INSTRUCTION MANUAL

PETROL

MODELS:

G 3000 H
G 5000 H
G 7000 H
G 12000 H
G 5 TF H
G 7 TF H
G 12 TF H

G 3000 V
G 5000 V
G 7000 V
G 10000 V
G 12000 V
G 5 TF V
G 7 TF V
G 10 TF V
G 12 TF V

GESAN S.A.
GRUPOS ELECTROGENOS

Thank you for buying a GESAN generator set.

This manual has been written to assist you in maintaining and operating your generator set correctly. Please read it carefully before putting the machine into operation so as to become familiar with the precautions to be taken during use and be able to perform maintenance in ideal conditions.

Please keep this manual at hand for consultation at all times and ensure it is included with the machine should it be re-sold.

GRUPOS ELECTROGENOS GESAN, S.A. is constantly striving to improve its products, and regularly introduces changes to the equipment it supplies. For this reason the characteristics and information contained in this manual may be modified without prior notice and without incurring any obligation.

If any problems or queries arise, please contact your distributor.

INDEX:

SAFETY INSTRUCTIONS

Please read carefully the following ***warnings*** *for your own safety and the safety of others :*

1. Make sure *that the control panel is well lit if you run your generator set in poor lighting conditions.*

2. *Make sure that you* ***know how to stop the generator set in case of emergency*** *and familiarize yourself with its controls and power outlets.*

Do not permit *operation by someone unfamiliar with the generator set.*
Do not let *children operate the generator set without the help of an adult.*
Children and pets *must be kept at a safe distance from the engine, in order to avoid burns or injury.*

3. Carry out all necessary checks *before starting the generator set in order to avoid accidents or damage to the equipment.*

4. Earth *the generator set as well as the load properly.*

5. Do not operate the generator set *when it is raining or where there is snow.* ***YOU MAY BE ELECTROCUTED.***

Do not get the generator set wet, or operate it with wet hands.

6. Do not connect *the generator set to the mains. Connection should be carried out by a qualified electrician in accordance with applicable standards and regulations.*

A poorly made connection may cause current returns which could lead to the electrocution of anybody working on the mains.

7.- *The engine exhaust emits sufficient heat to set some substances on fire:*

Ensure that the generator set operates ***at a safe distance*** *from buildings and other equipment (at least one metre).*

Keep all inflammable substances away *from the generator set.*

Do not touch *the engine or the exhaust pipe while the generator set is running. They can cause serious burns.*

Wait until the engine has cooled down *before carrying out maintenance or storing it.*

8. *The fuel used is highly inflammable and volatile :*

Ensure that the engine is not running *when filling the fuel tank and that the premises are sufficiently ventilated.*

Do not get near flames or sparks *while filling the fuel tank.*

DO NOT SMOKE *near the generator set.*

Keep the generator set on a firm, level surface*, otherwise fuel may spill and catch light.*

Do not over-fill *the fuel tank. After filling, ensure the fuel cap is properly closed.*

Do not spill *fuel when filling the tank. Fuel vapour or spilled fuel may catch light. If fuel is spilled, ensure the area is dry before starting the engine.*

9. *Exhaust fumes from the engine are poisonous:*

Do not operate the generator set *in a closed environment.*

If operating the set in an enclosed space, ***provide adequate ventilation*** *and direct the exhaust fumes out of the area.*

10. *If the generator set operates in a place where damp and dust are unavoidable, it must be* ***dried and cleaned*** *regularly.*

11. *At the slightest abnormality,* ***stop and disconnect the set****. Locate and correct the fault before starting up again.*

12. ***Regularly inspect*** *all electrical cables. If damaged cables or hazardous connections are found, stop the unit immediately and replace or correct the faulty cables before starting up again.*

13. ***Handle batteries with care.*** *Batteries give off explosive gases; keep sparks, flames and cigarettes well away. Provide adequate ventilation when charging or using batteries in enclosed space.*

Batteries contain sulphuric acid (electrolyte). Contact with the skin or eyes can cause severe burning. Wear protective clothing and a protective mask.

- If electrolyte comes into contact with skin, wash with water.

- If electrolyte comes into contact with eyes, wash eyes with water for at least 15 minutes and seek medical assistance immediately.

Electrolyte is poisonous. If you swallow it, drink large amounts of water or milk, and follow with milk of magnesia or vegetable oil and seek medical assistance.

Use only distilled water in batteries. Tap water will shorten battery life. If the battery is filled above the maximum level the electrolyte will overflow causing corrosion of the engine or adjacent parts. Clean away electrolyte which has been spilled.

14. ***Used oil*** *can cause skin cancer in cases of prolonged and frequent contact. Although this is unlikely, washing your hands after contact with used motor oil is recommended.*

KEEP OUT OF THE REACH OF CHIDREN.

Please refer also to the engine and alternator user's manual.

For further information or enquiries please contact :

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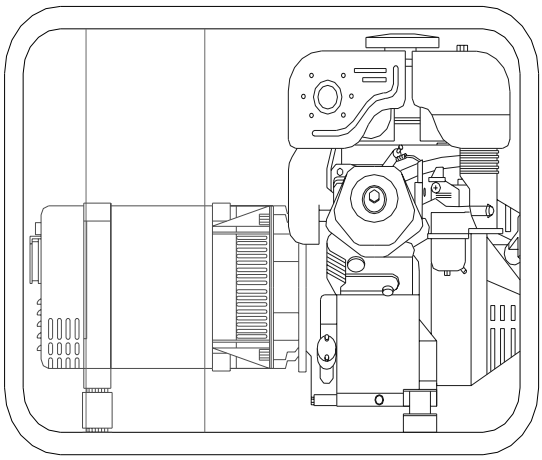
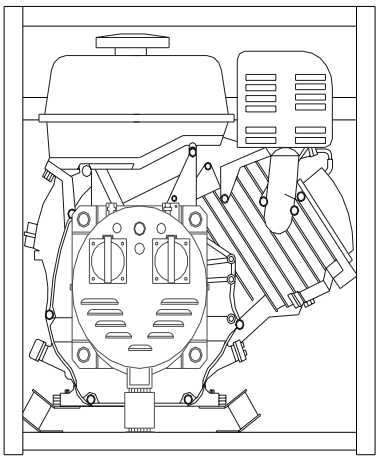
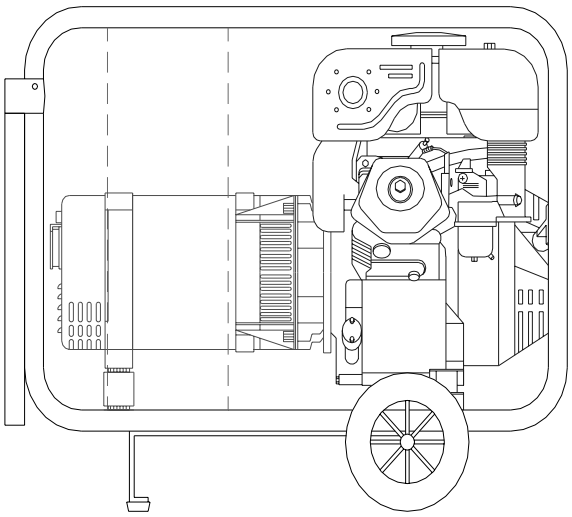
GENERAL DESCRIPTION

