SIMPLY SMARTER GROUND SUPPORT

Ground power units, pre-conditioned air units, cables and hoses

It’s all about connections

GENERATOR *OUTPUT TEST ENGINE DRIVE*

4400 400HZ GPU's

It's all about connections

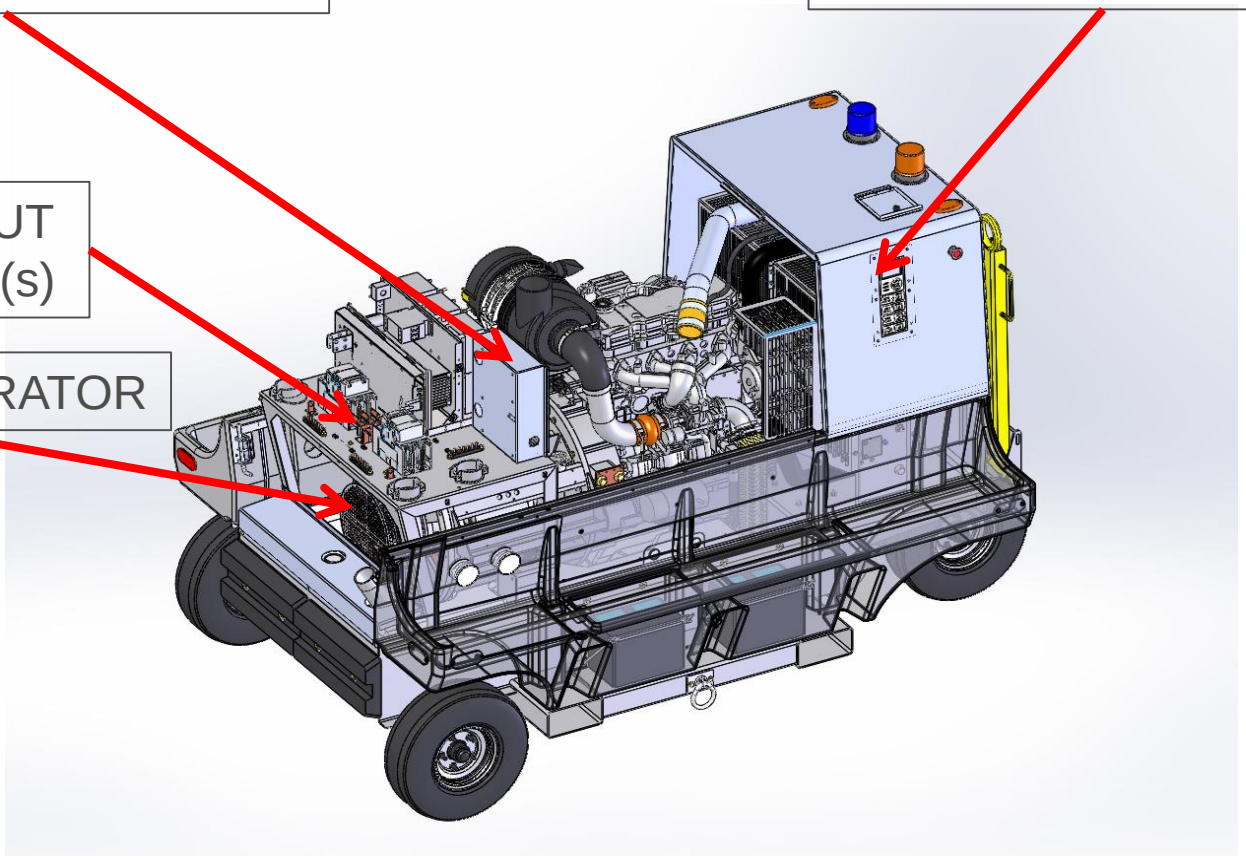
4400 GPU'S LOCATION OF PARTS

CONTROL MODULE
LOCATION OF INTERFACE
(contains Voltage Regulator)
AND CONTROL BOARD

DISPLAY
(OPERATOR CONTROL)

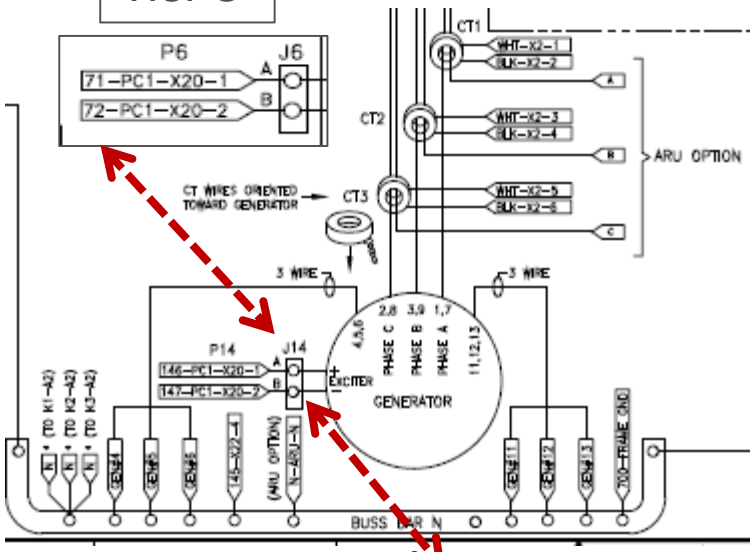
400HZ OUTPUT
CONTACTOR(s)

