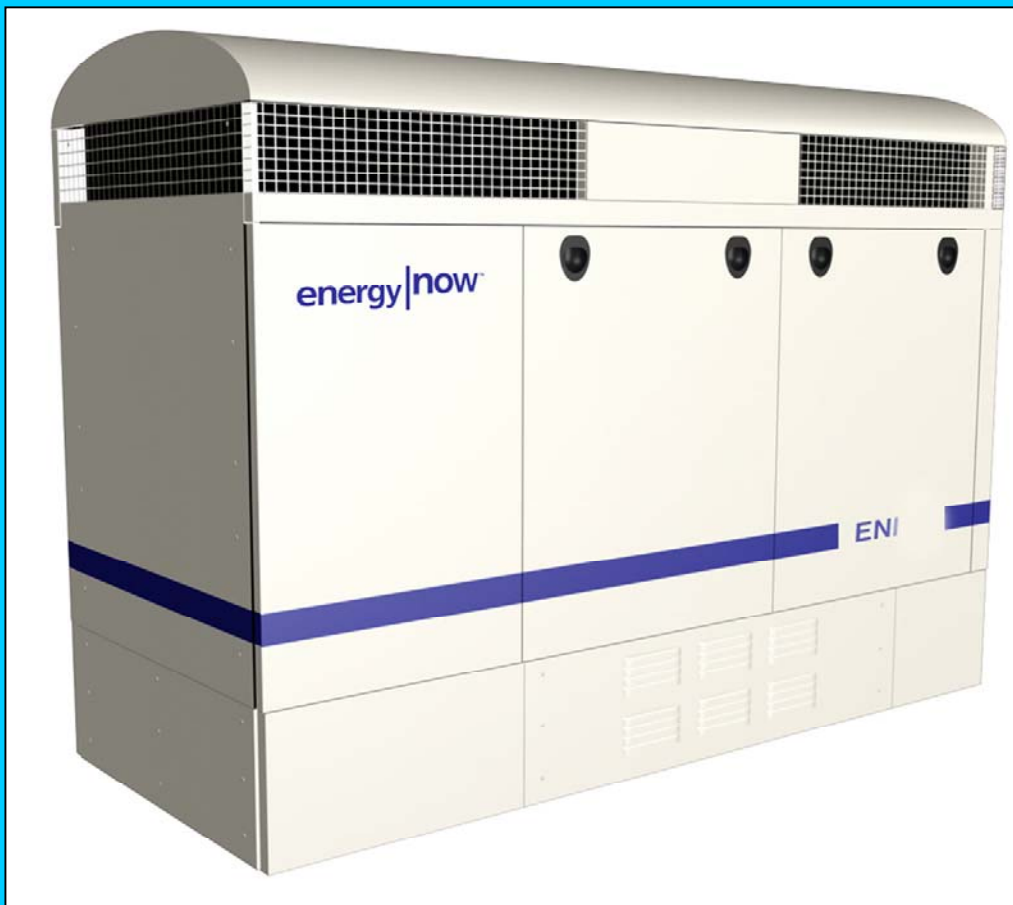

ENI 65 Induction

Operator Manual



	Page
Section A Introduction, Disclaimers, Safety Warnings	
Important Safety Instructions	A-1
Contacts For Assistance	A-1
Disclaimer	A-2
Safety	A-2
Warning Information Symbols and Definitions	A-4
Section B Initial Startup Procedure	
Preparation	B-1
Initial Inspection	B-1
GCP-21 Controller Panel Settings	B-1
Connect Battery	B-2
Turn On 120 Vac Power	B-2
Fill The Engine Oil Reserve Tank	B-3
Check The Oil level In The Engine	B-3
Check Engine Coolant Levels	B-4
Fill The CHP Fluid System	B-4
Turn On The Fuel Supply To The Engine	B-5
Start The ENI 85 On Test	B-5
If The ENI 85 Fails To Start	B-5
Engine Starts & Runs	B-10
Oil Reserve Valve	B-12
ENI 85 Induction Electrical System Calibration	B-13
Section C Startup Procedure	
Startup Procedure	C-1
Section D Shutdown Procedure	
Shutdown Procedure	D-1
Section E Lock-Out / Tag-Out Procedure	
Lock-Out / Tag-Out Procedure	E-1
Section F Remote Fault Procedure	
Remote Fault List & Description	F-1
Operator Display Module (PLC)	F-2
Clearing Faults	F-3
Remote Fault Mechanization	F-4

	Page
Section G Scheduled Maintenance	
Scheduled Maintenance	G-1
Section H GCP-21 Operator Interface	
GCP-21 General Operating Instructions	H-1
Detailed Function Explanation	H-4



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

Telephone:

765-621-7900



ENI 65 Induction
Operator Manual

Page Issued

11-07

Replaces

All rights are reserved. This material may not be reproduced or copied, in whole or part, in any form without written consent of I Power Energy Systems, LLC.

Information contained in this material, e.g., pictorial descriptions, notes and specifications, tables, codes and dimensions, may be cited, referenced or reproduced solely for the purpose of describing a physical component, or the application of a physical component, described in this document.

NOTICE: The copyright law of the United States governs the making of photocopies or other reproductions of copyrighted material. One of these specified conditions is that the photocopy or other reproduction is not to be used for any purpose other than private study, scholarship or research. If the user reproduces I Power Energy Systems, LLC material in excess of "fair use," that user may be liable for copyright infringement.

The use of information contained in this material is not warranted to be applicable or suitable for any particular purpose. Any liability, including infringement of trademarks, copyrights or patents, arising from the use of these materials is the sole responsibility of the user.

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.



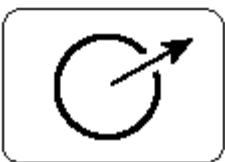
The area marked with this symbol can be at a temperature that can cause serious burns if touched.



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 GCP-21 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 GCP-21 and Utility Cabinets to be sure they are tight and that there are no wires obviously not connected.

2. GCP-21 controller panel switch settings

Set the switches as follows:

SWITCH / CONTROL	SETTING
SYSTEM	OFF
REMOTE LOCAL	LOCAL
EMERGENCY STOP	PULLED OUT



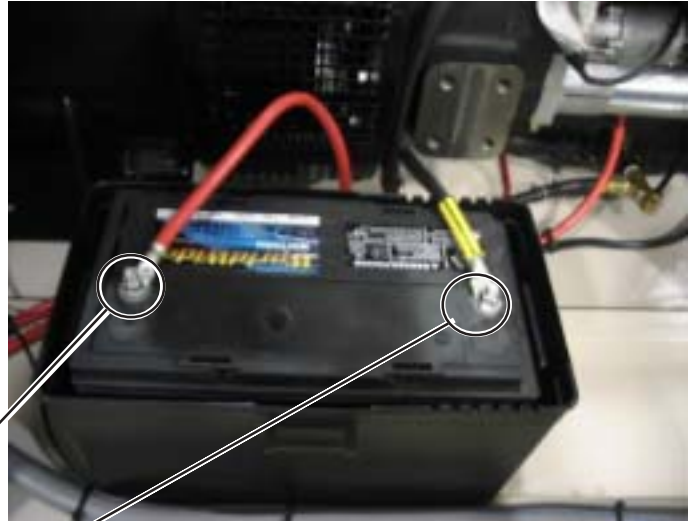
“Remote Local” Switch “Local”

“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.

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.



