-1	EMC. Generic standards. Immunity for residential, commercial and light-industrial environments.
BS EN 61000-6-2	EMC. Generic standards. Immunity for industrial environments
BS EN 61000-6-3	EMC. Generic standards. Emission standard for residential, commercial and light-industrial environments
BS EN 61000-6-4	EMC. Generic standards. Emission standard for industrial environments
BS ISO 3744	Acoustics. Determination of sound power levels of noise sources using sound pressure.

Notified Body for 2000/14/EC Noise Emission in the Environment by Equipment for use Outdoors Directive	HORIBA MIRA UK Watling Street Nuneaton Warwickshire CV10 0UT
Notified Body Number :	0888

I declare that as the authorised representative, the above information in relation to the supply and manufacture of this product is in conformity with the stated standards and other related documents following the provision of the above EC Directives.

Signed:		**Date:**	**13/04/18**
Printed:	**D.C.Coulton**	**Position:**	**Head of Systems**

Data Plate

Each generator supplied will have a data plate attached to the canopy of the set. Below is an exemplar data plate with notes to help understand the terminology and information supplied on the data plate of your machine.

CE	**Harrington Generators International Ltd** Ravenstor Road Wirksworth Derbyshire DE4 4FY Tel: +44 (0)1629 824284 Fax: +44 (0)1629 824613 www.hgigenerators.com info@hgigenerators.com	
Model:		**HRD060D**
Serial No:		**Manufactured:**
Rated Power: 6.0 kVA / 4.8 kW		**Power Factor PF:** 0.8
Voltage (Current): 110V (52.2A) / 230V (26.1A) 1Ph 50 Hz		
Performance Class: G1 LTP Limited Time Performance		
Sound Pressure Level:		L_{WA} 94 dB(A)
Maximum Altitude / Ambient Temperature:		1000 m / 40°C
Wiring Diagrams:		WD-HRD060D
Weight: 185/210kg	**Fuel:** Diesel	**Engine Speed:** 3000rpm

CE	This is the “CE” mark and indicates that the generator complies with the European Directives as detailed in the Certificate of Conformance
Model:	This is the build model of the machine e.g. SKD60C3
Build Code:	This is a code number, which tells us the exact build standard to which the generator was built. This is important when ordering spares or contacting our Technical Help Line
Serial No:	This is a unique number, which identifies the generator. This is important when ordering spares or contacting our Technical Help Line
Year of Manufacture:	Year of Manufacture e.g. 2013
Electrical Power:	This is the power in kVA and kW, the power factor and frequency
Voltage:	This is the nominal voltage e.g. 400V, 230V or 110V
Current Amps:	This is the nominal electrical current of the principal voltage
Performance Class	LTP “Limited Time Performance” means the generator should not be used continuously but will typically run for 8 hours a day. G1 is for general purpose use and the generator is not suitable to power sensitive specialist electronic equipment
Sound Pressure Level:	This is the level of sound produced by the generator when running at 75% auxiliary power. This generator complies with the CE Directive on sound levels
Maximum Altitude / Ambient Temperature:	These are given and if the generator is to be used at higher altitudes or at higher ambient temperatures HGI should be consulted
Weight:	This provides weights including and excluding a full tank of fuel
Fuel:	Only commercially available diesel fuel can be used. If a special type of diesel is to be used please consult HGI first to discuss its suitability

Specification

General Specification

Output Power & Power Factor:	6.0 kVA 4.8kW CTE Single Phase stand by power 5.4 kVA 4.3kW CTE Single Phase prime power Power Factor 0.8
Environment:	Temperature range: -10°C (without additional starting aids) to +40°C Relative Humidity: 10% to 90% Altitude sea level to +1000m (with slight derate)
Performance Class ISO 8528:	Electrical Class G1 Steady state voltage: +/- 10% Frequency droop < 8% LTP: Limited Time Performance
Overload Capability:	n/a
Fuel:	Commercial diesel with up to 10% bio-diesel i.e. B10 blend.

Voltages and Frequency:	230V/110V 50 Hz					
Output Current:	400V	-	230V	26.1A	110V	52.2A
Output Type:	Switched					
Sockets 110V	2 x 16A, 1 x 32A					
Sockets 230V	1 x 16A, 1 x 32A					
Sockets Position:	Control Panel					
Electrical Protection Devices:	2-pole main 25A MCB and individual socket breakers					
Other:	Buccaneer Socket for remote panel/AMF start/stop connection					

Generator Control System:	Deep Sea Electronics Engine and Generator Control Module
Starting Method:	Electric Start via Control Module as local or remote start.
Control Module:	DSE3110
Engine Protection:	Low Oil Pressure, Low Fuel
Engine Monitoring:	Battery voltage, hours run.
Electrical Protection:	Over/Under Speed, Voltage, Frequency
Electrical Monitoring:	Volts, Frequency

Engine model:	Yanmar L100N
Service Interval:	200 hours (first oil change at 50 hours)
Cylinders:	1
Power:	6.5 kW
Engine Speed:	3000 rpm
Engine Cooling:	Air cooled
Starting Method:	Electric Start
Electrical System:	12V DC system
Emissions Level:	n/a below threshold.
Lowest starting temperature:	-10°C without extra aids
Other:	n/a

Battery:	12V DC 45Ah 360A CCA maintenance free
Location:	Fitted inside canopy

Alternator Model:	Mecc Alte S20W-95A
Alternator Performance:	6kVA, DV/CTE, 2 Pole Single Phase, Class H

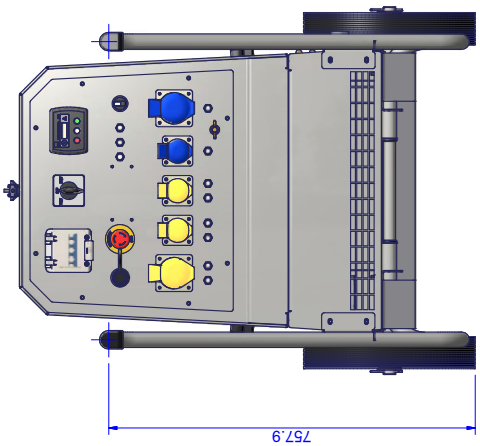
Fuel Tank Capacity:	26 litres		
Fuel Fill:	Internal 2” Filler Neck		
Fuel Tank Bund:	n/a		
Run Time at 100% load	12 hrs.	**Consumption at 100% load**	2.16 l / h
Run Time at 75% load	16 hrs.	**Consumption at 75% load**	1.62 l / h

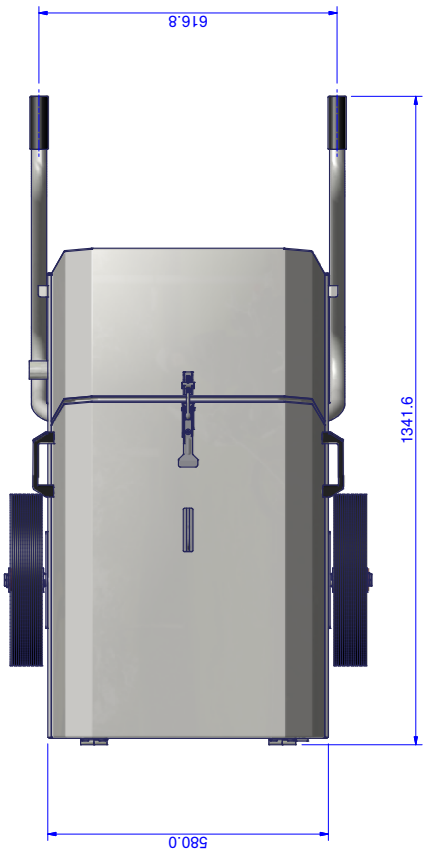
Sound Level 75% load at 7 m	69 dBA
Sound Level 75% load LWA	94 dBA
Noise Compliant to EC Reg’s:	Yes below 97 threshold

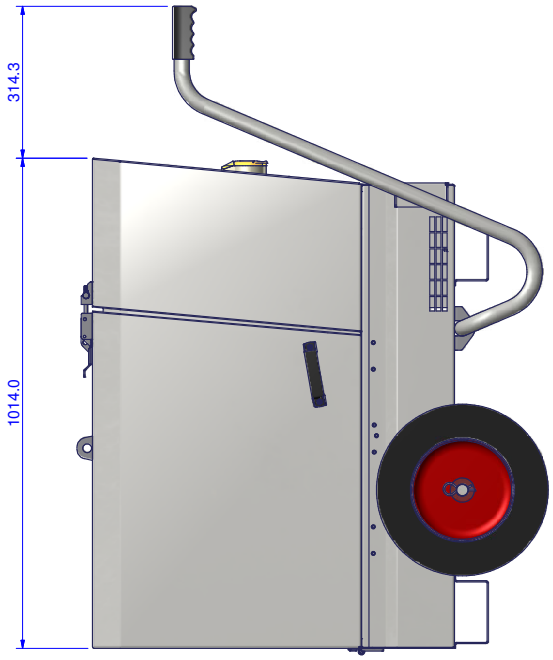
Canopy Type:	Full Acoustic Canopy with Hinged Lid
Material:	Smooth Galvanised Steel
Finish:	Painted Polyester Powder Coat
Colour:	Canopy: RAL9016 Arctic White Base: RAL9005 Black
Doors:	Lift-Up Hinged Cover with supporting cable.
Catches:	Compression latches
Lifting:	Lifting Beam With forklift from below
Fixing Down:	Through skid tubes underneath the base.
Towing:	Not suitable for tow or drag

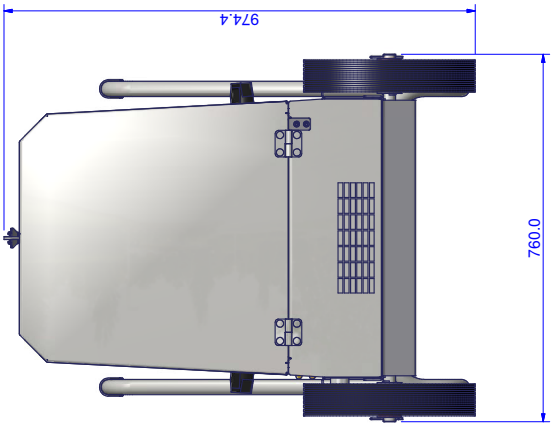
Dimensions LxWxH Skid Base	1014 x 580 x 851mm
Operating Clearance:	Minimum of 0.6 m all around and above.
Access for Servicing:	Access of 0.6 m required both sides.
Weight – fuel tank empty:	185 kgs
Weight – fuel tank full:	210 kgs

General Arrangement and Dimensions









Item Pt No.	Item Description						
WG-HRD060-mkI							
A							
R.W							
23.03.18							

For insert & fabrication specifications refer to PD999-001

Item Material	Material	Checked	© 23.03.18	Title	HRD060 mkI General Arrangement	Sht no.	1 /1
Finish							
Weight (kg)	270 kg						
Drg No.	WG-HRD060-mkI						

3D views are for illustration only.