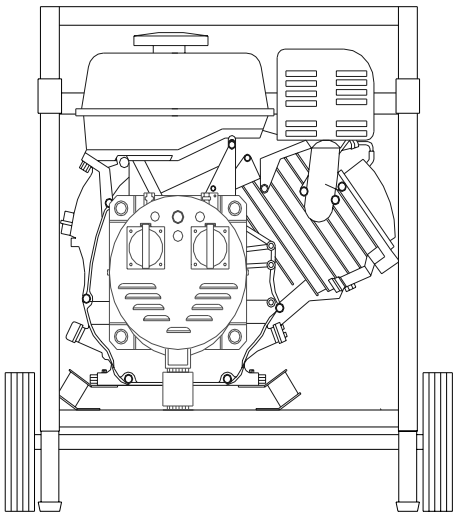
STATIONARY



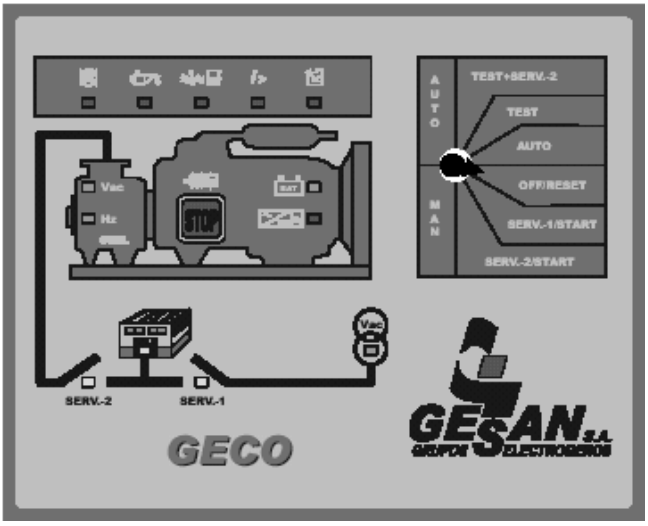


MOBILE



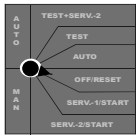


CONTROL CARD GECO



GECO is an AUTOMATIC CONTROLLER designed to start, control and monitor generator sets in mains failure situations, and can be used with both 12 and 24 VDC batteries.

OPERATION

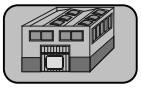


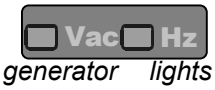
***GECO** can be switched to any one of six different operational modes:*

AUTOMATIC

If mains is O.K. the mains light 

will be illuminated and the mains contactor will be connected.
The mains contactor 

and load supplied 
lights will also be on.



If the mains fails and generator parameters are O.K., the generator lights will come on.
Three seconds later the mains contactor will open and the generator contactor will close.

The 

lights will illuminate.

*Up to three 20 second starting attempts are possible, with a 10 second pause between each attempt. If after three attempts the generator has not started, the **"Fail to Start"** light will illuminate and the hooter will sound (2 min.).* 

The start-up signal will cut out when the controller recieves the engine running signal, either by detecting generator frequency >20Hz or by receiving positive battery current through terminal 4. When mains returns, after a 60 second delay, the load will be transferred back to mains and the generator will idle for 2 minutes then shut down.

OVERRIDE MAINS *(AUTOMATIC MODE): Light off. Current is supplied by generator.*
OVERRIDE GENERATOR *(AUTOMATIC MODE): Light on. Generator will not start on mains failure.*

TEST 

*Works as **TEST WITH LOAD**, but the load is not transferred to the generator. If the mains should fail while in this mode, the load will automatically be transferred to the generator. The test finishes when the controller is switched to any other mode.*

TEST WITH LOAD 

*Works as **AUTOMATIC** by simulating a mains failure and transferring the load to the generator. When the controller is switched to any other position, and if mains is O.K., the load will be returned to mains.*

MANUAL

OFF/RESET

Shuts down the generator and cancels all alarm signals (mains contactor closed). The 

lamp lights up.

SERV 1 / START

The load is supplied by the mains (mains contactor closed) and the 

lamp lights up.
The generator starts and runs manually. Alarm signals work automatically.

SERV 2/ START

Generator starts and runs manually (generator contactor closed). The 

lamp lights up.
Alarm signals work automatically.

STOP 

*Emergency stop. If not switched to **OFF** the mains contactor closes and the* 

lamp lights up.

The hooter sounds and the 
lamp lights up.

ALARM SIGNALS:

FAIL TO START/EMERGENCY STOP/GENERATOR FAIL failure/running 

*The lamp lights up, the hooter sounds and **GECO shuts down the system.** Turn the switch to the **OFF** position.*

LOW OIL PRESSUREoil pressure 

*The lamp lights up, the hooter sounds and **GECO shuts down the system.** Turn the switch to the **OFF** position.*

HIGH WATER TEMPERATURE / WATER / 

*The lamp lights up, the hooter sounds and **GECO shuts down the system.** Turn the switch to the **OFF** position.*

OVERLOAD 

*The lamp lights up, the hooter sounds and **GECO shuts down the system.** Turn the switch to the **OFF** position.*

LOW FUEL LEVEL 

The lamp lights up and the hooter sounds. Resets automatically when the fuel tank is refilled.

BATTERY CHARGER:

***GECO** features a 2 Amp automatic battery charger which is fed by an external transformer.*

If battery voltage is O.K. the 

light will be on.

While the battery is being charged the  *light will be on continuously and when the*

floating voltage is reached the light will flash.