CB105

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:

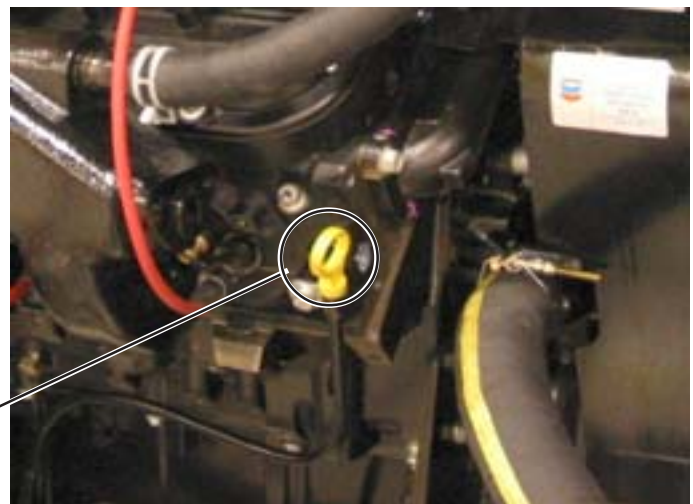
Use a ladder to safely reach the fill funnel with pour containers that can be safely handled.

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 65 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.

If the fuel system includes an auxiliary start boost fuel, be sure that system is functional.

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.

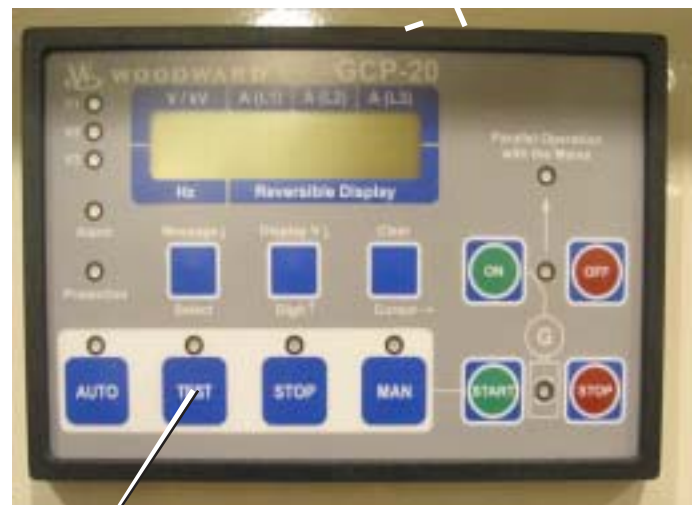
- a. Turn the “**SYSTEM**” switch to “**ON**”.
- b. After the GCP-21 controller powers up, press the “**TEST**” button. The engine will immediately go into the start sequence.
 1. Engine Crank For 10 Seconds
 2. Rest for 10 seconds

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.



System Switch



Test Button

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. GCP-21 controller fails to power up.

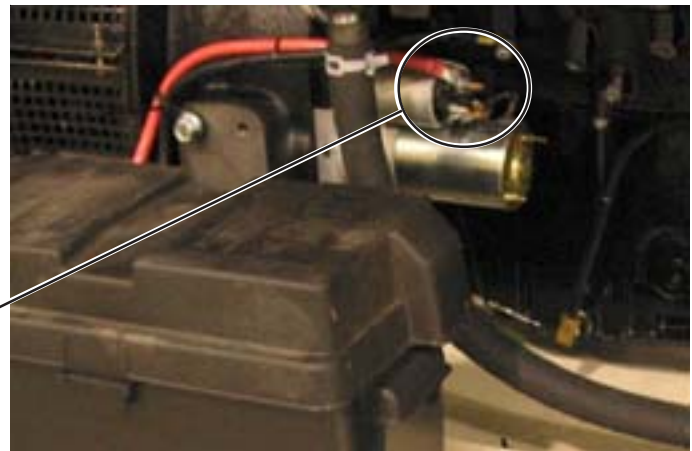
Problem Condition	Repair
12Vdc Battery Discharged	Charge the battery with a 12 V battery charger Replace the battery with a fully charged battery
12Vdc Battery Terminals - Poor connection	Clean battery terminals Turn off CB105 Disconnect battery terminals (negative first) Clean both battery & cable terminals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

b. The GCP-21 powers up, but the engine fails to crank or cranks very slowly.

The battery may have sufficient charge to operate the GCP-21 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 GCP-21 Controller Faults

Press and hold the "CURSOR / CLEAR" button



Cursor / Clear button

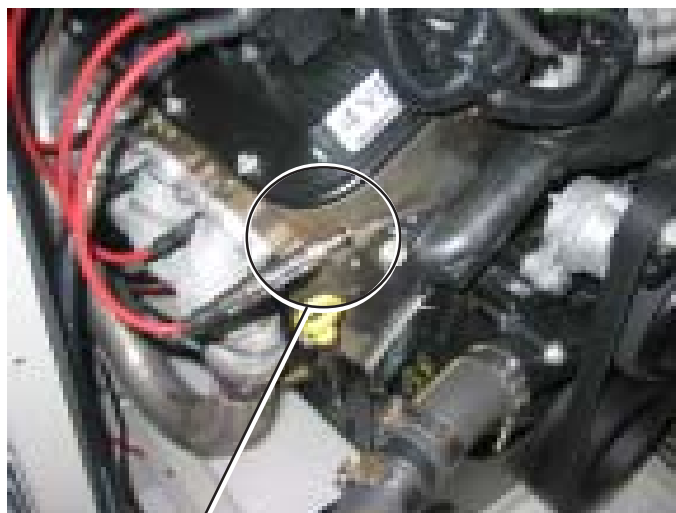
5. After the GCP-21 fault is cleared, crank the engine over by pressing the “TEST” button. The gas pressure must be at least **0.5 psi (13.9 in WC)** while the engine is cranking.
6. If the gas pressure is less than 13.9 in WC, investigate the site gas supply for possible causes of low gas pressure. Continue investigation until at least 13.9 in WC is achieved.
7. 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:

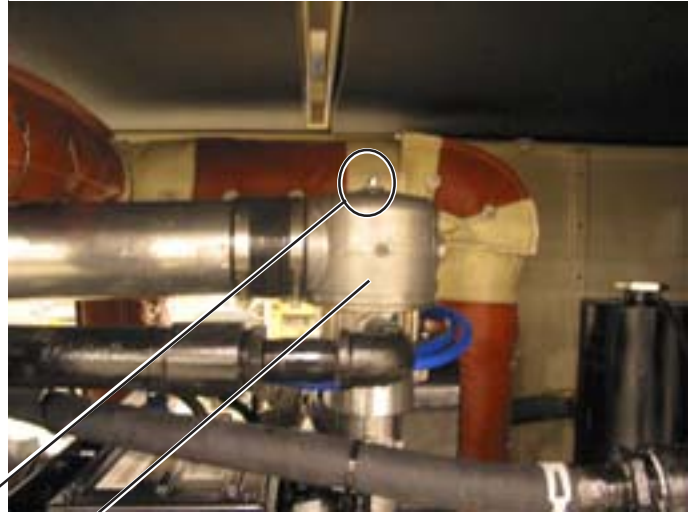
Do not touch the plug or connector to avoid shock from ignition voltage.

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

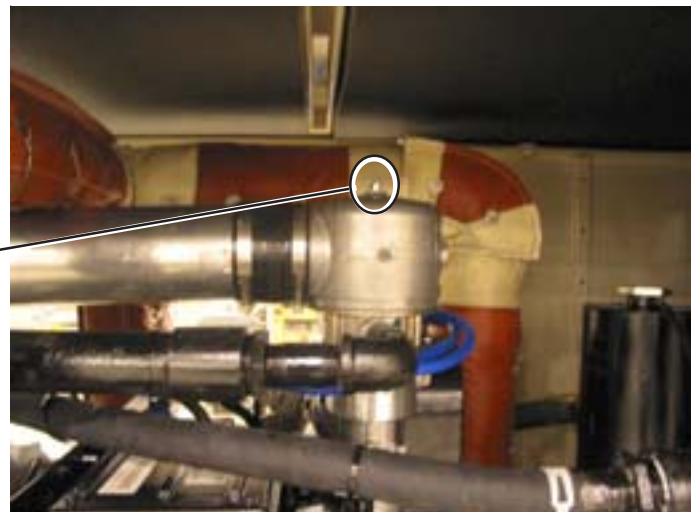
2. Observe the valve to see if it is stuck in the full up or down position. Move the valve through its full range of movement to be sure there is no obstruction.



