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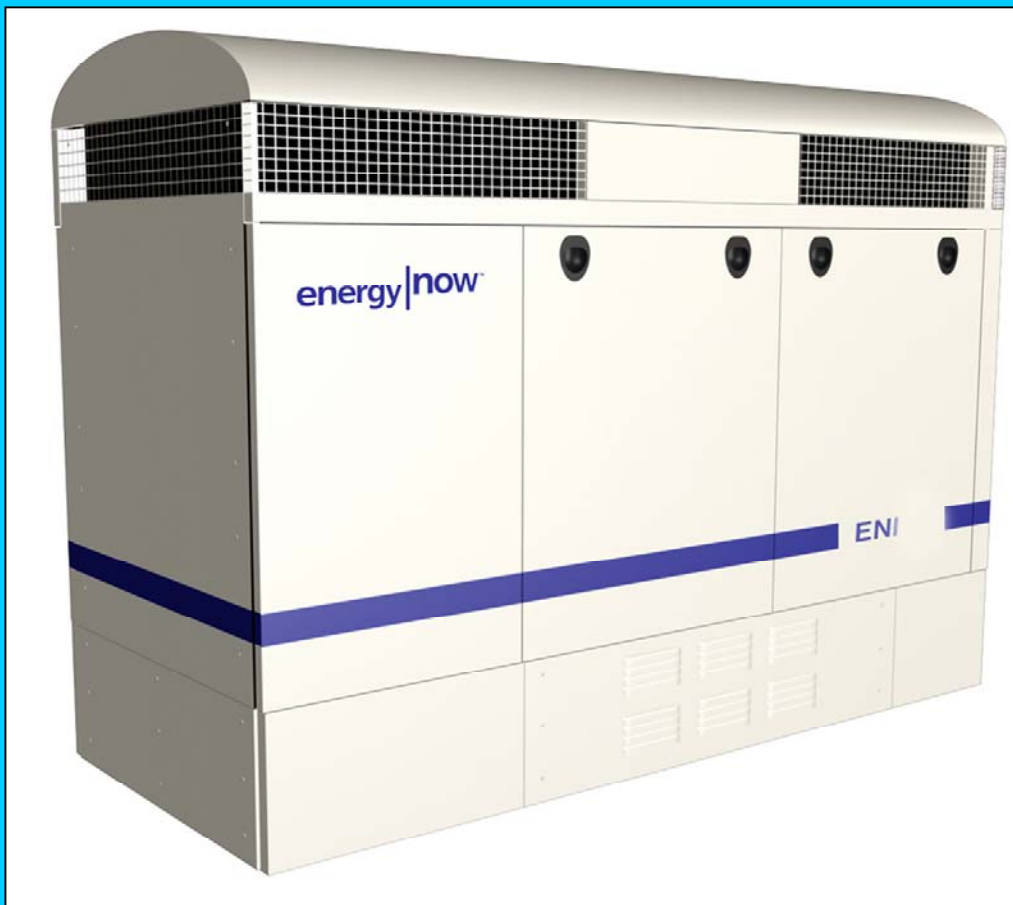
# ENI 65 Synchronous

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## Operator Manual

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## IMPORTANT SAFETY INSTRUCTIONS

These units are to be installed in accordance with the **National Electrical Code NFPA-70, NFPA 37 Requirements** (Installation & Use of Stationary Combustion Engines), and all other requirements of the authorities having jurisdiction.

Only those individuals professionally qualified to perform the tasks and functions involved in placing, connecting, commissioning, operating, and maintaining this equipment should be allowed access to the ENI 65.

## SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during the operation of the ENI 65.

This manual, and all others that contain relevant information, should be kept in a location convenient to the ENI 65 for ready reference.

## CONTACTS FOR ASSISTANCE

In the event additional information is needed beyond that offered in this manual, I Power Energy Systems, LLC may be contacted as follows:

e-mail:

[www.ipoweres.com](http://www.ipoweres.com)

Telephone:

765-621-7900



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Operator Manual

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## DISCLAIMER

These procedures are for general information only. The information applies to the general configuration of the ENI 65. Some applications may include configurations or systems not included in this manual. Contact I Power Energy Systems, LLC for specific information not included in this manual.

The publication of the information is not intended for use as a representation or warranty on the part of I Power Energy Systems, LLC, including any entity or person named herein that the information is suitable for any general or particular use, and it does not imply freedom from infringement of any patents or trademarks. Anyone making use of the information assumes all liability arising from such use.

This document is subject to periodic review and may be revised on a page-by-page basis. **Users are cautioned to refer to the latest revision.**

Only qualified & authorized personnel should operate this systems.

**UL Listed Units** - The ENI 65 displaying a UL listed label conformed to the appropriate UL Standards when leaving the factory. Any modifications thereafter not expressly approved in writing by I Power Energy Systems, LLC may cause the unit UL listing to be invalid and is the responsibility of the unit owner.

## SAFETY

**WARNING: Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all site and safety instructions and precautions. Failure to follow instructions can cause personal injury or death and/or property damage. The ENI 65 and the installation must be in accordance with all instructions and applicable codes.**

**WARNING: The calibration and checkout procedure should only be performed by qualified & authorized personnel knowledgeable of the risks posed by live high voltage electrical equipment.**



**CAUTION:** *The installation must include the following:*

A switch or circuit breaker shall be included in the building installation, that is in close proximity to the equipment and within easy reach of the operator and that is clearly marked as the disconnecting device for the equipment. The switch or circuit breaker will only remove power to the unit, hazardous voltages may still be connected to other terminals on the unit.

A Remote Manual Gas Shutoff Valve must be installed to isolate the ENI 65 from the gas fuel supply.

Operation and maintenance of equipment outside the ENI 65 is the obligation of the site. Associated information is not included in this manual and is not an obligation of I Power Systems, LLC.

WARNING & INFORMATION SYMBOLS AND DEFINITIONS



The enclosure displaying this symbol contains electrical voltages that can cause severe injury or death. Only qualified and authorized individuals are to access this enclosure.



The area marked with this symbol can be at a temperature that can cause serious burns if touched.



This symbol is located where a pinch hazard can exist. Care must be taken not to place fingers in a position where serious injury can result.



This symbol is located where components important to the performance and safe operation of the unit are located. Special instructions in service documents must be followed by authorized individuals.



The fluid port marked with this symbol is the CHP fluid out



The fluid port marked with this symbol is the CHP fluid in



## Preparation

The following installation activities must be completed before attempting this procedure:

- ENI 65 has been set in place and anchored to the mounting surface.
- All site electrical systems have been installed, inspected, and approved by local power authorities.
- All fuel systems have been installed, inspected, and approved by local authorities.
- The initial Job Settings have been installed into the EGCP-2 controller and the ENI 65 PLC controller and verified.

## 1. Initial Inspection

- Check to be sure all electrical power and fuel to the ENI 65 is turned off and locked out per local procedures.
- Perform a “walk around” the ENI 65 with the outer side panels removed and look for any obviously missing or disconnected items.
- Using appropriately sized screw drivers and wrenches. check all electrical connections in the EGCP-2 and Utility Cabinets to be sure they are tight and that there are no wires obviously not connected.

## 2. EGCP-2 controller panel switch settings

Set the switches as follows:

SWITCH / CONTROL	SETTING
SYSTEM	OFF
TEST	OFF
AUTO	OFF
RUN W/ LOAD	OFF
PROCESS	OFF
EMERGENCY STOP	PULLED OUT



“TEST” Switch “OFF”

“Process” Switch “OFF”

“Auto” Switch “OFF”

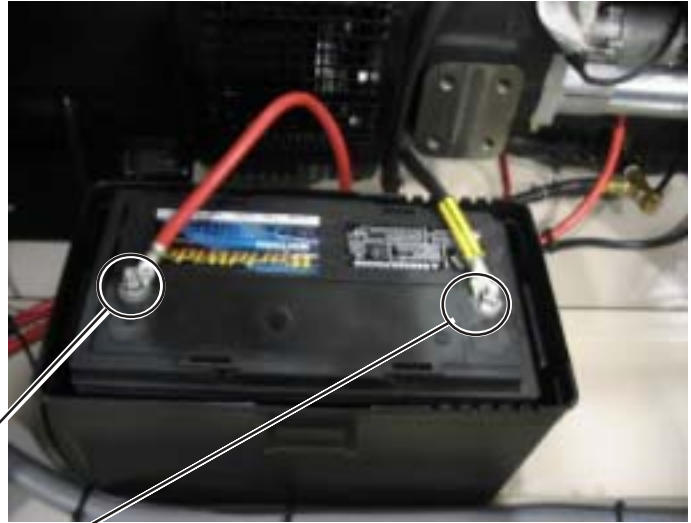
“Run w/ Load” Switch “OFF”

“System” Switch “OFF”

“Emergency Stop” Switch “Pulled Out”

### 3. Connect the Battery

- a. Examine the terminal posts on the battery and the cable terminals to be sure they are corrosion free. If any dirt or corrosion is present, clean with a battery terminal brush.
- b. Connect the **Positive Terminal** first and tighten. Do not over tighten since that can damage the battery post.
- c. Connect the **Negative Terminal** last.



*Connect Positive Cable First*

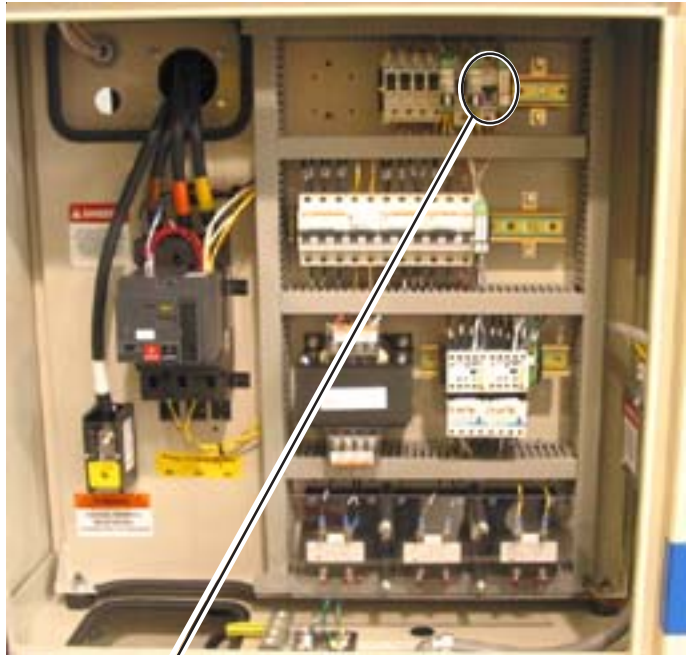
*Connect Negative Cable Last*

**Note:**

There may be a spark generated at the Negative Terminal when it is connected. This is caused by the Generator Breaker (CB1) Shunt Trip coil being energized. This is a normal condition.

**WARNING:**

The Utility Cabinet contains high voltage that can cause severe injury or death. The following procedure should only be performed by qualified personnel.



*CB105*

### 4. Turn on the 120 Vac Power

This applies power to the **Battery Charger** and the **Engine Block Heater** (if present).

- a. Turn on the 120 Vac power from the site to the ENI 65.
- b. Open the Utility Cabinet and locate CB105.
- c. Turn CB105 to the "ON" position.

## 5. Fill the engine oil reserve tank

### a. Oil Specification

**Standard** Chevron Low Ash  
HDAX SAE 40

### Cold Weather Package

Chevron Low Ash  
HDAX SAE 15W-40

Refer to oil labels in the unit for correct oil.

- b. Total oil quantity in the tank is approximately **14 gallons**.

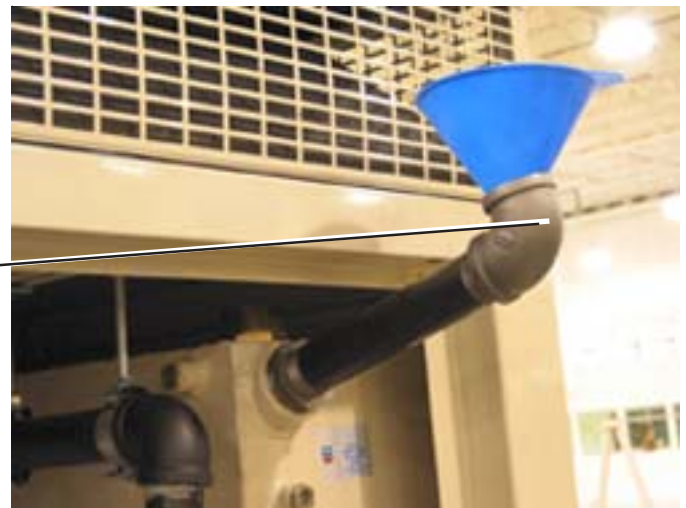


*Oil Reserve Tank*

### c. Suggested Fill Procedure - Reserve Oil Tank

A fill aid assembly can be helpful in filling the reserve tank. The parts in the assembly are:

1. 2 in. X 1 1/2 in Bushing
2. 1 1/2 in. X 12 in Pipe Nipple
3. 1 1/2 in. X 90 deg Elbow
4. Funnel



*Fill Aid Assembly*

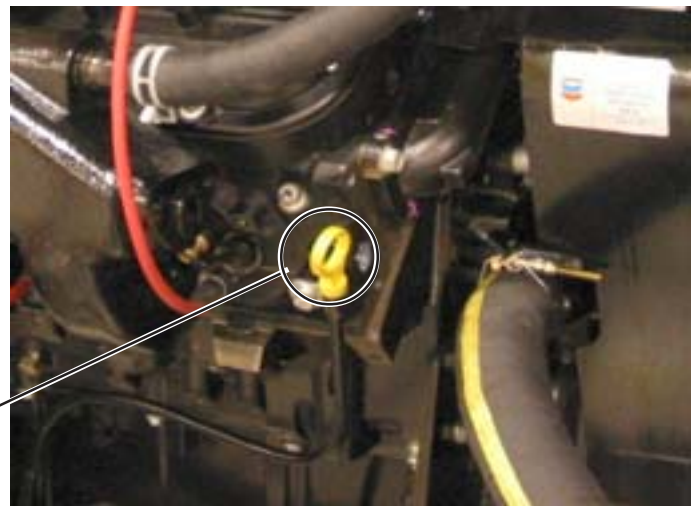
### **Caution:**

**Use a ladder to safely reach the fill funnel with pour containers that can be safely handled.**

## 6. Check the oil level in the engine.

The engine is filled with oil prior to shipping but the level should be checked prior to starting.

- Using the engine dip stick, the oil level must be between the "ADD" and "FULL" range on the dip stick.
- If the oil level is below the "ADD" mark, add oil at the engine fill cap until the level is between the "ADD" and "FULL" marks.
- Be careful not to overfill to where the level is above the "FULL" mark.



*Dip Stick*

## 7. Check Engine Coolant Levels

Although the engine is shipped with coolant levels full, check the engine coolant levels.

Remove the coolant pressure cap (marked 14 to 16 pounds) located on the engine fluid coolant surge tank, and SLOWLY add **DELO 50/50%** water solution until the system is full to the top of the highest pipe attached to the tank or to the "FILL" line, if present. This is to leave an air pocket at the top of the tank for fluid expansion.

*Engine Coolant Fill Cap*



## 8. Fill CHP Fluid System

### a. ENI 85 Unit

Fill the CHP loop with by SLOWLY adding coolant at the fill cap on top of the CHP Loop Surge Tank. Fill the tank to the top of the highest pipe connected to the tank or to the "FILL" line, if present. This is to leave an air pocket at the top of the tank for fluid expansion.

*CHP Fluid Fill Cap*



### b. Site Fluid Circuit

The fluid circuit including the Load Dump Unit and not part of the ENI 65 Unit must be filled with the appropriate fluid. Adequate fill and fluid surge facilities must be included in the site system. A fluid pump must also be part of the site system to move fluid through the site fluid circuit and the Load Dump Unit.

### CHP Fluid Requirements:

**Warm weather Climates** (Never Below Freezing):

Water with a mix of **Havoline Extended-Life Corrosion Inhibitor (XLI)**.