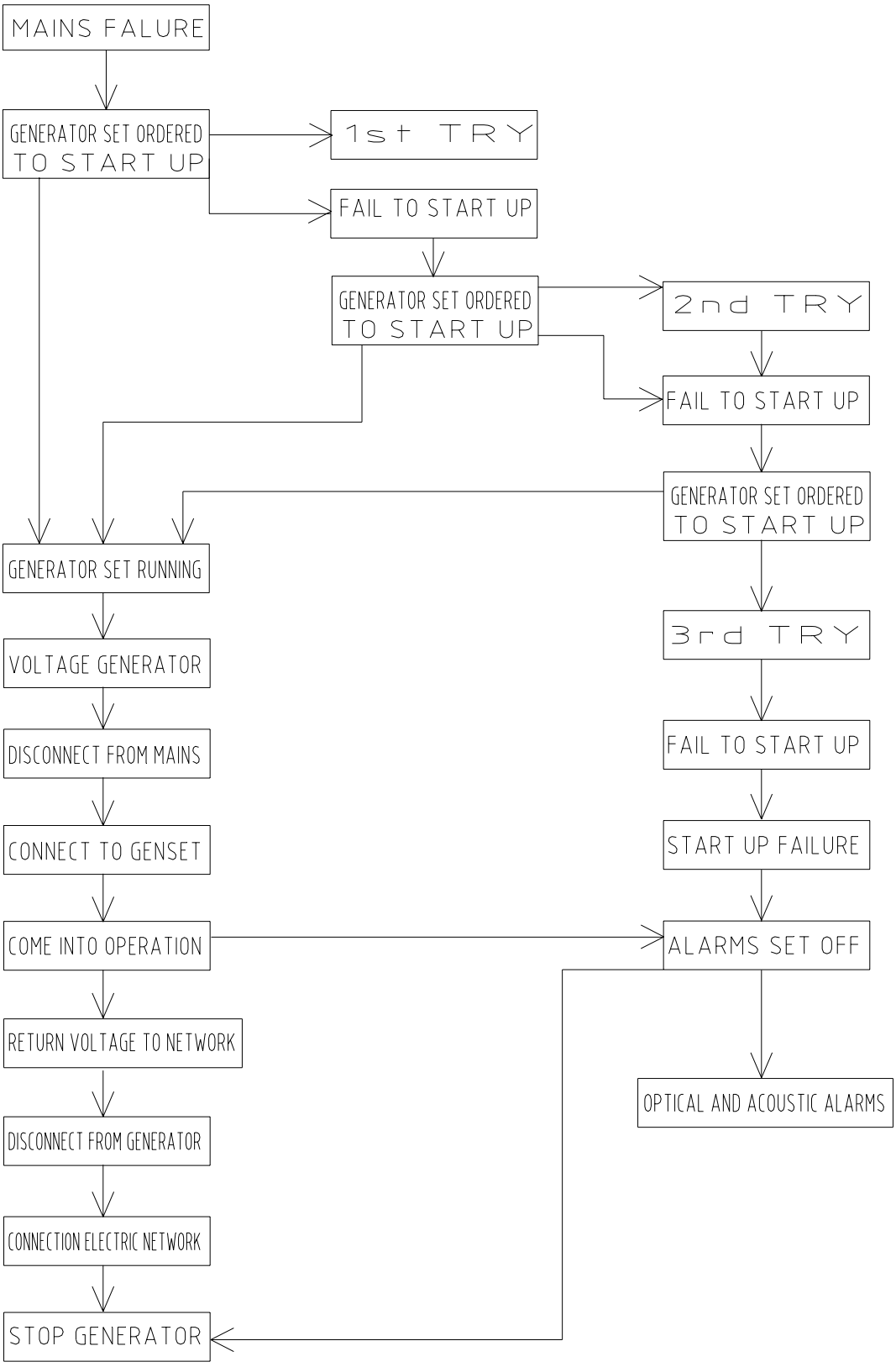
POTENTIOMETERS

		Factory adjusted values
Potentiometer 1:	*Adjusts generator voltage monitor.*	*200-250 V.*
Potentiometer 2:	*Adjusts generator frequency.*	*48-54 Hz.*
Potentiometer 3:	*Adjusts min. mains voltage monitor.*	*200V.*
Potentiometer 4:	*Adjusts battery charge voltage.*	*13.8(12VDC)/27.6(24VDC)*

These potentiometers are adjusted at the factory to normal operating values.

SPECIFICATIONS

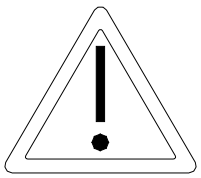
Mains failure-start delay:	*3 sec.*
Shutdown signal duration:	*20 sec*
Start-up impulse duration:	*20 sec.*
Generator alarm signal delay:	*1 min*
Pause between impulse duration:	*10 sec*
Running failure alarm signal delay:	*3 sec*
Generator contactor connection delay:	*3 sec.*
Max. battery charge current:	*2 amp*
Monitoring activation delay:	*10 sec.*
Max. hooter duration:	*2 min.*
Mains restored-transfer back delay:	*1 min.*
Number of start-up attempts:	*3*
Idling duration:	*2 min.*
Relay contacts rating:	*8 amp*



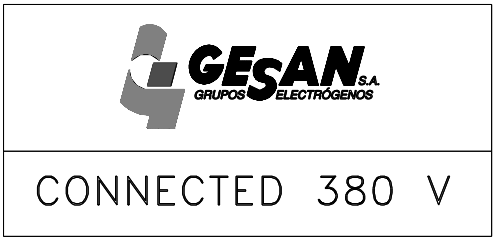
Flow chart for operation of an emergency automatic generator set

LABELS

On your generator you will find the following labels:

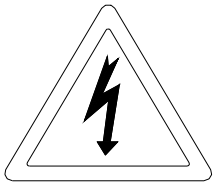


LABEL 1
(UNDEFINED HAZARD)



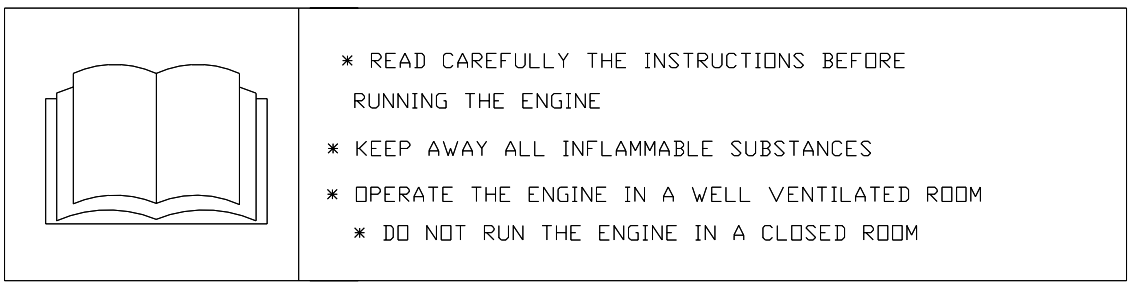
LABEL 2

LABEL 3
(EARTH)



LABEL 4
(ELECTRICAL HAZARD)

LABEL 5



For your safety and the safety of the others, please replace immediately all these labels in case of loss or damage.

BEFORE OPERATION

(Please note that this section is valid for models DS170L, DS240L, DS240R and DS400L)

In order to carry out the maintenance checks stated below, please ensure that the unit is on a flat and stable surface.

- ***RECOMMENDED OIL***

Always choose the correct viscosity suited to the ambient temperature in which the unit will be run.

From (4ºC) 40ºF……..……..…SAE 30
Between –18ºC (0ºF) and +4ºC (40ªF)……SAE 5W-30, SAE10W-30)
Below 4ºC (40ºF)……...Synthetic 5W-20, 5W-30

If the temperature is above 4ºC (40ºF), multigrade oils (10W-30 etc) increase oil consumption and can harm the engine. If using these types of oils, check the oil level ona more regular basis.

If using oils SAE30 below 4ºC (40ºF), start up will be more difficult and can harm the engine due to lack of lubrication.

WARNING!!!

Chosing the right oil is an important factor as it can affect the enigne's life span and performance.
Running the engine with too little oil can lead to serious damage.
Do not use non detergent or vegetable oils.