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 85 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 GCP-21 controller. This information is viewed by pressing the **“MESSAGE / SELECT”** button until the desired data appears on the screen..



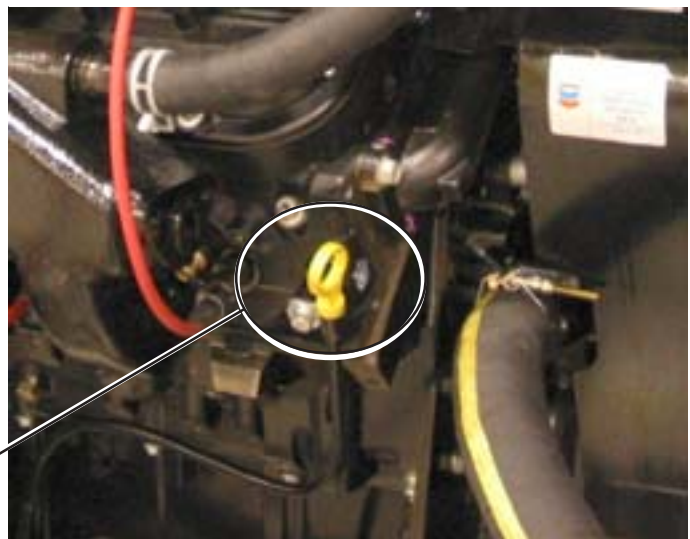
Message / Select

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 pressing the **“STOP”** button.
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 pressing the “STOP” button

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 pressing the “TEST” button. 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 65.

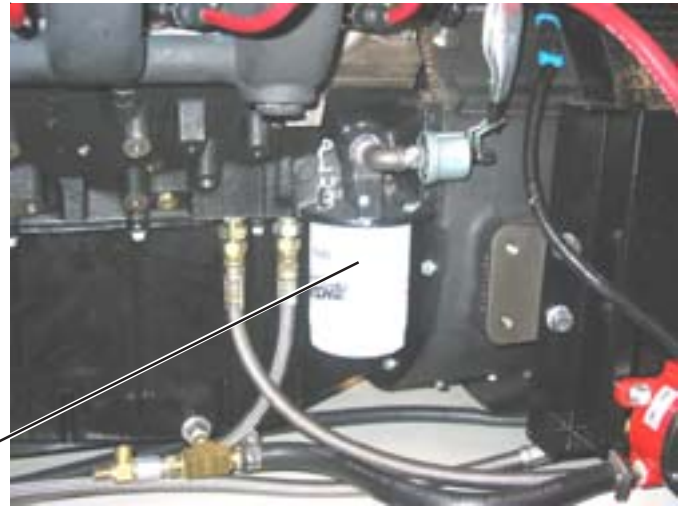


CHP System Cap

h. Check for fluid leaks

1. With the engine running and the coolant temperature at least 195 deg F, walk around the ENI 85 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 pressing the “STOP” button. 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 INDUCTION 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.

The only operating method available for the ENI 65 Induction unit is 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.

Note:

The fan and pump motors are powered by grid voltage applied at the bottom of the Generator Breaker (CB1). This voltage must be present to perform this check.

- 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 65 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. Proceed to the Grid Power Direction Of Rotation check on Page B-14

2. Check for Power Phase Rotation

Note:

The phase rotation of the generator and the grid must match in order to function correctly. This must be checked and corrected, if necessary, before the ENI 85 can be used. The ENI 85 is factory wired for CW Rotation (Phase Order A, B, C).

- a. With grid voltage applied to the bottom of the Generator Breaker (CB1), carefully attach a **“Rotation Test Meter”** to the 3 leads to Phases A, B, and C.
- b. Read the **“Direction Of Rotation”** indicated on the meter. The direction is indicated by a light turning on either **“CW”** or **“CCW”**. This is the direction of rotation of the grid power.
- e. If the Direction Of Rotation is **CCW**, the power cables to the center and right terminals at the bottom of Generator Breaker (CB1) must be reversed.

To change the generator power “Direction Of Rotation”, stop the ENI 65 by pressing the **“STOP”** button.

1. Turn off and lock out the grid power to the bottom of the Generator Breaker (CB1).
2. Reverse the power Phase B & C cables from the generator located at the top of the Generator Breaker (CB1).
3. After reversing the Phase B and C cables, recheck the **grid power “Direction Of Rotation”**. The direction should be opposite of the first check and now be CW.

Power “Direction Of Rotation” Check Example



Phase Rotation Meter

*Phase Connections
Attach To Bottom Of Generator Breaker (CB1)*

3. Setting the ENI 65 Power Level.

Once the grid direction of rotation has been determined to be the same for both the grid and generator power, the ENI 65 can apply power to the power bus.

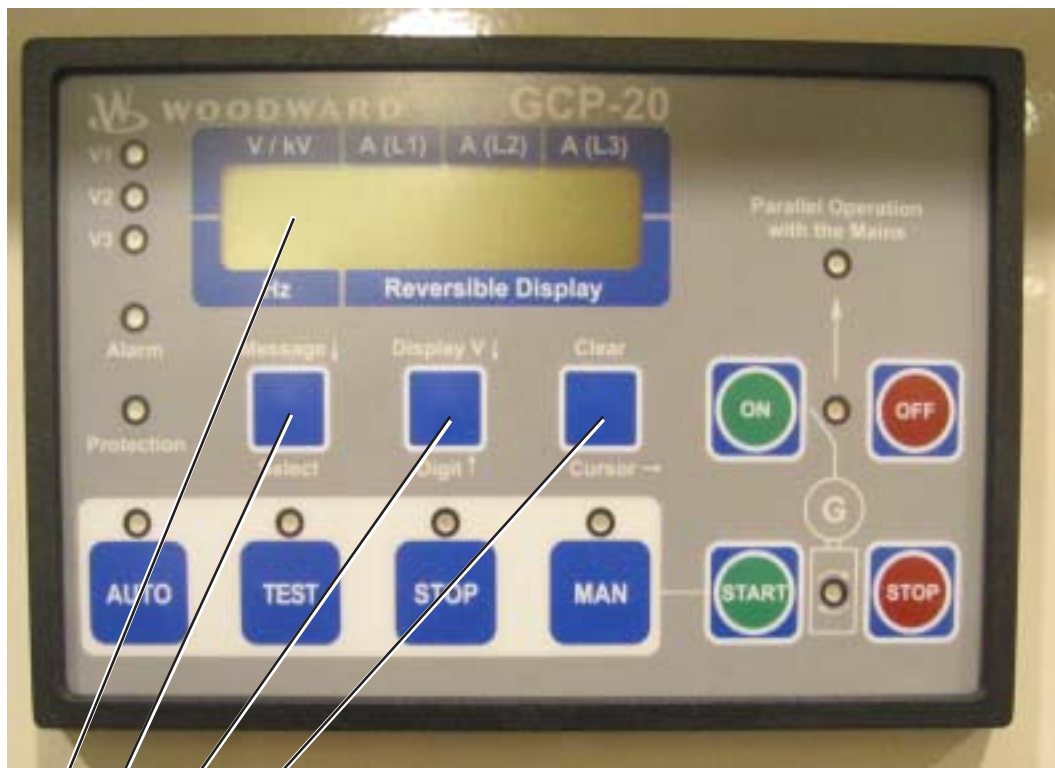
Note:

If the fuel supply is not sufficient for the ENI 65 to operate at 65 Kw, use the maximum power level achievable to set the power level.