**Cold Weather Climates:**

**DELO 50/50%** water solution



*Typical Load Dump - Must be filled*

9. Turn on the fuel supply to the ENI 65.

10. Start the ENI 65 on test.

**WARNING:**

Before attempting to start the ENI 65, be sure there are no towels or tools inside the unit and all personnel are clear.

- a. Turn the “SYSTEM” switch to “ON”.
- b. After the EGCP-2 controller powers up, turn the “TEST” switch to “ON”. The engine will immediately go into the start sequence.
  1. Engine Crank For 10 Seconds
  2. Rest for 10 seconds

The sequence repeats for a total of 3 start attempts.

If the engine has not started, a “Start Fail” fault is set and must be cleared before another start sequence can be initiated. The cause of the starting problem must be determined and corrected before another start attempt.

**Caution:**

Turn the “TEST” switch to “OFF” before trouble shooting any no start condition.



Test Switch  
System Switch

The switch settings should be as follows for the Start attempt:

SWITCH / CONTROL	SETTING
SYSTEM	ON
TEST	ON
AUTO	OFF
RUN W/ LOAD	OFF
PROCESS	OFF
EMERGENCY STOP	PULLED OUT

11. If the ENI 65 fails to start

The following steps are recommended to determine where basic system problems reside that can cause the ENI 65 not to start. As each system is checked, a start attempt should be made to determine if further steps are necessary.

- a. EGCP-2 controller fails to power up.

Problem Condition	Repair
12Vdc Battery Discharged	Charge the battery with a 12 V battery charger Replace the battery with a fully charged battery
12Vdc Battery Terminals - Poor connection	Clean battery terminals Turn off CB105 Disconnect battery terminals (negative first) Clean both battery & cable terminals with a wire brush Reconnect & tighten terminals (positive first) Turn on CB105



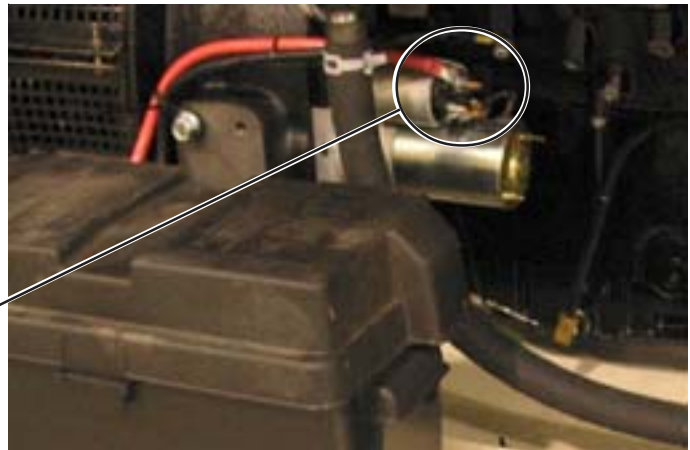
**b. The EGCP-2 powers up, but the engine fails to crank or cranks very slowly.**

The battery may have sufficient charge to operate the EGCP-2 controller, but not have enough to crank the engine. This problem is frequently noted by a “click, no crank” observation from the cranking motor during the start attempt.

The engine may also crank but not start. The cranking speed must be above 120 rpm to ensure there is sufficient voltage available to the ignition system to fire the coils and plugs.

Problem Condition	Repair
12Vdc Battery Discharged	Charge the battery with a 12 V battery charger Replace the battery with a fully charged battery
12Vdc Battery Terminals - Poor connection	Clean battery terminals Turn off CB105 Disconnect battery terminals (neg first) Clean both battery & cable terminals with a wire brush Reconnect & tighten terminals (pos first) Turn on CB105
Cranking Motor - Poor connection	Clean & retighten power at the cranking motor

*Cranking Motor Power Connection*



**c. Low gas pressure**

If the engine cranked with sufficient speed to start, the fuel gas pressure may be inadequate. An initial evaluation is made by checking the gas pressure at the inlet to the ENI 65 gas regulator. Use the following procedure to check the gas pressure:

1. Turn off the gas valve in the line to the ENI 65.
2. Remove the 1/2 in NPT pipe plug in the gas line between the Fuel Shutoff Valves..

*Gas Line Access Plug*



3. Install a fitting that will permit connecting a suitable gas pressure measuring instrument.
4. Turn the remote gas valve to the "ON" position to apply gas to the ENI 65.

**Note:**

The engine must be cranked to open the gas shut off valves to apply gas pressure to the check point. The "Start Fail" fault must be cleared in order to proceed. Use the procedure shown.

### Clearing EGCP-2 Controller Faults

1. Press the "Config" button.
  2. Enter the 4 digit security code
    - A. Press the "Enter" button to start.
    - B. Note the cursor indicating the first digit.
    - C. Using the vertical buttons on the "Scroll" pad, press the buttons until the first digit is set.
    - D. Using the horizontal buttons on the "Scroll"pad, press the buttons until cursor indicates the second digit.
    - E. Repeat the procedure until all 4 digits are displayed.
  3. Press the "Enter" button.
  4. Press the "Alarm Clear" button to clear the fault.
- Note: Contact I Power Energy Systems for the correct code for your ENI 65.



Alarm Clear

Scroll pad

Enter

Config

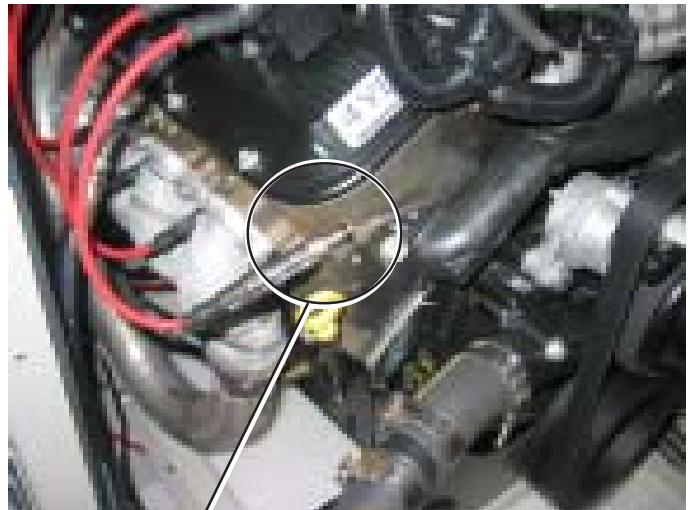
6. After the EGCP-2 fault is cleared, crank the engine over by turning the “**TEST**” switch to “**ON**”. The gas pressure must be at least **5 in. WC** while the engine is cranking.
7. If the gas pressure is less than 5 in WC, investigate the site gas supply for possible causes of low gas pressure. Continue investigation until at least 5 in WC is achieved.
8. When the pressure check is completed, turn the remote gas valve to the “**OFF**” position, remove the hose and gage, and reinstall the pipe plug.

**d. Check for the presence of ignition.**

**WARNING:**

**Be sure the gas valve to the ENI 65 is turned off and locked out.**

1. Remove one of the spark plug connections at the plug and the associated spark plug.  
Cylinders number 1 or 2 are the most convenient.
2. Insert the spark plug into the plug connection and lay it on the engine making sure the plug is grounded.
3. Turn the “**TEST**” switch to “**ON**”.
4. Observe the spark plug for presence of spark as the engine is cranking.



*Spark Plug*

**WARNING:**

**Do not touch the plug or connector to avoid shock from ignition voltage.**

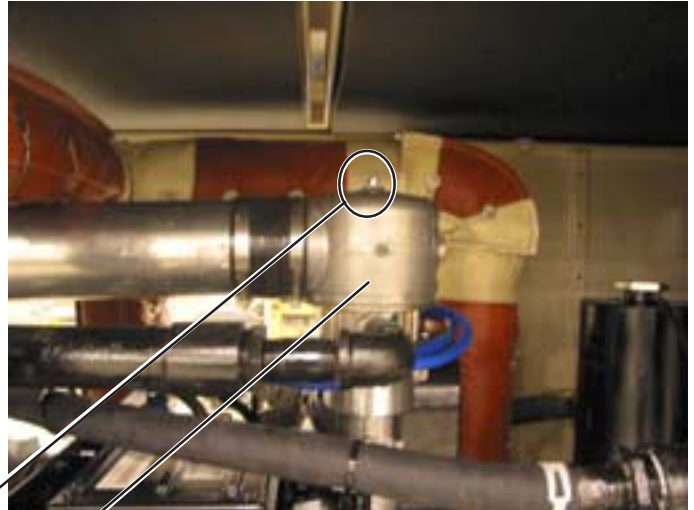
5. If spark is observed, reinstall the spark plug and the plug wire.



## e. Fuel Mixer valve operation

The fuel mixer has a vertically moving valve that can stick and prevent the engine from starting. The valve must be free to move for the engine to start and run properly.

1. Remove the cover that is over the mixer. This is done by removing the thumb nut at the top of the mixer and lifting up on the cover.



*Mixer thumb nut*

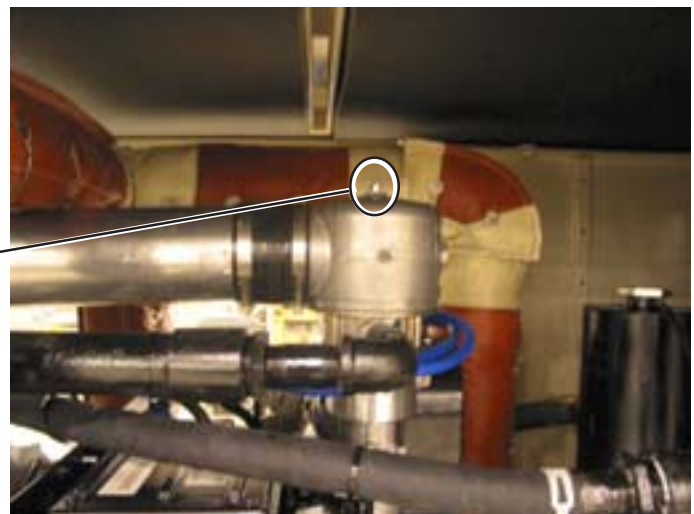
2. Observe the valve to see if it is stuck in the full up or down position. Move the valve through its full range of movement to be sure there is no obstruction.



*Mixer cover*

*Check valve movement*

3. After confirming valve movement, replace the cover and thumb nut.



*Thumb nut*

**f. If the major systems are functional:**

- A. Battery charged & cables clean and tight
- B. Adequate gas pressure is present
- C. The engine has ignition
- D. The mixer is functional

The ENI 65 should start. If problems are still present, contact I Power Energy Systems for assistance.

## 12. Engine starts and runs

- a. The ENI 65 is started and running on “TEST”. Refer to the start procedure in Step 10, Page B-5 for details.
- b. Allow the ENI 65 to run for at least 10 min. and observe the oil pressure and coolant temperature on the EGCP-2 controller. This information is viewed by pressing the “ENGINE” button.



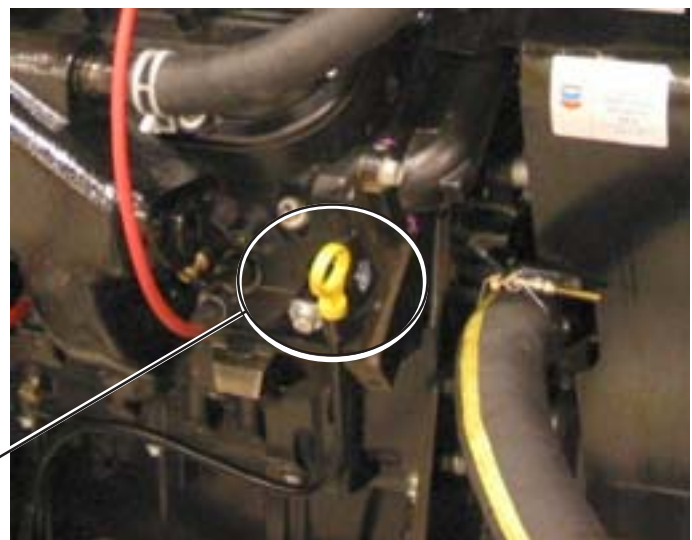
*Engine*

- c. The oil pressure and coolant temperature should read per the table below:

ENI 65 Oil Pressure & Coolant Temperature	
No Load Condition	
Oil Pressure	40 to 60 psi
Coolant Temperature	195 deg F

- d. Oil Pressure Low

1. Stop the engine by turning the “TEST” switch to “OFF”.
2. Check the engine oil level using the dip stick.
3. Add oil if the engine level checks below the “ADD” mark.



*Dip stick*

**Caution:**  
Do not over fill

e. Coolant temperature

If the coolant temperature does not rise to 195 deg F, significant amount of air is in the system. All air must be purged from the coolant system for proper operation.

f. Engine Coolant System Purge Procedure:

1. Stop the engine by tuning the “TEST” switch to “OFF”.

**WARNING:**  
Use caution opening the coolant fill cap. Coolant may be under pressure and hot and can cause burns.

2. Carefully remove the coolant pressure cap in the engine cooling system after the cap has cooled to hand touch.
3. Add coolant until the tank is full to the top of the highest pipe connected or to the “FILL” line, if present.
4. Restart the engine by turning the “TEST” switch to “ON”. If the engine coolant temperature still does not increase significantly, repeat the steps above.



*Engine Coolant System Cap*

g. CHP Coolant System

All air must be purged from the CHP system also. This includes both the site specific system as well as the Load Dump Unit. It may take several iterations of “burping” the systems to eliminate all the trapped air. There may be multiple purge points in the system. There is one point in the ENI 85.

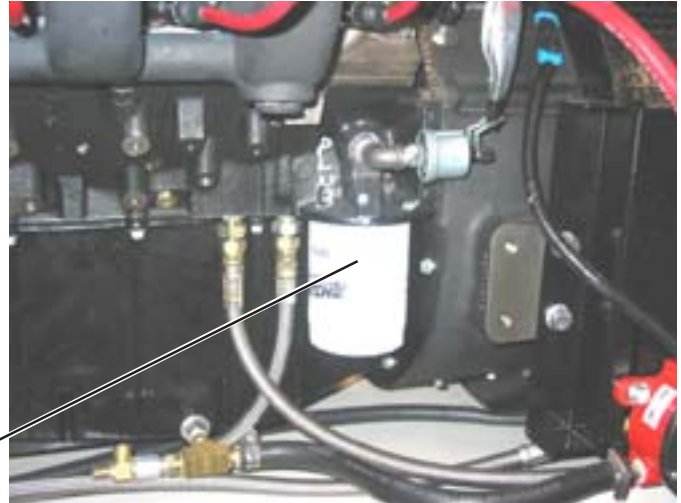


*CHP System Cap*

h. Check for fluid leaks

1. With the engine running and the coolant temperature at least 195 deg F, walk around the ENI 65 and observe each coolant and oil line connections for any sign of leakage.
2. Check the oil filter for any sign of leakage.
3. If leakage is observed, stop the engine by turning the “TEST” switch to “OFF”. Repair the leaks, restart the engine and confirm the repair.

*Oil Filter*



**13. Oil Reservoir Valve**

Turn the oil flow valve under the reservoir oil tank to the “Open” position.

*Reserve oil flow valve*



**14. This completes the initial preparation of the ENI 65 engine / CHP systems.**

## ENI 65 SYNCHRONOUS ELECTRICAL SYSTEM CALIBRATION

**WARNING:**

The utility cabinet contains high voltage that can cause severe injury or death. Only qualified personnel should work in the electrical cabinet and perform the following procedures.

**WARNING:**

Personnel working in the electrical cabinet must use protective clothing and tools appropriate and rated for the high voltage involved. Serious injury or death may result from using improper clothing or equipment.

These procedures are intended for an ENI 85 used in a “GRID PARALLEL” application.

1. Check for correct rotation of the vent fan and CHP pump.

**Note:**

This check must be made as soon as the engine starts. Delay can damage the fan and pump.

The motors for the fan and pump are 480 Vac, 3 Phase motors. Direction of rotation must be confirmed correct or damage to these components can result.