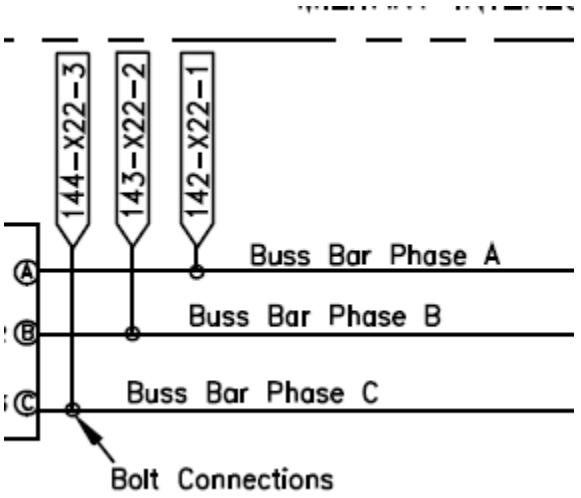
400HZ GENERATOR



GENERATOR OUTPUT TEST: UNIT NOT RUUNING

Tier 3



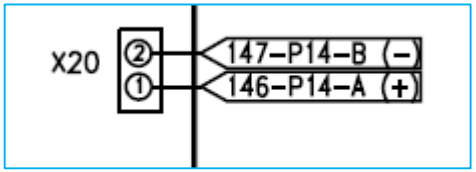


POWER MODULE

EXCITER

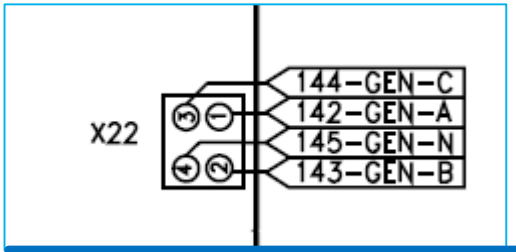
Tier 4

400HZ SENSE LINES



INTERFACE BOARD X20

CAN UNPLUG AND CHECK FOR GROUNDED OR OHMS (29 Ω OHMS) TO FIELD



INTERFACE BOARD X22

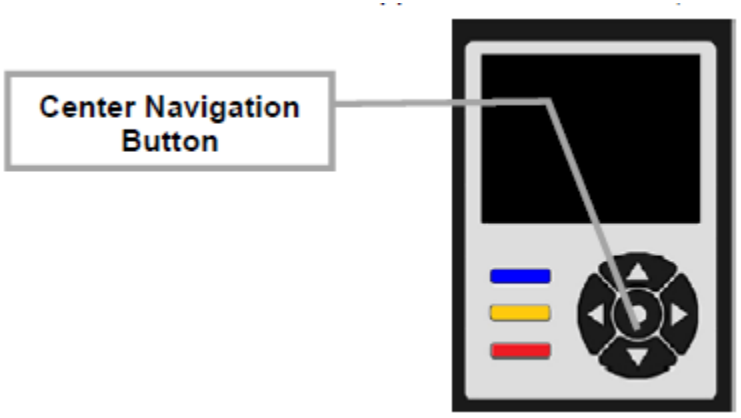
CAN UNPLUG AND CHECK FOR OHMS TO GROUND OF STATOR

GENERATOR OUTPUT *TEST: UNIT NOT RUUNING*

INTERFACE BOARD CHECK FUSE

GETTING TO 6 ICON SCREEN

PUSH AND HOLD CENTER BUTTON FOR 5-8 SECONDS

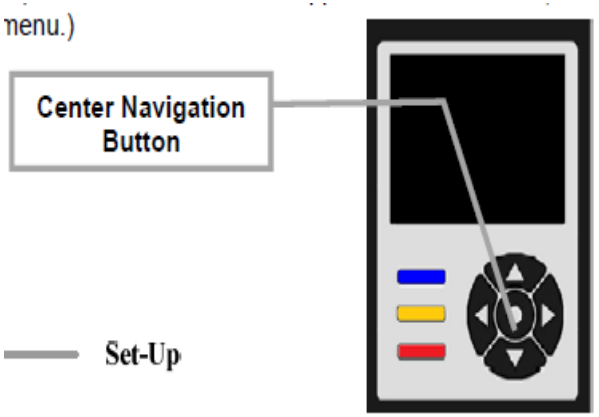


If you get a message that this is disabled go to next page

UNLOCK THE MENU SCREEN

How to unlock the menu screen

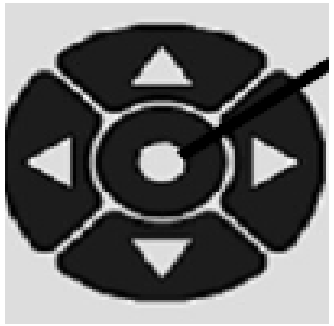
Once you have pushed the center button and get a error **Disabled**. Push the right, up, down,down arrow keys and hold the center button until the six icons show up



Once you have the six icons using the arrow key highlight the top left icon (Set up) pushed the center button.
Using the down arrow get to the menu lock bypass setting. show up. If it is enabled press center button to highlightuse the arrow up or down to then change to disabled. Press center button to un highlight it.

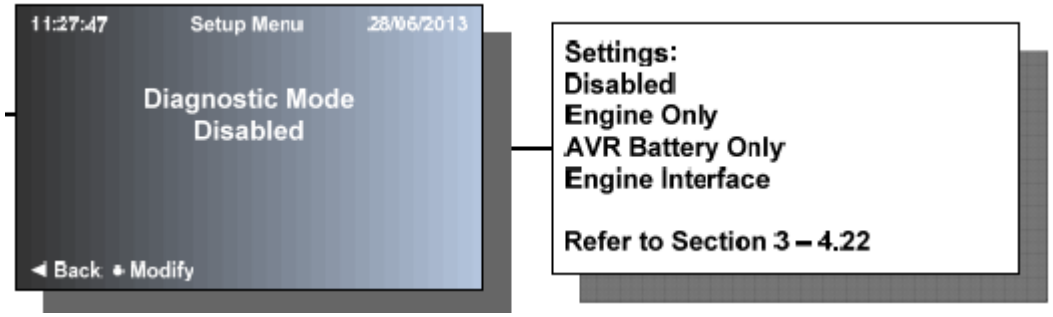
DIAGNOSTIC MODE

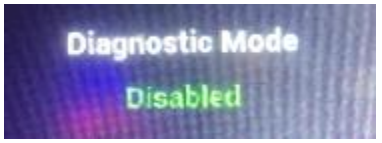
1. USE AROW KEY DOWN TO HIGHLIGHT DIAGNOSTIC MODE
2. PRESS CENTER BUTTON.

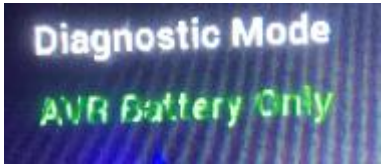


DIAGNOSTIC MODE

1. HIGHLIGHT DISABLED
2. ONCE HIGHLIGHTED PRESS THE CENTER BUTTON (Disabled will be green)
4. USE THE DOWN ARROW TO SELECT **AVR BATERY ONLY (** Turns green**)**
5. PRESS CENTER BUTTON (Turns White)
6. USE THE LEFT KEYES TO GET BACK TO THE 6 ICONS