Note:

The ENI 65 output power level is factory set to 65 Kw.

If a different output level is required for the application, this setting change should be made before starting the ENI 65 to produce power.



GCP-21 Controller Panel

Display Screen

Message / Select

Display V / Digit

Clear / Cursor

1. Turn the "SYSTEM" switch on the control panel "ON".
Allow the Controller to come on.
2. Using 2 fingers, press "DISPLAY / DIGIT" and "CLEAR / CURSOR" buttons at the same time.
The Screen will display "Software Version....."

3. Press "MESSAGE / SELECT" button.
This will allow the Security Code to be entered that is necessary to change set values.
4. The Security Code is entered in the following procedure (contact I Power Energy Systems to obtain the correct code):
 - a. The cursor in the Display Screen will indicate the first digit.
 - b. Press the "DISPLAY / DIGIT" button until the desired number is indicated on the screen.
 - c. Press the "CLEAR / CURSOR" button to move to the next digit in the Display Screen.
 - d. Repeat the above procedure until the Security Code is indicated in the Display Screen.
 - e. Press "MESSAGE / SELECT" button twice to bring up the Main Menu on the Display Screen.
5. Pressing the "MESSAGE / SELECT" button indexes through the menu items which are shown one at a time.

Menu Structure

The Main Menu consists of the title of group of settings with an indication if changes are to be made in that group. As each menu item is displayed, the "NO / YES" indication for that item can be changed by pressing the "CLEAR / CURSOR" button.

Note:
If a "Yes" is indicated accidentally, simply index through the resulting detail menu by pressing the "MESSAGE / SELECT" button until the next Main Menu item appears in the Display Screen.

Power Level Settings

The power level settings are in the "CONFIGURE CONTR" sub menu.

There are 2 settings that are switched with the "REMOTE / LOCAL" switch, P set1 (Local), and P set2 (Remote).

To change the settings:

1. Index to the "CONFIGURE CONTR." item in the Main Menu by pressing the "MESSAGE / SELECT" button.
2. Change the default action from "NO" to "YES" by pressing the "CLEAR / CURSOR" button.
3. When the sub-menu appears, index down by pressing the "MESSAGE / SELECT" button. The first 2 items in the submenu are the load level settings:

PSet 1 C0065kW

To change to a lower value, move the cursor to the digit to be changed by pressing the "CLEAR / CURSOR" button. Then, press the "DISPLAY / DIGIT" button until the desired value appears. If another digit is to be changed, repeat the procedure.

When the desired value is set, press "MESSAGE / SELECT" button to bring up the second load level:

Pset 2 C00065kW

Repeat the procedure above to change Pset 2 to a lower value.

4. When the new values have been entered, press the "MESSAGE / SELECT" button twice to save the new values.
5. Using 2 fingers, press the "DISPLAY / DIGIT" and "CLEAR / CURSOR" buttons at the same time to exit the menus.
6. The unit is ready to run with the new values.

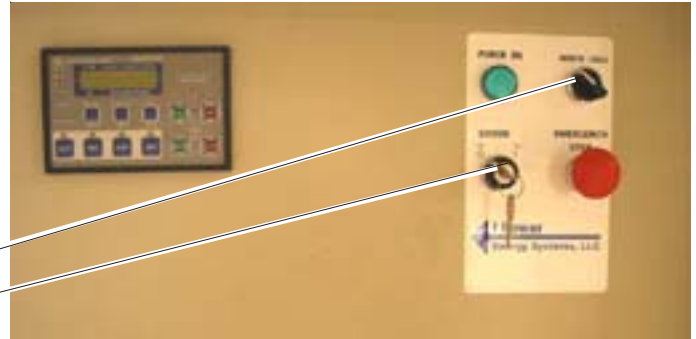
START-UP PROCEDURE

1. Unit Inspection

Before starting the unit, verify all connections are complete and all moving elements are clear.

2. Control Switch Settings

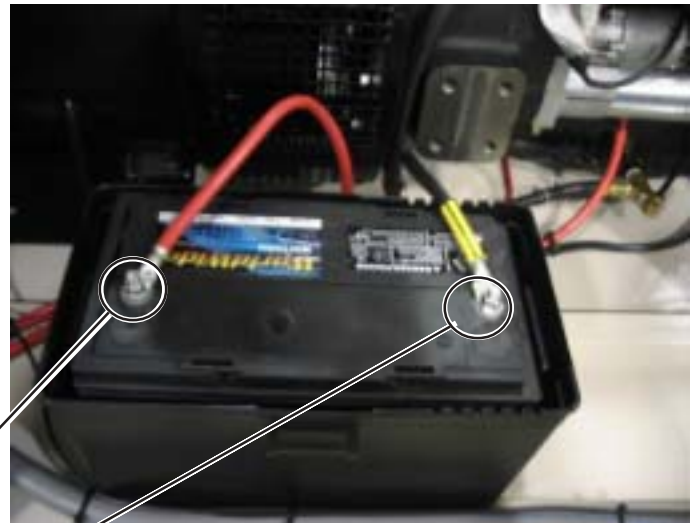
Make sure the “**REMOTE / LOCAL**” switch is set to ‘**LOCAL**’, and the “**SYSTEM**” switch is “**OFF**”.



Local Switch
System Switch

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.

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.



CB105

5. Generator Breaker(CB1) Lockout Removal

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



Locking Device Location

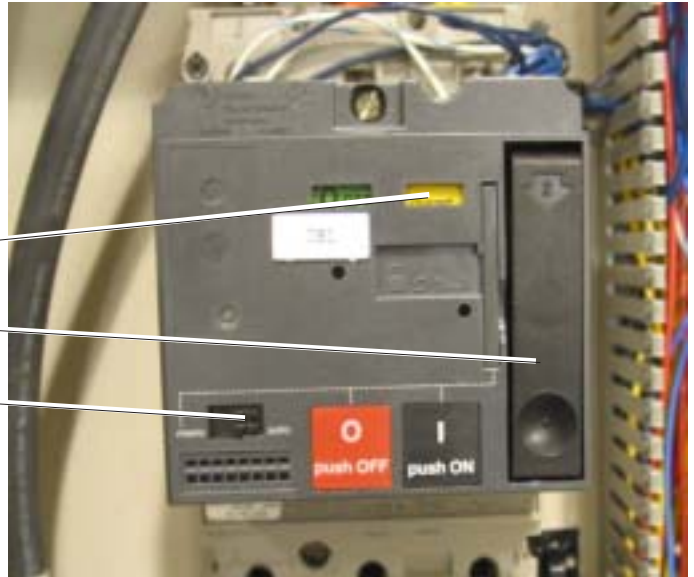
6. Generator Breaker (CB1) Automatic Operation

Push in the Locking Device and switch the "MANUAL/AUTO" switch to "AUTO". The Woodward GCP-21 controller is now in control of the breaker.