- a. Start the ENI 65 on “**Test**”. Refer to Item 10, Page B-5.
- b. The ventilation fan and CHP pump (if present) will start a few seconds after engine start. Check to be sure air is being pushed out the exhaust vents at the top front of the ENI 85 and the CHP pump is turning CW as viewed from the front of the pump.
- c. If the above conditions are not present, the ENI 65 can not be operated. Contact I Power Energy System for assistance.

2. Adjust the generator voltage indication.

The generator voltage indication in the EGCP-2 controller must be adjusted to match the actual voltage from the generator.

**WARNING:**

This procedure involves high voltage. Only qualified personnel with suitable protective clothing and utility grade equipment should do these tests. Serious injury or death can result.

**Caution:**

*The grid power must be turned off and locked out for the initial generator voltage checks.*

- a. Open the Utility Box and locate the generator power connections at the top of the Generator Breaker (CB1)

*Generator Power Connections*

*Phase A*

*Phase B*

*Phase C*

*Generator Breaker (CB1)*

*Generator Neutral Connection*



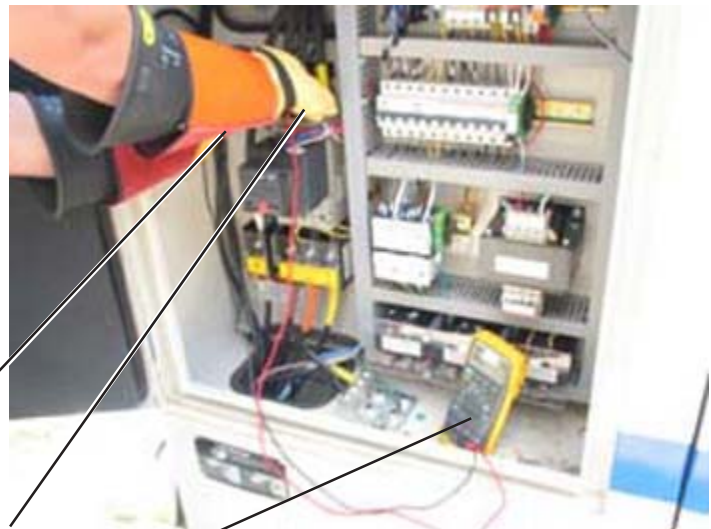
- b. With the generator running in test and the engine stable, measure the generator voltage (VPT) between the left and center terminals (Phase A), between the center and right terminals (Phase B), and between the right and left terminals (Phase C).

- c. Record the voltages measured.

*Line A Probe*

*Line B Probe*

*Utility Grade VOM*

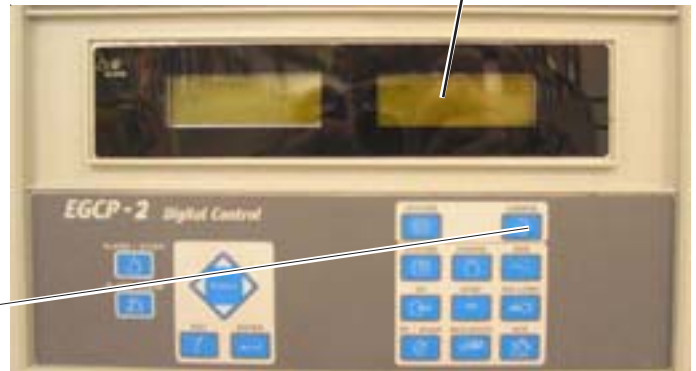


- d. The voltage indication in the EGCP-2 controller for generator voltages must be adjusted to be the same as measured in Step B-1. The voltage indication adjustment procedure is as follows:

1. Press the **“CONFIG”** button.

*Actions indicated on the right screen,*

*Config*



2. The controller will request an ID number  
Press **“ENTER”** to get the first number for setting.  
Use the **“SCROLL”** pad to obtain the digits needed.  
The vertical pad points change the digit and the horizontal pad point indexes from one digit to another. Using the **“SCROLL”** pad, enter in the required 4 digit number, then press **“ENTER”**.  
Contact I Power Energy Systems, LLC for correct code information.

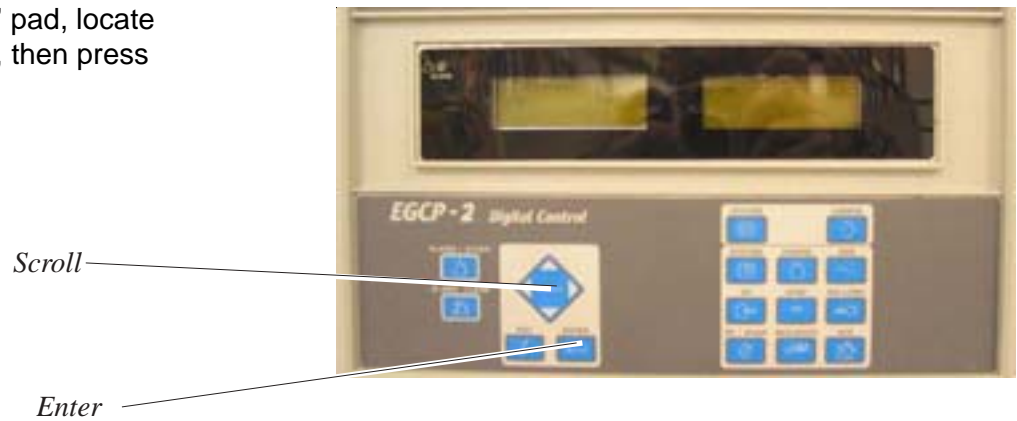
*Scroll*

*Enter*



3. Using the **“SCROLL”** pad, move to **“Calibration”** in the right screen, then press **“ENTER”**.

4. Using the “**SCROLL**” pad, locate “**PT Phase A Scale**”, then press “**ENTER**”.



5. Using the “**SCROLL**” pad, change the “**Scale**” value until the “**GEN A VL-L**” voltage is the same as measured for Phase A.



6. Press “**ENTER**”.

7. Using the “**SCROLL**” pad, locate “**PT Phase B Scale**”, then press “**ENTER**”.





8. Repeat Steps 5 & 6 to set “**GEN B VL-L**”, then press “**ENTER**”.

*Enter*



9. Using the “**SCROLL**” pad, locate “**PT Phase C Scale**”, then press “**ENTER**”.

*Scroll*

*Enter*



10. Repeat Steps 5 & 6 to set “**GEN C VL-L**”, then press “**ENTER**”.

*Enter*



11. The generator voltage indications in the EGCP-2 controller are now set.

12. Turn the “**TEST**” switch to “**OFF**” to shut down the ENI 65.

### 3. Line (Bus / Mains) Voltage Indication Adjustment.

The Line voltage indications must be set (Bus / Mains) using the following procedure:.

**Note:**

The EGCP-2 controller has but 1 adjustment for both the “BUS” and “MAINS” voltage.

**WARNING:**

**This procedure involves high voltage. Only qualified personnel with suitable protective clothing and utility grade equipment should do these tests. Serious injury or death can result.**

- a. The Generator Breaker (CB1) must be in the **Manual / Off** position and **locked out**.. Refer to the Lockout / Tagout Procedure, Section E.

*Lock Out Generator Breaker (CB1)*

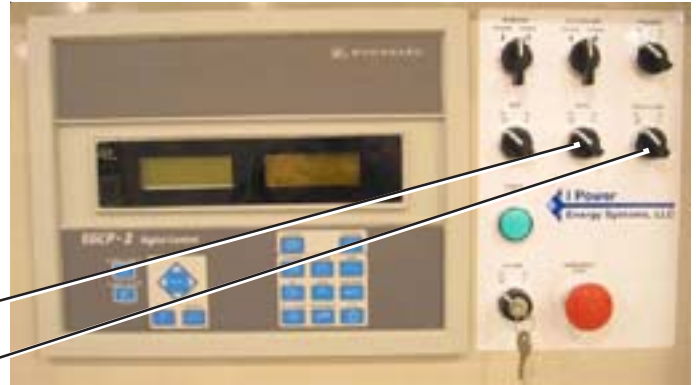
*Grid Voltage*



- b. For the electrical system calibration, the grid voltage must be applied to the bottom of the ENI 65 Generator Breaker (CB1). Remove the lock out on the grid power to the ENI 65. This will apply grid voltage to the bottom side of the Generator Breaker (CB1).
- c. Place the EGCP-2 in “**SYNC CHECK**” mode. This setting allows the power rotation to be check without the possibility of closing the Generator Breaker (CB1).
  - 1. Using the “**SCROLL**” pad, move down the menu to “**SYNCHRONIZER**” in the controller right screen and press “**ENTER**”.
  - 2. Scroll to “**SYNC MODE**” and press “**ENTER**”.
  - 3. Scroll to “**CHECK**” and press “**ENTER**”.

- d. Start the ENI 65 by turning the “**AUTO**” and “**RUN w/ LOAD**” switches “**ON**”.
- e. The EGCP-2 controller will indicate the voltage from the “**BUS PT**” while running in this mode. The Generator Breaker (CB1) will not be attempted to be closed by the EGCP-2 controller as long as it is set in the “**SYNC CHECK**” mode.

*Auto*  
*Run w/ Load*



- f. Measure the voltage at the bottom of the Generator Breaker (CB1) between the left terminal (Phase A), and the center terminal (Phase B) using a utility grade VOM. Record the voltage measured.

*Line A*  
*Line B*  
*Utility Grade VOM*



### g. **Line (Bus / Mains) Voltage Indication Adjustment Procedure**

The Bus voltage indication must be adjusted per the following procedure.

- 1. Using the “**SCROLL**” pad, locate “**Bus PT Scale**”, then press “**ENTER**”.

*Scroll*  
*Enter*



2. Using the “**SCROLL**” pad, change the “**Bus PT Scale**” value until the same voltage is indicated as measured in Step c, Page B-19.

Scroll

Enter



3. Press “**ENTER**”.

4. The voltage indication in the EGCP-2 controller for the Bus / Mains Voltage has now been set.



**Notice:**

If the Mains (Grid) voltage is more than 25 volts from 480 V, contact I Power Energy Systems, LLC for assistance. The generator regulator is set to 480 V at the factory and if the Mains (Grid) voltage is more than 25 V different, the Woodward EGCP-2 may not be able to achieve a synchronous state.

**4. Phase Direction Of Rotation**

The “Direction Of Rotation” must be checked for both the generator voltages and the grid voltages.

The phase must agree for successful operation.

- a. The ENI 85 must be started on “**TEST**” for this procedure. Refer to Item 10, Page B-5.

SWITCH / CONTROL	SETTING
SYSTEM SWITCH	ON
AUTO SWITCH	OFF
RUN w/ LOAD	OFF
TEST SWITCH	ON
EGCP-2 SYNC	SYNC CHECK
GRID POWER	ON

**WARNING:**

This procedure involves high voltage. Only qualified personnel with suitable protective clothing and utility grade equipment should do these tests. Serious injury or death can result.

**b. Check Phase Rotation Procedure**

The direction of rotation of both the generator and line power must be checked and confirmed to be the same.

**c. Place the EGCP-2 in “SYNC CHECK” mode.**

This setting allows the power rotation to be checked without the possibility of closing the Generator Breaker (CB1).

1. Using the “**SCROLL**” pad, move down the menu to “**SYNCHRONIZER**” in the controller right screen and press “**ENTER**”.
2. Scroll to “**SYNC MODE**” and press “**ENTER**”.
3. Scroll to “**CHECK**” and press “**ENTER**”.

**d. Using a “Rotation Test Meter”, carefully attach the three leads to Phases A, B, and C at the top of the Generator Breaker (CB1).**

**e. Read and note the “Direction Of Rotation” indicated on the meter. The direction is indicated by a light turning on either “CW” or “CCW”. This is the generator power rotation.**

**f. Remove the meter from the top side of the Generator Breaker (CB1) and reattach to the bottom side of the breaker being sure to attach to Phase A, B & C are the same as in Step d.**

**g. Observe the indicated “Direction Of Rotation”. This is the rotation direction of the Line or Grid power.**



*Rotation Meter Connected To Generator Power*



*Grid Power — Generator Power — Phase B — Phase C —*

h. If the “Direction Of Rotation” of the Grid power (bottom of the Generator Breaker, CB1) matches the “Direction Of Rotation of the generator power, then the “Direction Of Rotation” matches and no further action is needed.

i. If the direction of rotations do not match, the Phase B and Phase C on the Grid side must be reversed.  
Stop the ENI 65 by turning the “Test” switch to “OFF”.



Grid Power —  
Generator Power —  
Phase B —  
Phase C —

**WARNING:**  
The grid power to the ENI 65 must be turned off and locked out before attempting to reverse the phase cables on the bottom of the Generator Breaker (CB1). Serious injury or death can result.

j. After the Phase B and Phase C cables have been reversed, turn the Grid power back on and start the ENI 65 on “Test”. Be sure the EGCP-2 controller is still in “SYNC CHECK” mode.

k. Repeat Steps c through h.  
The “Direction Of Rotation” will now match.

m. This completes the Phase Rotation Procedure.

## 5. Check Power Phasing Procedure

In addition to the “Power Direction Of Rotation”, the “Power Phasing” between the generator power and grid must also be the same.

**WARNING:**

**This procedure involves high voltage. Only qualified personnel with suitable protective clothing and utility grade equipment should do these tests. Serious injury or death can result.**

- a. Start the ENI 65 with the following switch settings:

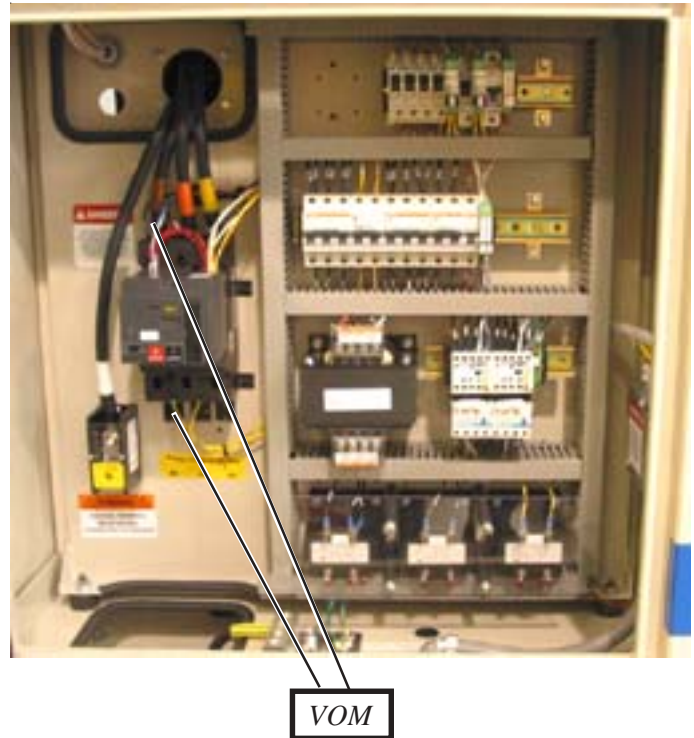
**Note:**

.A utility grade VOM is required for this test.

SWITCH / CONTROL	SETTING
SYSTEM SWITCH	ON
AUTO SWITCH	ON
RUN w/ LOAD	ON
TEST SWITCH	OFF
EGCP-2 SYNC	SYNC CHECK
GRID POWER	ON

- b. Monitor the “SYNC” screen on the EGCP-2 controller. Wait for the display to read “CLOSE GEN BREAKER” before proceeding.
- c. Carefully place one lead of the VOM on the Generator side Phase A (top of the Generator Breaker (CB1), and the other lead on the grid side Phase A (bottom of the Generator Breaker (CB1)).
- d. If the Generator and Grid voltages are in phase, the voltage measured will be less than 50 Vac by the VOM. If a voltage greater than 50 Vac is measured, the generator and grid voltages are out of phase.  
**This condition must be corrected.**

Phase 1 Check



- e. Repeat the check procedure in Steps b to c for all 3 phases.
- f. If the voltages measured are greater than 50 Vac, the phase of the grid must be changed. This is done by moving each of the 3 grid power cables one terminal over.