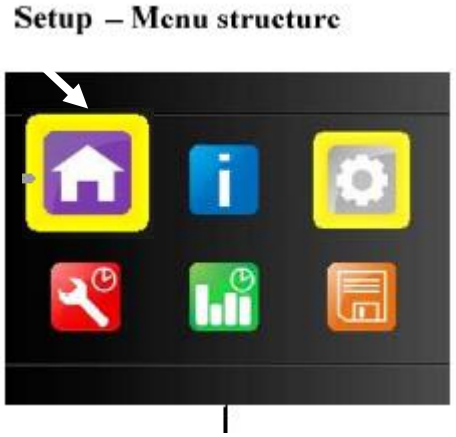


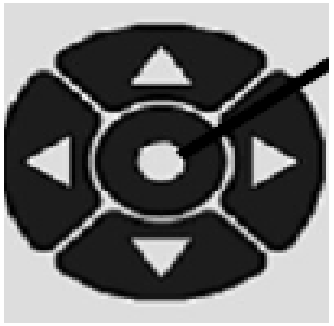


AVR BATTERY ONLY: WILL SUPPLY BATERY VOLTAGE TO GENERATOR

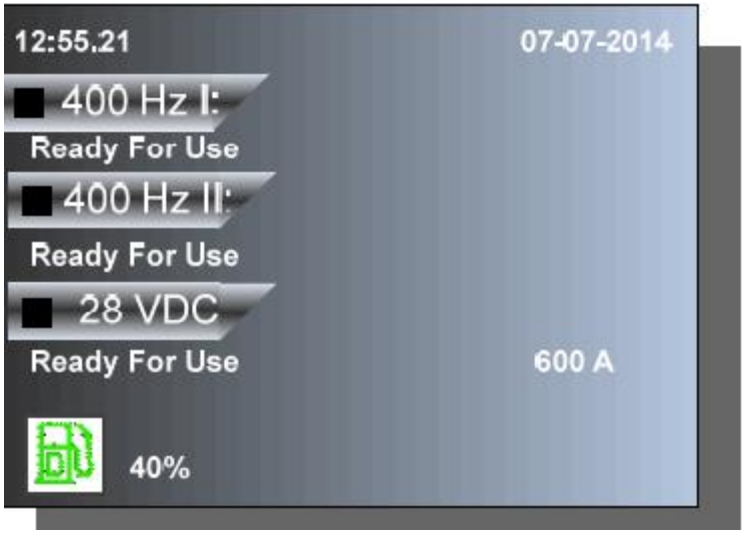
GETTING TO 6 ICON SCREEN

1. USE ARROW KEYS TO SELECT THE HOME ICON TOP LEFT
2. PRESS CENTER BUTTON





Home Screen

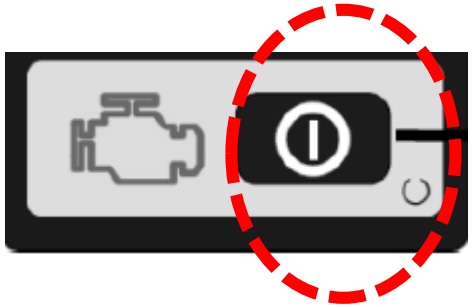


This shows Option Two 4400 HZ and DC OUTPUTS

DIAGNOSTIC TEST: Ensure Generator is serviceable

NOTE DEPENDING ON ALLOW **ENGINE IDLE ENABLE**

- Idle First or go to Rated speed
- **PUSH ENGINE START SWITCH again to go to Rated**
- **Engine should go up to rated speed (Full Run)**

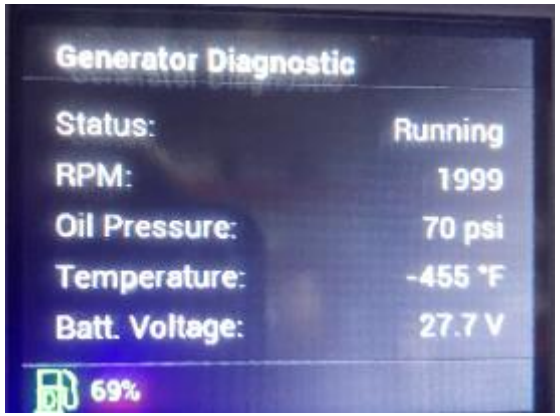


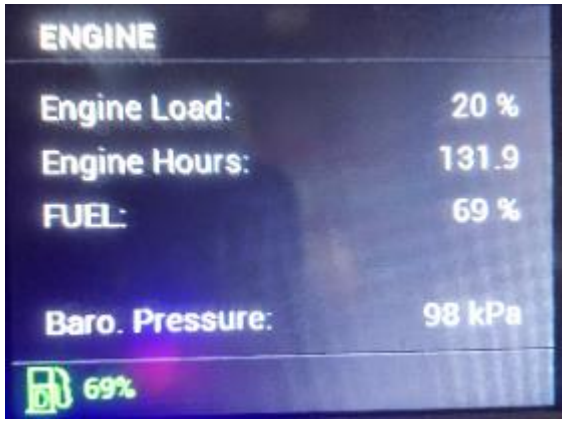
DIAGNOSTIC TEST:

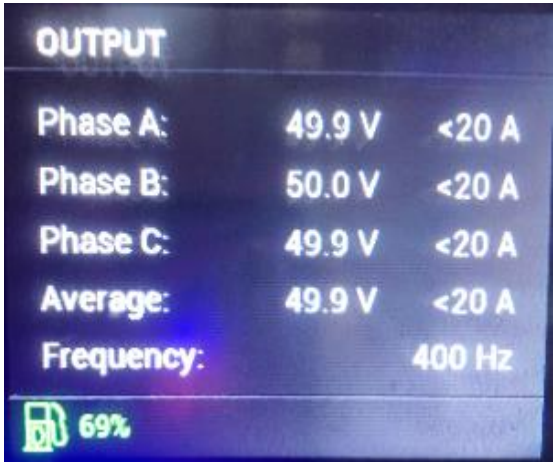
USE THE DOWN ARROW KEY TO REVIEW SCREENS