Spring Status Indicator

Charge Handle (Lift up at bottom)

Manual / Auto Mode Switch

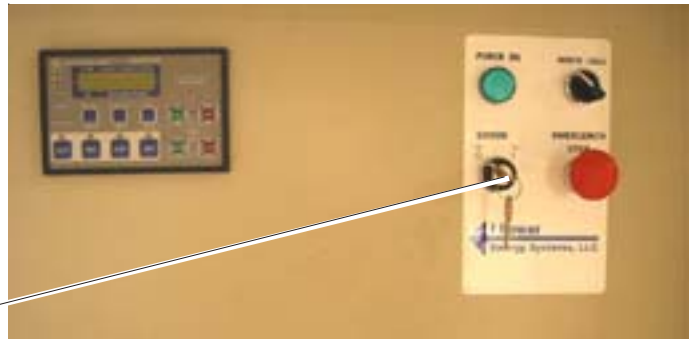


Note:

Check the "SPRING STATUS" indication. If "DISCHARGE" is indicated, pull on the "CHARGE HANDLE" until the Breaker internal motor changes the internal spring.

7. Power Up The System Controller

Turn "SYSTEM" switch to the "ON" position. Allow the GCP-21 Controller panel to boot up completely.



System Switch

8. Start The ENI 65 On Test

The ENI 65 should be started on test after performing any maintenance or repairs. This is to inspect the mechanical parts of the system to be sure no problems exist.

Start the engine by pressing the “TEST” button.

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.

Test



Note:

If the fuel system includes a start boost fuel, be sure to follow site instructions for proper use.

9 Shut Down When Running On Test

The engine is shut down by pressing the “STOP” button.

Stop



Returning the ENI 65 To Service

The ENI 65 can be operated in both automatic (AUTO) and manual, (MAN) modes.

Manual Operation

1. Set the “**REMOTE / LOCAL**” switch to “**LOCAL**”.
2. Turn the “**SYSTEM**” switch “**ON**”.



Remote / Local

System Switch

3. Press the “**MAN**” button, then the “**START**” button next to it.
The engine will start and run. The light with the arrows indicate the engine is running at speed.



Engine Run Indicator

Start

Man

4. To close the Generator Breaker (CB1), press the green “**ON**” button. The GCP-21 will close the breaker and the breaker status light will come on.

Generator Breaker Off

Generator Breaker Status

Generator Breaker Close

Engine Stop



5. To stop the ENI 65 while operating in manual mode:

- a. Open the Generator Breaker (CB1) by pressing the red “**OFF**” button.
- b. Stop the engine by pressing the red “**STOP**” button.

Automatic Operation

1. Set the “**REMOTE / LOCAL**” switch to “**LOCAL**”.
2. Turn the “**SYSTEM**” switch “**ON**”.



Remote / Local

System Switch

3. Press the “**AUTO**” button.
The GCP-21 controller will start the ENI 65 engine and close the Generator Breaker (CB1) without any further operator action.



Stop

Auto

4. To stop the ENI 65 while operating in AUTO mode, press the blue “**STOP**” button.
The GCP-21 will ramp down the load, open the Generator Breaker (CB1), place the engine in cool down, then shut the engine off.

Remote Operation

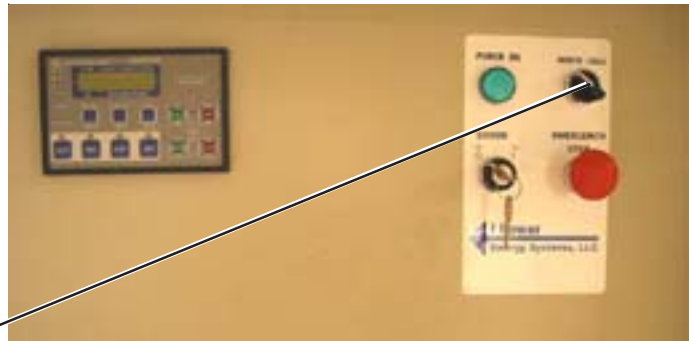
If the operator has a facility to remotely control the ENI 65, the necessary internal circuitry has been included in the unit.

The site must have the necessary facilities external to the ENI 65 for successful remote operation.

This function is controlled by the “**REMOTE / LOCAL**” switch.

Warning:

To avoid unintentional remote start-ups, the “**REMOTE / LOCAL**” switch must always be set in “**LOCAL**” when the ENI 65 is being repaired or serviced. Serious injury can result from an unintentional start attempt.



Remote Local

This Page Intentionally Left Blank



**ENI 65 Induction
Operator Manual**

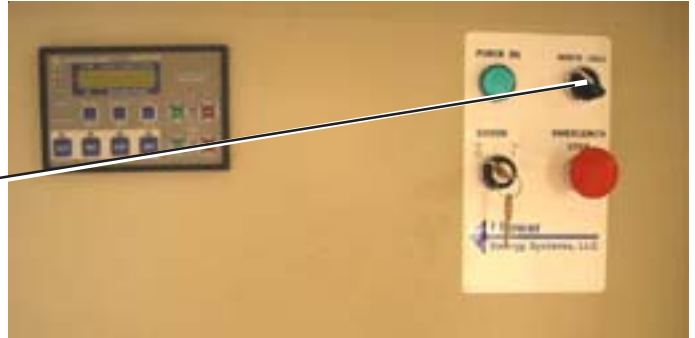
Page Issued
11-07

Replaces

SHUTDOWN FROM “TEST” OR “AUTO” MODE

1. Turn the “**REMOTE / LOCAL**” switch to “**LOCAL**”.

Remote Local



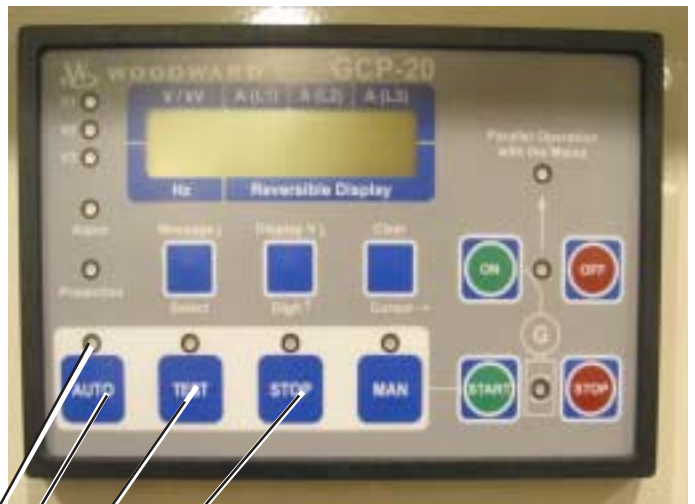
2. Observe the indicator lights above the buttons. If the indicator light is lit above the “**TEST**” or “**AUTO**” button, the ENI 65 is stopped by pressing the blue “**STOP**” button.

The GCP-21 controller will ramp down the load and open the Generator Breaker (CB1) (if in “**AUTO**” mode), conduct a cool down and turn off the engine.

3. Press the “**STOP**” button.

Notice:

The engine will go through its shut down procedure automatically.