Safety

A few words about safety

Your safety and the safety of others are very important and using this generator safely is an important responsibility.

HGI have designed this generator to give safe and dependable service if operated in accordance to these instructions. Please ensure that you read this owner's manual and understand the functionality of the generator before using. You can help prevent accidents and harm to yourself and nearby personnel by being familiar with the controls, and by observing safe operating procedures.

The warnings and safety instructions appearing in this guide are not meant to cover every eventuality and hazards associated with operating or maintaining a generator. You must use your own good judgement, care and caution.

⚠ This is the safety alert symbol. It is used to alert you to potential hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

here are four types of safety alert messages used in this manual:

⚠ DANGER

Danger refers to immediate hazards which WILL result in severe personal injury or death.

⚠ WARNING

Warning refers to a hazard or unsafe method or practice which CAN result in severe personal injury or possible death.

⚠ CAUTION

Caution refers to a hazard or unsafe method or practice which CAN result in personal injury.

⚠ NOTICE

Notice refers to a method or practice which can result in product damage, or to draw attention to additional information or explanations.

Operator Responsibility

- Know how to stop the generator quickly in case of emergency.
- Understand the use of all generator controls, output sockets, and connections.
- Be sure that anyone who operates the generator receives proper instruction.

If you have any doubts about the safe operation of this equipment, please contact HGI or a competent operator or qualified technician.

Precautions

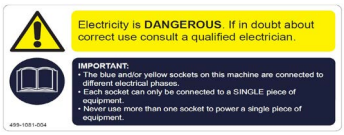
The generator can constitute a hazard to users, nearby personnel and property unless the following precautions are observed during operation:

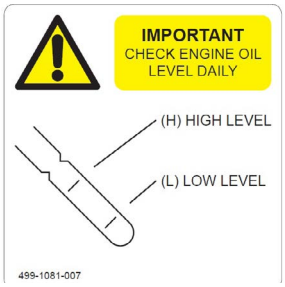
- Ensure that you know how to stop the engine in an emergency.
- Exhaust fumes are poisonous and can kill.
  - **Ensure** that the area surrounding the machine has no restrictions that would prevent an adequate flow of clean, ambient air.
- Fuel is highly flammable, when refuelling:
  - **Do not** run the engine.
  - **Do not** smoke.
  - **Avoid** overfilling the fuel tank.
  - **Wipe up** any fuel spilt on the machine and move the equipment away from the area where fuel has been spilt.
- Parts of the engine, and particularly the exhaust system will get very hot during use, and will remain hot for some time after the generator has stopped.
- Do not use the equipment with loose or missing components or guards.
- Additional care should be applied if using the generator in damp or wet conditions.
- Regularly inspect the condition of trailing cables and integrity of connectors. Only use correctly rated cable and standard plugs of suitable capacity for the application.
- During servicing, follow HSE recommendations regarding the handling and disposal of contaminated oil products.

The generator is fitted with a number of labels that alert the user to the safe operation and safety requirements. A full explanation of these is contained here. If any of the labels are missing or unreadable a duplicate should be obtained and fitted.

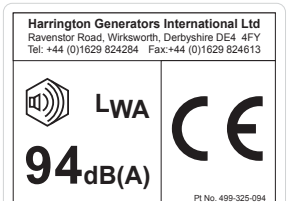
Label	Location / Part No	Description
	On Fuel Filler Cap. Qty. 1. Label No: 499-1081-002	DIESEL FUEL ONLY This generator must only be filled with commercial diesel fuel containing up to 5% bio-fuel. If special grades of diesel e.g. 100% Bio-Diesel are to be used consult HGI first to discuss its suitability.
	On end: Part of label No: 499-1081-003	ELECTRICITY IS DANGEROUS If in doubt about the correct use consult a qualified electrician or contact our Technical Help Line.
	On end: Part of label No: 499-1081-003	CHECK ENGINE OIL LEVEL DAILY Check the oil level each day and top up if necessary to the top mark given in the oil level diagram above. If oil consumption is excessive investigate further.
	On end: Part of label No: 499-1081-003	LOW LOAD RUNNING: Operating the generator at low load levels for extended periods can result in high levels of carbon build up in the engine and exhaust system which can lead to excessive smoking, reduced efficiency and overheating. If the generator is not required switch it off and avoid running with light or no load wherever possible. Also see Maintenance Section.
	On end: Part of label No: 499-1081-003	ENSURE Generator IS AT LEAST 1 METRE AWAY FROM BUILDINGS, VEHICLES etc. WHEN IN USE. This is to ensure a free flow of cooling air to the generator and that the exhaust from the generator does not affect other items.
	On end: Part of label No: 499-1081-003	KEEP FLAMMABLE MATERIAL AWAY FROM THE GENERATOR The exhaust and some surfaces are hot and flammable material should not be allowed near the generator.

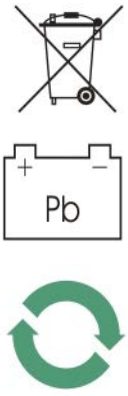
	On end: Part of label No: 499-1081-003	OPERATE ONLY IN WELL VENTILATED AREAS. EXHAUST FUMES CAN KILL. Generally the generator will be installed in a Welf-Air Cabin or similar in accordance with our separate Installation Guide An exhaust extension is normally supplied with each generator and should be used to duct the exhasut gas straight outside. Sufficient air grilles for ventilation should be provided. For such applications consult the Technical Help Line if in doubt.
	On end: Part of label No: 499-1081-003	STOP ENGINE AND ALLOW TO COOL DOWN FOR A FEW MINUTES BEFORE REFUELLING. In addition DO NOT SMOKE while refuelling, use a funnel or similar to prevent fuel spillage, avoid over filling the fuel tank and wipe up any spilt fuel. Avoid contact of fuel with skin.
	On end: Part of label No: 499-1081-003	THIS GENERATOR SHOULD ONLY BE USED TO POWER DOUBLE INSULATED CLASS II ELECTRICAL EQUIPMENT UNLESS THE OPTIONAL EARTH LEAKAGE TRIP (RCD) IS FITTED. In the UK it is currently permissible to use small mobile generators for short periods without an external earth connection being made. But ONLY double insulated electrical equipment can be powered by the generator. All modern electrical equipment intended for outdoors use should be double insulated and marked with the  logo. For fixed installations (or where a mobile generator is to remain in the same position for a long time) an earth leakage system (RCD) should be fitted to the generator and an external earth connection should be used. CAUTION: Using a 13 amp 3 pin “plug in” type earth leakage unit intended for the mains supply may not work on a generator and should not be relied upon to protect the User in the event of all types of fault.
	On end: Part of label No: 499-1081-003	DO NOT ADJUST THE SPEED OF THE ENGINE UNLESS YOU HAVE BEEN TRAINED TO DO SO If the generator is not producing enough power for the application or you suspect a problem do not adjust the engine speed. This may damage the engine, alternator and any power equipment plugged into the generator.

	On end: Part of label No: 499-1081-003	KEEP CHILDREN AT A SAFE DISTANCE FROM THE EQUIPMENT AND DO NOT ALLOW THEM TO OPERATE IT This is a mandatory Health and Safety Requirement for this equipment. A version with a key switch is available if required.
	On end: Part of label No: 499-1081-003	DO NOT OPERATE WITH ANY COVERS OPEN If covers are open (or missing) the generator will exceed the European Noise Regulations and the cooling of the engine and alternator will be affected which may cause damage to them.
	On end: Part of label No: 499-1081-003	ONLY OPERATE ON A LEVEL SURFACE Generally the generator will only be used on a level surface. It can be used on small inclines as given in the Specification as given previously but additional precautions may be needed to stop it moving due to vibration.
	On end: Part of label No: 499-1081-003	DO NOT SPILL FUEL ONTO HOT SURFACES The exhaust outlet and the box around it in particular are hot.
	On end: Part of label No: 499-1081-003	IF AN EARTH LEAKAGE TRIP (RCD) IS FITTED THE GENERATOR'S BRASS EARTH STUD SHOULD BE CONNECTED TO AN EXTERNAL EARTH. THIS EXTERNAL EARTH CAN BE AN EARTH SPIKE OR ANY SUITABLE EARTH POINT. THE RCD SHOULD BE TESTED DAILY BY PRESSING THE TEST BUTTON AND CHECKING IT DOES TRIP. If the generator is to be used for a fixed installation or installed on the same site for a long period it should be installed by a competent person. The User should be shown where the TEST button is located and shown how to use it. An earth spike kit is available as an optional extra.
	On Control Panel. Qty. 1. Label No: 499-1081-004	ELECTRICITY IS DANGEROUS Warning Label advising safe use of sockets

	On side panels near base. Qty. 4 off. Label No: 499-1081-005	FORK LIFT POINT The generator can be lifted from the sides or from the front or rear using a fork lift truck with correctly spaced forks. It is intended that when lifting from the sides, that one fork passes through the part of the frame that forms a loop and foot.
	On control panel and generator base Qty 2 Label No: 499-1081-006	EARTH POINT An M8 brass earth stud is supplied next to the output sockets for the external earth connection.
	On the panel that can be removed to gain access to the oil dip stick. Qty. 1. Label No: 499-1081-007	CHECK ENGINE OIL LEVEL DAILY The oil level should be seen on the oil dip stick as per the diagram on the label.
	On Fuel Filler Cap. Qty. 1. Label No: 499-1081-008	DIESEL FUEL ONLY This generator must only be filled with commercial diesel fuel containing up to 5% bio-fuel. If special grades of diesel e.g. 100% Bio-Diesel are to be used consult HGI first to discuss its suitability.
	On Control Panel around the DC Isolator Switch Qty 1 Label No. 499-945-012	DC ISOLATOR IDENTIFICATION Informational label showing the ON / OFF positions of the switch.
	Next to exhaust outlet. Qty. 1 Label No: 499-1081-010	CAUTION HOT EXHAUST The exhaust pipe is shielded as much as is practical but the final outlet is hot.