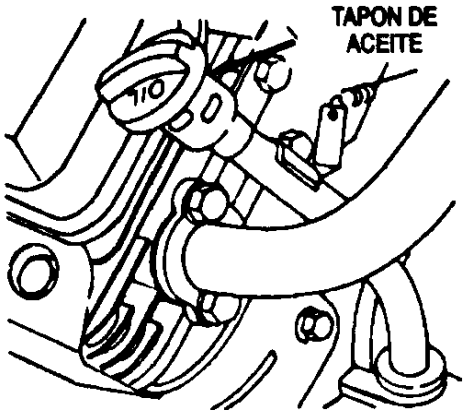
- ***CHECKING THE OIL LEVEL***

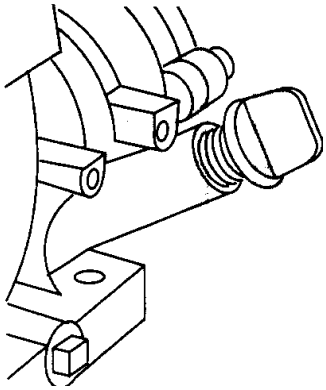
a) Remove dipstick and wipe it clean.

b) Replace dipstick (See photo 1)

c) Remove the dipstick once again and check the oil level (The dipstick should be firmly screwed to the tube whilst the engine is running)

d) If the oil level is too low, refill to the point marked on the dipstick and check once more. (See photo 3)





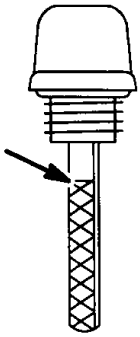


Photo 1 *Photo 2* *Photo 3*

- ***RECOMMENDED FUEL***

Use motor fuel.

WARNING!!!

**Do not mix oil with fuel which has already been used*
**Do not let dirt or water enter the tank.*
**Do not use fuel which contains alcohol.*

NOTE: THE WARRANTY DOES NOT COVER ENGINE DAMAGE CAUSED BY THE USE OF POOR QUALITY FUEL.

WARNING !!!

Fill the fuel tank where there is sufficient ventilation and with the engine is switched off.

Do not smoke or allow sparks or flames in the area where the engine is refuelled or where fuel is stored.

Do not overfill the fuel tank and make sure that after pouring fuel, the fuel cap has been screwed on properly.

Be careful not to spill fuel when refilling. Fuel vapour or spilled fuel may catch fire. In case of a fuel spillage, make sure that the area is dry before starting the engine.

KEEP FUEL OUT OF THE REACH OF CHILDREN

OPERATION

Once the engine is running, your GESAN generator set is ready to provide you with the energy you require.

However, for your own safety and for the correct running of your generator set, please follow the instructions set out below.

WARNING !!!

**** Do not connect** the generator set to the mains.*

**** Do not start the generator** without checking that there is nothing connected to the output sockets.*

**** Do not change** the cable connections.*

** **Do not change the engine speed**: The frequency and the voltage directly depend on the rotation speed of the engine. This adjustment IS CARRIED OUT AT THE FACTORY.*

MANIPULATING THE ACCELERATOR ON THE ENGINE ENTAILS THE LOSS OF THE WARRANTY.

**** Do not connect equipment** using a voltage different from that supplied by the generator set.*

** **It is not advisable** to use this generator set for equipment such as television sets, hi-fi systems, computers, etc.*

** **If an electric welder is to be connected**, please consult our engineers. Current peaks MAY BURN OUT THE ALTERNATOR.*

**** Avoid overloads**. The generator set is fitted with a circuit breaker. If the circuit breaker is set off, ensure that the load is reduced before restarting the unit.*

For problem-free operation remember that:

- The sum of the power ratings of the equipment connected to the generator set has to be compatible with the characteristics shown at the end of this manual.

- Some apparatus (electric motors, air compressors, etc.) absorb power higher than their nominal power rating when starting. Please consult your distributor in each case.

- Do not exceed the maximum current (Amps) values indicated for each output socket.

COMMISSIONING

INSTALLATION

a) Place the machine on a firm, flat surface.

b) If the machine is to work outdoors, protect it against rain. Make sure the machine is running in an environment where there is minimal damp and dust. Check that the exhaust is not pointing at people.

c) If the machine is to run in an enclosed space, install a pipe of sufficient diameter to evacuate exhaust fumes outside, where they will not endanger people. Make sure that the machine is ventilated sufficiently for the engine to run.

d) Allow enough space for supervision, servicing and maintenance. We recommend that at least 1 metre is left free around the machine.

CONNECTIONS

Open the control panel and connect the apparatus to be used to the terminals, then lift the circuit breaker.

The terminals can also be connected to an external distribution box, to which the apparatus is then connected.

DURING OPERATION

Make sure that the maximum power consumption is within the values shown in this manual, in order to avoid alternator breakdown.

Check the fuel level from time to time to prevent the fuel circuit from emptying.

STARTING UP

AUTOMATIC STARTING WITH GECO

These generator sets feature a set mounted terminal box and a control panel which may be mounted on the set or separately if required. These generator sets may run both manually or automatically.

1) Check that the switch on the control card is in the OFF position.

2) Following the wiring diagram supplied, wire up the terminal box to the control panel, connecting both power cables and control cables.

3) Check that the circuit breaker inside the control panel is disconnected.

4) Check oil and radiator water levels. Fill if necessary.

5) Check fuel level.

6) Connect up the battery, first the positive terminal, then the negative terminal.

7) Connect the mains and check that the voltage indicator light is on.

8) Connect the circuit breaker or trip (lever up).

9) Turn the switch on the control card to the desired position:

STOPPING THE ENGINE

MANUALLY

Press button STOP of control card.

AUTOMATICALLY

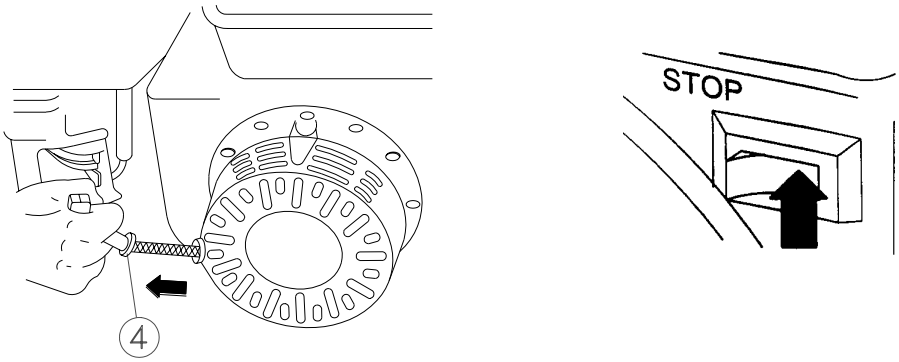
If the bridge between terminals 1 and 2 is opened, first the generator contactor disconnects and the engine stops one minute later.

MANUAL START-UP

WARNING!!!

Check that nothing is connected to the generator set outputs

a) Open the fuel tap (1). Check the postion of idle cutoff where necessary.
b) For enines fitted with choke, pull the lever out.
c) Turn the engine knob to ON
d) Pull the starter grip smoothly out until a certain resistance is felt and then pull out hard.
e) *For engines with choke, push the lever in.*



(For automatic start or start up via signal, the choke is automatic)

ELECTRIC START:

WARNING!!!

a) Check that nothing is connected to the generator set outputs.

b) Turn the key to the contact position and start the engine by turning the key further to the right. Once the welding set has started, release the key.

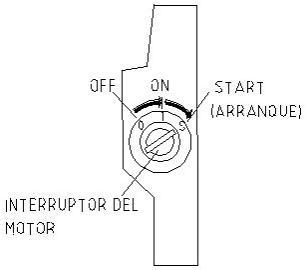
c) Open the fuel tap and check the idle cutoff where necessary.

d) For enines fitted with choke, pull the lever out.

e) Turn the engine knob to ON.

f) Turn the key to the contact point.

g) For engines fitted with choke push the lever in.