Indicator Lights (Operating Mode)

Auto

Test

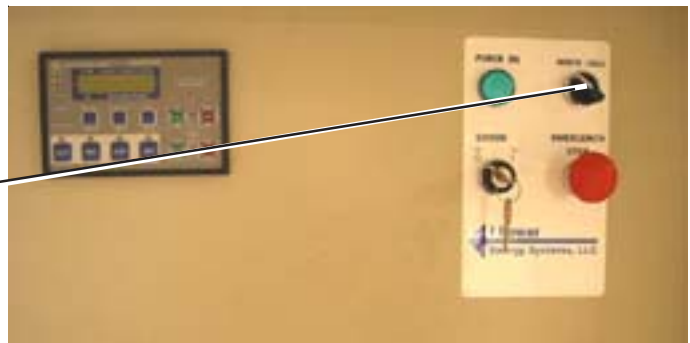
Stop

4. Proceed with Lockout & Tagout. Refer to Section E.

Shutdown From Manual Mode

1. Turn the “**REMOTE / LOCAL**” switch to “**LOCAL**”.

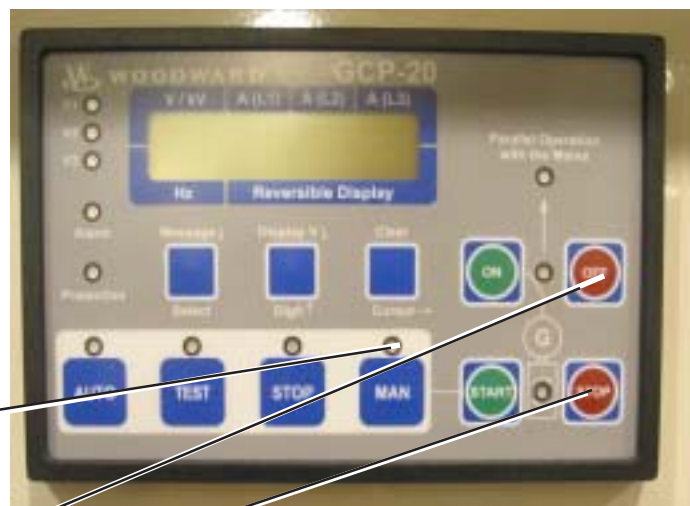
Remote Local



2. Observe the indicator lights above the buttons. If the indicator light is lit above the “**MAN**” button, the ENI 65 is operating in manual mode. The unit is shutdown with the following steps:

- a. Press the red “**OFF**” button. This opens the Generator Breaker (CB1).
- b. Press the red “**STOP**” button. This turns off the ENI 65 engine.

Indicator Lights (Operating Mode)

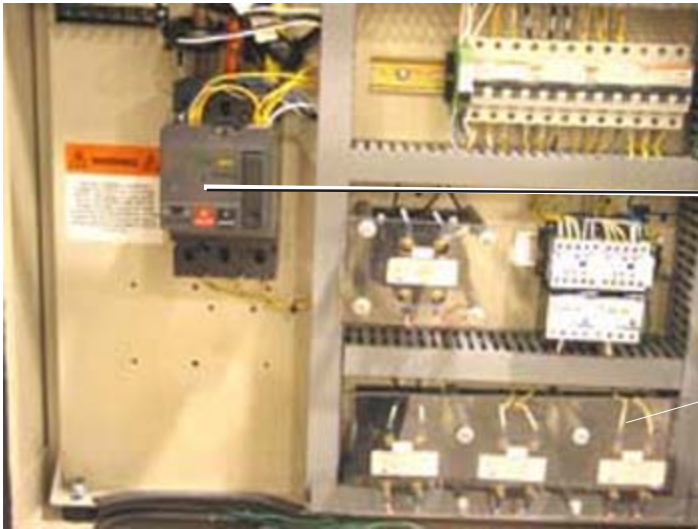


Red Off

Stop

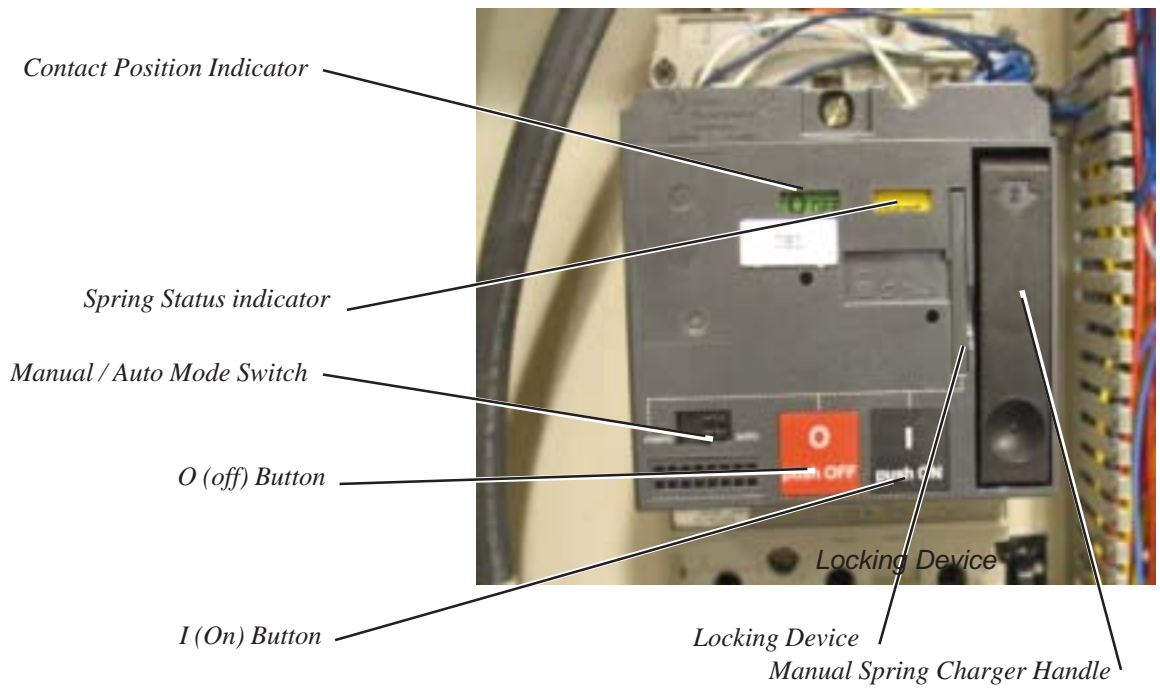
3. Proceed with Lockout & Tagout. Refer to Section E.

Utility Box



Generator Breaker (CBI)

Generator Breaker



Contact Position Indicator

Spring Status indicator

Manual / Auto Mode Switch

O (off) Button

I (On) Button

Locking Device

Locking Device

Manual Spring Charger Handle

WARNING:

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

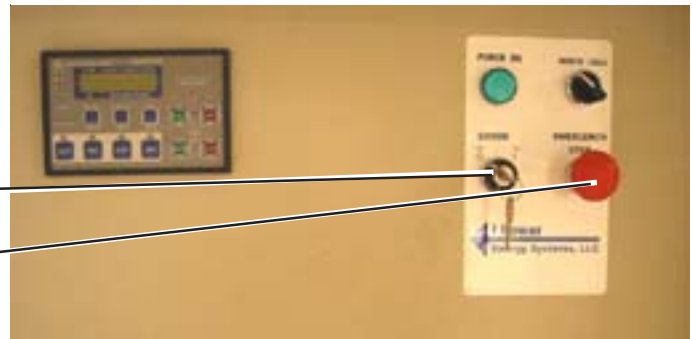
WARNING:

For breaker maintenance, utility power must be locked out at the disconnect or circuit breaker for the generator feed.

1. The Shutdown Procedure, Section D must be completed before locking out and tagging out the ENI 65.
2. Turn the “**SYSTEM**” switch off and remove the key.
3. Push in the “**EMERGENCY STOP**” button.

System Switch

Emergency Stop



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** on top right side of the interior of the panel box to the “**OFF**” position. This Breaker opens the 120Vac power from the site source.

CB105



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



Negative Cable

6. Locate the Generator Breaker in the Utility Section.



Generator Breaker (CB1)

Caution:
Bottom of breaker may be energized.

7. Put the Generator Breaker(CB1) into “**MANUAL**” mode by moving the “**MODE**” selector switch to the “**MANUAL**” position.