**WARNING:**  
The grid power to the ENI 85 must be turned off and locked out before attempting to change the phase cables on the bottom of the Generator Breaker (CB1). Serious injury or death can result.

- g The ENI 65 must be stopped by turning the “**AUTO**” and “**RUN w/ LOAD**” switches to “**OFF**”. Also, the grid voltage to the bottom of the **Generator Breaker (CB1)** must be **turned off and locked out**.
- h. Reposition all 3 of the grid power cables by moving each one terminal to the right. Move the Phase A cable to the center terminal, move Phase B cable to the right terminal and move Phase C cable to the left terminal..



*Move Original Right Cable To Here*

*Move Original Left Cable To Here*

*Move Original Center Cable To Here*

*Adjust Phasing*

- i. Check the power phasing again by repeating Steps b to c, Page B-23.
- j. If all 3 voltages measured are still not less than 50 Vac, the procedure must be repeated again. The generator power and grid power should now be in phase with all 3 voltage measurements indicating less than 50 Vac.

**K. This completes the Power Phase Check Procedure.**



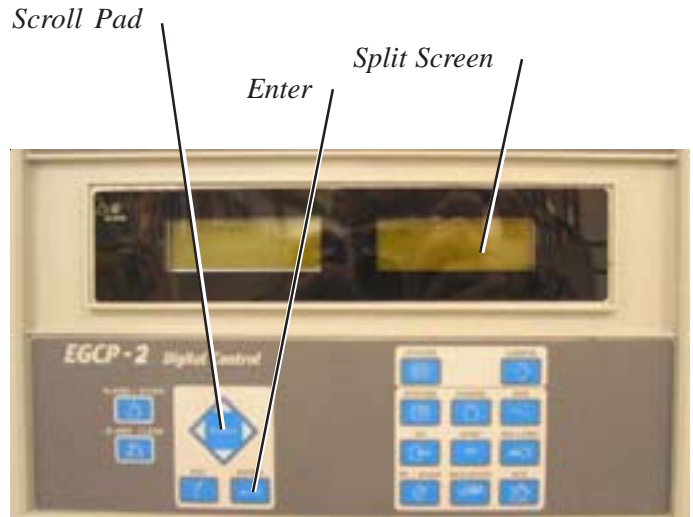
## 6. Phase Current Measurement

The Phase Current indications in the EGCP-2 controller must be set.

The current in each power phase must be measured and the current indication in the EGCP-2 controller must be adjusted to be the same value as the values measured.

**WARNING:**

**This procedure involves high voltage. Only qualified personnel with suitable protective clothing and utility grade equipment should do these tests. Serious injury or death can result.**



- a. With the unit not running and the “**Calibration**” menu called up, move to the “**CT Phase A Offset**” item with the “**Scroll Pad**”.

*Run w/ Load Switch to Off*

*Auto switch to Off*



- b. Using the “**Scroll**” pad, adjust the “**Offset**” value until the current indication is “**0**”. The “**Offset**” is indicated at the top of the right split screen, and the “**Current Value**” is at the bottom.

Press “**Enter**” when the current indication reads “**0**”.

- c. Repeat **Steps a and b** for **Phase B** and **Phase C** current indications.

- d. The **current scale** in the EGCP-2 controller must be set.  
The ENI 65 must be started, synchronized to the grid, and provide output power for this phase of the current calibration.

- e. Set the EGCP-2 into the “**Sync Run**” mode.
  - 1. Using the “**Scroll**” pad, move to the “Synchronizer” item in the right screen and press “**ENTER**”.
  - 2. Scroll to “**Sync Mode**” and press “**ENTER**”.
  - 3. Scroll to “**Run**” and press “**ENTER**”.
- f. Start the ENI 65 by turning the “**Auto**” switch to “**On**” and then the “**Run w/ Load**” switch to “**On**”.

g. The ENI 65 will start and attempt to synchronize to the grid. When the EGCP-2 controller has met the synchronizing requirement, the Generator Breaker (CB1) will close. This event can be noted by an audible sound coming from the Generator Breaker, (CB1). The ENI 65 is now providing power output at the “Preset” load value, usually 10% of rated capacity.

The process can be monitored by pressing the “**Sync**” button.

The generator data can be viewed by pressing the “**Gen**” button.

If the the indicated output level is not equal to 10% of the unit output rating, the output level must be set using the following procedure:

- 1. Press “**ESC**” to return to the Main Menu.
- 2. Using the “**Scroll**” pad, move to “**Real Load Control**”, and press “**ENTER**”.
- 3. Using the “**Scroll**” pad, move to “**Base Load Reference**”, then press “**ENTER**”.
- 4. Using the “**Scroll**” pad, set the next load level then press “**ENTER**”.
- 5. Press “**ESC**”.
- 6. Using the “**Scroll**” pad, move to “**Calibration**”, then press “**ENTER**”.



*Gen*  
*Sync*



*Esc*

*Enter*

*Scroll*

h. The actual current in each phase can now be measured.

Using a "Clamp On" amp meter, read and record the actual current in each phase.

*Phase Current Measurement*



i. The current reading in the EGCP-2 controller must be set to the same value as measured.

1. Using the "**Scroll**" pad, locate "**CT Phase A Scale**", then press "**ENTER**".
2. Adjust the "**CT Phase A Scale**" until the current reading is the same as measured on "Phase A", then press "**ENTER**".
3. Repeat steps a & b above for "Phase B" and Phase "C".

*Scroll*

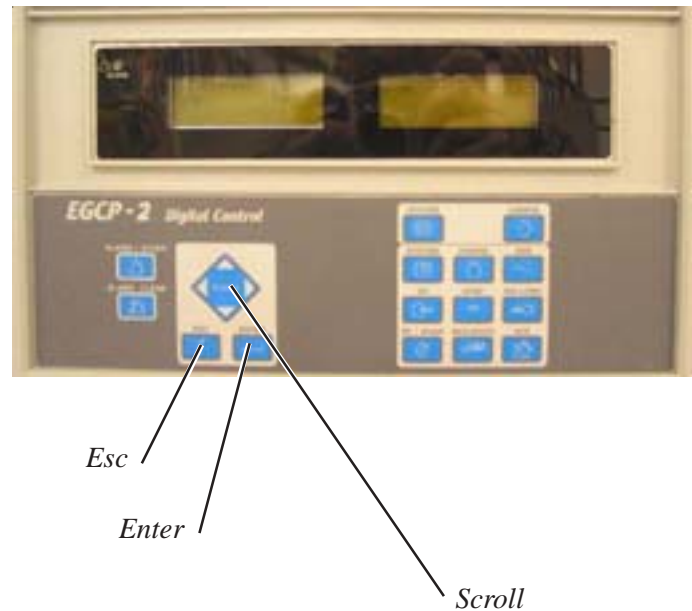
*Enter*



j. The current readings in the EGCP-2 controller have now been set at the 10% load level (approximately 8.5 Kw). This equates to a "rough" adjustment. To refine the current settings, the process must be repeated at higher load levels.

k. Adjust the current readings in the EGCP-2 controller at the 2nd current level, 33% load (approximately 25 Kw). Reset the load as follows:

1. Press “**ESC**” to return to the Main Menu.
  2. Using the “**Scroll**” pad, move to “**Real Load Control**”, and press “**ENTER**”.
  3. Using the “**Scroll**” pad, move to “**Base Load Reference**”, then press “**ENTER**”.
  4. Using the “**Scroll**” pad, set the next load level then press “**ENTER**”.
  5. Press “**ESC**”.
  6. Using the “**Scroll**” pad, move to “**Calibration**”, then press “**ENTER**”.
- l. Repeat Step i, Page B-27 to set the current indications at the 2nd load level.
- m. Adjust the current readings in the EGCP-2 controller at the rated current level, 100% load (65 Kw).  
Repeat Step i, Page B-27.



**6. The Setup Procedure is now complete.**

**Note:**  
It is important not to run the ENI 65 below 50% load for more than 30 minutes. This is due to condensate that may become present in the exhaust system at these lower power levels.

## STARTUP PROCEDURE

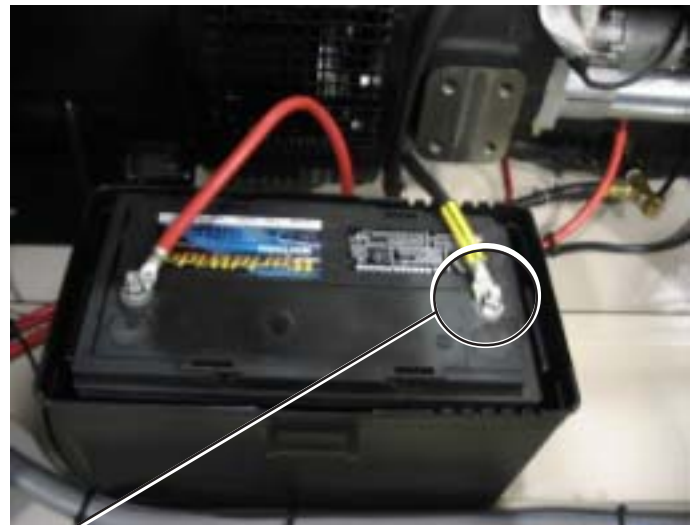
1. Before starting the unit, verify all connections are completed and all moving elements are clear.
2. Make sure all selector switches are in the "OFF" position .

SWITCH / CONTROL	SETTING
SYSTEM	OFF
TEST	OFF
AUTO	OFF
RUN W/ LOAD	OFF
EMERGENCY STOP	PULLED OUT



3. Unlock and turn on all site power, water and gas, shut off and locked out during the Lock Out Procedure.
4. Connect the Negative battery cable.

**Note:**  
A small spark may be experienced while connecting the battery. This is caused by the Generator Breaker (CB1) shunt trip coil and is normal.



*Negative Cable*

**WARNING:**  
The Utility Cabinet contains high voltage that can cause severe injury or death. The following procedure should only be performed by qualified personnel.

5. Open the Utility Cabinet and turn on breaker CB105.

*CB105*



6. Remove the locking device from the Generator Breaker (CB1)

*Locking Device Location*

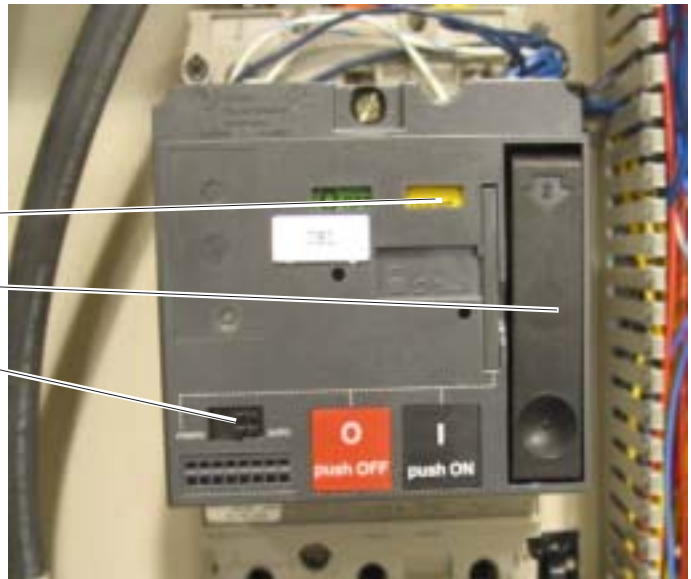


7. Push in the Locking Device and switch the “**MANUAL/AUTO**” switch to “**AUTO**”. The EGCP-2 controller is now in control of the breaker.

*Spring Status Indicator*

*Charge Handle (Lift up at bottom)*

*Manual / Auto Mode Switch*



**Notice:**

Check the “**SPRING STATUS**” indication. If “**DISCHARGED**” is indicated, pull on “**CHARGE HANDLE**” until the Breaker internal motor changes the internal spring.

**Caution:**

*The engine will go through its start up procedure automatically. After starting, the engine will increase to 1800 rpm (running speed).*

*System Switch*

8. Turn “**SYSTEM**” Switch to the “**ON**” position. Allow the EGCP-2 Controller panel to boot up completely.



SWITCH / CONTROL	SETTING
SYSTEM	ON
TEST	ON
AUTO	OFF
RUN W/ LOAD	OFF
EMERGENCY STOP	PULLED OUT

9. Start the engine by turning the “TEST” switch to the “ON” position.
10. Verify the unit is operating correctly and there are no engine oil or coolant leaks present.
11. Turn “TEST” switch to the “OFF” position. (This will cause the engine to stop).
12. Turn the “SYSTEM” switch to the “OFF” position.
13. If the ENI 85 is to operate in “Process” mode, then the “PROCESS” switch will also need to be switched “ON”.
14. Proceed with returning the ENI 65 to service by:
  - a. Turn the “SYSTEM” switch” to “ON”.
  - b. Turn the “AUTO” switch to “ON”
  - c. Turn the “RUN w/ LOAD” switch to “ON”.



Test Switch



Test Switch

System Switch

SWITCH / CONTROL	SETTING
SYSTEM	ON
TEST	OFF
AUTO	ON
RUN W/ LOAD	ON
EMERGENCY STOP	PULLED OUT

**Notice:**

This will cause the engine to start, come to speed, regulate voltage, frequency, synchronize to the grid, and close the Generator Breaker, CB1. The Unit will begin its normal running mode.




Auto Switch

Run w/ Load Switch

System Switch

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	<p><b>ENI 65 Synchronous Operator Manual</b></p>	<p>Page Issued 11-07</p>	<p>Replaces</p>
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## SHUT DOWN PROCEDURE

1. Access the control panel containing the EGCP-2 controller and related switches.

*EGCP-2 Controller Access Door*



2. Turn the “TEST” switch (if in the “ON” position), “AUTO” switch, “RUN w/ LOAD” switch and “PROCESS” switch to the “OFF” position.

The unit will initiate a “Soft Shutdown” by ramping down the Kw load, open the Generator Breaker (CB1), and initiate an engine cooldown .

SWITCH / CONTROL	SETTING
SYSTEM	OFF
TEST	OFF
AUTO	OFF
RUN W/ LOAD	OFF
EMERGENCY STOP	PULLED OUT

*OFF*



3. Turn the “**SYSTEM**” switch to the “**OFF**” position.  
This turns off the power to EGCP-2 controller and the control PLC.

*System Switch off*



**WARNING:**  
The Utility Cabinet contains high voltage that can cause severe injury or death. The following procedure should only be performed by qualified personnel.

4. Locate circuit breaker CB105 in the Utility Cabinet. Switch CB105 to “OFF”.  
This turns off the power from the site to the battery charger.

*CB105*



**Note:**  
If the ENI 65 is being shut down only to bring the unit off line and no work is to be done on the unit, CB105 should remain turned on to keep the battery charged.

5. Proceed to the “**Lockout / Tag-out**” Procedure if any work is to be performed on the ENI 65 or related systems..

LOCKOUT / TAG-OUT PROCEDURE

Utility Box



*Generator Circuit Breaker (CB1)*

**Generator Breaker (CB1)**



*Contact Position Indicator*

*Spring Status indicator*

*Manual / Auto Mode Switch*

*O (off) Button*

*I (On) Button*

*Locking Device*

*Manual Spring Charging Handle*

**WARNING:**

It is very important to follow the LOCKOUT / TAG-OUT PROCEDURE carefully. Failure to do so can cause serious damage to the unit and even death. Be sure to use every safety precaution possible when working on or around this unit.

**WARNING:**

Any work on the unit electrical system should only be performed by qualified & authorized personnel knowledgeable of the risks posed by live high voltage electrical equipment.

**WARNING:**

For breaker maintenance, the utility power must be locked out at the site load source.