NOTE: Do not use the electric starter for during more than 5 seconds at a time. If the engine does not start up , release the key and wait ten seconds before trying again.

STOPPING THE ENGINE

MANUAL START UP

a) *Disconnect all apparatus connected to the generator output.*
b) *Use the choke, where fitted.*
c) *Turn the engine knob to OFF.*
d) *Close the fuel tap.*

ELECTRIC START

Stop the unit using the key, turning it to the left.

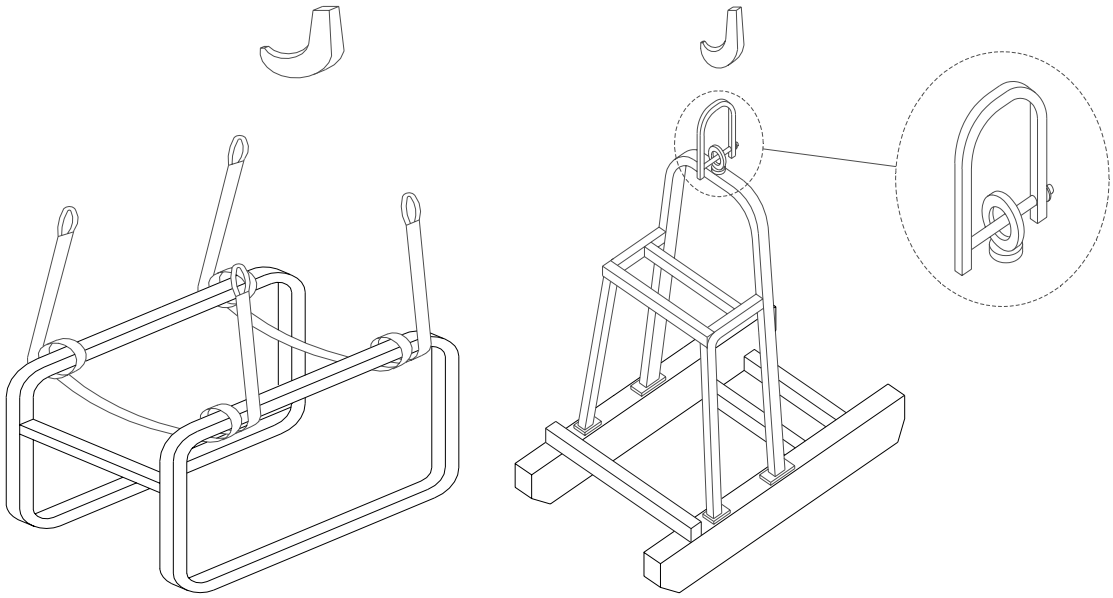
HANDLING AND STORAGE

HANDLING

Depending on the chassis or baseframe, the generator set can be transported in different ways.

Generator sets with tubular chassis, should be transported using two slings tied to the chassis as shown on the diagram in fig. 1 It is important that the slings are secured firmly to the chassis and that they do not give.

For skid baseframes with a seat form should be loaded using the hook provided on the pole on the upper part as shown in diagram fig.2.



TRANSPORT

WARNING !!!

Before carrying the generator ensure that the battery is disconnected. Drain the fuel tank before carrying the generator set.

LONG TERM STORAGE

When the generator set is withdrawn from service for a prolonged period please bear in mind the following instructions:

a) Store the generator in a damp free and dust free environment.

b) If the generator set is not to be used for more than six months, drain the engine oil and remove the oil filter. Replace when the set is to be used again.

c) Remove injectors and pour a small amount of oil in the cylinders through the cylinder orifices.

d) Crank the engine manually, if possible, to distribute the oil in the engine.

e) Disconnect the batteries.

Your generator set will thus be ready for starting whenever you need to operate it.

MAINTENANCE

Therefore vital, to ensure long lasting service from your generator set, that you observe the schedule provided and also consult the engine and alternator manuals.

WARNING !!!

**The engine and exhaust pipe reach very high temperatures and can cause serious burns or set some inflammable substances on fire. Let the engine cool down for at least 15 mins. before undertaking maintenance.*

** The use of NON ORIGINAL or equivalent parts may damage your generator set*

MAINTENANCE SCHEDULE:

In order to avoid problems and accidents it is important to maintain the machine in optimum condition.

		At each use	***1st month or 20 hours***	***Every 3 months or every 50 hours***	***Every 6 months or every 100 hours***	***Annually or every 300 hours***
Engine Oil	*Check level*	√				
	Change		√		√	
Air filter element	*1 Check*	√				
	Clean			*√		
Sediment cup	***Clean***				√	
Oil filter	***Replace***					*At 200 hours*
Spark Plug	***Clean and re adjust***				√	
Combustion chamber	***Clean***					** √
Valves	***Clean***					** √
Valve settings	***Check and adjust***					** √
Petrol filter/tank	***Clean***					** √

(*)Clean more often if running in a dusty environment
(**)To be carried out by specialists with the right tools
(***)Replace where necessary

CHANGING THE OIL

Prolonged and frequent contact with used oil can lead to skin cancer. Although this is unlikely, it is recommended that you wash your hands after having been in contact with used engine oil.

In order to empty the oil quickly and completely, it is best to empty the carter immediately after the engine has cooled down (approx. 15 minutes)

a) Remove cap for filling (1) and cap for emptying (2) (See photo 8)

b) Replace emptying cap with joint and screw tightly (See photo 8)

c) Fill up using recommended oil and check that it is level with the filling orifice.

WARNING !!!

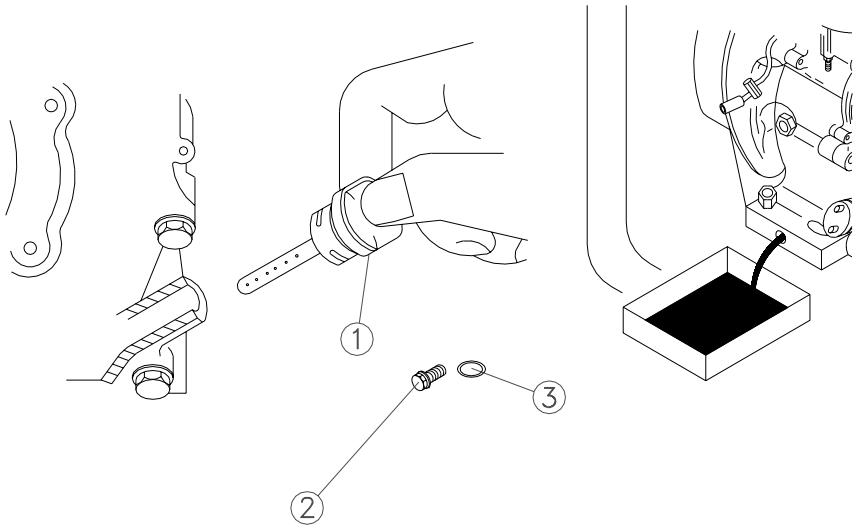


Photo 8

AIRFILTER

Never use petrol or other flammable liquids to clean the air filter elements. Such liquids can catch fire and lead to the deterioration of said elements.