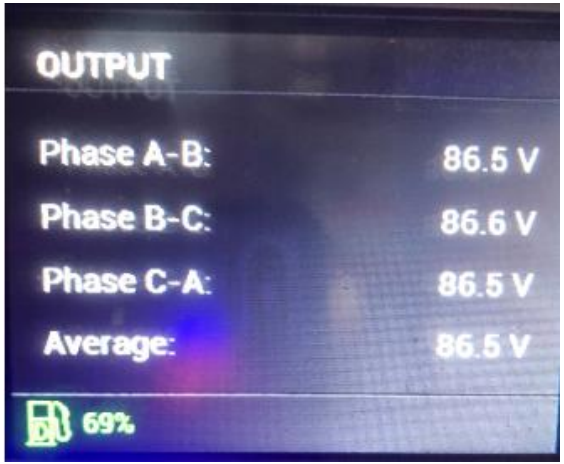
THIS SHOWS A WORKING GENERATOR

NOTE: PWM DUTY CYCLE at 32% NO LOAD





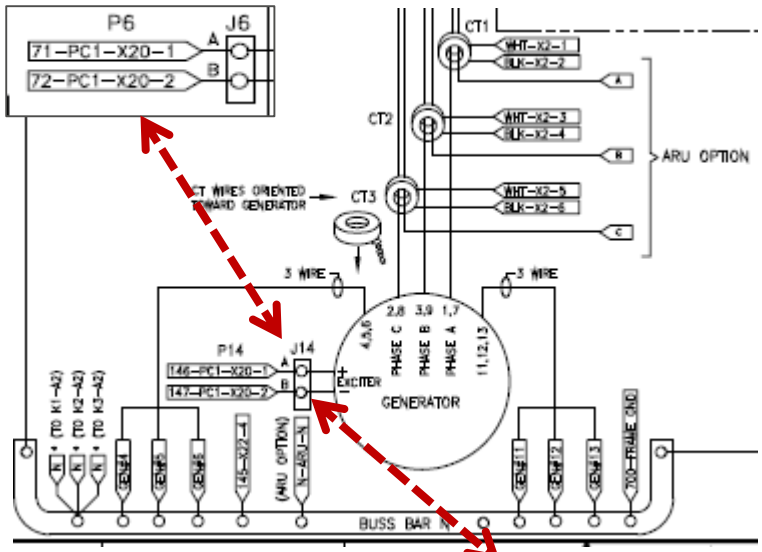


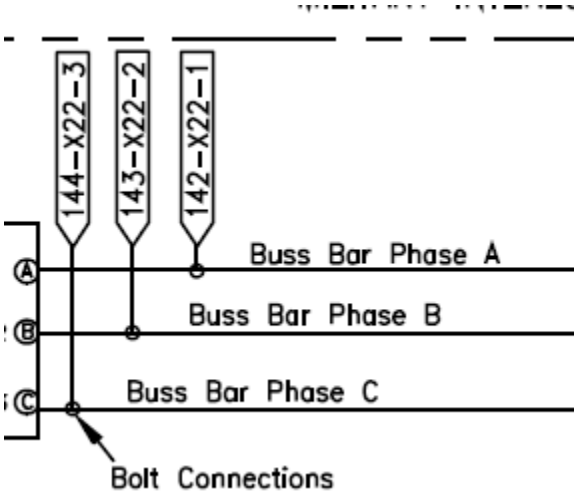


NOTE: IF PWM DUTY CYCLE is HIGH THERE IS PROBLEM, IF VOLTAGE ARE UNBLANCED THERE IS A PROBLEM

In Generator Diagnostic MODE

Tier 3



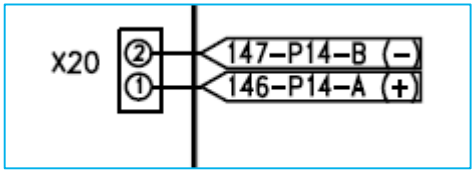


POWER MODULE

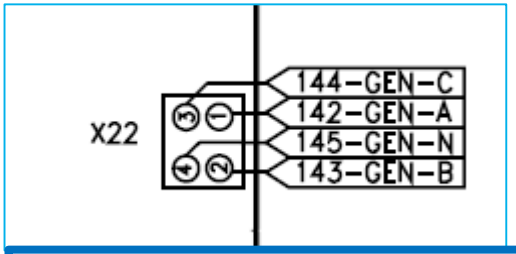
EXCITER

Tier 4

400HZ SENSE LINES



Back probe the plug with a meter you should read 12VDC

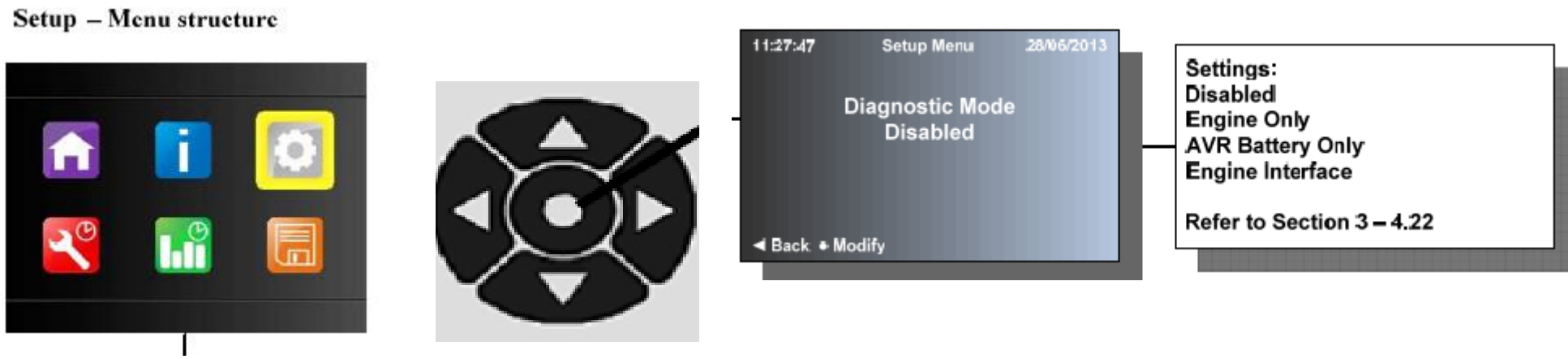


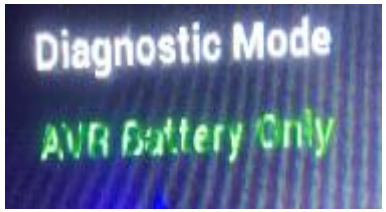
INTERFACE BOARD X22

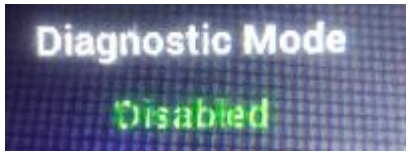
You can measure the generator output voltage.