1. Turn the switches on the EGCP-2 control panel labeled "TEST", "AUTO", and "RUN w/ LOAD" to their "OFF" positions.

SWITCH / CONTROL	SETTING
SYSTEM	OFF
TEST	OFF
AUTO	OFF
RUN W/ LOAD	OFF
EMERGENCY STOP	PULLED OUT



*Test Switch*

*Auto Switch*

*Run w/ Load Switch*

2. Push in the "EMERGENCY STOP" button.

*Emergency Stop*



3. Turn the “**SYSTEM**” switch to the “**OFF**” position and remove the key..

*System*



**WARNING:**  
The Utility Cabinet contains high voltage that can cause severe injury or death. The following procedure should only be performed by qualified personnel.

4. Locate the Utility Section Door on the right side of the unit. Open the Utility Section Door and switch the breaker labeled **CB105** to the “**OFF**” position. This Breaker opens the 120 Vac power from the site source.

*CB105*



5. Disconnect the (-) negative cable lead to the battery.

*Negative Cable*



6. Locate the Generator Breaker (CB1) in the Utility Section. .

**WARNING:**

The Bottom of breaker may be energized with high voltage that can cause severe injury or death.

*Generator Circuit Breaker (CB1)*



7. Put the Generator Breaker into “**MANUAL**” mode by moving the “**MODE**” selector switch to “**MANUAL**” the position.

*Manual / Auto Mode Switch*



8. Press and hold the “**OFF**” button.

*Off Button*



9. While holding the “OFF” button in, pull out the “**LOCKING DEVICE**”. This disables the breaker but does not discharge it.

*Locking Device Out*

*Off Button In*



10. Install a suitable lock in the slot for the “**LOCKING DEVICE**” making sure the lock is “**LOCKED**”.

*Place Locking Device*



**WARNING:**

The site Shut-off and Lock Out facilities for gas and CHP water and associated pumps and electrical power must also be shut off and locked out.

Refer to local codes and requirements for safe conditions at the ENI 65 unit.

11. You may now safely proceed with the Service or Repair of the ENI 65 Unit.

Note: Refer to the “**Startup Procedure**” to place the ENI 65 back into service.

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**ENI 65 Synchronous  
Operator Manual**

Page Issued  
11-07

Replaces



## Woodward EGCP-2 Controller

### Remote Fault List and Description

The EGCP-2 indicates either Remote Fault 1, 2, or 3.

The unit control module (PLC) can be interrogated to determine the fault cause.

Controller Fault	PLC Code	Fault Description	Result
Remote Fault 1	M40	ECM (Engine) Warning	Soft shutdown
	M41	Low Oil Level	
	M42	CB1 Shunt or Overcurrent Trip	
	M43	Protective Relay (CB107) Fault	
	M44	Ventilation Motor Fault	
	M46	Pre Catalyst Temperature Low	
	M47	Temperature Across Catalyst Low	
Remote Fault 2	M60	ECM (Engine) Fault	Hard Shutdown
	<del>M61</del>	<del>Low Inlet Gas Pressure</del>	
	M63	CHP Coolant Pump Fault	
	M64	Low CHP Coolant Flow	
	M65	Internal Air Temperature High	
	M66	No Ventilation Air Flow	
	M67	Catalyst Temperature High	
Remote Fault 3		Master Stop Button Pressed	Hard Shutdown

**Soft Shutdown**      The Woodward EGCP-2 Controller causes the ENI 65 to go into an orderly shutdown mode including an engine “cool down”.

**Hard Shutdown**      The ENI 65 shuts down immediately.

The fault creating the shutdown condition must be repaired and cleared before normal operation of the ENI 65 can be resumed. Each of the conditions that can cause the remote fault must be investigated to determine the particular events that caused the fault. Refer to the Woodward EGCP-2 Controller instructions for information on clearing faults.

An “Operator Display Module” (PLC) is located in the Woodward EGCP-2 Controller cabinet that can be interrogated to determine the status of the fault conditions and read the codes.

**Note:**  
If the ENI 65 does not have a catalyst, M 67 will not be active

## Operator Display Module (PLC)

The Operator Display Module may be accessed by opening the Woodward EGCP-2 Controller cabinet. The Cabinet is opened by turning the latching screws 1/4 turn.

The Operator Display Module is in the upper left corner of the cabinet.

### To view fault conditions

- 1 With controls power on, the screen shows "RUN".
- 2 The "RUN" indication may be flashing. In this case, press the "ESC" button to stop the 'RUN' from flashing.
- 3 Press "RT ARROW" button until the screen shows "I OO O"
- 4 Press "MODE/ENTER" button.
- 5 The screen shows "I" blinking.
- 6 Press "UP ARROW" button until "M" shows on the screen blinking.
- 7 Press "RT ARROW" button until the second digit on the left of the screen is blinking.
- 8 Press "UP ARROW" button the first digit of the fault code is blinking on the screen.
- 9 From the Remote Fault List Table, this will be either a 4 or a 6.

*Operator Display Module*



- 10 Press "RT ARROW" button until the digit to far right digit on the screen is blinking.
- 11 Press "UP ARROW" button until the second digit of the fault code number is blinking. This will be a number from 0 to 4 depending on the code identification from the Remote Fault Table.

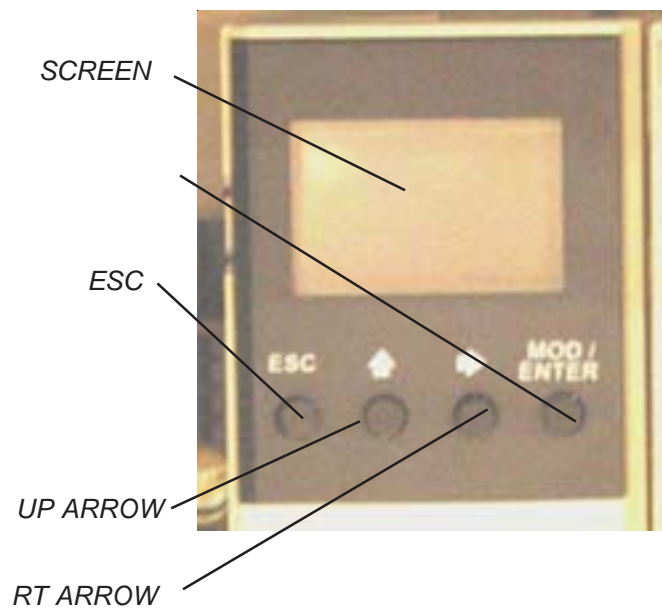
Press "MODE/ENTER" button

- 12 The status of the fault is indicated in the bottom right of the screen:  
 0 = No fault set  
 1 = Fault set

### For checking additional fault codes:

- 1 Press "ESCAPE" button.
- 2 Repeat previous steps.

The Operator Display Module faults are cleared with the Woodward EGCP-2 Controller.



## Clearing Fault Codes Woodward EGCP-2 Controller

**WARNING:** The “AUTO” and “TEST” switches must be in the “OFF” position or the ENI 85 might automatically start when the Fault Codes are removed.

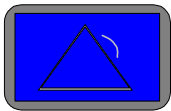
Notice: The materials in this manual relating to the Woodward Controller are excerpt from the Woodward instruction manuals. Please refer to the Woodward website for the latest information.

Alarm/Event Key

Alarm/Clear key

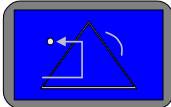
### ALARM/EVENT LOG KEYS:

ALARM / EVENT



The ALARM/EVENT key is used to access the Event log. When pressed, the current alarm events will be displayed on the right hand LCD screen. When multiple alarms are logged, the up and down scroll keys will allow you to navigate within the Event log. The Event log will store up to 16 events, as more events happen the oldest alarms will be dropped off to make room for the newer events. If power is cycled to the control, the Event log will be cleared.

ALARM CLEAR



The ALARM CLEAR key is used to acknowledge and clear alarm events from the Event log. To acknowledge and clear alarm and shutdown events a Security Code of Operator Level or higher is needed. After selecting the ALARM/EVENT key:

**If the Alarm mode is Visual or Warning –**

1. Pressing the ALARM CLEAR key will acknowledge the selected alarm, this means the cursor will move from the Alarm Name line down to the Time and Date line.
2. Pressing the Alarm Clear key a second time will remove the event from the log.

**If the Alarm/Shutdown mode is Audible, Soft Shutdown, or Hard Shutdown –**

1. Pressing the ALARM CLEAR key once will de-energize Discrete Output #11, Audible Alarm. This will happen without selecting the ALARM/EVENT key and without a Security Code entered.
2. With the ALARM/EVENT key pressed, so the Event log is being displayed: Pressing the ALARM CLEAR key a second time will acknowledge the selected alarm. This means the cursor will move from the Alarm Name line down to the Time and Date line.
3. Pressing the Alarm Clear key a third time will remove the event from the log.



**Remote Fault Mechanization**

**Soft Shutdown Faults**

<b>Remote Fault</b>	<b>Description</b>	<b>Enabling Function</b>	<b>Trip Condition</b>
M40	ECM Fault	System Controller Controlled Fuel Solenoid Energized	Soft Shutdown (MIL) Signal From The ECM On For 2 Seconds
M41	Engine Oil Low	System Controller Power On	Oil Replenish Unable To Bring Engine Oil Level To Full Set Point Within 2 Seconds
M42	Protective Relay Fault	System Controller Power On	Generator Circuit breaker CB1 Tripped
M43	Generator Breaker CB1 Shunt Trip Power Off	System Controller Power On	CB1 Shunt Trip Power Circuit Breaker Tripped For 2 Seconds
M44	Power To The Box Vent Fan Motor Off	Box Vent Fan Enable Signal On	Box Vent Fan Motor Overload Tripped For 10 Seconds
M47	The Temperature Difference Across The Catalytic Converter Indicating Component Function	Generator Circuit Breaker CB1 Closed For 30 Minutes Or More ENI 85 Not Operating IN Standby Mode ENI 85 Output Greater Than 46 Kw	Catalytic Converter Post Temperature Less Than 20 Degrees Greater Than The Catalytic Converter Pre-Temperature For More Than 10 Minutes

**Note:**  
If the ENI 65 does not have a catalyst, M 47 will not be active.

## Hard Shutdown Faults

Remote Fault	Description	Enabling Function	Trip Condition
M60	ECM Fault	System Controller Controlled Fuel Solenoid Energized	ECM Fault Output
<del>M61</del>	<del>Low Fuel Pressure</del>	<del>System Controller Controlled Fuel Solenoid Energized</del>	<del>Low Fuel Pressure For More Than 2 Seconds</del>
M63	CHP Coolant Pump Motor Power Off	Coolant Pump Enable Signal On	CHP Pump Motor Overload Tripped For 10 Seconds
M64	Low CHP Coolant Flow	Coolant Pump Enable Signal On	Low CHP Coolant Flow For 10 Seconds
M65	Box Temperature High	System Controller Power On	Box temperature High For 5 seconds
M66	Low Box Vent Air Flow	Box Vent Fan Enable Signal On	Low Box Vent Air Flow For 5 Seconds
M67	High Catalytic Converter Temp.	System Controller Power On	Catalytic Converter Input And / Or Output Temp High For 5 seconds

**Note:**

If the ENI 65 does not have a catalyst, M 67 will not be active.

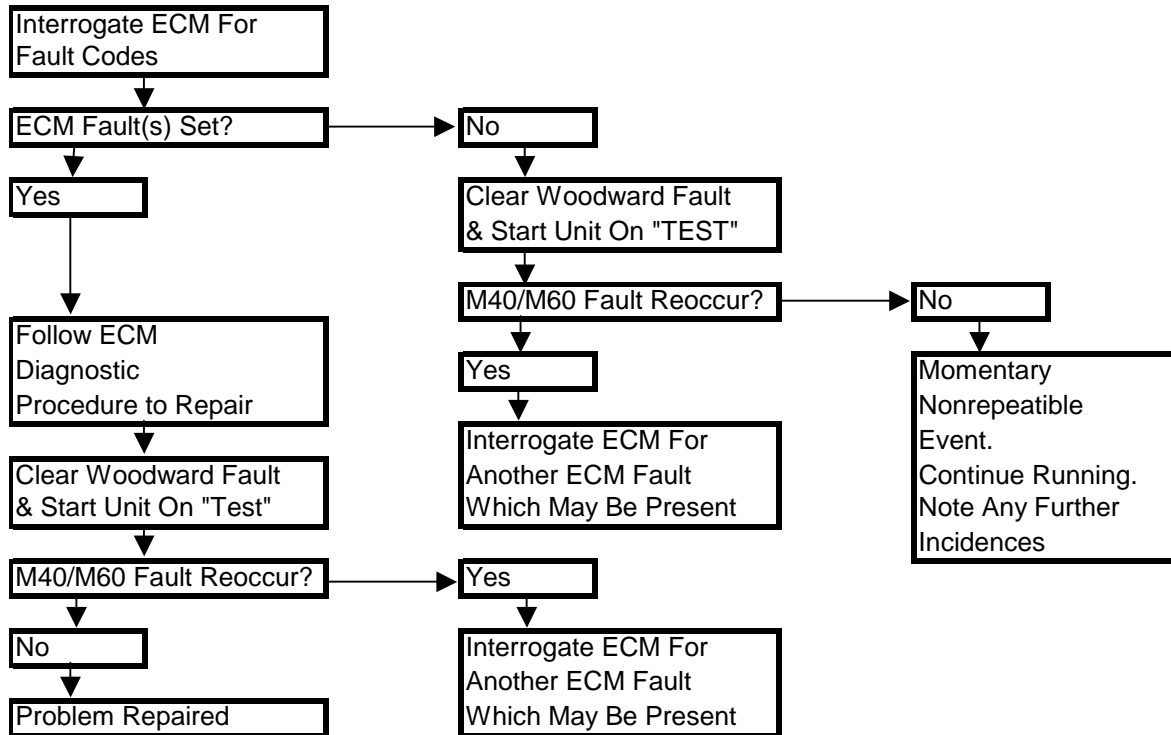
**Remote Fault Diagnostic Trees**

<b>Fault Code</b>	<b>Page</b>
M40 / M60.....	F-7
M41.....	F-8
M42 (CR102).....	F-9
M42 (CR206).....	F-10
M43.....	F-11
M44.....	F-12
M45 (120Vac CB1 Motor Operator).....	F-13
M46.....	F-14
M47.....	F-15
M63.....	F-16
M64.....	F-17
M65.....	F-18
M66.....	F-19
M67.....	F-20

## Fault Code M40 / M60 ECM Fault

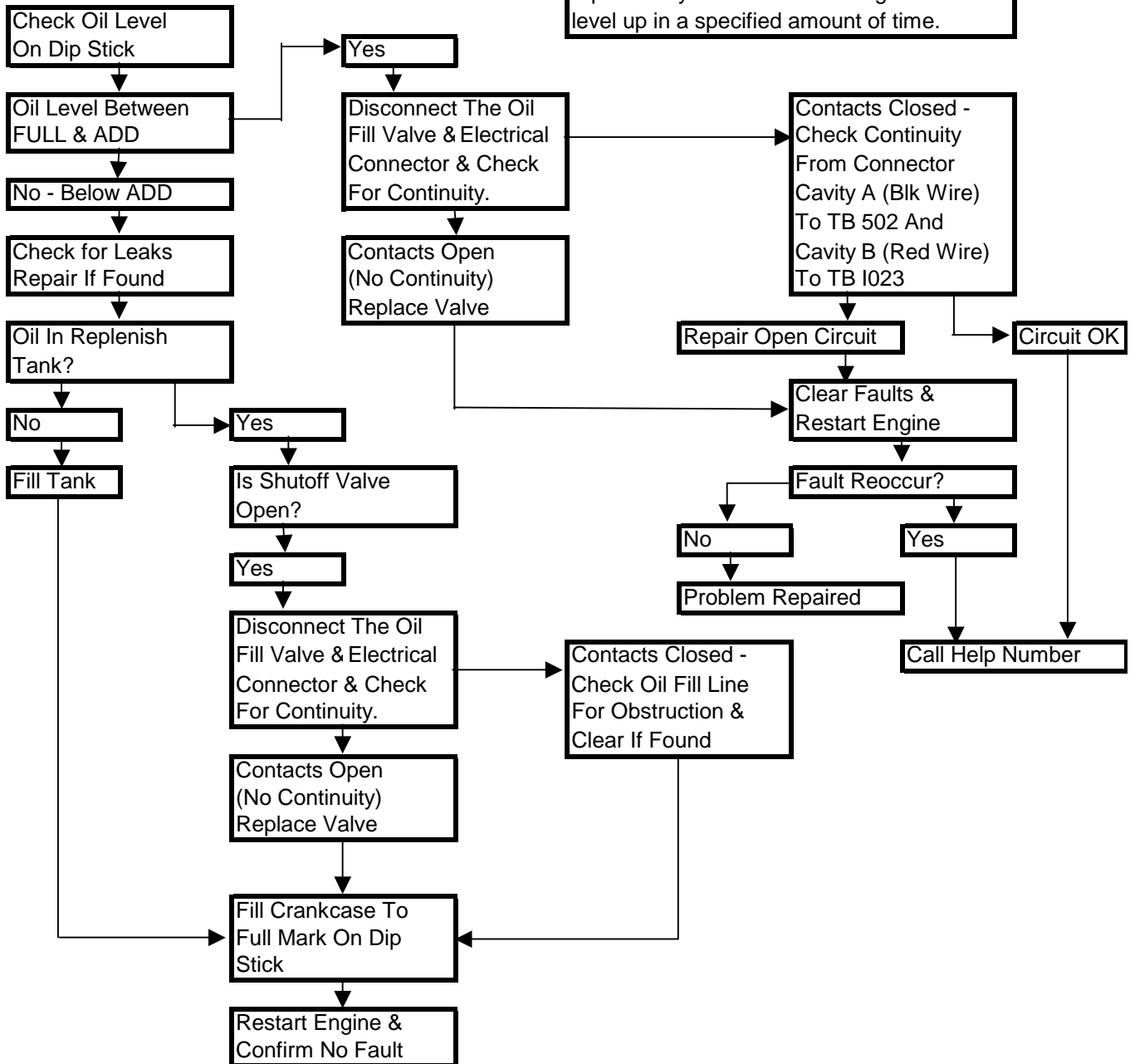
### Fault Definition:

The fault indicates the Engine Controller (ECM) has detected an out-of-specification condition.