¡¡ ATENCION !!!

**Do not use the generator set without air filter as this can cause damage to the engine.*

1) Remove air filter.

2) Clean the paper element with compressed air not exceeding 2.1 kg/cm.

3) Clean foam element woth a little petrol and after leave it to dry thouroughly before fitting it back .

SPARK PLUG MAINTENANCE

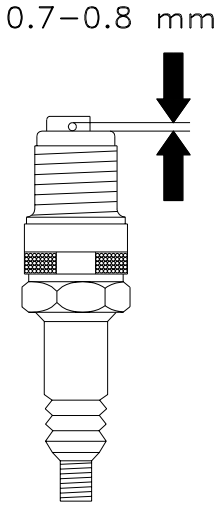
WARNING !!!

**Do not touch the exhaust pipe or the spark plug immediately after use as this can cause serious burns.*

a) Remove valve cap and unscrew the spark plug with a spanner.

b) Check the spark plug and replace it if the electrodes are dirty or the insulator is broken or melted.
Clean the spark plug with a metallic brush.

Do not clean by sanding.



c) Measure the distance between the electrodes with thickness guage. This should measure between 0.7 and 0.8 mm. If an adjustment needs to be made, simply turning the lateral electrode is enough.

d) Check the state of the washer. Then screw the spark plug firmly back into place.

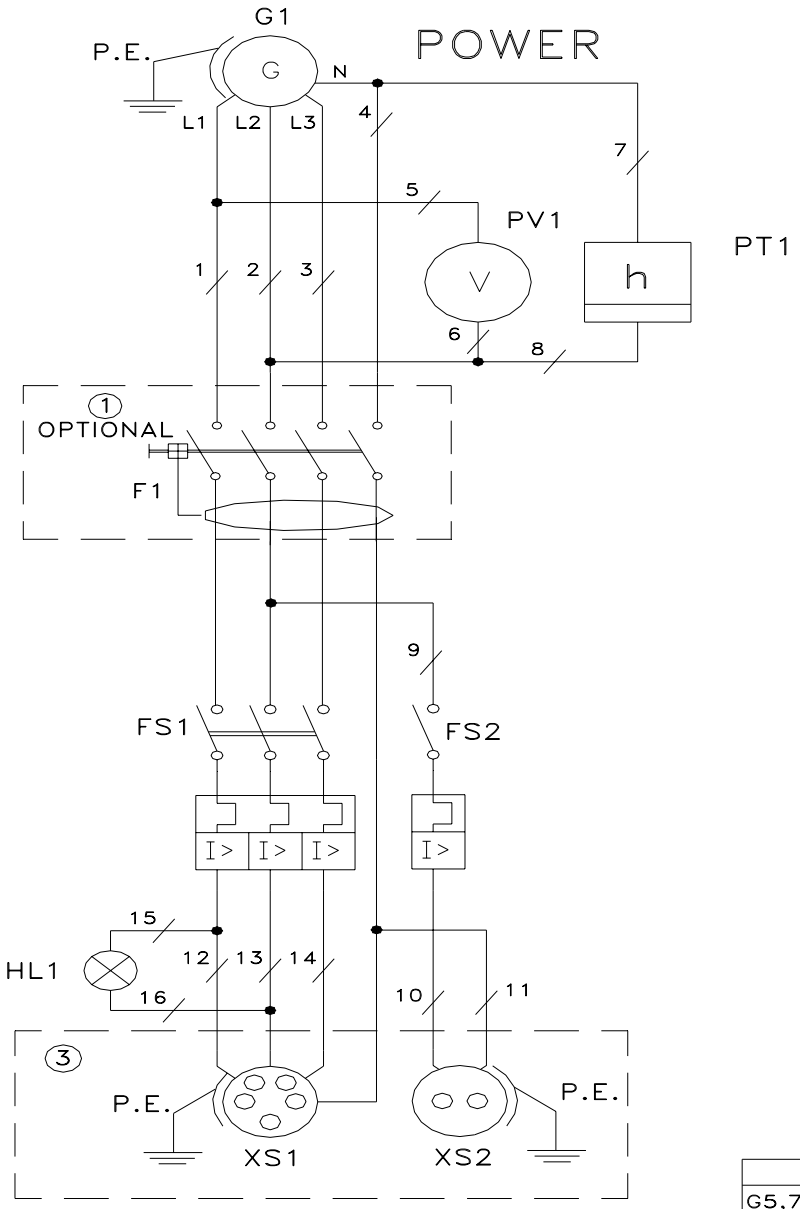
e) If using a new spark plug, turn halfway round once more and if re suing a spark plug, scre ¼ of the way round. Replace the cap on the spark plug. capuchón de la bujía.

Photo 11…

The spark plug should be screwed in correctly otherwise it may heat up and damage the engine.

WIRING DIAGRAM

WIRING DIAGRAM PETROL AUTOMATIC 400/230 V.



		UNIT MODEL			
		G5,7 L4,6	G8,R8,L8 GS240 DC V DS240R	G10,L10 R10	G12,R12
XS2	MF 2P+T. Schuko socket	16A	16A	16A	16A
XS1	17 TF 3P+T+N CEE Socket	16A	16A	32A	32A
HL1	380V Red Neon Lamp.				
FS2	1P Moduler Autom. Circuit breaker	10A	10A	10A	10A
FS1	3P Moduler Autom.Circuit breaker	10A	16A	16A	20A
PT1	230VAC50Hz 45x45 Hours run meter				
PV1	540 0-400V Voltmeter				
P1	4P,25A.30mA Elcb Circuit Breaker				
ELEM.	TYPE				

DIAGRAM N° 1337

WIRING DIAGRAM PETROL MANUAL 400/230 V.