	Next to air vents. Qty. 2 off. Label No: 499-1081-011	INLET AND OUTLET VENTS TO BE KEPT CLEAR These must be kept free from obstructions to allow a free flow of cooling air or the engine and alternator could over heat.
	On the top panel Qty. 1 Label No: 499-1081-012	NO STEP The generator should not be used as a step. The fuel tank is made of plastic and not suitable to support the weight of a person.
	On Output Panel Pt No. 499-1081-013 Qty 1	DANGER 230V Alerting to voltages behind cover
	On Control Panel Qty 1 Label No. 499-1081-014	230V OUTPUT Advisory label showing voltage of the generator
	On Hinged Lid Qty 1 Label Part No: 499-1081-015	DANGER MOVING MACHINERY INSIDE DOOR This label warns operators that there will be moving parts inside the generator when the unit is in a running state.
	On Control Panel below the USB Port Qty 1 Label No. 499-1081-016	USB PORT Information label advising position of USB Port.
	On the RH side, above the access panel Label No: 499-1081-017	FUEL FILL THIS SIDE The fuel filler cap is located inside this cover. Remove the cover to access the filler and for refuelling. **DO NOT REFUEL WHILE THE SET IS RUNNING OR HOT!**

	On Control Panel Qty 1 Label No. 499-1081-018	DANGER ELECTRICITY The battery is 12 V DC and care should be taken not to come into contact with the terminals.
	On Top of 110V Sockets Qty 1 Label No. 499-1081-019	110V Advisory of voltage on socket output
	On Top of 230V Sockets Qty 1 Label No. 499-1081-020	230V Advisory of voltage on socket output.
	On Control Panel Qty 1 Label No. 499-1081-021	12 V DC Advisory of the battery voltages and care should be taken not to come into contact with the terminals.
	On top next to lifting loops. Qty. 4 off. Label No: 499-1081-022	LIFTING POINT The generator can be lifted by hooks or lifting straps at the four points marked on top of the square tube frame. A four-point (not two-point) lift is recommended.
	On end: Part of label No: 499-325-094	LWA 94 dB This is the sound level. At this level the generator should not be operated in a small space occupied by people. The generator is intended to be operated out doors or in a very large industrial building where people are many metres away from the generator. If you cannot hold a normal conversation because of background noise your hearing may be in danger. You should move away, wear ear protection or turn off the equipment.

Battery Compartment		
	On front panel over battery compartment Part of label No: 499-081-001	DANGER ELECTRICITY The battery is 12 V DC and care should be taken not to come into contact with the terminals.
	On front panel over battery compartment Part of label No: 499-081-001	DANGER ACID The battery contains acid and if any liquid is seen check the source, but assume first that it is acid. Care should be taken in cleaning up acid.
	On front panel over battery compartment Part of label No: 499-081-001	WARNING EXPLOSIVE MATERIAL The battery can under certain conditions give off small quantities of hydrogen gas. Do not smoke or use naked flames while working on a battery. NEVER attempt to burn a battery as a method of disposal.
	On front panel over battery compartment Part of label No: 499-081-001	DISCONNECT NEGATIVE LEAD FIRST AND RECONNECT LAST This is to ensure that if a spanner slips you cannot create a circuit from the live battery post to the generator chassis.
	On front panel over battery compartment Part of label No: 499-081-001	NO SMOKING OR NAKED LIGHTS The battery can under certain conditions give off small quantities of hydrogen gas. Do not smoke or use naked flames while working on a battery.
	On front panel over battery compartment Part of label No: 499-081-001	RECYCLE The battery contains lead and sulphuric acid and should be recycled at an approved facility only and not put into a dust bin.

Electrical Safety

In addition to the information given previously the-generator should be installed, earthed and used with reference to the following:-

- I.E.E Regulations 17th Edition (BS 7671:2008)
- Health and Safety Executive Publications GS27 Protection Against Electric Shock
- Health and Safety Executive Publications GS24 Electricity On Construction Sites
- Health and Safety Executive Publications PM53 Emergency Private Generation

available from HMSO. Alternatively the HGI Technical Help Line would be pleased to advise you on the best measures for your particular application.

NOTICE

This generator is **NOT** fully water proof and neither the generator, nor any electrical equipment should be left out side indefinitely and operated in prolonged and heavy rain or snow. The generator is suitable to be left outside in light rain. We would NOT recommend operating hand held electrical equipment in light rain or snow.

DO NOT use a pressure washer to clean the generator as high pressure water may enter the electrical system.

Lifting and Moving

In addition to the information given previously the following apply:-

Manual Lifting

Manual handling operations should be planned and under taken after considering:-

- Manual Handling Operations Regulations 1992: Guidance on Regulations L23: HSE Publications 1998
- Manual Handling Assessment Charts: HSE Publications 08/03

For the HRD060D generator, manual lifting (even with four people) cannot be recommended as a formal risk assessment would show it to be a high risk activity.

Manual Moving by Pushing Using the Handles and Wheels

The generator has been designed to be pushed on an occasional basis over a short distance by a fit person with no relevant health problems over a suitable dry surface. As such this activity would represent a low to medium risk. A specific risk analysis should be conducted for the particular set of circumstances.

For smooth surfaces like concrete floors generators with solid tyres can be used. For rough surfaces only those generators fitted with pneumatic tyres should be pushed.

Generators should not be pushed up or down steep; ramps, inclines or loaded/unloaded from vehicles using planks or similar temporary structures. Extra care should be taken in the wet. The bar on the front of the generator can be used by a second person to guide or help the generator wheels to pass over a bump but is not designed as a lifting point.

The centre of gravity of a generator can move once it is being pushed due to the fuel moving in its tank. It should be anticipated that the generator will try to tip over forwards if you hit a bump on the ground or if you are trying to push it too quickly.

Mechanically Assisted Lifting

The weight has been given previously in this manual. The centre of gravity is located as shown in Figure 1 General Dimensions. In Great Britain all assisted lifting is governed by:-

- Lifting Operations & Lifting Equipment Regulations 1998 (LOLER) SI 1998 No: 2307

The following publication should also be observed:-

- HSE ACoP publication L113 Safe Use of Lifting Equipment, Lifting Operations and Lifting Equipment Regulations.

As a guide line only you should ensure that all lifting equipment is:-

- Sufficiently strong, stable and suitable for the proposed use.
- The load and anything attached must be suitable to be lifted.
- Positioned or installed to prevent the risk of injury, e.g. from the equipment or the load falling or striking people.
- Visibly marked with any appropriate information to be taken into account for its safe use, e.g. safe working loads.
- Accessories, e.g. slings, clamps etc. should be similarly marked.

You must ensure that a lifting operation must be planned, supervised and carried out in a safe manner by people who are competent.

No personnel should be present in an area where a mechanical lifting operation is taking place.

Lifting by Fork Lift Truck

The generator can be lifted from the side using a fork lift truck with correctly spaced forks passing through the fork lift pods as indicated below.

Lifting by Hooks or Straps

The generator can be lifted by hooks or lifting straps passing through the same pods as indicated above.A four point (not two-point) lift is recommended.

Lifting by Single Point Lifting Beam

An optional single point lifting beam is available.

This bolts on to the top frame but once fitted it is anticipated that it will not be removed. Before each use, the fixing of this beam should be inspected to make sure that no fixing bolts have been removed or loosened and that it has not been damaged.

Hazards to Health

A list of the hazards that may affect health are included with safety precautions and first aid instructions.

Material / Location	Hazard	First Aid Measures
Engine Oil	When hot may burn the skin but not expected to give rise to an acute hazard under normal conditions of use. May cause an allergic skin reaction in sensitive individuals. Continuous skin exposure may give rise to dermatitis. Gloves, overalls and eye protection should be worn when handling this product. Do not burn old oil as a method of disposal as combustion is likely to give rise to a complex mixture of airborne solids, liquid particulates and gases including carbon monoxide and unidentified organic and inorganic compounds . Old engine oil has potential health implications and should not come into contact with the skin.	**Burns:** Rinse with clean water, cover with a sterile pad and obtain medical assistance. **Skin Contact**: Remove contaminated clothing and wash thoroughly with soap and water. If persistent irritation occurs obtain medical attention. If the material is injected under high pressure into the body obtain medical assistance immediately. **Inhalation:** In the unlikely event of inhalation of fumes if dizziness or nausea occurs move the individual to fresh air. If symptoms persist, obtain medical attention. If difficulties are experienced with breathing a qualified person should administer oxygen. If breathing stops give artificial respiration. **Eyes:** In the unlikely event that the material enters the eye flush with copious quantities of clean water. If persistent irritation occurs obtain medical attention. **Ingestion:** In the unlikely event that ingestion occurs, wash out the mouth with water and seek medical attention. Do not induce vomiting.
Diesel Fuel	May cause skin irritation. Gloves, overalls and eye protection should be worn when handling this product.	As for engine oil above.
Fibre Glass Insulation (over exhaust pipe duct and lining exhaust pipe box)	The User will not normally come into contact with this material but Service Technicians may. May cause skin and respiratory tract irritation. Gloves, overalls, dust mask and eye protection should be worn when handling this product.	**Skin Contact**: Remove contaminated clothing and wash thoroughly with soap and water. If persistent irritation occurs obtain medical attention. If the material is injected under high pressure into the body obtain medical assistance immediately. **Inhalation:** In the unlikely event of inhalation of fumes if dizziness or nausea occurs move the individual to fresh air. If symptoms persist, obtain medical attention. If difficulties are experienced with breathing a qualified person should administer oxygen. If breathing stops give artificial respiration. **Eyes:** In the unlikely event that the material enters the eye flush with copious quantities of clean water. If persistent irritation occurs obtain medical attention.
Other insulation, gaskets and seals	No specific hazards under normal use conditions. DO NOT burn as a method of disposal as combustion is likely to give rise to a complex mixture of airborne solids, liquid particulates and gases including carbon monoxide and unidentified organic and inorganic compounds which may be hazardous to health.	N/A