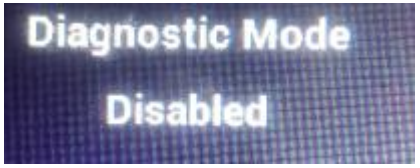
DIAGNOSTIC MODE DISABLED

1. USE ARROW KEYS TO SELECT THE SETUP ICON TOP RIGHT
2. PRESS CENTER BUTTON
3. PLACE DIAGNOSTIC MODE IN DISABLED







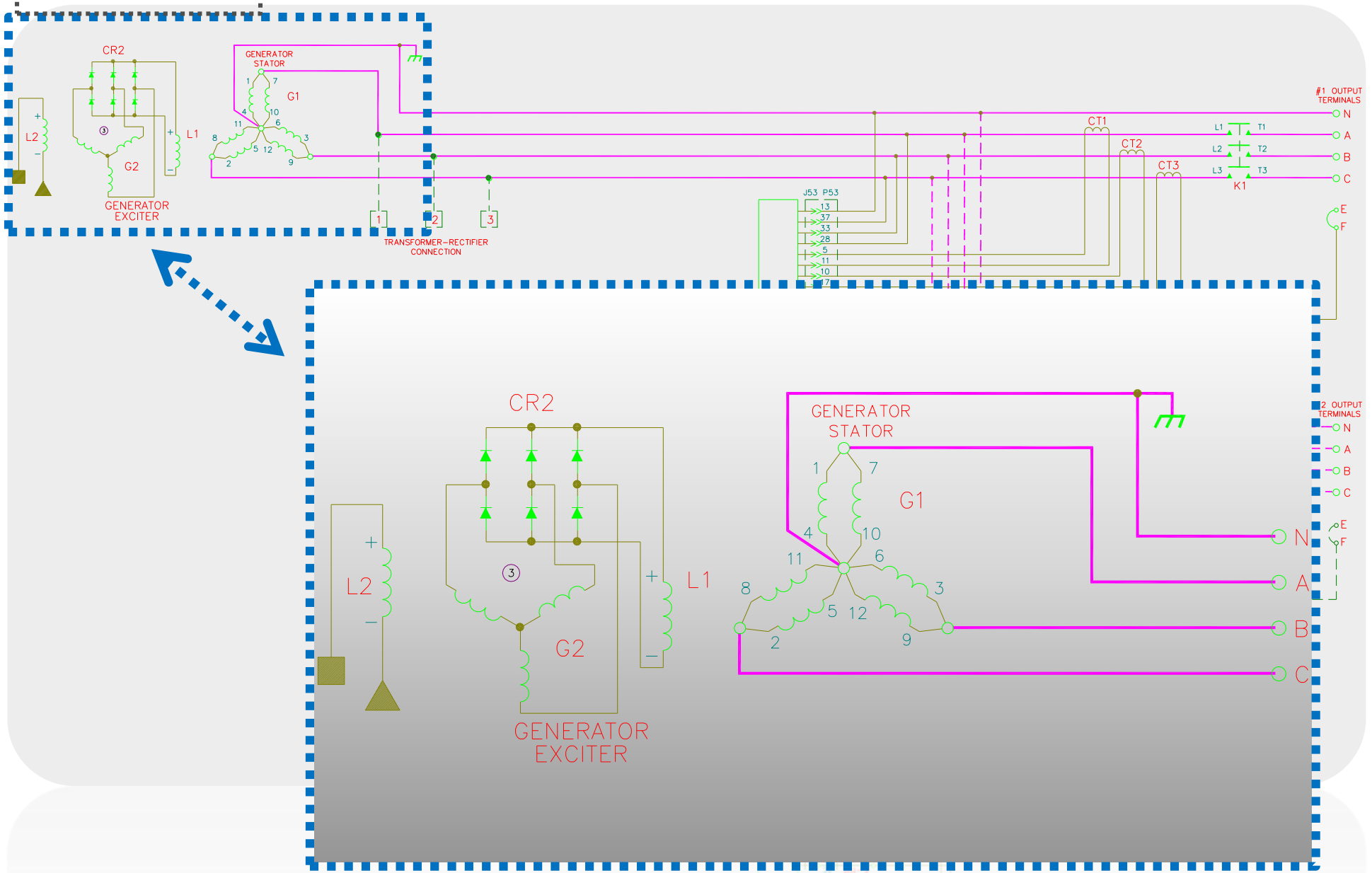


GENERATOR COMPONENT TEST:

Ensure Generator is serviceable

GSE

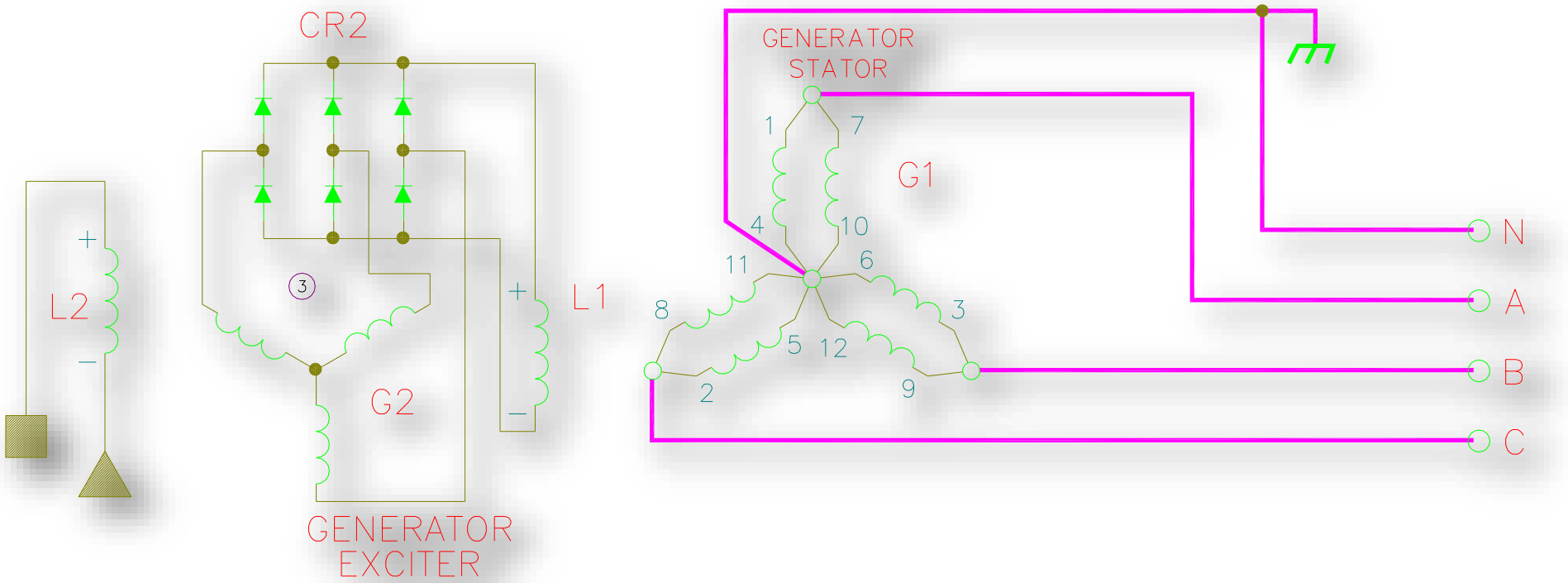
GENERATOR



GENERATOR COMPONENT *TEST:*

Ensure Generator is serviceable

GENERATOR COMPONENTS



L2 ***EXCITER FIELD WINDING***

G2 ***EXCITER ARMATURE*** **(ROTATES)**

CR2 ***DIODES:*** ***RECTIFY*** **- AC FROM ARMATURE (G2) to DC for (L1)**

L1 ***GENERATOR REVOLVING FIELD*** **(ROTOR)**

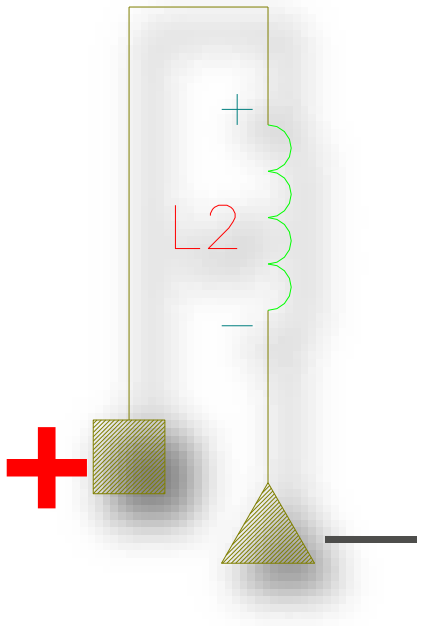
G1 ***STATOR WINDINGS:*** **Generator Output 3 ø AC, 115 per Phase (ø = symbol for phase)**

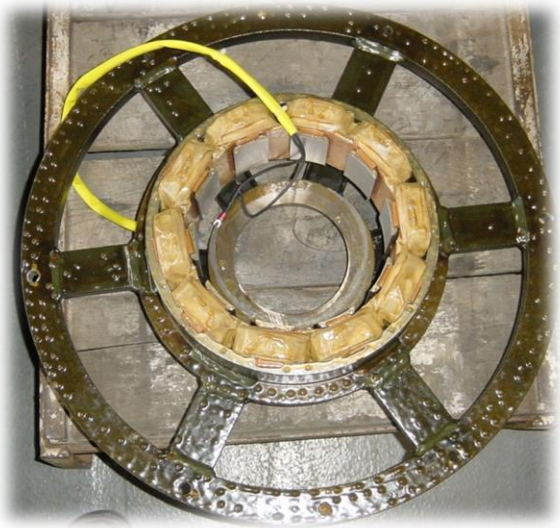
GENERATOR COMPONENT *TEST:*

Ensure Generator is serviceable

GENERATOR COMPONENTS:

EXCITER FIELD WINDINGS (L2)