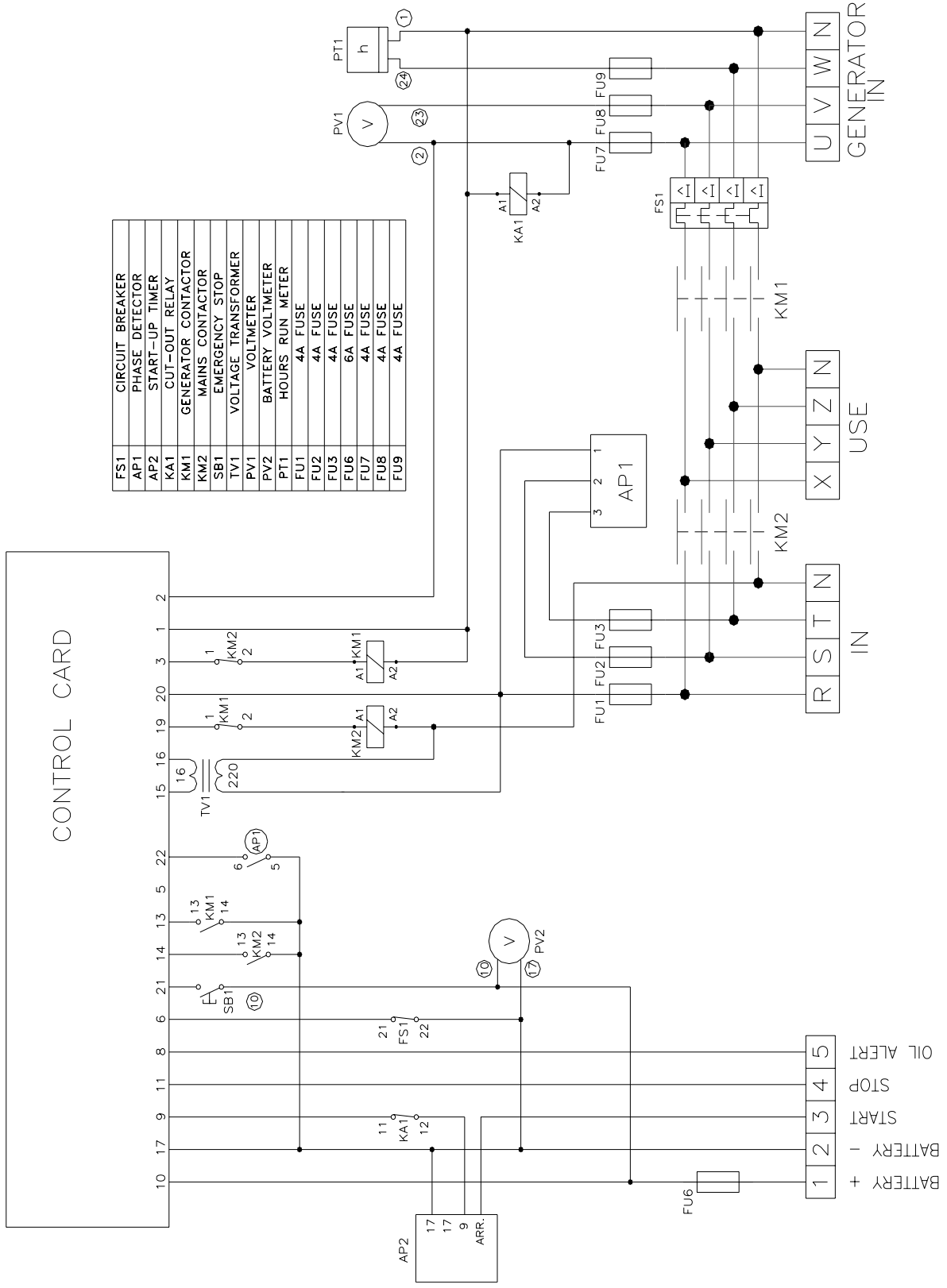


DIAGRAM Nº 1029

WIRING DIAGRAM PETROL AUTOMATIC 230V.

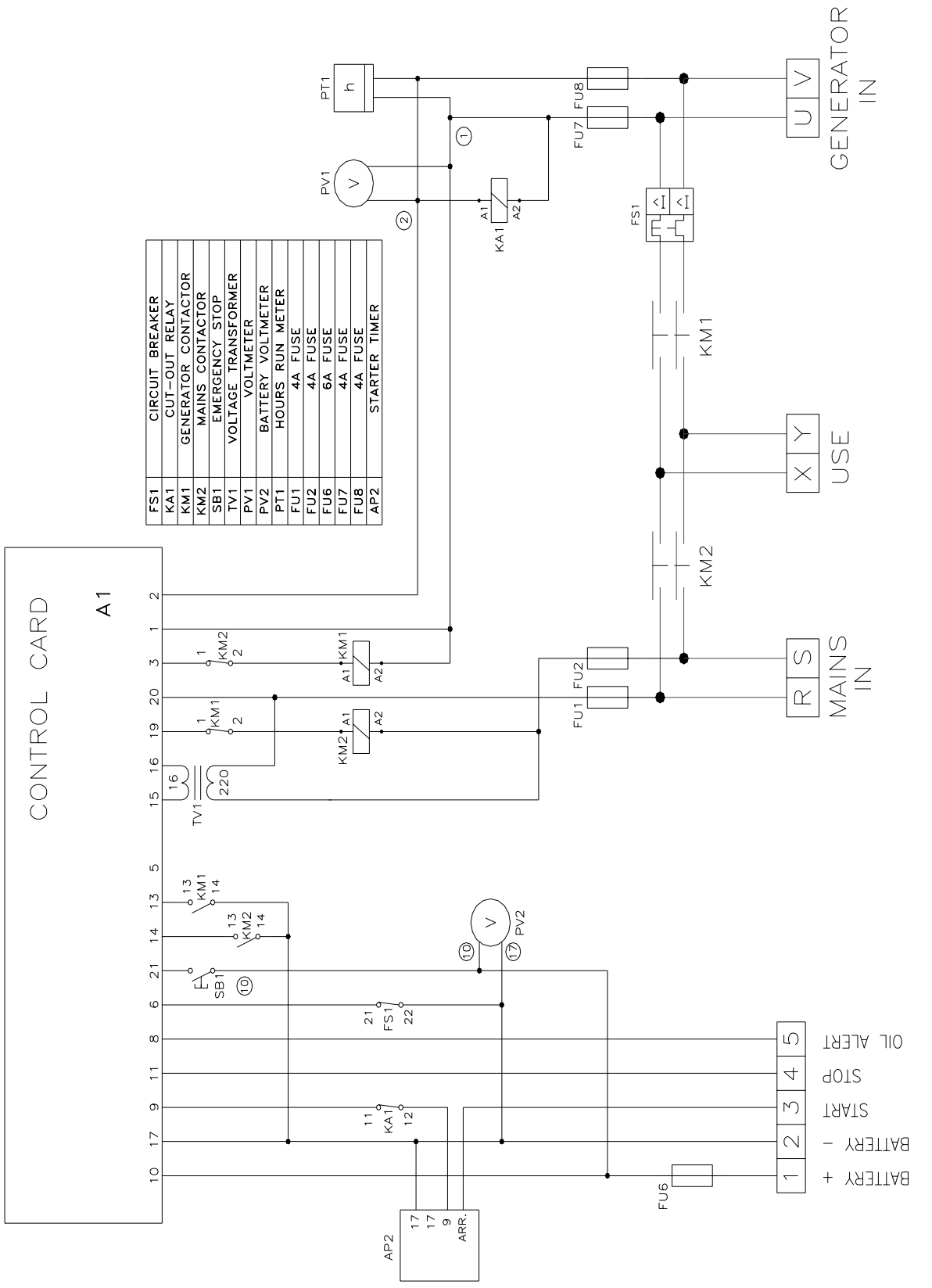
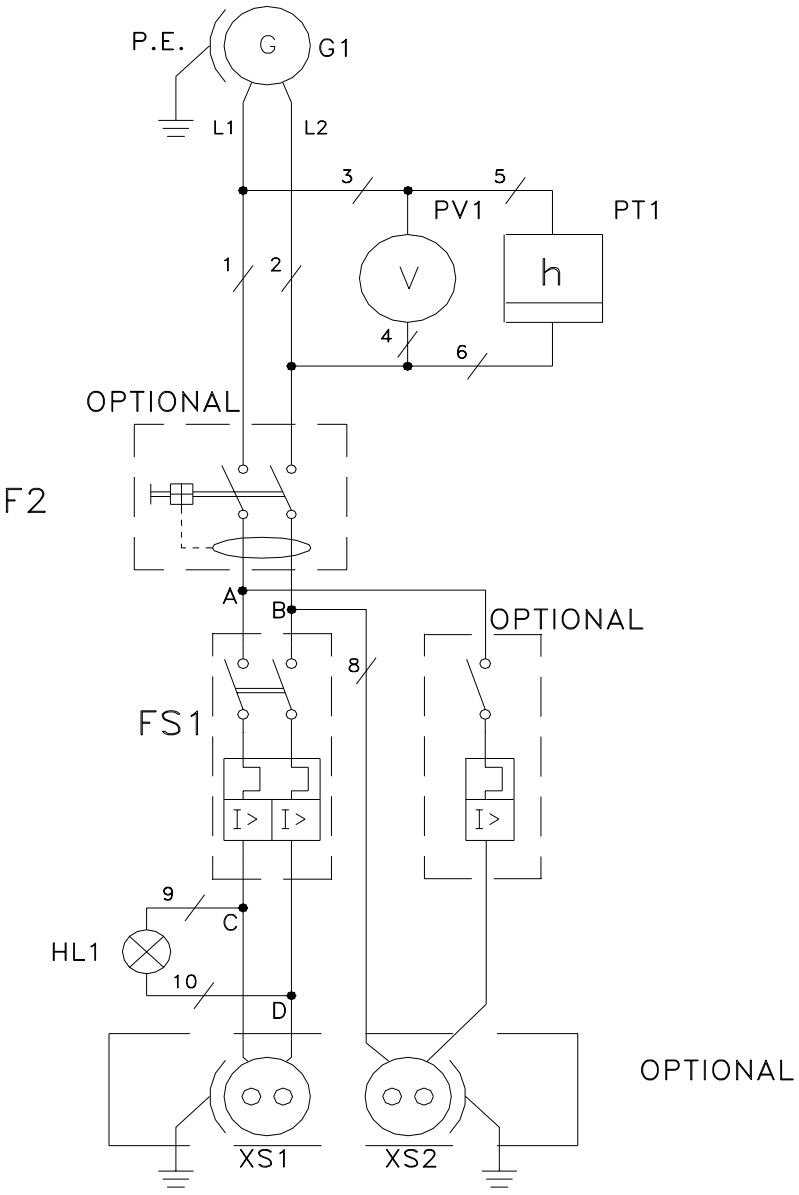