Asbestos	This generator is asbestos free.	N/A
Battery Acid Battery is located in the battery box at the front of the generator	The User and Service Technicians will not normally come into contact with acid. Battery contains acid electrolyte which is absorbed in the separator glass mat material. If battery case is punctured, completely flush any released material from skin or eyes with water. Battery posts, terminals and related accessories contain lead and lead compounds which have been known to cause cancer and reproductive harm. Batteries also contain other chemicals which have been known to cause cancer. Wash hands after handling. Avoid contact with acid materials. Use soda ash or lime to neutralize material released or spilled: Flush with copious amounts of water.	**Skin Contact**: Remove contaminated clothing and wash thoroughly with soap and water. If persistent irritation occurs obtain medical attention. If the material is injected under high pressure into the body obtain medical assistance immediately. **Inhalation:** In the unlikely event of inhalation of fumes if dizziness or nausea occurs move the individual to fresh air. If symptoms persist, obtain medical attention. If difficulties are experienced with breathing a qualified person should administer oxygen. If breathing stops give artificial respiration. **Eyes:** In the unlikely event that the material enters the eye flush with copious quantities of clean water. If persistent irritation occurs obtain medical attention. **Ingestion:** In the unlikely event that ingestion occurs, wash out the mouth with water and seek medical attention. Do not induce vomiting.
Exhaust Fumes	Exhaust fumes are very hot and contain carbon monoxide which can cause unconsciousness and death in humans and animals. It is odourless and tasteless but diesel exhaust fumes contain other chemicals and soot which will irritate the eyes and breathing and will usually alert the user to the presence of fumes. Symptoms of carbon monoxide poisoning are dizziness, nausea, fatigue and vertigo.	**Skin Contact**: Remove contaminated clothing and wash thoroughly with soap and water. If persistent irritation occurs obtain medical attention. If the material is injected under high pressure into the body obtain medical assistance immediately. **Inhalation:** In the unlikely event of inhalation of fumes if dizziness or nausea occurs move the individual to fresh air. If symptoms persist, obtain medical attention. If difficulties are experienced with breathing a qualified person should administer oxygen. If breathing stops give artificial respiration. **Eyes:** In the unlikely event that the material enters the eye flush with copious quantities of clean water. If persistent irritation occurs obtain medical attention.
Electric Shock	• Assess the situation first. • DO NOT touch the person until it is safe for you to do so. • Identify where the electricity is coming from. DO NOT assume it is the generator • Turn off the electricity at the source. • To stop generators in an emergency press the RED stop button on the generator control panel or remove the plug from the socket. On Automatic Mains Failure Units (AMF) press the emergency stop button on the main control panel. • If necessary check patients air ways, administer artificial resuscitation, move the person to the recovery position. • Even if the person remains conscious anticipate that they will pass into shock. • Local burns where contact was made should be covered by a sterile dressing. • Obtain medical attention immediately.	

Operation

The guidelines for operating the generator are outlined in the section.

The HRD060D is resiliently enclosed within an acoustically treated housing providing noise attenuation. A large lift up lid provides access for ease of servicing and maintenance in a tight space.

The HRD060D is configured to be operated locally at the set but can be provided with an optional remote start controller.

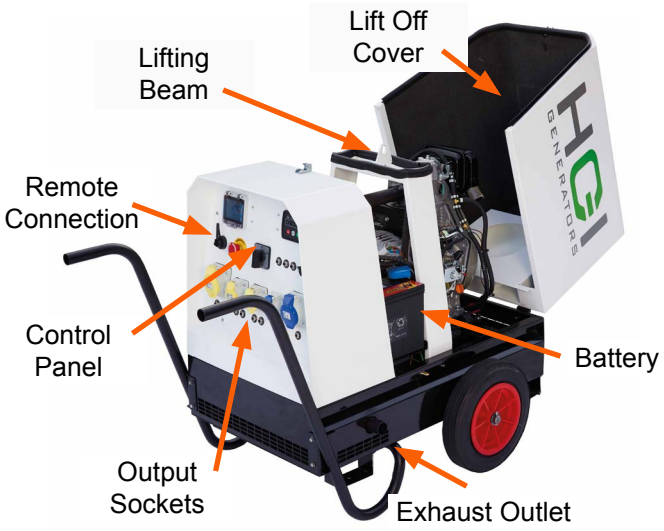
The At-Set operation utilises a DSE3110 controller that monitors the engine condition and provides warning information about the generator.

If configured for remote start stop operation HGI recommend the use of the HGI CN222 remote start controller which has a simple push-button stop / start and programmable timer so that once started the generator will run for a specified period and then shutdown. This is typically set at 1 hour.

NOTICE

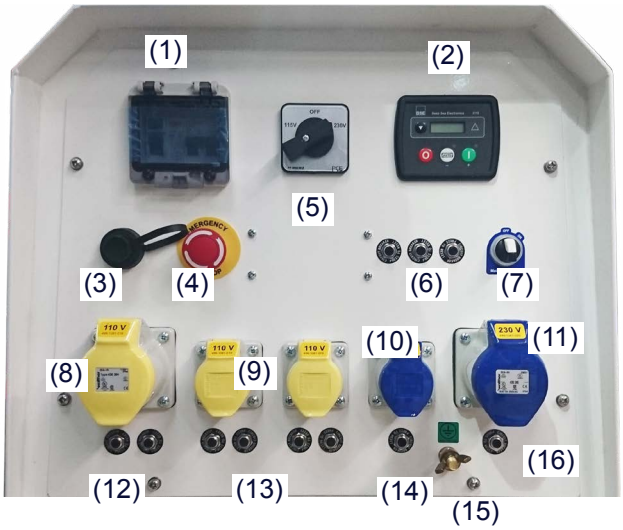
For safety reasons, the battery negative lead will be disconnected prior to delivery. It is recommended that this action is repeated when moving the generator or for long term storage.

Generator Layout



Control Panel

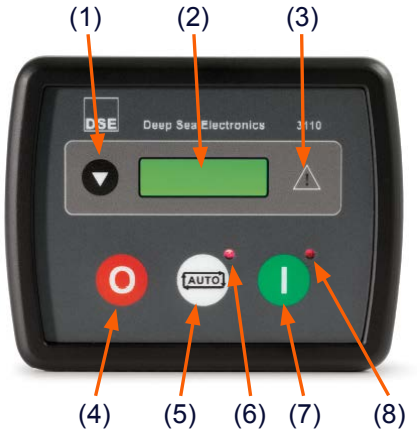
The control panel is at the rear of the generator:



Item	Description
1	Main Output MCB and RCD
2	DSE3110 Control Module
3	Remote Start / AMF Panel Connection
4	Emergency Stop Button
5	Voltage Selection Switch
6	DC Isolation Fuse Control Module Fuse Remote Connection Fuse
7	DC Isolator Switch (SW1)
8	32A 110V output socket
9	2 x 16A 110V output sockets
10	16A 230V output socket
11	32A 230V output socket
12	30A MCBs 32A 110V Socket Protection
13	15A MCBs 16A 110V Socket Protection
14	15A MCB 16A 230V Socket Protection
15	Earth Stud
16	30A MCB 32A 230V Socket Protection

DSE3110 Control Module

The control panel has a Deep Sea Electronics 3110 engine and generator management system which combines engine management, condition monitoring and general operational control of the machine. It is designed for ease of use and provides information via the LCD display which is accessed through a simple scroll menu system.



Item	Description
1	Navigation Button Pressing this button scrolls the display to show the various instruments.
2	Main Status Display This displays the generator instrument and alarm conditions.
3	Common Alarm Indicator This illuminates when an alarm is present.
4	Stop/Reset Button This stops the generator and also resets any alarms present (provided the fault has been cleared).
5	Select “Auto” Mode This places the set in ‘Automatic’ mode allowing the set to be operated automatically and/or remotely.
6	Auto/Remote Indicator
7	Start Button This button starts the engine. Press once ONLY to start the engine. The unit will automatically attempt up to three starts.
8	Run Indicator

The Deep Sea 3110 is the main STOP / START control unit for the generator. The control module allows the user to control the operation of the generator engine and also provides instrumentation for;

- Engine Speed
- Generator Voltage
- Generator Frequency
- Engine Run Time (Hrs)
- Battery Volts

The DSE module will go into standby when no common alarms have been triggered after 1 minute of inactivity. If the emergency stop is pressed the DSE module will not go into standby.

NOTICE

Do not use Emergency Stop for routine stopping of the generator or the Control Module will not go to low power mode and discharge the battery.
Use the control Module “Stop” button to stop the engine and when the engine has stopped turn the control Module isolation switch to OFF.

To activate the control module press the green Start button once.

Instrumentation

To access various instrumentation displays you will need to press the “page” button on the engine control module. Each “page” of instrumentation can be accessed sequentially in this order.

- Engine speed
- Generator volts
- Generator frequency
- Engine run time
- Battery volts

If an alarm is raised while an instrumentation view is being displayed the instrumentation view is changed to the alarm page. The alarm page is only available when an alarm has been raised; also the default instrumentation view that is displayed is the engine speed page.

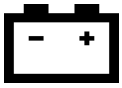
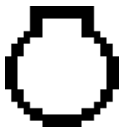
Indicators

There are 3 indication LED’s (Light Emitting Diodes) on the front of the engine control module;

1. The Started Mode Indicator
   This LED is to the upper-right of the Start button and is illuminated when the engine is in the “Start” mode.

2. The Automatic Mode Indicator
   This LED is to the upper-right of the Auto button and is illuminated when engine control module is in the “Auto” mode.