**Fault Code M41**  
**Low Engine Oil Level**  
 Synchronous Unit

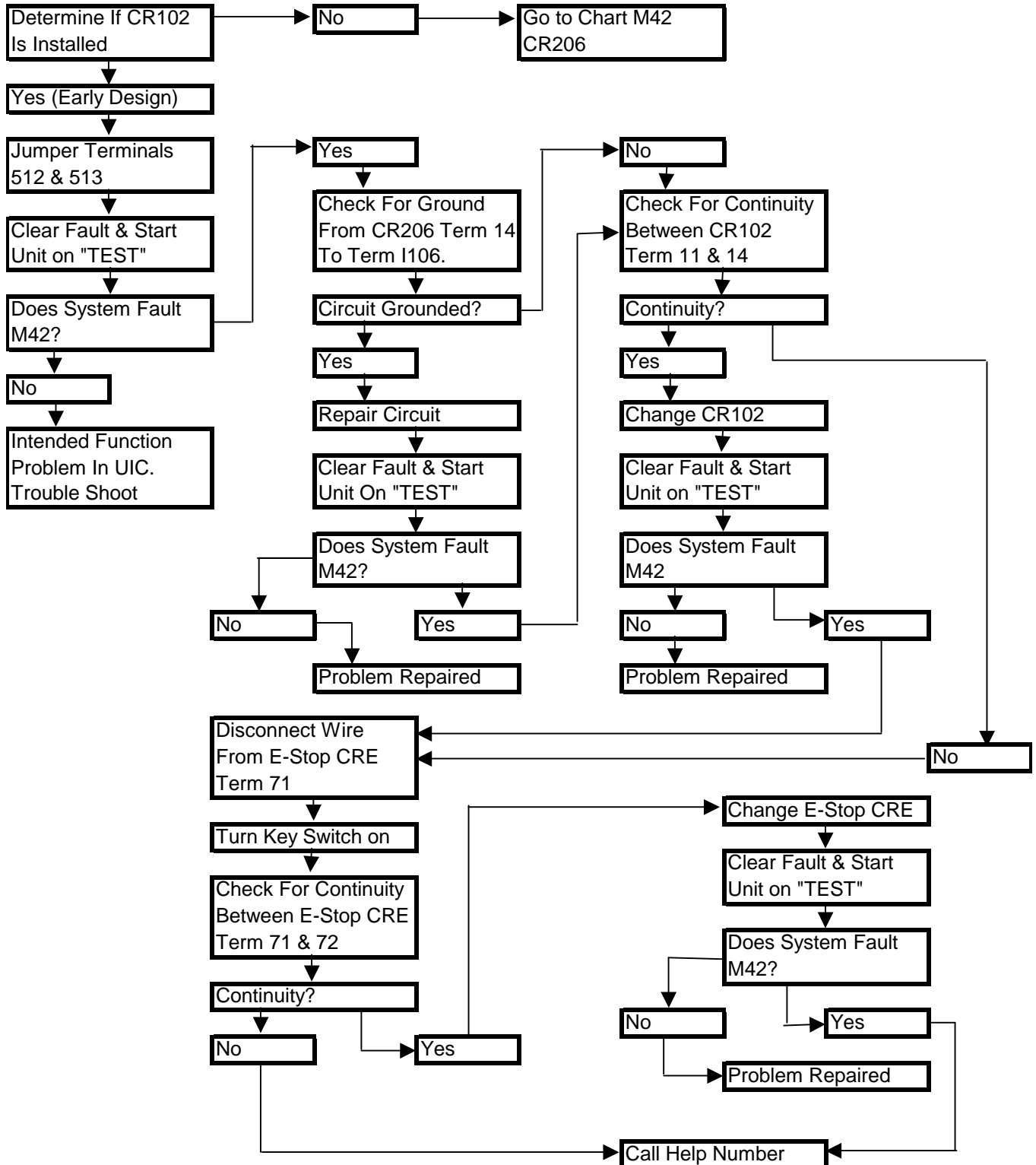
**Fault Definition:**  
 The fault indicates the engine oil is below the low limit of crankcase fill and the oil replenish system could not bring the oil level up in a specified amount of time.





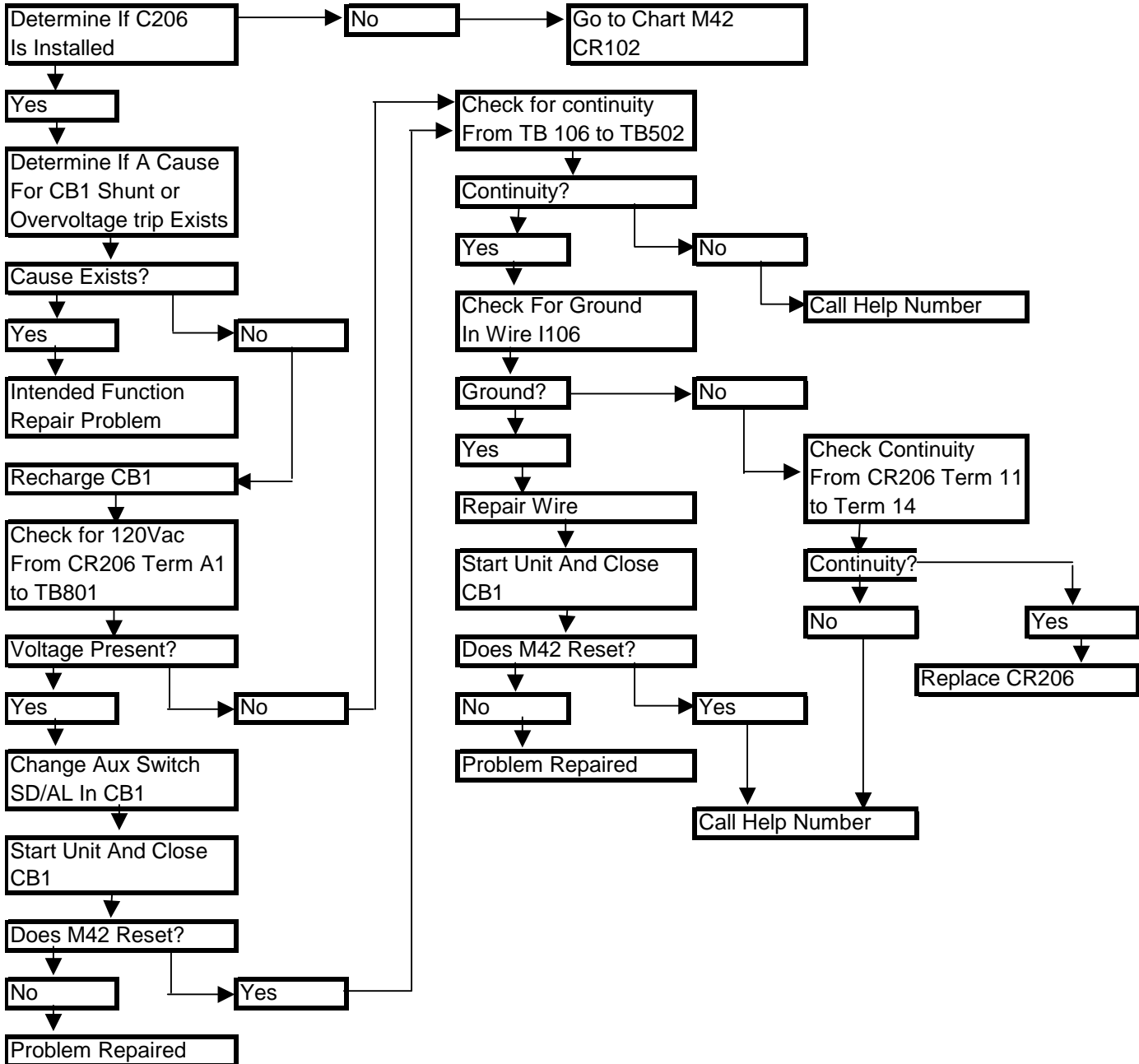
## Fault Code M42 Protective Relay CR102