DIAGRAM Nº 1027

WIRING DIAGRAM PETROL MANUAL 230V.



		GRUPO					
ELEM.	DESCRIPTION	G3000	G5000	G7000	G8000	G10000	G12000
F2	2P. Elcb Circuit Breaker	25A	25A	40A	40A	63A	63A
XS2	2P+TT+NSocket	30A	32A	32A	32A	32A	32A
XS1	2P+TT+NSocket	30A	16A	16A	16A	16A	16A
HL1	220V Neon Lamp.						
FS1	2P Circuit Breaker	10A	20A	32A	40A	50A	50A
PT1	230V 50HzHours run meter.						
PV1	540 0-250V Voltmeter						
N? PART	TYPE						

DIAGRAM Nº 1376

TROUBLESHOOTING

(Problems with the engine)

Problem	Possible cause	Solution
Engine does not start up	1. Valves	1. Remove and grind the valve base
	2. Loose Cylinder Screws	2.Tighten
	3.Blocked ducts	3.Remove and clean
	4. Blocked fuel filter	4. Replace
	5. Air in fuel pipes	5. Ventilate
	6.Blocked injectors	6. Check the nozzle and replace where necessary
	7. Blocked vent on tank	7. Clean
	8. Injection valve blocked	8. Check and replace where necessary
	9. Pump	9. Check and replace damaged part
	10. Battery discharged	10. Recharge
	11. Cables connected incorrectly	11. Check wiring diagram and correct
	12. Faulty start up switch	12. Replace
	13. Faulty starter engine	13. Repair or replace
Engine starts up, then cuts out	1. Blocked air filter	1. Replace
	2. Low ticking over	2. Change to 51.5 Hz
	3. Blocked fuel filter	3. Replace
	4. Air in fuel circuit	4. Release
	5. Blocked vent on tank	5. Clean
	6. Hitched rack	6. Check and replace where necessary
Engine does not accelerate	1. Overload	1. Check recommended maximum loads
	2. Incorrect injection advance	2. Repair
	3. Broken spring on regulator	3. Replace
	4. Blocked fuel filter	4. Replace
	5. Blocked vent on tank	5. Clean
	6. Zip caught	6. Check and consult technician
	7. Air in fuel circuit	7. Ventilate
Varying speed	1. Zip caught	2. Check and consult technician
	2. High oil level	2. Check and adjust level
Black smoke	1. Air filter blocked	1. Replace
	2. Incomplete runninng in	2. Check running hours and follow indications to complete it
	3. Worn down segments	3. Check segments and cylinder sleeve
	4. Worn down cylinders	4. Check and correct
	5. High oil level	5. Check and correct
The generator does not excite	1. Low engine speed	1.Check revolutions and bring them back to normal value
	2. Condensor damaged	2. Change condensor
	3 Defective winding	3. Check resistance on windings
	4. Diodes broken	4. Check and replace
	5. Loss of remanence	5. Apply 220V to condensor
High tension on empty	1. High speed	1. Check revolutions and adjust
Low tension on empty	1. Reduced speed	1. Check revolutions and adjust
	2.Damaged Diodes	2. Check and replace
	3. Damaged windings	3. Check resistance on windings
Correct tension on empty, but falls with load	1. Reduced speed with load	1. Check revolutions and adjust
	2. Load too high	2. Check and intervene where necessary
	3. Short circuit on diodes	3. Check and change
Tension unstable	1. Infrequent contacts	1. Check connections
	2. Irregular rotation	2. Check uniformity f rotation
Noisy	1. Damaged bearings	1. Replace
	2. Damaged coupling	2. Check and repair
High temperature on alternator	1. Opening on vents partially blocked	1. Remove and clean the
	2. Possible overload	2. Check the load

(Problems with the alternator)

Problem	Cause	Solution
No current in the alternator	1. The circuit breaker or limiter arer unscrewed	1. Screw in the circuit breaker
	2. Failure to excite	2.Consult technician
	3.Low speed on engine	3. Check engine speed
	4. Damaged condensor	4. Change
	5. Brush holder broken	5. Replace
	6. Rectifying bridge	6. Replace
	7. Damaged potentiometer	7. Replace
Tension too high without load	1. Capacity condensor too high	1.Control capacity
Tension too low without load	1. Diodes or varistor damaged	1. Change
	2. Faulty winding	2. Check and change
	3. Capacity condensor too low	3. Check capacity
	4. Potentiometro not set to maximum	4. Set to maximum
Correct tension on empty, but falls with load	1. Speed too low with load	1. Check the load
	2. Load too high	2. Check the load
	3. Short circuit on diode	3. Check and change
Tension unstable	1. Poor contacts	1. Check
Noisy alternator	1. Faulty bearings	1.Replace
	2. Faulty coupling	2. Check
Electrode is not melted correctly	1. Fault in excitation	1. Consult technician
	2. Potentiometro poorly regulated	2. Regulate
No current in output terminals	1. Potentiometro damaged	1. Replace