3. The Common Alarm Indicator
   The type of common alarm is represented by an Icon that can be seen in the large green LCD on the control module. The Icons and the descriptions of the the alarms they represent be seen below:

Icon	Alarm / Warning Description
	**BATTERY UNDER VOLTAGE / BATTERY OVER VOLTAGE** The DC supply has fallen below or risen above the low/high volts setting level.
	**CHARGE FAILURE** The auxiliary charge alternator voltage is low as measured from the W/L terminal.
	**ENGINE HIGH TEMPERATURE** The module detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm setting level after the “Safety On” timer has expired.
	**LOW FUEL LEVEL** The level detected by the fuel level sensor is below the low fuel level setting.
	**LOW OIL PRESSURE** The module detects that the engine oil pressure has fallen below the low oil pressure pre-alarm setting level after the “Safety On” timer has expired.
	**INTERNAL MEMORY ERROR** Either the configuration file or engine file memory is corrupted. Contact **MTC** for assistance.
	**GENERATOR OVER VOLTAGE** The generator output voltage has risen above the pre-set pre-alarm setting.
	**GENERATOR UNDER VOLTAGE** The generator output voltage has fallen below the pre-set pre-alarm setting after the Safety On timer has expired.
	**GENERATOR OVER FREQUENCY** The generator output frequency has risen above the pre-set pre-alarm setting.
	**GENERATOR UNDER FREQUENCY** The generator output frequency has fallen below the pre-set pre-alarm setting after the Safety On timer has expired.
	**FAIL TO START** The engine has not fired after the preset number of start attempts.
	**FAIL TO STOP** The module has detected a condition that indicates that the engine is running when it has been instructed to stop. NOTE: ‘Fail to Stop’ could indicate a faulty oil pressure sensor – If engine is at rest check oil sensor wiring and configuration.

Common Alarms

The common alarm indicator will be illuminated when there is a condition with the engine or alternator that requires the operator’s attention. When the common alarm indicator is illuminated one of the following icons will be displayed on the modules LCD.

More information about the DSE3110 control module can be found in Manufacturer’s Service and User Guides section of this manual.

Remote Connection Terminal

These are to be used to connect the set to a remote Automatic Mains Failure (AMF) panel, remote control panel or timer volt free switch. The switched connection can then transmit a start and stop signal to the DSE3110 to initiate the generator start up or shutdown procedure.

Remote Start Controller

HGI can supply remote start controllers (e.g CN222) whioch are read for easy connection via a buccaneer plug for connecting into the socket on the generator control panel.

Contact HGI Sales for further information on the types of remote start panels available for your generator.

Automatic Mains Failure (AMF) Panel

A typical AMF panel that can be used to control the starting and stopping of the generator is shown below.

The AMF panel is connected to the Remote Connection Socket on the generator. Contact HGI Sales for further information on installing an AMF system for your generator.

Emergency Stop

Pressing the emergency stop pushbutton will immediately stop the engine and prevent it from restarting.

The emergency stop button must only be used to stop the machine in an emergency and not to stop the set during normal operation.

To restart the generator, release the emergency stop button by twisting clockwise, reset the control module by pressing the red button, and start the generator by pressing the green Run button.

Voltage Selection Switch

This is a two way switch.
To select 110V turn the switch to the 110V position.This will enable power output to be taken from the 110V Sockets. To select 230V move the switch to the 230V position. This will enable power output to be taken from the 230V socket and terminals.

Control Module DC Isolation Switch

The DC Isolator Switch enables operation of the generator. It is a simple ON / OFF switch.

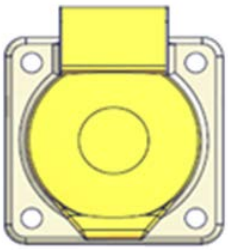
When switch is turned to the “Off” all functionality is removed from the generator and it is safe to work on. When tuned to “On” and the remote panel inhibit socket is in place the generator can be operated locally.

Turning the Switch to the ON position activates the Deep Sea Electronics 3110 control module.

Output Sockets

These generators can be supplied with either 110V sockets, 230V sockets or a combination of both depending upon the model.

Blue
230V



Yellow
110V

Connect the equipment to be powered (load) into the socket outlets on the generator control panel. Check that the total load from all equipment connected does not exceed the generator rating.

On Dual Voltage models, select the required voltage 110V or 230V with the voltage selector switch.

The output sockets are all individually protected by an MCB (miniature circuit breaker) which is set at 15 Amps on small output sockets and 30 Amps on the larger sockets. If the current being drawn through the socket exceeds this for a short time the MCB will trip and the button will pop out. To reset the MCB when it has tripped remove the load from that socket, wait a few minutes and press the button.

Earth Stud

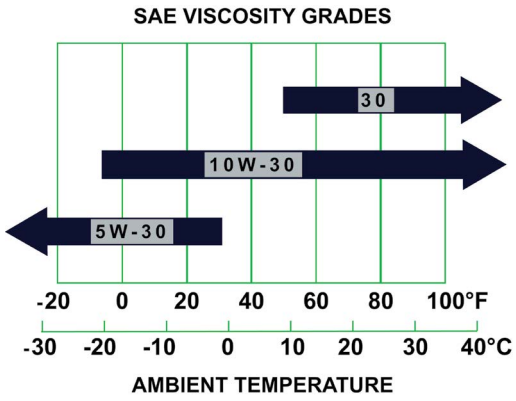
The M10 brass stud in the terminal pod should be connected to an external earth point or to an earth spike. An earth spike can be supplied as an optional extra and should be driven at least 600 mm into soil.

Pre-Operation Checks

Engine Oil

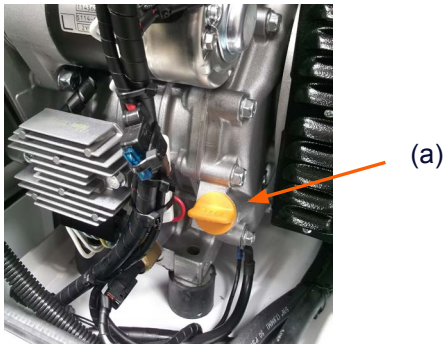
Check the oil level BEFORE EACH USE with the generator on a level surface and the engine stopped.

SAE 10W-30 API grade CD or higher is recommended for general, all temperature use. Other viscosities shown in the chart may be used when the average temperature in your area is within the indicated range.



To check the oil level:

1. If the generator has been running, wait for 10 mins to allow the oil to drain back into the oil pan.
2. Access the engine via the Service Access
3. Remove the oil filler cap / dipstick (a) and wipe the dipstick clean.



4. Insert the filler cap/dipstick back into the dip tube and then remove again, checking where the oil level lies on between the minimum and maximum positions on the dip stick.

5. If the level is low, top up with the funnel supplied to make topping up easy and clean.

Oil Capacity: 1.65 Litres

Replace the engine oil after the first 50 hours, then every 200. When changing the oil or topping-up, use oil of a grade suitable for the prevailing ambient temperatures (see table in engine handbook).

Fuel

⚠ WARNING

Diesel is highly flammable and explosive.
You can be burned or seriously injured when handling fuel.
Stop the engine, keep heat, sparks, & flames away.
Handle fuel only outdoors.
Wipe up spills immediately.

The fuel level can be checked using the visual sight gauge in the base of the generator. If this indicator is in the red, refuel.

It can also be checked by activating the DSE3110 control module and pressing the green Run/ Start Button ⏽ once. If the fuel is low the Low Alarm indicator will be lit and the generator will shutdown to prevent air locking in the fuel system.

To refuel.

1. Ensure that the engine is stopped
2. Remove the fuel tank cap.
3. Refill the fuel tank avoiding spilling fuel.
4. Do not fill above the upper limit mark.

⚠ NOTICE

Fuel can damage paint and plastic. Be careful not to spill fuel when filling your fuel tank. Damage caused by spilled fuel is not covered under warranty.

5. After refuelling tighten the fuel cap securely.

Fuel Capacity: 26 Litres

General

Check that the generator is located on level ground and in an open space with free air flow on all sides, at least one metre from other equipment and buildings, and clear of any combustible material.

Starting

WARNING

Please check that all equipment is disconnected from the generator prior to starting.

1. Review the Safety Precautions.
2. Perform Preoperational checks.
3. Turn the DC Isolation Switch to the ON position.
4. Press the red Reset Button on the Engine Control module.
5. Press the green START button on the DSE3110 controller once. (The run/start indicator will illuminate).
6. Wait approximately 10 seconds while engine preheats.
7. Allow the engine to warm up for 1 minute before connecting any load to the generator output.
8. Connect the equipment to be powered (load) into the socket outlets on the generator control panel. Check that the total load from all equipment connected does not exceed the generator rating.

If the engine fails to start after 3 attempts then initiate fault finding to rectify the problem.

NOTICE

If the generator is not required switch it off and avoid running with light or no load wherever possible. Also see Maintenance Section.

Stopping

1. Switch off the electrical output and disconnect the load from the generator's output.
2. Allow the generator to run off load for 2 minutes to cool down.
3. Press the red STOP button.

Stopping and Starting Remotely

To use the generator remotely the third party remote control panel will need to be connected to the remote connection socket on the control panel.

Once connected:

1. Press the red Reset Button on the Engine Control module on the generator control panel.
2. Press the white Auto button on the generators DSE3110 control module.

Typically, the remote control panel will have run and stop buttons / switches. If using an HGI CN222 control panel:

3. To start, press the Green Run/Go button on the remote control.
4. To stop press the Red Stop button on the remote control.

If the remote control panel has a timer facility (as with the HGI CN222) it will, typically, have been programmed to run the generator for a preset time. This timer countdown begins once the Green button has been pressed.

If you should require generator power after the time has elapsed then press the green button once more to restart the timer.

5. Should you require to stop the generator from the remote control panel then press the Red button.

AMF Installations

WARNING

Installation of the generator is to be made by qualified personnel in accordance with appropriate regulations e.g., Electricity Safety, Quality and Continuity Regulations 2002 (S.I. 2002/2665), and Electrical Safety regulations cited previously in this document.

During the installation the AMF panel will need to be connected to the remote connection socket on the control.

Once connected

1. Press the red Reset Button on the Engine Control module on the generator control panel.
2. Press the white Auto button on the generators DSE3110 control module.

The AMF panel will then control the starting and stopping of the generator.

Shutdown Protections

The generator is fitted with the following protection devices that will shut down the generator in the event of a fault. They are indicated by LED's on the engine control module: The warning siren will also sound.

Over-Crank
Operates if the engine is cranked continuously for more than 10 seconds and the engine fails to start. This is to help prevent damage to the starter motor. If the engine fails to start after three attempts investigate the cause.

Low Oil Pressure
Operates if the oil pressure falls below a safe level. This can be caused by a lack of oil, wrong type of oil or high temperature. Check and top up the oil level as necessary. During starting, the alarm is held off for 18 seconds to allow the oil pressure to build up to normal running level. The engine will not crank if there is a "low oil" pressure signal prior to starting.