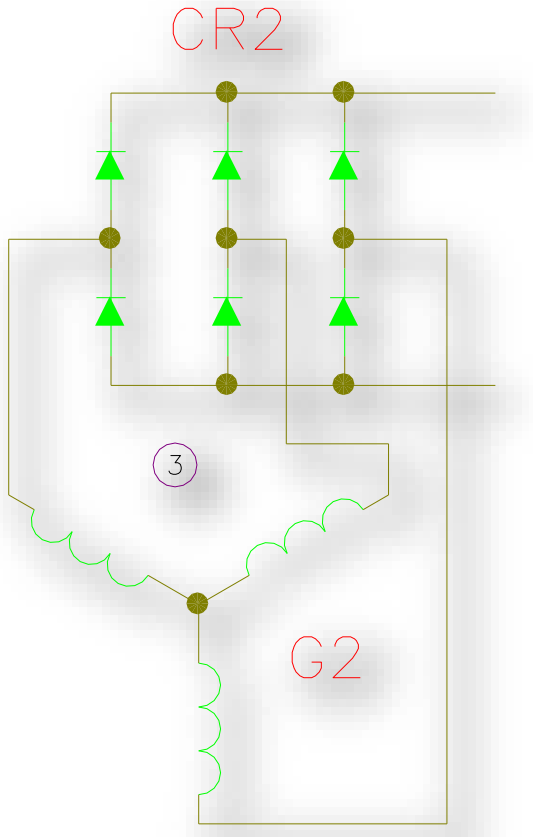
- ***Build Magnetic field for G2 Armature***
- ***Controls Generator output by DC Voltage Signal from Regulator***
- ***Receives Battery power in Diagnostics mode to test Generator***

GENERATOR COMPONENT TEST:

Ensure Generator is serviceable

GENERATOR COMPONENTS:

EXCITER ARMATURE



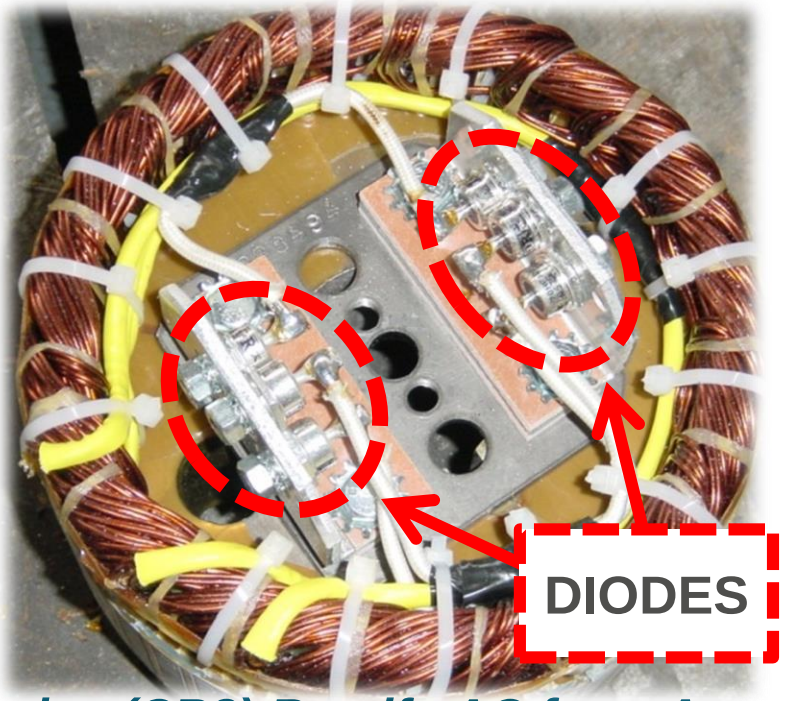
- *While Rotating, Produces AC from Magnetic Field from L2 Field Windings*
- *AC Voltage is present on Armature*
- *AC is Sent to Diodes mounted on Armature Assembly*

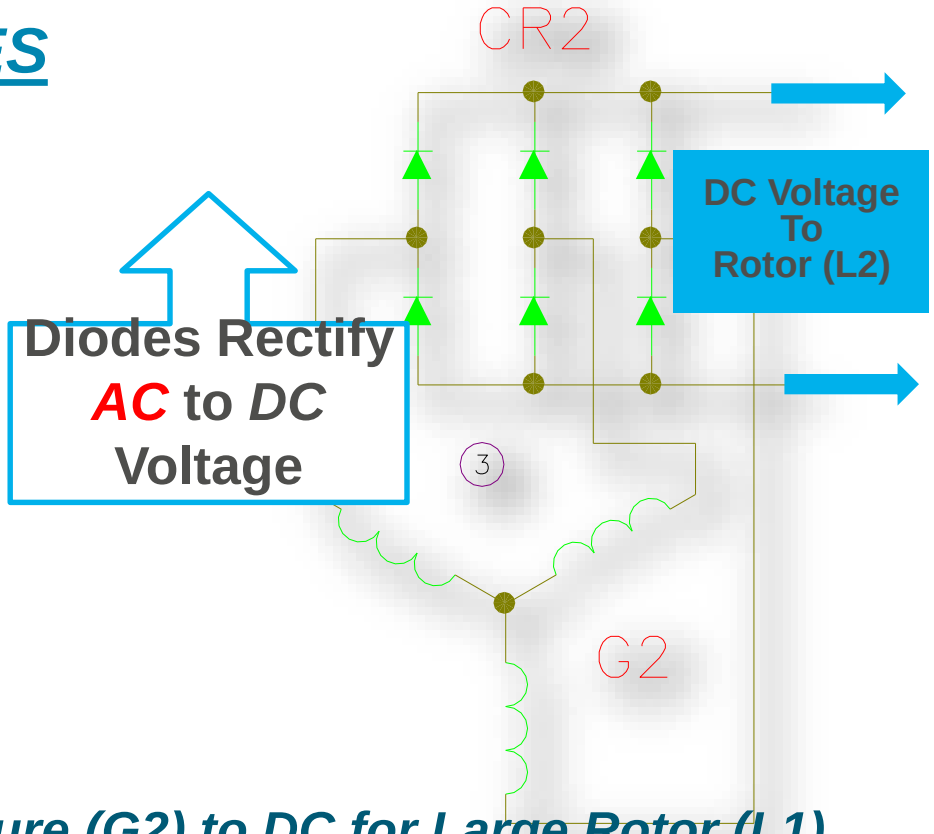
GENERATOR COMPONENT TEST:

Ensure Generator is serviceable

GENERATOR COMPONENTS:

EXCITER DIODES





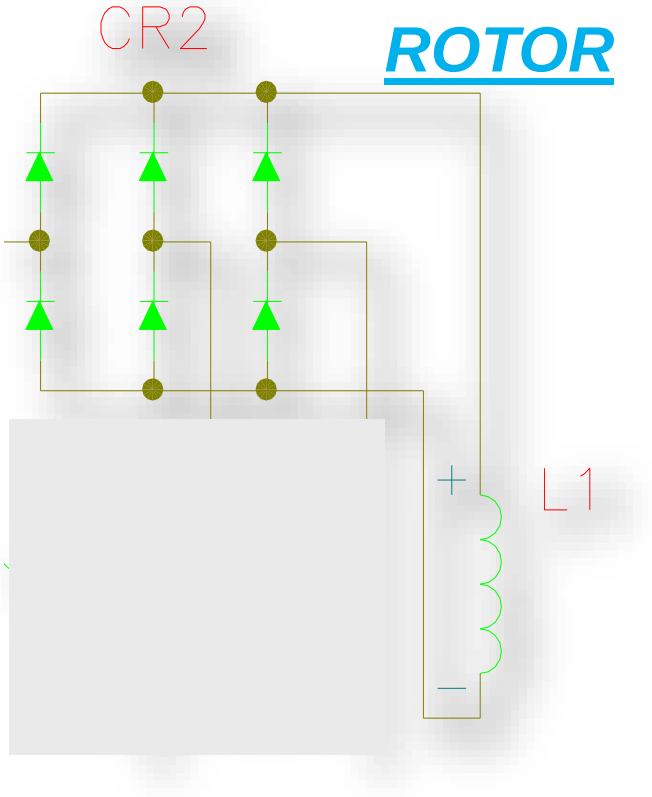
- *Diodes (CR2) Rectify AC from Armature (G2) to DC for Large Rotor (L1)*
- *There are 6 Diodes*
- *3 Diodes are Connected Positive and 3 are Connected Negative*
- *You can not interchange the diodes. Negative connected and Positive connected*
- *You can measure each diode while it is connected to ensure it is serviceable*

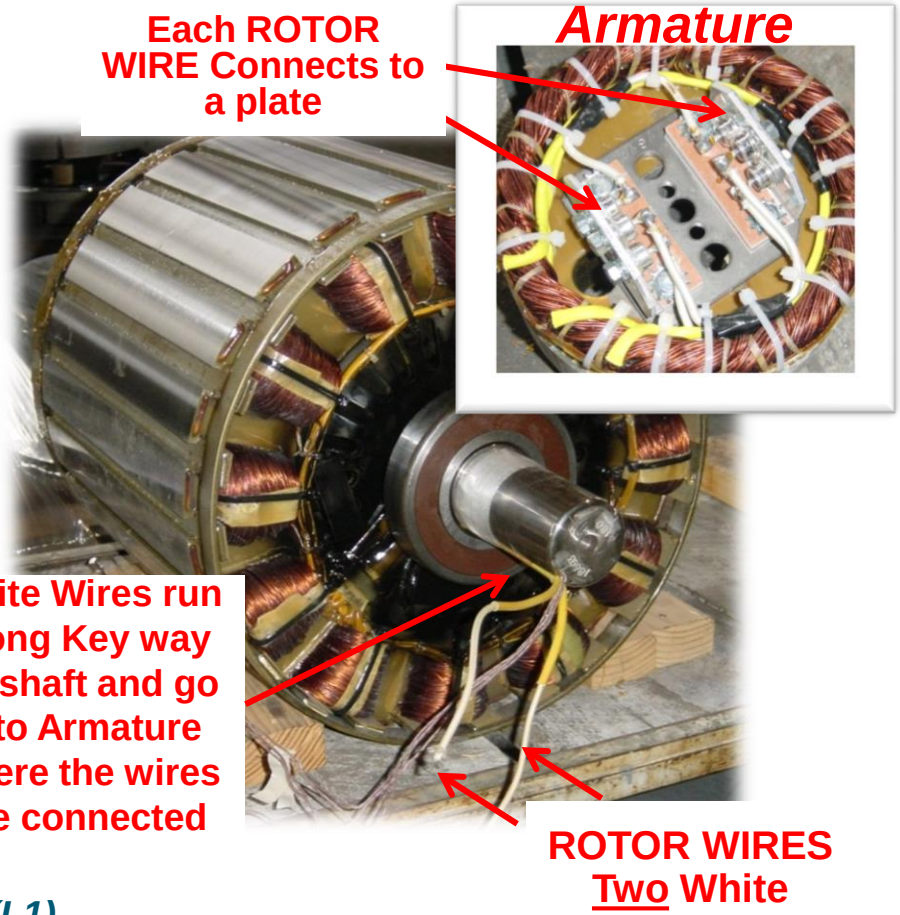
GENERATOR COMPONENT TEST:

Ensure Generator is serviceable

GENERATOR COMPONENTS:

ROTOR

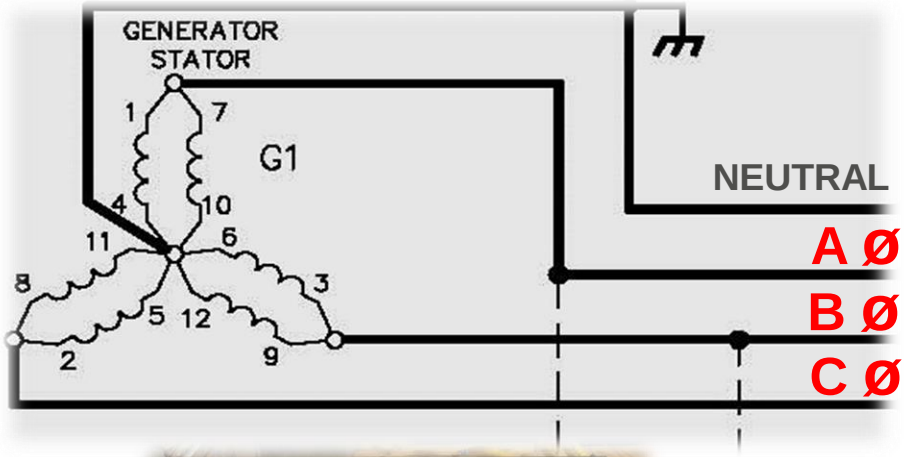




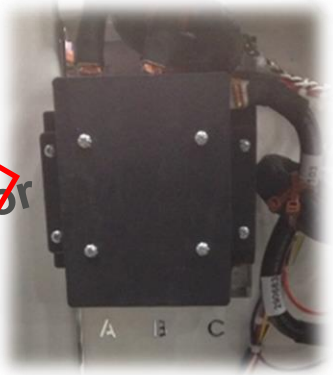
- *DC from Diodes applied directly into Large Rotor (L1)*
- *Rotor (L1) builds large Magnetic field that will be Induced (moved) into the Stator windings*
- *Rotor Has two large wires that go down a key way shaft and connects to the Armature (G2) Diode plates*
- *The Rotor resistance can be measured at the armature where the two wires connect*
- *2.1 Ω is the proper reading for a serviceable Rotor*

GENERATOR COMPONENT TEST:

Ensure Generator is serviceable



To Output Contactor

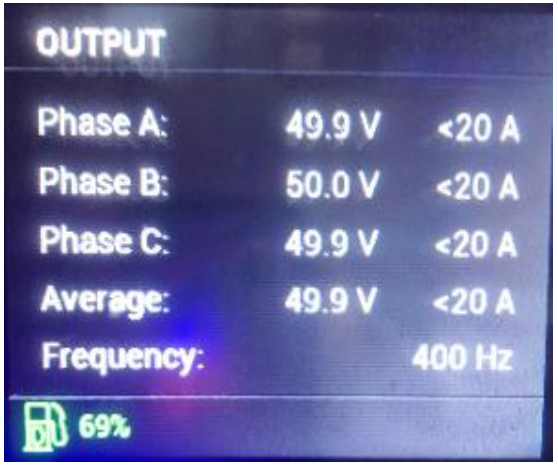


Outside View of Stator Welded to Housing

Inside View of Stator Assembly

- *Stator Windings are mounted to Generator Housing*
- *Magnetic Field From Rotor (L1) (rotating inside) Induces AC into Stator windings (G1)*
- *115 VAC is provided out of the Stator on Aø, Bø and Cø (phases)*
- *The Three phases attach to the Output Contactor*
- *Measure each phase wire to ground, zero resistance should be present (Open)*