Synchronous Unit



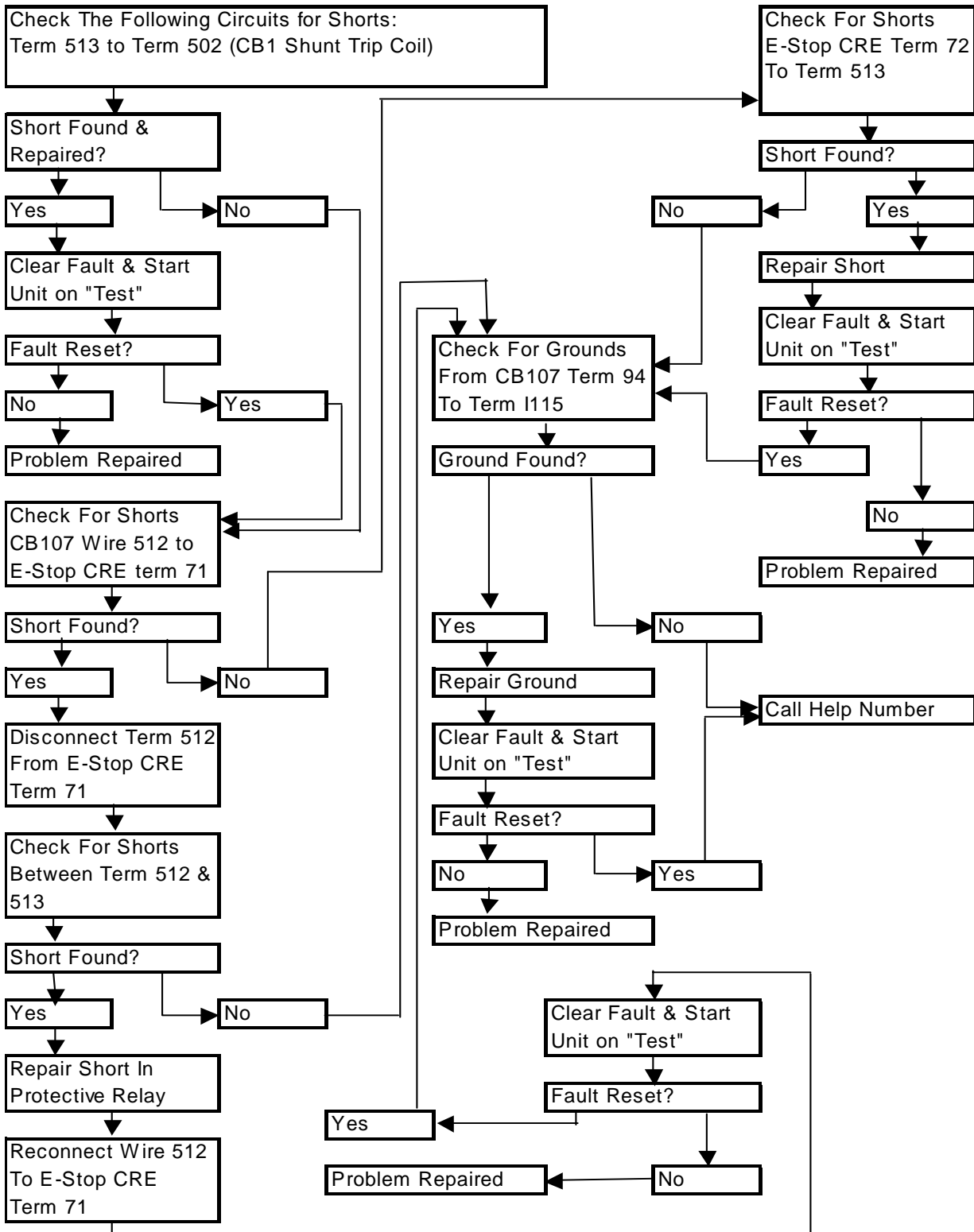
## Protective Relay CR206

Synchronous Unit

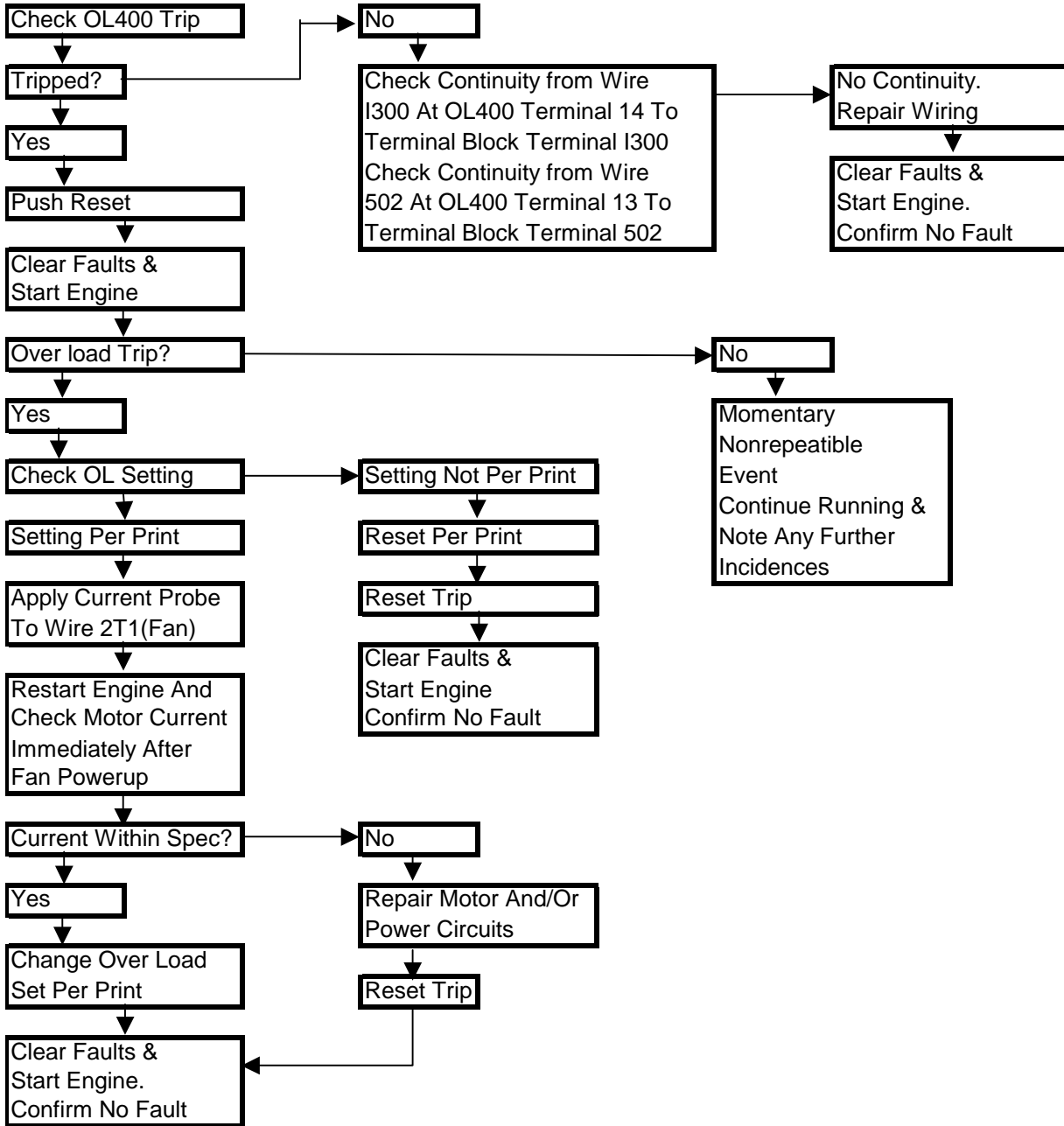


## Fault Code M43 Protective Relay CB107

Synchronous Unit



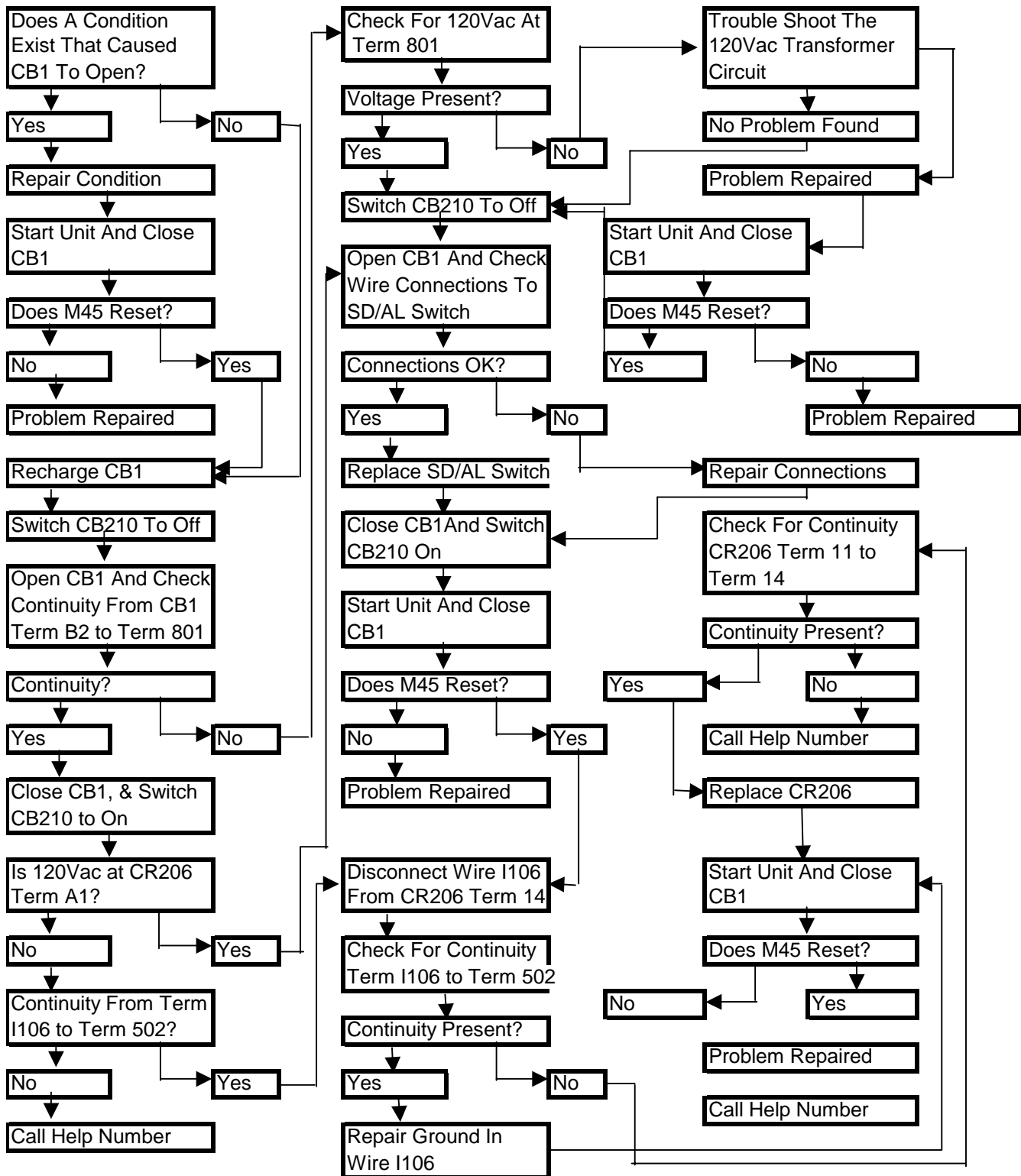
## Fault Code M44 Box Vent Blower Motor



## Fault Code M45 (120Vac CB1 Motor Operator)

### Generator Circuit Breaker Fault

Synchronous Generator



## Fault Code M46 Low Catalyst Input Temperature

Synchronous & Induction Units

Fault Code M67 indicates the temperature of the exhaust gas entering the catalytic converter did not achieve the minimum operating temperature in the specified amount of time.

The usual cause for this condition is the engine calibration has gone out of specifications. Working with the engine calibrations requires specialized equipment and training. Call the HELP NUMBER for assistance.

**Note:**

If the ENI 65 does not have a catalyst, M 67 will not be active

## Fault Code M47 Low Catalyst Delta Temp

Synchronous & Induction Units

Fault Code M47 indicates the temperature differential between the exhaust in and out of the converter did not achieve the minimum operating condition in the specified amount of time.

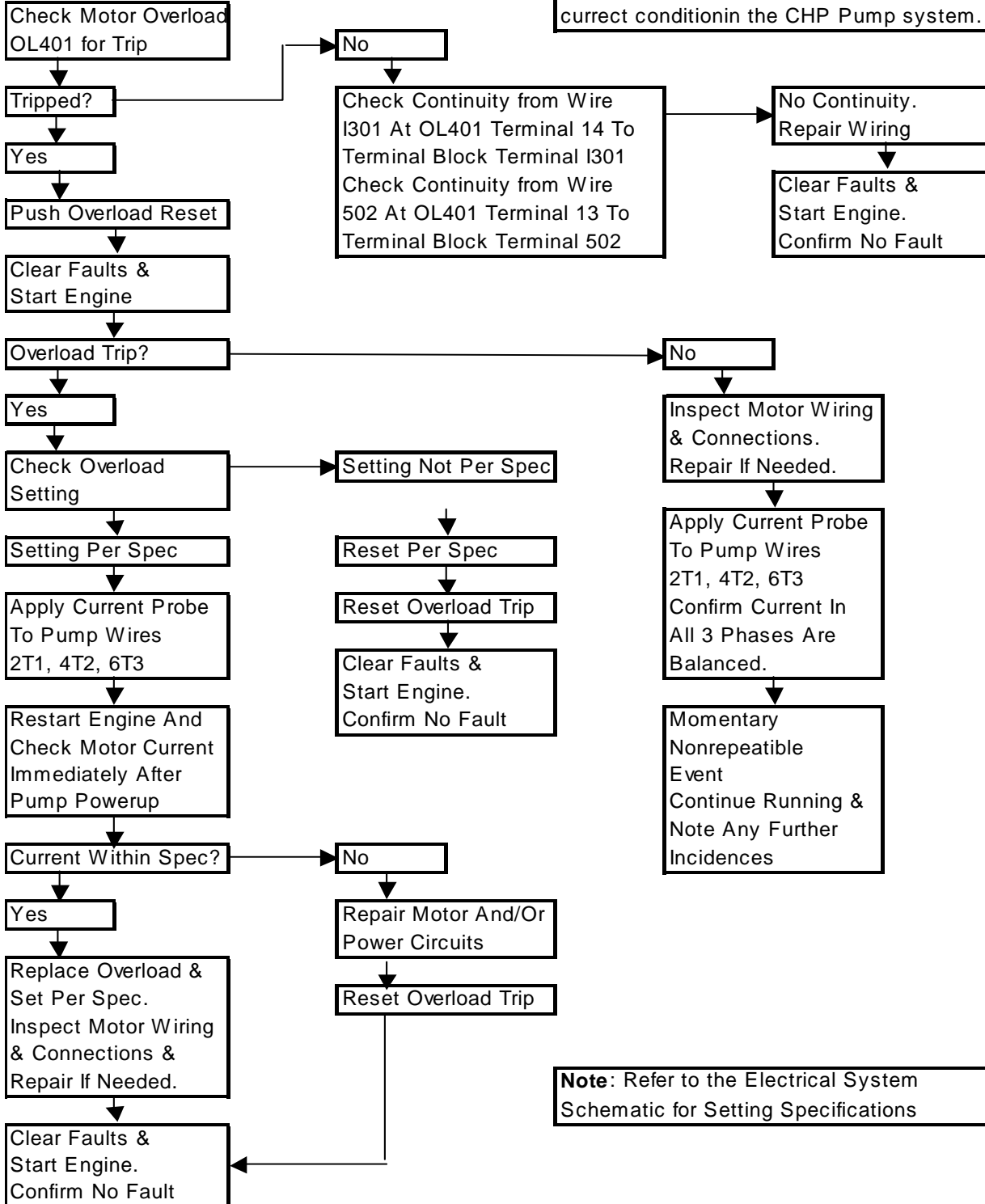
The usual cause for this condition is the engine calibration has gone out of specifications. Working with the engine calibrations requires specialized equipment and training. Call the HELP NUMBER for assistance.

<p><b>Note:</b> If the ENI 65 does not have a catalyst, M 47 will not be active</p>
---

## Fault Code M63 CHP Coolant Pump Motor Synchronous Unit

### Fault Definition:

The fault indicated that the thermal interlock on the CHP Coolant Pump contactor has opened. This may be caused by an over-current condition in the CHP Pump system.



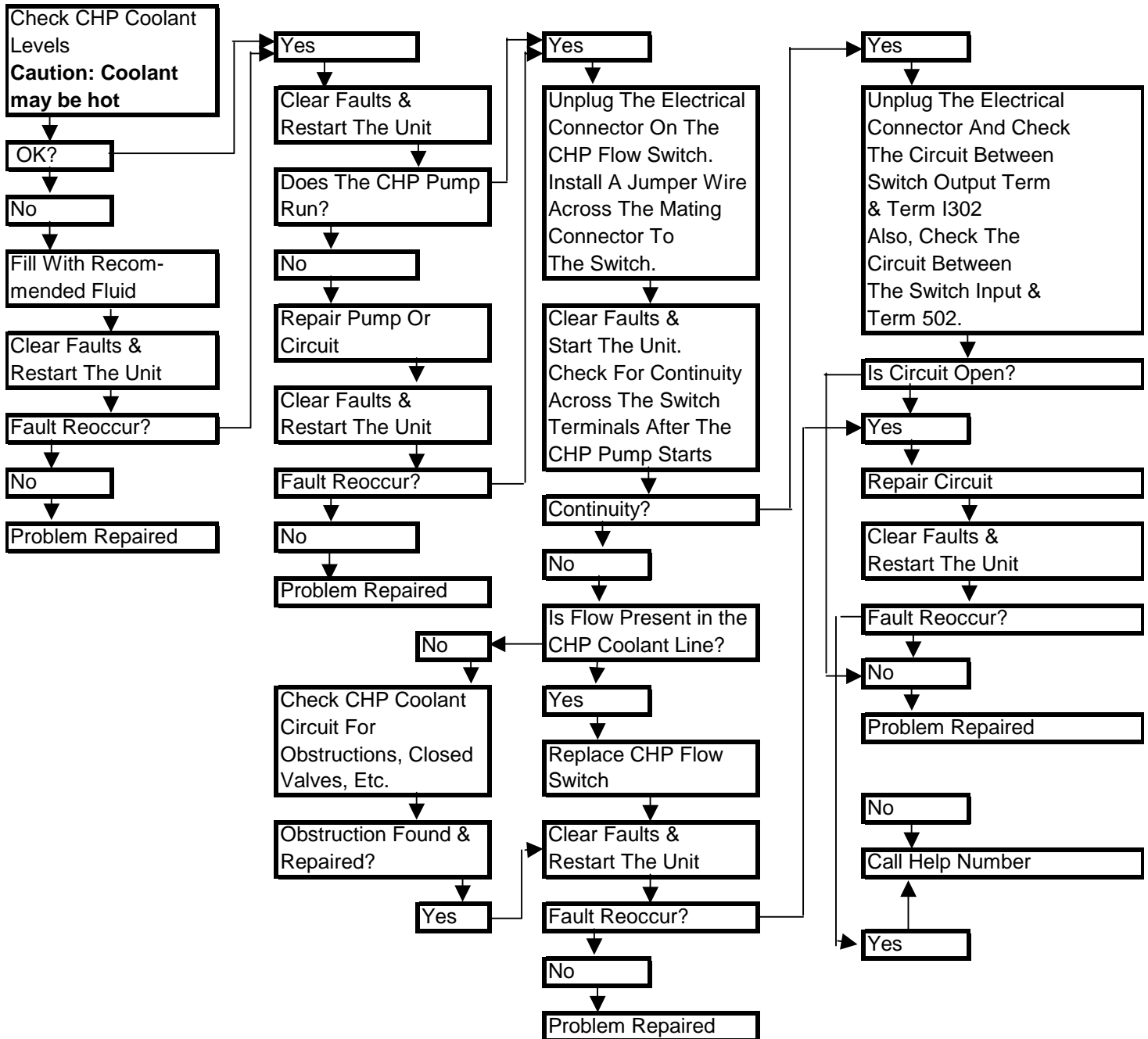
**Note:** Refer to the Electrical System Schematic for Setting Specifications



## Fault Code M64 Low CHP Coolant Flow Synchronous Unit

### Fault Definition:

The fault indicates that the CHP Coolant Flow Switch has "opened". This may indicate that a disruption in the CHP coolant has occurred.