Low Fuel Level
Check and top up the fuel as necessary. The engine will not crank if a low fuel alarm is present. DO NOT let the engine run out of fuel as the fuel system may have to be bled before it will restart. The control module can be set by a small switch on the back to sound an alarm AND shut down on low fuel or just sound an alarm.

Fault Finding

IMPORTANT:
If the following checks and investigations can be completed without the use of tools then the operator can safely undertake them. If tools are needed then ONLY trained technicians can undertake the work safely. Wiring diagrams can be obtained from HGI to help with electrical fault finding.

Engine Fails to Start

Symptom	Cause and Remedy
Starter motor did not attempt to turn the engine over and no fault icons are displayed on the engine module.	• Battery Isolator is OFF • Check the emergency stop button is not pressed IN. • Check the control fuse or MCB has not failed. • Flat battery or wrong polarity from battery. • Check that the battery is producing over 12V DC from the positive terminal relative to the chassis of the generator. • Check the connections to the control module. • Check the operation of the slave relay, module and it's fuses • Check the connections to the starter motor. • Check the operation of the starter motor by making a temporary connection to its solenoid.
Starter motor did not attempt to turn the engine over and the oil pressure icon is displayed on the Engine module.	• The control module believes that oil pressure is present when the engine is off. • Check the oil pressure switch has not gone faulty. • Check the control module has not gone faulty by swapping it. • Check fuel level in the tank(s) and that the fuel selector switch is set to the correct tank i.e. internal or external.
Engine turns over but will not start. No smoke seen from exhaust pipe.	• Check that the fuel filter is not blocked or full of water. • Check there is a 12V DC supply to the fuel solenoid valve. • Check* fuel is getting past the fuel solenoid valve. • Check* fuel is flowing at high pressure out of the fuel pump located next to the fuel solenoid. • Suspect the fuel system is air locked or there is contamination blocking the fuel system or injector.
Engine turns over but will not start.after 3 attempts to start). "Start Fail" will be displayed on control module Smoke seen from exhaust pipe.	• Suspect faulty fuel supply as above. • Suspect faulty fuel injector nozzle. • Suspect contaminated / unsuitable fuel. • Suspect starter motor is not turning engine over quickly enough particularly if the temperature is too low. • Suspect serious fault with the engine.

* Care should be taken while working on the fuel system particularly when fuel is under high pressure.

Engine Starts but then Stops

Symptom	Cause and Remedy
Engine starts but then closes down.	• Check control circuit fuse and MCB. • Check battery charger circuit fuse. • Check the 12V DC supply from the battery and battery charger has not been lost. • Suspect faulty control module. Swap it to check it.
Engine starts but then closes down. Common alarm on the control module triggered.	• Check the fuel level and that the fuel system is not blocked or air locked. • Then check for faulty fuel level switch. • Check oil level then check for faulty oil pressure switch. • Check the fuel solenoid valve has not closed prematurely. • Check the fuel system has not become contaminated or defective as given previously.
Engine starts but then closes down on Speed Fault on the Control Module.	• Speed Fault - The most common cause of incorrect speed is air or contamination in the fuel system. Bleed the system and try starting again

Other Engine Faults

Symptom	Cause and Remedy
Has the miniature circuit breaker (MCB) tripped or pop-out breaker tripped.	• Before resetting disconnect all load. Look for any obvious reasons or faults as to why the equipment has caused the unit to trip. Reset the MCB and reconnect and switch on equipment one piece at a time. Do not hold the suspect equipment and use the selector switch on the generator to turn the supply ON to the suspect equipment. If a piece of equipment trips the MCB repeatedly make sure it cannot be used again by removing the plug and labelling faulty/ unsafe.
The miniature circuit breakers have not tripped.	• Suspect a major fault with the alternator or its voltage regulation unit.

No Electrical Output

Symptom	Cause and Remedy
Check the electrical output selector switch is set to the correct position.	• For dual voltage generators ensure that the correct selection has been made on the voltage selection switch. Choose the correct setting. • Set Main MCB to ON
Check the miniature circuit breaker (MCB).	• Each 110V/230V output has its own MCB to prevent excessive electrical load being taken through that socket. Check if the miniature circuit breaker (MCB) has tripped or 2-pole circuit breakers have been set to OFF.

Maintenance

Good maintenance is essential for safe, economical, and trouble free operation. This not only ensures that your engine is at its optimum in fuel efficiency, but maintains the engine in order to minimize the risk of breakdowns. This will save you money in the long run, as worn items can be spotted sooner, saving further problems.

Maintenance Schedule

Service intervals will have to be reduced if the welder-generator is operated in dusty or severe conditions. The first service is required after 50 hours from new then as given below.

Servicing must be carried out by a competent engineer. A written record of the service work should be made using the form contained in this manual or similar. The welder-generator must be serviced in accordance with our recommendations for the warranty to be valid.

DO NOT use a pressure washer to clean the welder-generator as high pressure water may enter the electrical system. Use a damp cloth or similar.

Maintenance Schedule	Daily Checks	After the first 50 Hrs	Every 3 Months or 200 Hrs	Every 6 Months or 400 Hrs
Check & replenish fuel	o	o	o	o
Check & replenish engine oil	o	o	o	o
Check fuel filter for dirt and water	o	o	o	o
Check battery	o	o	o	o
Check for oil and fuel leaks	o	o	o	o
Check operation of earth leakage unit (RCD) trip if fitted.	o	o	o	o
Check the hours run meter works	o	o	o	o
Change engine oil		o	o	o
Clean oil filter		o	o	o
Replace fuel filter				o
Check air filter clean			o	
Replace air filter				o
Adjust valve clearances				o
Check alternator brushes & slip rings				o
Check operation of MCB's				o
Control Module Safety Shut Down				o
Battery Charger				o
Canopy and Trolley				o
General Inspections			o	o
Run on ¼, ½, ¾ full load for 30 minutes		o	o	o

If you'd like to make an appointment for HGI to service your generator using our in house 26-point health checker guide for your generator then please contact the Service Department.

Safety Precautions

Some of the most important safety precautions follow. However, we cannot warn you of every conceivable hazard that can arise in performing maintenance. Only you can decide whether or not you should perform a given task.

⚠ WARNING

Failure to properly follow maintenance instructions and precautions can cause serious injury or death. Always follow the procedures and precautions in the operations manual. Where third party equipment is incorporated into the generator always refer to their guides for familiarisation

Safety Precautions

- Make sure the engine is off before you begin any maintenance or repairs. This will eliminate several potential hazards:
- Read the instructions before you begin, and make sure you have the tools and skills required.

Maintenance Routine

The following procedures refer to the common maintenance items for servicing your generator.

Check and Replenish Fuel

Refer to Pre-Operational Checks to check the fuel level.

Replace the fuel filter every 6months or 400hrs.

Drain and flush the fuel tank periodically to prevent the build-up of contaminants, particularly when the generator has operated in high humidity and dusty environments.

Check and Replenish Engine Oil

Refer to Pre-Operational Checks to check the engine oil level and replenish.

Replace the engine oil after the first 50hrs and then every 3 months or 200 hours operation. When changing the oil or topping up, it is recommended to use oil of grade 10W30.

Drain the oil in the engine while the engine is warm. Warm oil drains quickly and completely.

Place the generator on a level surface, and place a suitable container under the generator at the service access panel side of the generator.

Remove the oil filler cap / dipstick.
Remove the drain grommet in the base of the generator.

Drain the oil into the suitable container.

Follow HSE recommendations regarding the handling and disposal of contaminated oil products.

The oil filter element is a washable type, and should be cleaned at every oil change (3 months/200 hours).

Replace components in reverse order.

Fill with recommended oil to the max level shown on the dipstick

Battery

The battery is a maintenance free unit and should not require the electrolyte being topped up.

Check that the positive and negative terminals are tight and secure, and free from corrosion. Lightly coat them with petroleum jelly or similar to protect from corrosion.

Check that the battery securing strap is tight and the battery is held firmly.

Fuel System

Check the semi-transparent pre-filter daily for signs of water contamination and replace if necessary.

Change the filter every 6 months or 400hrs.

Air FIlter

The Air Filter contains two elements. Clean or replace the air filter in accordance with the Engine Manual later in this document. Check the hose between the air filter and the engine is secure and not damaged.

Replace the air filter every 400hrs/6 months.

Check RCD Trip

The earth leakage unit (RCD), if fitted, has a self-test button which can be used to apply a fault and to check that the unit trips out when the generator is running.

Check Operation of MCBs

No maintenance can be carried out on MCBs other than a physical check to ensure the MCB latches in the On position and no sign of external damage can be seen.

Adjust Valve Clearance

Valve Clearances should be checked after the first 6 months or 600hrs. The clearance for both the intake and exhaust valves should be 0.15mm when the engine is cold. Refit the rocker cover with a new gasket.

Alternator

Ensure that the cooling air vents do not become blocked by dirt, debris etc. and that the cooling fan is not damaged.

Control Module Safety Shut Down

This module will prevent the generator from starting or shut it down if faults occur. Check the following:-

Hours Run Counter; confirm counter is working.

Low Oil Pressure; with the engine off, remove the connection to the normally closed oil pressure switch and attempt to start the engine. The Control Module should see an open circuit representing oil pressure when there should be none and prevent starting.

With the engine running short the oil pressure switch to the generator chassis to simulate loss of oil pressure and the module should shut down the engine and show an alarm.

Low Fuel Level; with the engine off disconnect the 3 way plug and socket to the optical fuel level sensor and attempt to start the engine. It should recognise no fuel present and prevent starting and show an alarm.

Reconnect the sensor and start the engine normally and disconnect the sensor to simulate
low fuel level. The module can be set by a small switch on the back to sound an alarm AND shut down on low fuel or just sound an alarm (preferred for welders and similar). The Control Module should sound the alarm and stop the engine depending on how the switch is set.

Battery Charger

Stop and start the engine a few times if needed to draw off the battery.

Start the engine and allow running for 5 minutes, then checking that the battery charger is delivering at least 13.2V DC into the battery.

Starter Motor

These are normally sealed for life but should be inspected and serviced in accordance with the engine manufacturers instructions.

Exhaust System

Inspect the exhaust system and silencer at the flexible sections and joints in particular.

Check the exhaust is adequately supported and secured. Check for leaks and signs of burning of the insulation. Replace insulation if necessary.