GENERATOR OUTPUT FREQUENCY: Automatically set at 400 Hz (HERTZ)

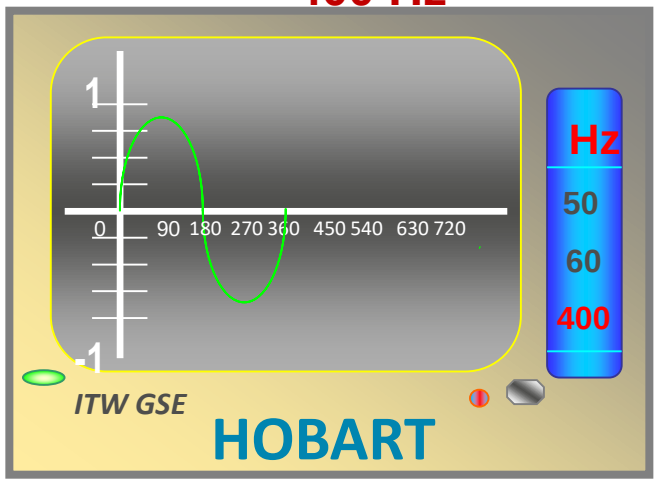


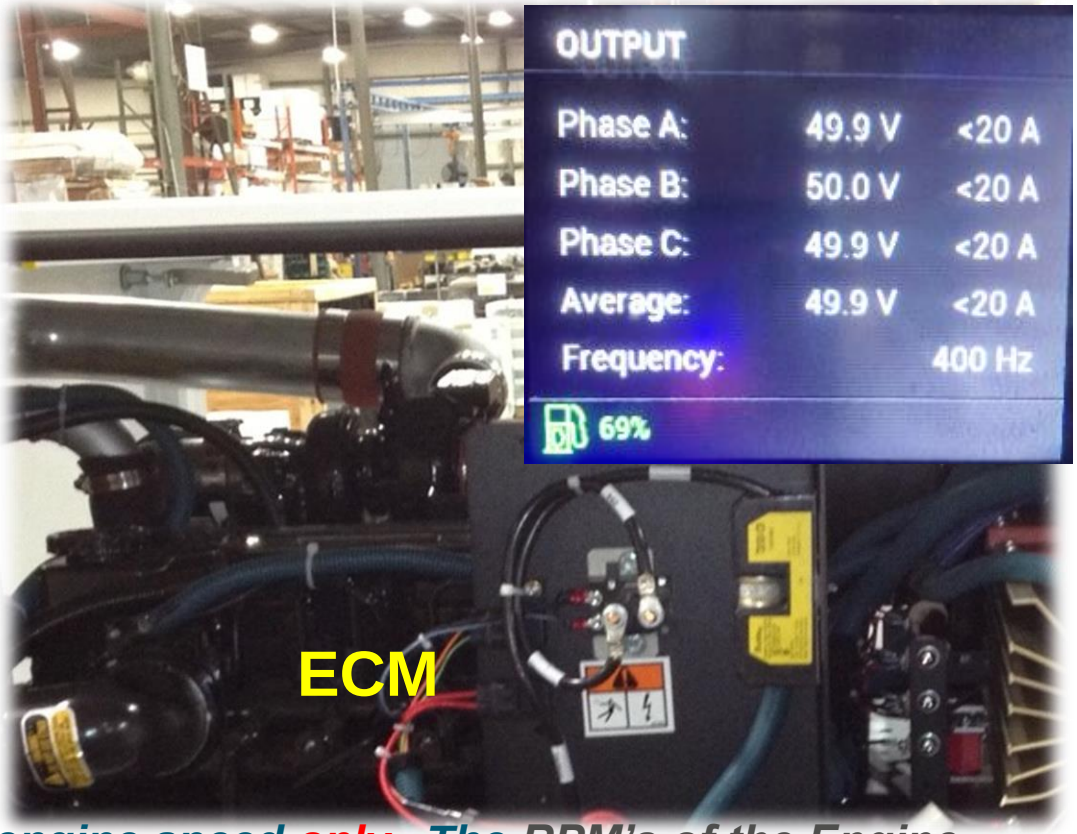
Place meter on AC selection. Push mode switch (or move selector on your meter) until meter has hz displayed

- *Frequency is how many times the AC sign wave moves per second*
- *Regular Outlet wall frequency is 60 Hz or 50 Hz is some countries*
- *Because of the 400 Hz used on Aircraft, The voltage moves faster*
- *The Larger Frequency allows Aircraft to utilize smaller electrical components and there for save on Weight and Fuel*
- *The Aircraft or Aircraft personnel will complain if the Frequency is not accurate to: + or - 1 Hertz*

GENERATOR OUTPUT FREQUENCY: Automatically set at 400 Hz (HERTZ)

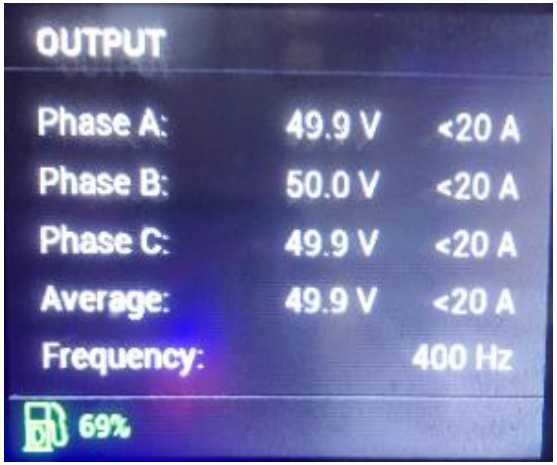
- ✓ **O-Scope** showing *one* complete frequency cycle
- ✓ **Generator rotation creates 400 of these cycles per second: 400 Hz**





- *Frequency is Controlled by the engine speed only. The RPM's of the Engine establish the 400 Hz. That would be 400 cycles per second*
- *Example: Model 90CU20 the 20 stands for 2000rpms 90CU24 the 24 stands for 2400 rpms. These are the RPM's needed for the particular model to create the 400 hz.*
- *The Voltage Regulator has nothing to do with adjusting the Frequency*
- *However you must have AC out of the Generator to measure the Frequency*

Sympton: Frequency High or Low



EXAMPLE

- *ENGINE SPEED FLUCTUATING (Surging) or operating at a lower or higher RPM than normal.* **Possible Fuel System Problem.**
- ➢ *Check fuel lines and filters to ensure fuel is available to Engine*
- *If RPM's are not at rated speed; the ECM must be calibrated*
- *The Repair would be done by Cummins / or if you have* **INSITE Tool** *To Diagnose)*
- *The Generator / Voltage Regulator is not the cause; this is strictly an* **ENGINE ISSUE**

- CONTACT TECHNICAL SUPPORT
- support@itwgse.us
- +1 (941)-721-1092
- US/CAN 877-874-5322