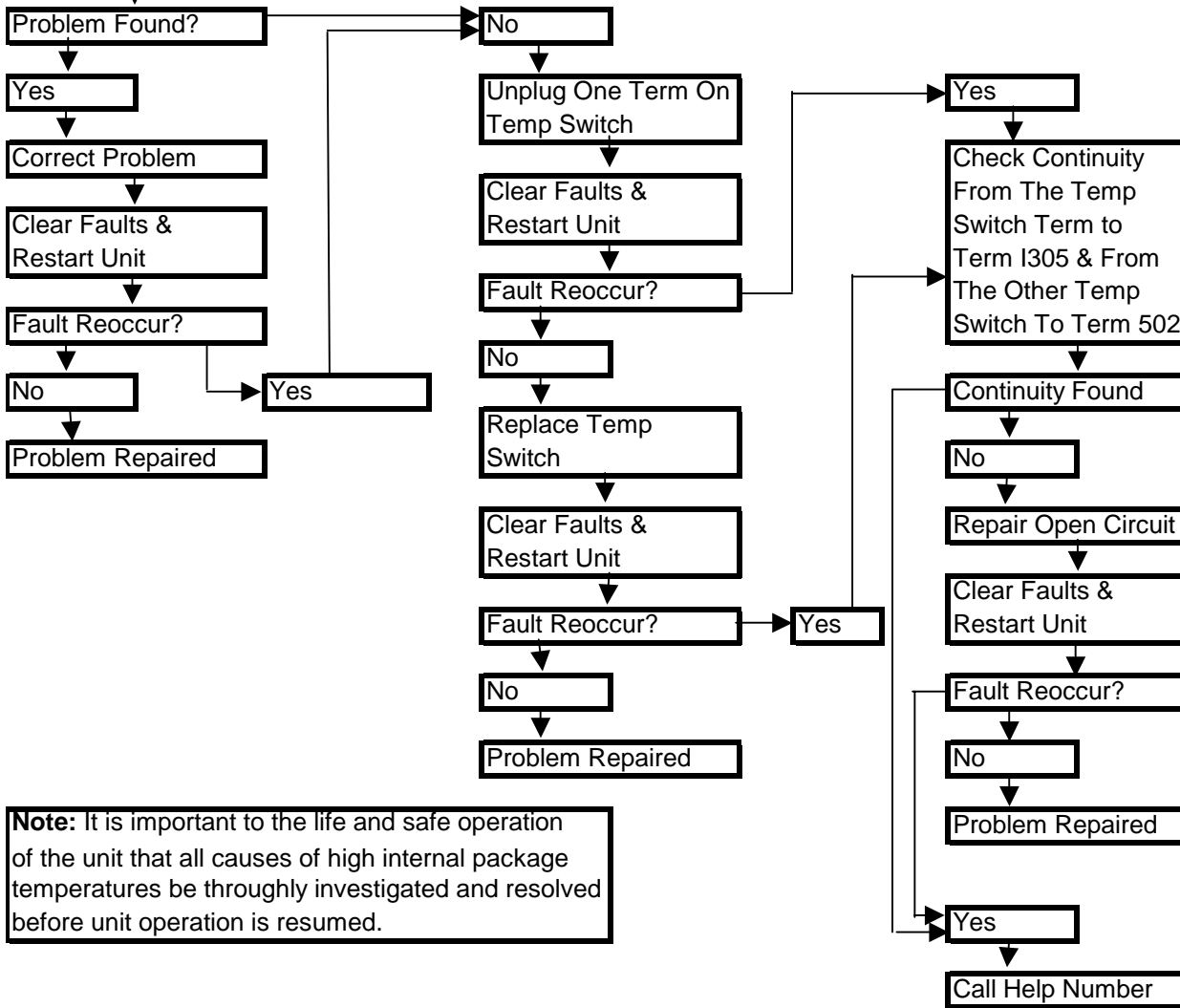


**Fault Code M65**  
**Thermal Interlock**  
 Synchronous Unit

**Fault Definition:**

The fault indicates that the Thermal Switch circuit has "opened". This may be caused by the Thermal Switch "opening" because the internal package temp. has exceeded 160 deg F. It should be noted that the Thermal Switch will reset at 120 deg F and reset might occur before a service technician can arrive to investigate.

Thoroughly Investigate All Potential Causes For High Box Temperature  
 Exhaust Blankets Not Covering  
 Exhaust System Leak  
 Other Codes Set, ie  
 M63, M66

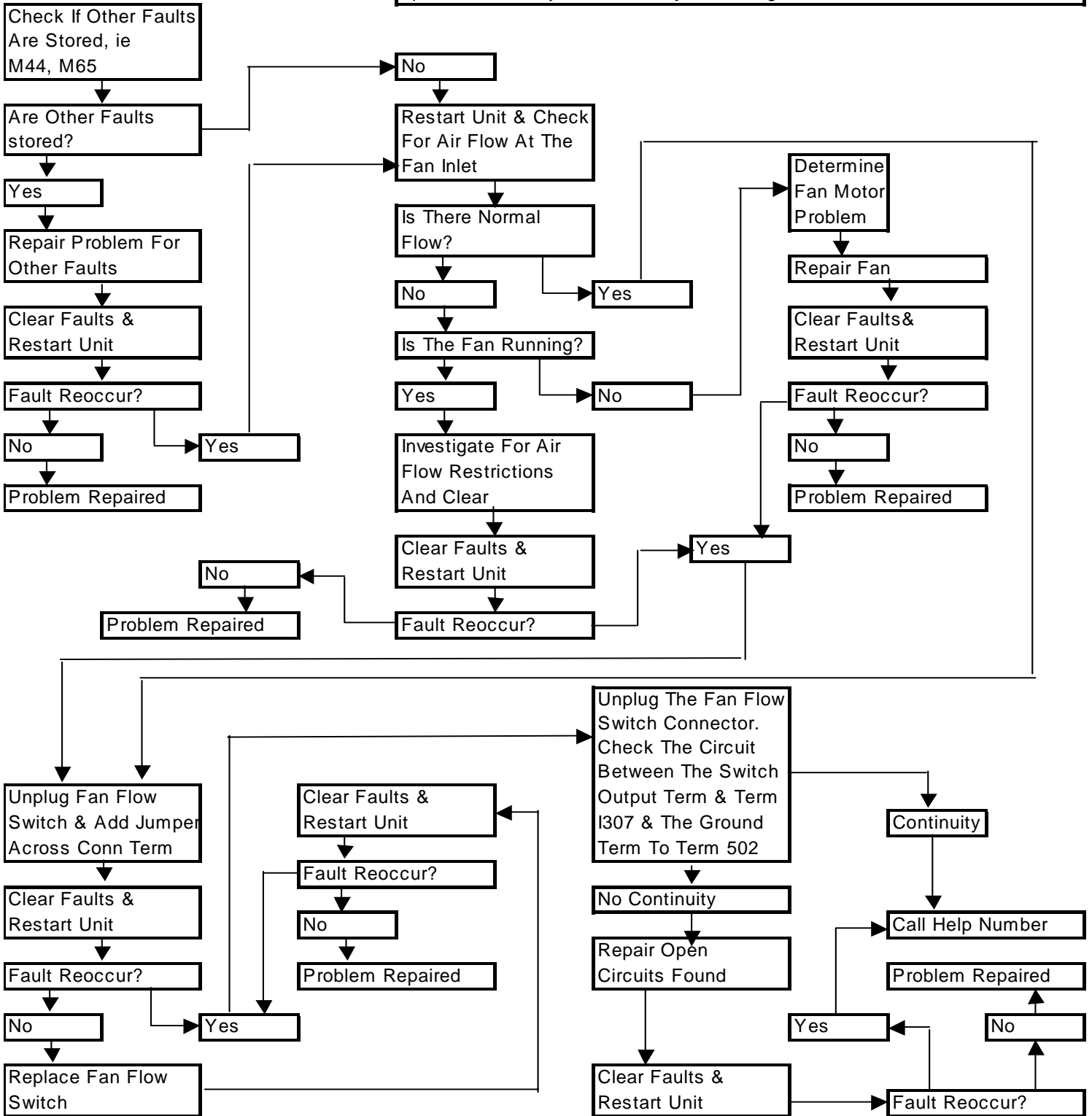


**Note:** It is important to the life and safe operation of the unit that all causes of high internal package temperatures be thoroughly investigated and resolved before unit operation is resumed.

## Fault Code M66 No Vent Air Flow

### Fault Definition:

The fault indicates that the air flow circuit "low flow" switch has opened. This may be caused by a blockage in the unit ventilation airstream



**Fault Code M67****Catalytic Converter Gas Temperature High****Synchronous & Induction Units**

Fault Code M67 indicates the temperature of the exhaust gas entering or exiting the catalytic is over the maximum limit.

The usual cause for this condition is the engine calibration has gone out of specifications.

Working with the engine calibrations requires specialized equipment and training.

Call the HELP NUMBER for assistance.

**Note:**

**If the ENI 65 does not have a catalyst, M 67 will not be active**

## ENI 65 Maintenance Schedule

Item	Scheduled Maintenance Every 1500 Hrs	Minor Overhaul Every 8000 Hrs	Major Overhaul Every 24000 Hrs
Engine Oil & Filter-Change	X		
Check Fluid Levels	X		
Engine Serpentine Belt-Inspect	X		
Spark Plugs-Replace	X		
Engine Air Filter-Clean & Inspect	X		
General Systems Inspection	X		
Engine Cylinder Heads-Replace		X	
Spark Plug Wires-Replace		X	
Engine Air Filter-Replace		X	
Engine Coolant Pump-Replace		X	
Tighten Electrical Panel Connections		X	
Engine Assembly-Replace			X
Exhaust Tubing-Replace			X
Engine Coolant Hoses-Replace			X
Exhaust Blankets			X

## Service Parts Kits

Item	I Power P/N	Package Usage
Scheduled Maintenance	26084-001	Low Temp Application
Scheduled Maintenance	26084-002	Standard Application
Minor Overhaul	25345-001	Low Temp Application
Minor Overhaul	25345-002	Standard Application
8000 Hour Service Complete	26085-001	Low Temp Application
8000 Hour Service Complete	26085-002	Standard Application
Major Overhaul	25346-001	Low Temp & Dual Element Cat. App.
Major Overhaul	25346-002	Low Temp & Single Element Cat. App.
Major Overhaul	25346-003	Stand. Temp & Dual Element Cat. App.
Major Overhaul	25346-004	Stand. Temp & Single Element Cat. App.



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**ENI 65 Synchronous  
Operator Manual**

Page Issued  
11-07

Replaces

## OPERATOR INTERFACE

**Notice:**

The materials in this manual relating to the Woodward Controller are excerpt from the Woodward instruction manuals. Please refer to the Woodward website for the latest information.

The EGCP-2 Operator Interface is designed for simplicity and redundancy of function in all operating modes. The backlit LCD screens are used to display various operating and status information to the operator, as well as for reading configuration setpoints and alarm information. The backlight on the LCD screen will stay on whenever the engine's speed is over 50 RPM. When the engine shuts down, the backlight will turn off after five minutes. Pressing any key on the front panel will first turn on the backlight and pressing the key a second time will perform that function. The backlight will turn off after five minutes of non-use and the engine is shut down.

### NOTE

*The EGCP-2 Operator Interface can only be used for unit configuration and monitoring. Unit start/stop, sync, or mode selection commands can not be given through the EGCP-2's front panel.*

### CAUTION

*An unsafe condition could occur with improper use of these software tools. Only trained personnel should have access to these tools.*

The screens provide eight lines of Status Information, with the option of displaying four lines of Setpoint tuning or Alarm Log information. These screens allow the user to monitor and tune related parameters at the same time.

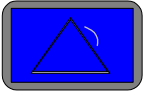


A red Light Emitting Diode (LED) on the face of the control is used to indicate an alarm condition by flashing repeatedly, and to indicate a shutdown condition by staying on continuously.

There are a total of 19 keys on the keypad. Each of the keys has the following function(s):

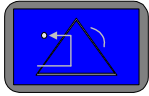
## ALARM/EVENT LOG KEYS:

### ALARM / EVENT



The ALARM/EVENT key is used to access the Event log. When pressed, the current alarm events will be displayed on the right hand LCD screen. When multiple alarms are logged, the up and down scroll keys will allow you to navigate within the Event log. The Event log will store up to 16 events, as more events happen the oldest alarms will be dropped off to make room for the newer events. If power is cycled to the control, the Event log will be cleared.

### ALARM CLEAR



The ALARM CLEAR key is used to acknowledge and clear alarm events from the Event log. To acknowledge and clear alarm and shutdown events a Security Code of Operator Level or higher is needed. After selecting the ALARM/EVENT key:

If the Alarm mode is Visual or Warning –

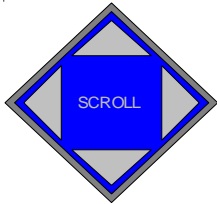
1. Pressing the ALARM CLEAR key will acknowledge the selected alarm, this means the cursor will move from the Alarm Name line down to the Time and Date line.
2. Pressing the Alarm Clear key a second time will remove the event from the log.

If the Alarm/Shutdown mode is Audible, Soft Shutdown, or Hard Shutdown –

1. Pressing the ALARM CLEAR key once will de-energize Discrete Output #11, Audible Alarm. This will happen without selecting the ALARM/EVENT key and without a Security Code entered.
2. With the ALARM/EVENT key pressed, so the Event log is being displayed: Pressing the ALARM CLEAR key a second time will acknowledge the selected alarm. This means the cursor will move from the Alarm Name line down to the Time and Date line.
3. Pressing the Alarm Clear key a third time will remove the event from the log.

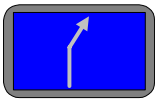


## NAVIGATION and ADJUSTMENT KEYS:



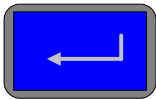
The SCROLL KEY is used to move the cursor up, down , left and right. It also is used to increment and decrement values while in the configuration menus.

ESC



The ESCAPE KEY is used to move upwards (out of )the configuration menu levels. It also is used when tuning a value to restore the previous value, if the new value is not entered into memory (see the enter key, below).

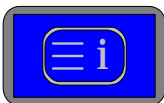
ENTER



The ENTER KEY is used to move downwards (into) the configuration menu levels. It is also used to when tuning a value to enter the new value to memory. It also serves as a means to commit alarm event items to the alarm event list without removing them. This is known as logging the alarm event item. Pressing the enter key while on the selected alarm/event item will “save” that item to the event list. If the selected alarm event was an active alarm event, the action(s) associated with the alarm event will also be cleared from the control logic.

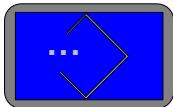
## STATUS and CONFIGURATION KEYS:

STATUS



The STATUS KEY, when pressed, will put both left and right LCDs into the status display mode. The status displays provide information about different items of engine and generator set operation. See the STATUS MENU buttons, below for details on the various status keys. There are no adjustment values in the status menus.

## CONFIG

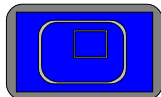


The CONFIG KEY, when pressed, will put the right hand LCD into the configuration mode. Configuration menu items will be displayed in the right hand screen. Status information will continue to be displayed in the left hand screen. Since there are various menu items and adjustments in the configuration menu, a blinking cursor is provided in the right hand display when the configure mode is active.

## STATUS MENU KEYS :

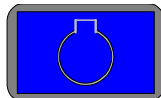
The contents of the various status menus are described in the Status Screens section in Chapter 4 of this manual.

## SYSTEM



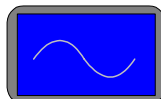
The SYSTEM STATUS key, when pressed displays the system status information. The system status display is also the default status display screen (it is always the first display shown after a power up of the control). This display shows general information about the operation of the engine generator set.

## ENGINE



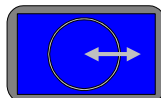
The ENGINE STATUS key , when pressed displays status information about the engine functions and operation.

## GEN



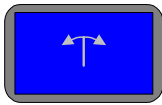
The GEN STATUS key shows three phase generator parameters when pressed.

## I/O



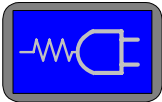
The I/O STATUS key provides the status of all the discrete inputs and outputs, as well as information on analog inputs and outputs.

## SYNC



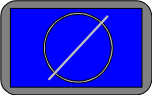
The SYNC STATUS key shows status information regarding the generator breaker and utility breaker synchronizer.

## KW LOAD



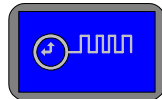
The KW LOAD STATUS key, when pressed, shows the status information for the KW load control of the EGCP-2.

## PF / KVAR



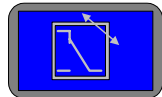
Press the PF/KVAR STATUS key to display VAR/PF Mode information, as well as three phase generator voltage and current.

## SEQUENCE



The SEQUENCE STATUS key provides sequencing information for multiple unit systems. Single unit systems, and units not in the AUTO mode will not provide status information in this screen.

## ATS



The ATS STATUS key, when pressed, displays the status information for the Automatic Transfer Switch functions.

## Navigation Procedure

The following drawings detail a step-by-step procedure for navigating through the EGCP-2 software. Additionally, the typical display entries seen at each step are shown.