If the engine has run on low load for a considerable period the exhaust may be sooted up. Run the engine on low load for 10 minutes and gradually increase to full load for 30 minutes to blow and burn any soot out of the exhaust. Care should be taken that hot soot does not land on combustible material.

Canopy and Trolley

Check security of fixings and fasteners on the machine. Lubricate hinges and latches with light machine oil.

Ensure that the inlet and outlet louvres are kept clean and unimpeded at all times. Check that no sound insulation has become loose and obstructed them.

Grease wheel axles and check tyre pressure if pneumatic tyres are fitted (40PSI / 2.7 bar).

With the lower air outlet box removed to reveal the alternator bearing end, check the cooling fan is secure and not damaged.

The engine should be sucking in air from outside the canopy. With the front panel removed to reveal the battery check the foam seal is complete all around this compartment and air can only be drawn from outside and cannot re-circulate.

With the left and right hand side panels removed check that bulkhead plate that is bolted to the front face of the engine is sealing against the sound insulation of the side panels.

Check that the area around the fuel tank for signs of damage or leakage.

General Inspections

Inspect generally for:-

Fuel and Oil Leaks: Look for excessive oil in the base tray. Look for weeps from fuel hoses and connections. Check the insulation is dry and not contaminated with fuel or oil.

Worn or Failed Anti Vibration Mounts: When the side panels are removed rock the engine and check all four anti vibration mounts are flexing slightly and have not failed or broken up.

Damaged or missing insulation and seals: Generally look at the sound insulation and seals and check it is still securely fitted and has not deteriorated.

Missing Safety Labels: These labels are a mandatory safety requirement and if any are missing or not easy to read they should be replaced. Full details of all labels are contained in this manual. A replacement label kit is available.

Chaffing or Stretching of Cables: Inspect all cables and connections and look for obvious signs of wear or damage.

Correct sealing / fitting of exhaust pipe: Remove the top panel and check the exhaust pipe is correctly fitted and sealed at its mounting flange with no signs of blowing.

Lifting Points: Inspect the lifting points for obvious signs of wear, damage or distortion.

Signs of Over Heating: Look for obvious deterioration due to heat and investigate the cause and rectify as necessary.

Fuel Cap: Check the cap seals correctly. Check for obvious signs of fuel spillage.

Electrical:

- Inspect sockets, and replace if damaged or contact pins are burnt.
- Check all wiring is secure and not damaged.
- Check the output voltage and frequency are correct.
- Check the earth continuity between the socket earth pins and the generator frame.

Run on ¼, ½, ¾ then full load

Operating the generator at low load levels for extended periods can result in high levels of carbon build up in the engine and exhaust system which can lead to excessive smoking, reduced efficiency and overheating. Looking at the silencer's outlet will give some indication this has happened.

After each service the generator should be run first on ¼, then ½, then ¾ and finally full load using a load bank or a similar load like an electric fan heater, to burn out any deposits of soot in the engine and silencer.

Each level of load should be applied for at least 10 minutes or until the exhaust is clear of soot and smoke. If you suspect the engine is badly sooted, **DO NOT** apply full load but build the load up gradually.

It should be anticipated that hot soot will be expelled from the engine during this procedure and it should be done in a safe place away from combustible material and under supervision at all times.

Maintenance Record Sheet (for use by owner / service agent)

Name of Owner:
Address:

Order No:

Name of Service Organisation:
Address:

Job No:

Generator Details (from Data Plate)

Model:
Serial No:
Build Code:
Year of Manufacture:
Rated Power:
Power Factor PF:
Voltage (Current):
Fuel Type

Date of Service:

Hours Run meter reading: **(hrs)**

Service Interval:
Daily / 50hrs / 3mth 200hrs / 6mth 400hrs

General Condition:

Daily Checks:

1. Fuel Level Checked	Yes / No
2. Oil Level Checked	Yes / No
3. Battery Check	Yes / No
4. Check for oil / fuel leaks	Yes / No
5. Check RCD works (if fitted)	Yes / No
6. Check fuel filter not contaminated	Yes / No
	Yes / No

After first 50hrs from new.
Every 3 months or 200 hrs

1. Complete daily checks	Yes / No
2. Change the engine oil	Yes / No
3. Clean the oil filter	Yes / No
4. Check the air filter clean	Yes / No
5. General inspections	Yes / No
6. Run at ¼, ½, ¾ and full load	Yes / No

Every 6 month or 400 hrs

1. Complete Daily Checks	Yes / No
2. Complete 200 hrs service	Yes / No
3. Check battery terminals and fixing	Yes / No
4. Replace fuel filter	Yes / No
5. Replace air filter	Yes / No
6. Set engine valve clearances	Yes / No
7. Check alternator brushes/slip-rings	Yes / No
8. Check alternator vents are clear	Yes / No
9. Check operation of all MCB's	Yes / No

6 month cont....

a. Check operation of Control Module	
• Hours run meter is running	Yes / No
• Low oil pressure shut down works	Yes / No
• Low fuel shut down works	Yes / No
7. Check Canopy and Trolley	
• All fixings secure	Yes / No
• Inlet/outlet air louvers clear	Yes / No
• Confirm all seals in the engine compartment sound and serviceable	Yes / No
8. General checks	
• Anti vibration mounts are serviceable	Yes / No
• All insulation/seals fitted & serviceable	Yes / No
• All safety labels are fitted	Yes / No
• All cables and connections sound	Yes / No
• Exhaust system sound and serviceable	Yes / No
• If fitted lifting beam safe and serviceable	Yes / No
• No signs of over heating	Yes / No
• Check fuel cap seals	Yes / No
9. Run at ¼, ½, ¾ and full load	Yes / No

Spare parts used:

Notes:

Signed: Representing: Date:

Parts and Service

Contact Details

Parts Department

Tel: +44 (0) 1629 821 645
Fax: +44 (0) 1629 821 606
email: parts@hgigenerators.com
Website: **www.hgiparts.com**

Service Department

Tel: +44 (0) 1629 821 647
Email: service@hgigenerators.com

Technical Help Line

Tel: +44 (0) 1629 821 614 or 821 652

Warranty Statement

See HGI Website **www.hgigenerators.com/warranty-statement-2.html**

Functional Spares

Part Description	Part Number
Air filter element	A1020-035
Oil strainer element	A1020-009
Fuel solenoid 12V	A1020-128
Starter motor 12V	A1020-024
Fuel Injector nozzle	A1020-113
Battery charger circuit fuse 20 Amp 1”x1/4”	A1020-105
Battery charger / voltage regulator	A1020-053
Rocker cover gasket (needed when setting valve clearance)	A1020-030
Inline Diesel Fuel Filter	170-278
Fuel Level Sensor	085-788
Fuel Pump	170-1147
Battery 12V	120-234
AV mount	070-100
MCB 1Pole 15 Amp	110-015
MCB 1Pole 30 Amp	110-030
MCB 1Pole 3 Amp	110-003
Main Output MCB 2Pole 25 Amp	110-225
RCD 30mA 2Pole 40Amp	110-532
110V 16A Socket	090-001
110V 32A Socket	090-002
230V 16A Socket	090-021
230V 32A Socket	090-022
110 - 230V Voltage Selector Switch	080-232

Transportation and Storage

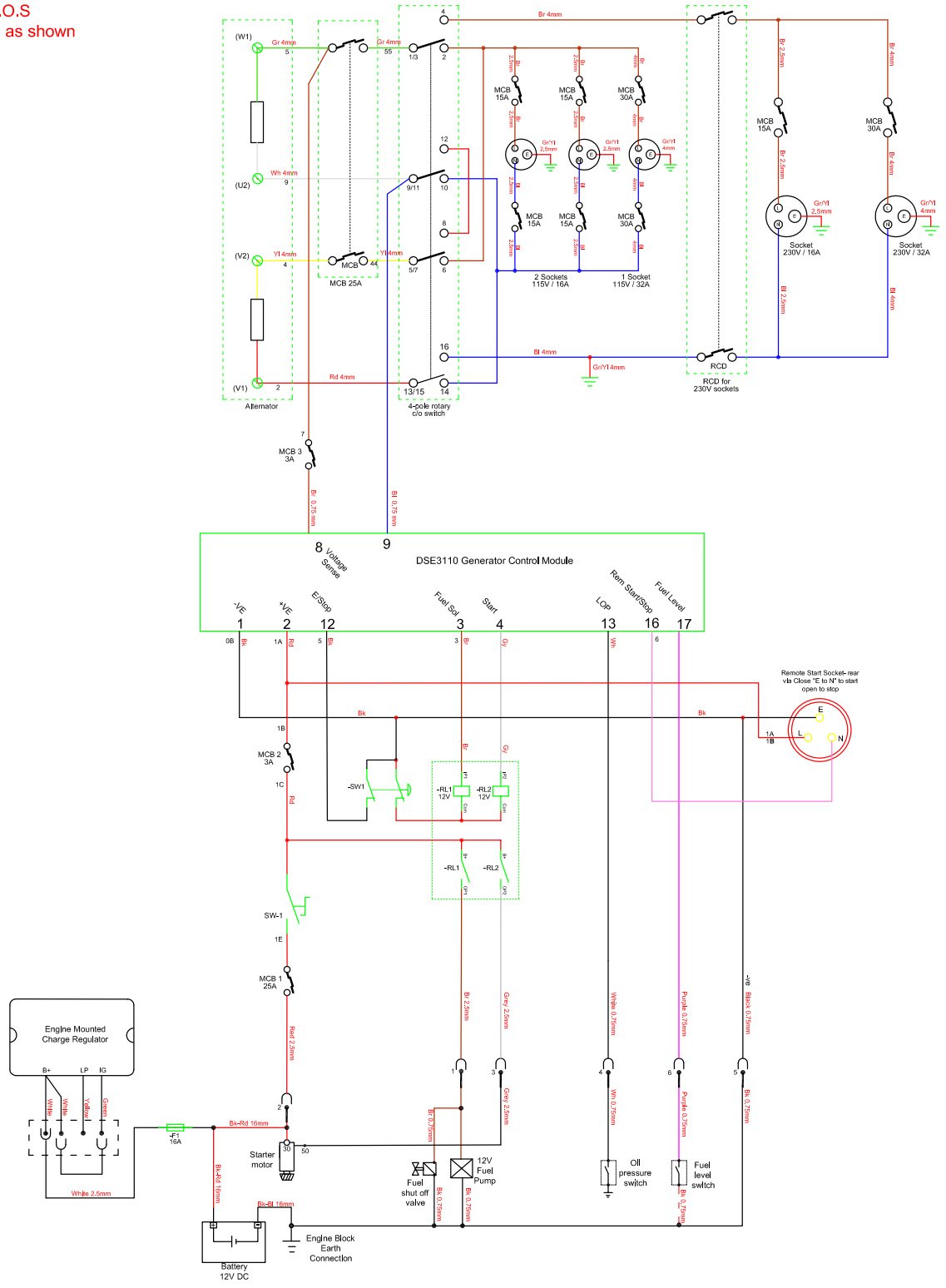
⚠ NOTICE	Do not lay the generator on its side when moving, storing, or operating it. Oil may leak and damage the engine or your property

If the generator has been used, allow it cool for at least 15 minutes before loading the generator on the transport vehicle. A hot engine and exhaust system can burn you and can ignite some material. To prevent fuel spillage when transporting, the generator should be secured upright in its normal operating position, with the engine Control Module switched OFF.

Take care not to drop or strike the generator when transporting. Do not place heavy objects on the generator.

Item	Description
Engine:	Turn the Engine Control Module “OFF” Short Term typically up to 6 months: Do not run the generator out of fuel. If the engine runs out of fuel the fuel system will become air locked and will have to be bled before the engine will restart. Leave a small quantity of fuel in the fuel tank. Drain any water from the water separator / filter. Run the engine for a few minutes and drain the warm oil and fill with new oil as for a normal service. With the decompression lever (lever with red plastic knob above the rocker cover) pulled and held down press the starter button for three seconds. This will inject fuel into the cylinder and valves to act as a rust inhibitor without starting the engine. Long Term over 6 months: For long term storage each engine manufacturer will have their own recommendations typically: 1. Replace engine oil with a special inhibiting oil. 2. Flush through fuel system and leave full with a special inhibiting compound. 3. Spray connectors in the loom and plug in sensors with Vaporol Inhibitor or similar. Please contact HGI for further details.
Alternator:	No special requirements other than store in a dry well ventilated place. If the generator has been stored for a considerable period of time e.g. several years the alternator insulation winding resistance should be checked as they can absorb moisture. The insulation resistance must be at least 1 MΩ (1 mega ohms). If it is less than this then the alternator windings can be dried out by placing the alternator in an oven at 60-70°C for a few hours with plenty of air movement. Generally if this procedure is required consider replacing the alternator. Flashing the Alternator: if ther is no electrical output after long term storage the alternator may have lost it’s residual magnetism. There is a procedure to re-magnetise the alternator. Please contact HGI for details.
Electrical :	No special requirements other than store in a dry well ventilated place.
General:	Store in dry, well ventilated and dust free place. If the generator is to be stored long term it would be beneficial to start and run the generator under electrical load for half an hour every three months and then store as above (but no need to change the oil).

All Wiring 0.75 Tri rated U.O.S
Colours as shown



DO NOT SCALE				© 07.12.17			
Finish				Matl.			
Issue	A	B	C	D			
Drawn	R.W	RG	RG	RG			
Date	07.12.17	07.03.18	20.03.18	23.03.18			
Checked							

Harrington Generators Ltd.

General Tolerance
No decimal places
One decimal place

Title HRD060
Dual Voltage Switched

Drg No WD-HRD060

CN222 Remote Control Instructions

The Harrington Generators International (HGI) CN222 Remote Control is designed to provide remote starting and stopping of generators.

Fig 1

The CN222 has large easy to use push-button controls. Green to Run and Red to Stop.

The CN222 also contains a timer so that the generator can be scheduled to run for the programmed duration e.g. 1.5h hours. See *Programming the Timer* to set the duration.

Safety

HGI's CN222 is designed to give safe and dependable service if operated according to instructions.

⚠ Notice

- Ensure that all operators read these instructions prior to use.
- Check that covers are in place and secure.
- Check visually the integrity of all cables and connectors.

⚠ Warning

- Check that the generator is positioned such that hot exhaust gases will not cause damage to the CN222.

Fixing

The CN222 remote start/stop timer module (Fig 1) is a small light grey plastic box measuring 8" x 4½" and easily integrated into a Cabin interior.

The module fixes to the cabin with 2 or 4 screws (Item A, Fig 2) which are housed behind 2 hinged panels. The hinged panel also hides the 4 screws securing the top plate in place.

Fig 2

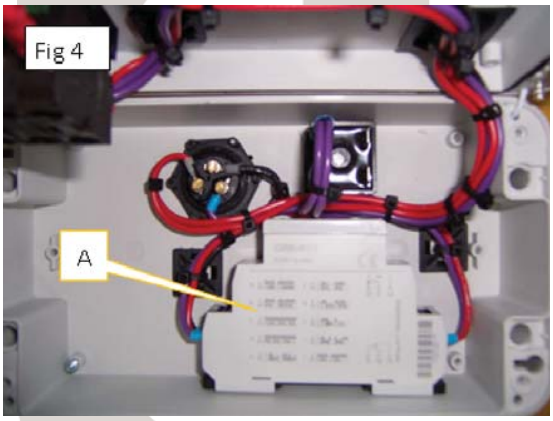
Connections

The modules umbilical cord is a three wire cable that connects via a plug and socket behind the module (Fig 3). The output cables inside the box are Black to Earth, Purple to Neutral and Red to Live should you need to disconnect the socket.

Fig 3

Programming the Timer

The module features a unique timer mechanism which automatically turns the generator off after a pre set time. This saves the generator needlessly running when no one is in the cabin. The 'run on' timer is adjustable from 1 second to 10 days. The factory setting is one hour. Please do not alter the other 'function' settings.



To reset the timer, the module top plate will need to be removed by unfastening the screws (Item B, Fig 2). The timer relay (Item A, Fig 4) is secured to the base of the enclosure by a self adhesive pad. To access the timer controls the timer will need to be gently detached.

There are two timer control selectors (fig 5) on the front face of the relay. Item A is the rough time range selector, Item B is the fine timer adjustment. The third selector is the function adjustment - DO NOT adjust this dial.

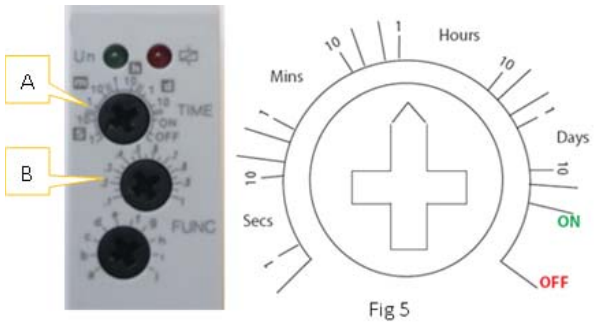
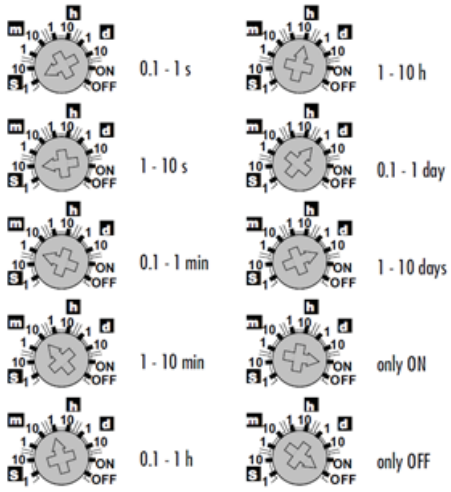


Fig 5

To re-set the timer use a small screwdriver to firstly set the rough time range into a time bracket as in Fig 6.

Fig 6



To change the time range move the position of the pointed slot to the new time range required. The movement will click through the increments until the selected range is reached.

After this set the fine time delay adjustment (Item B, Fig 5 and Fig 7). This is based upon a decimal fraction scale of the rough time range selected, i.e. each increment is a tenth of the maximum value of the rough time range.

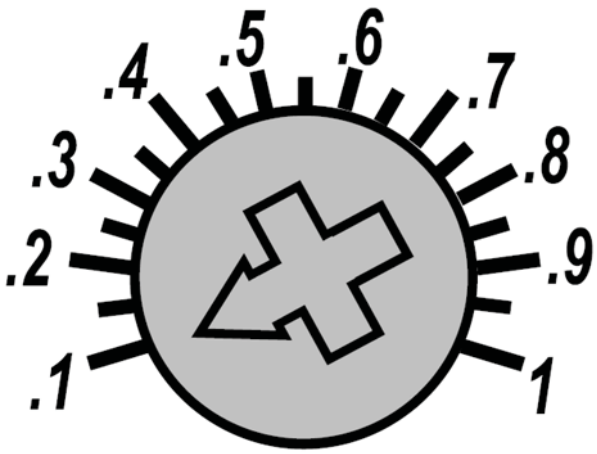


Fig 7

For example,

To set the timer to operate for 30 minutes, set the rough time range to the 0.1- 1 hr selection and then set the fine adjustment dial to position .5

To set the timer to operate for 3 hours, set the rough time range to the 1-10 hr bracket and then set the fine adjustment dial to position .3

Again the selector will click into the incremental setting.

When reset replace the timer relay back into the module replacing self adhesive pad if necessary.

Replace the top plate and secure with the screws extracted earlier and re-site on cabin wall.

Check the new timer setting by starting the generator and observing the timed stopping of the generator after the elapsed timer period.

Contact

If you are in any doubt or have any concerns about the safe operation of the CN222 then please consult with your service depot or contact HGI:

Technical Helpline: 01629 821 620
General Enquiries: 01629 824 284

www.hgigenerators.com

Manufacturer’s Service and User Guide Links

Every effort is made to ensure that the manufacturer’s user and service guides contained in this manual are the latest available at the time of publication. If in doubt about the recency of the documents then please contact the manufacturer or visit their website for the latest information.

Yanmar L100 Engine Operators Manual

- http://www.yanmarengines.co.uk/products.php?range_id=1&section_id=2

Deep Sea 3110 User Guide

- http://www.deepseaplc.com/products/dse-genset

Mecc Alte ECO / ECP User Manual

- http://www.meccalte.com

If you are still unsure then please contact HGI Technical Helpline: +44 (0) 1629 821 614 or 821 652