Manual / Auto Mode Switch

8. Press and hold the “OFF” button.

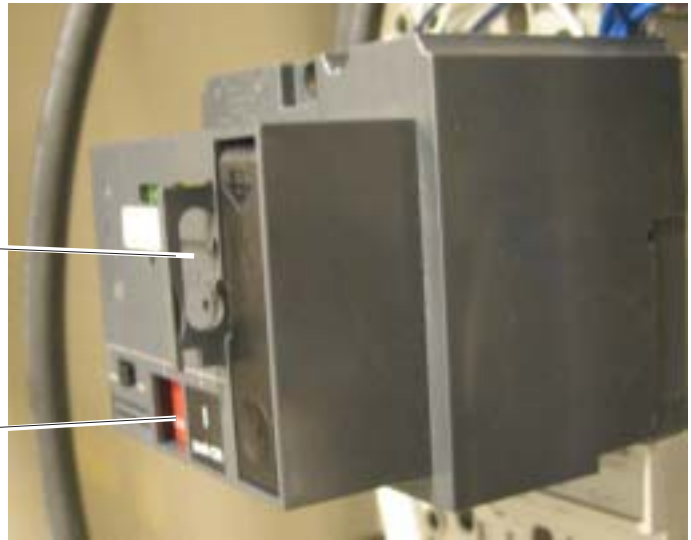
Off Button



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 locking device in the slot of the “**LOCKING DEVICE**” making sure the lock is “**LOCKED**”.

Place Locking Device



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

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

12. The ENI 65 is now safe to proceed with Service or Repair.

Note:

Refer to Startup Procedure, Section C, to bring the ENI 65 back on line.

This Page Is Intentionally Left Blank



**ENI 65 Induction
Operator Manual**

Page Issued
11-07

Replaces

Woodward GCP-21 Controller

Remote Fault List and Description

The GCP-21 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
	M61	Low Inlet Gas Pressure	
	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 GCP-21 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 85 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 GCP-21 Controller instructions for information on clearing faults.

An “Operator Display Module” (PLC) is located in the Woodward GCP-21 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, M46,
 M 47 & M 67 will not be active.

Operator Display Module (PLC)

The Operator Display Module may be accessed by opening the Woodward GCP-21 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 7 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:

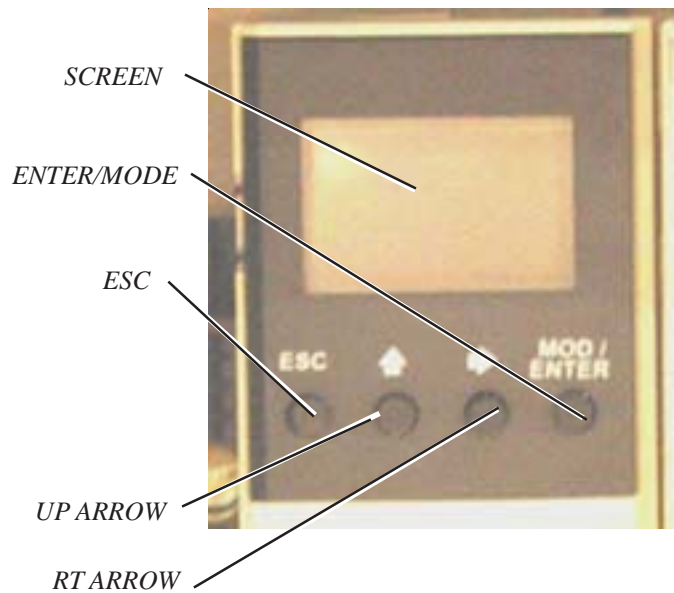
0 = No fault set

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 GCP-21 Controller.



Clearing Fault Codes

Woodward GCP-21 Controller

To clear fault codes, press and hold the "CURSOR" button.



Cursor

Remote Fault Mechanization

Soft Shutdown Faults

Remote Fault	Description	Enabling Function	Trip Condition
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
M61	Low Fuel Pressure	System Controller Controlled Fuel Solenoid Energized	Low Fuel Pressure For More Than 2 Seconds
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.

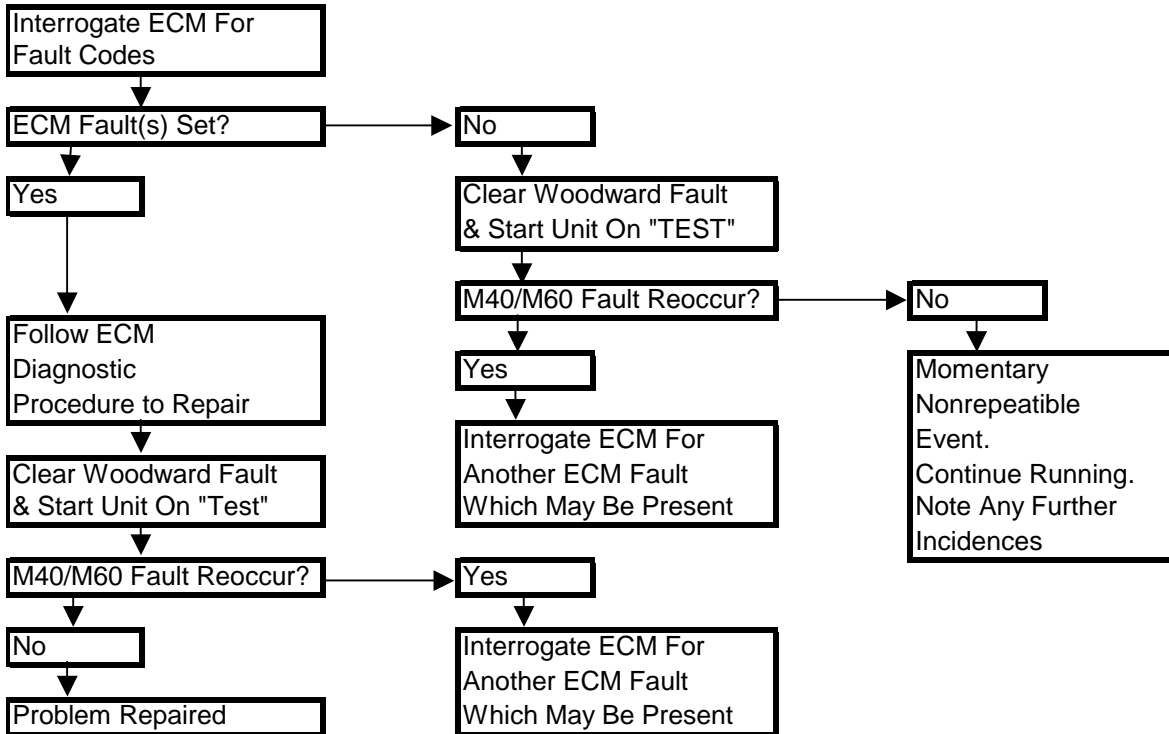
Remote Fault Diagnostic Trees

Fault Code	Page
M40 / M60.....	RF-6
M41.....	RF-7
M42 (CR102).....	RF-8
M42 (CR206).....	RF-9
M43.....	RF-10
M44.....	RF-11
M45 (24Vdc CB1 Motor Operator).....	RF-12
M45 (120Vac CB1 Motor Operator).....	RF-13
M46.....	RF-14
M47.....	RF-15
M61.....	RF-16
M63.....	RF-18
M64.....	RF-19
M65.....	RF-20
M66.....	RF-21
M67.....	RF-22

Fault Code M40 / M60 ECM Fault

Fault Definition:

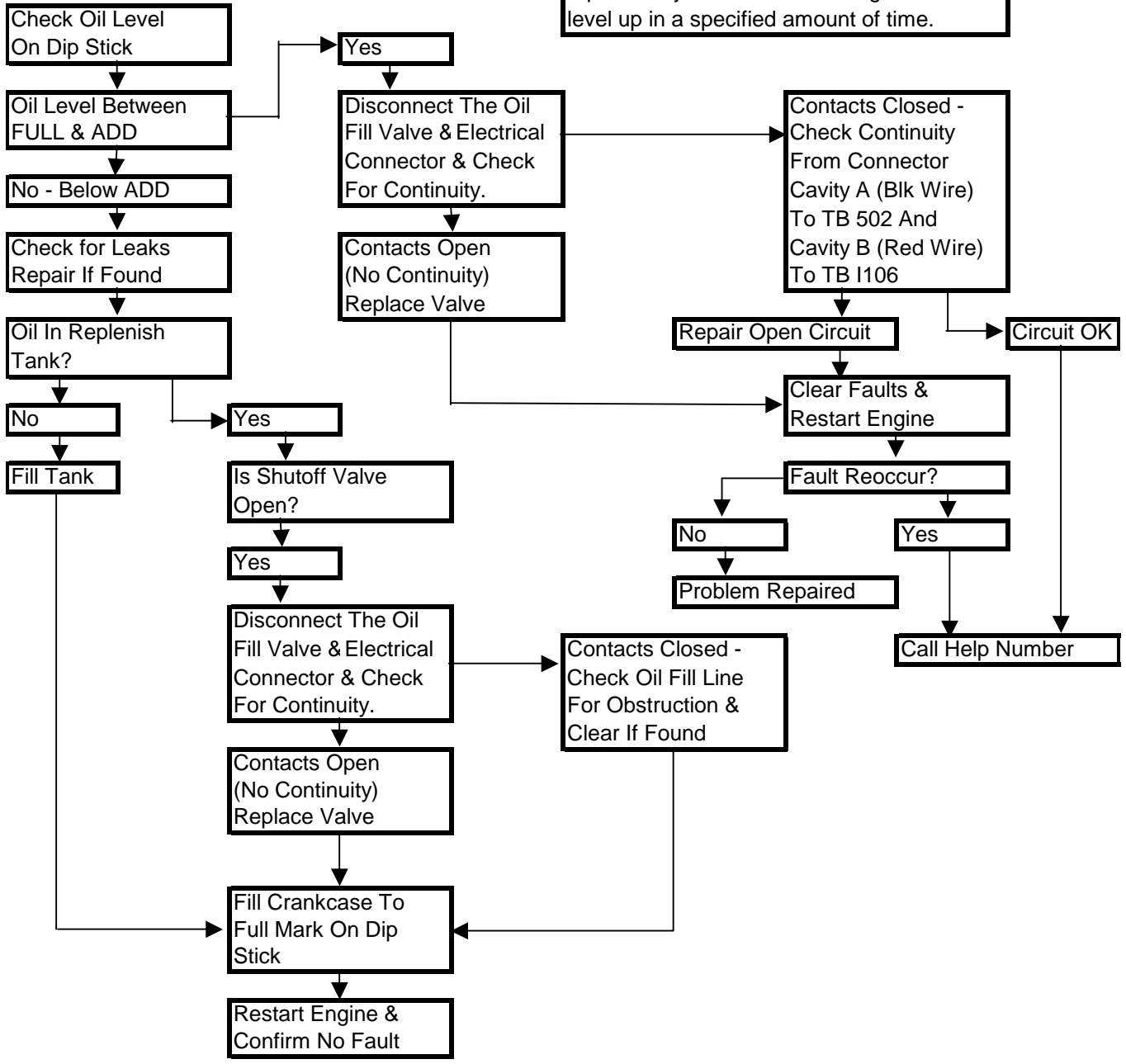
The fault indicates the Engine Controller (ECM) has detected an out-of-specification condition.



Fault Code M41 Low Engine Oil Level

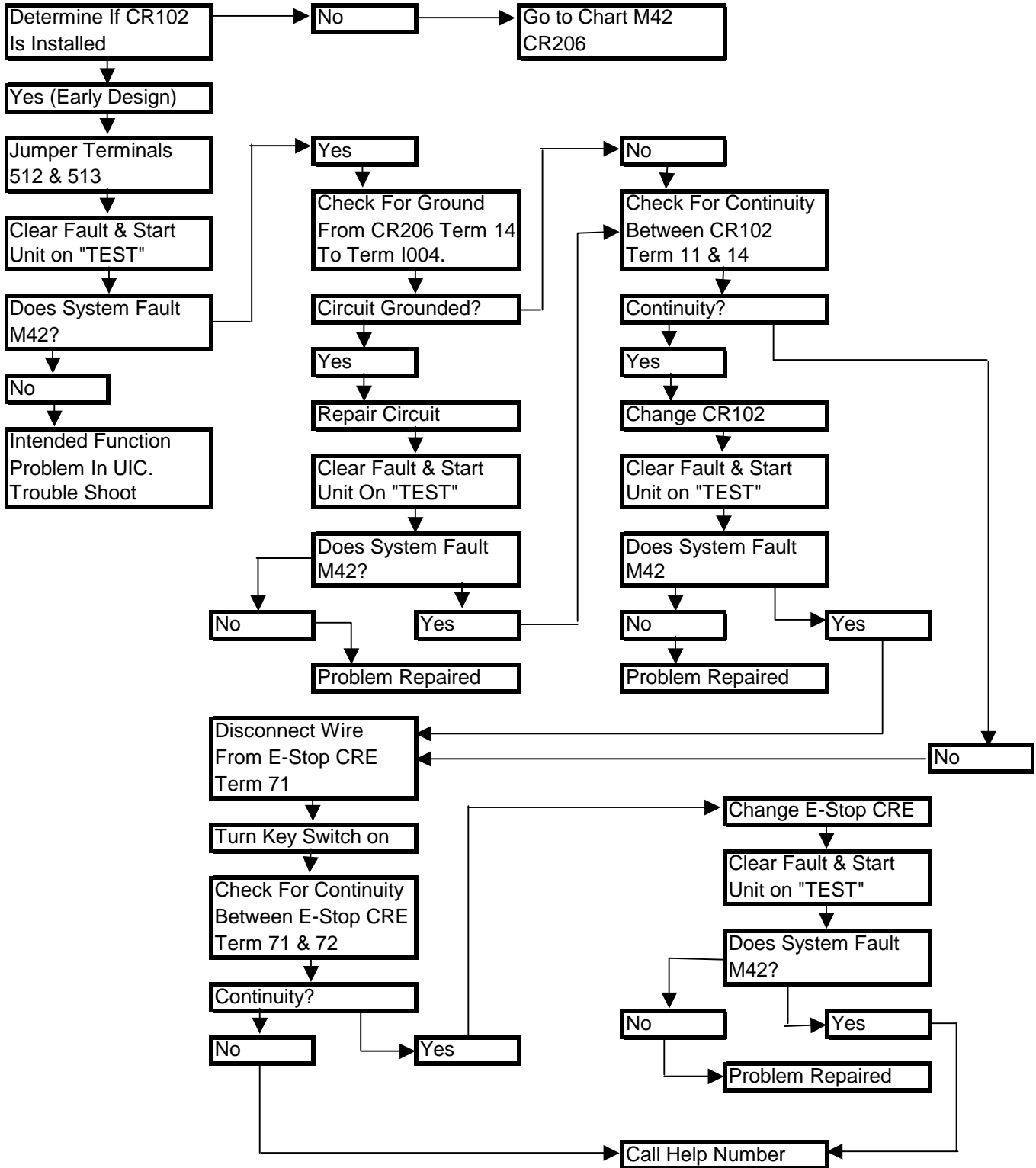
Induction Unit

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.



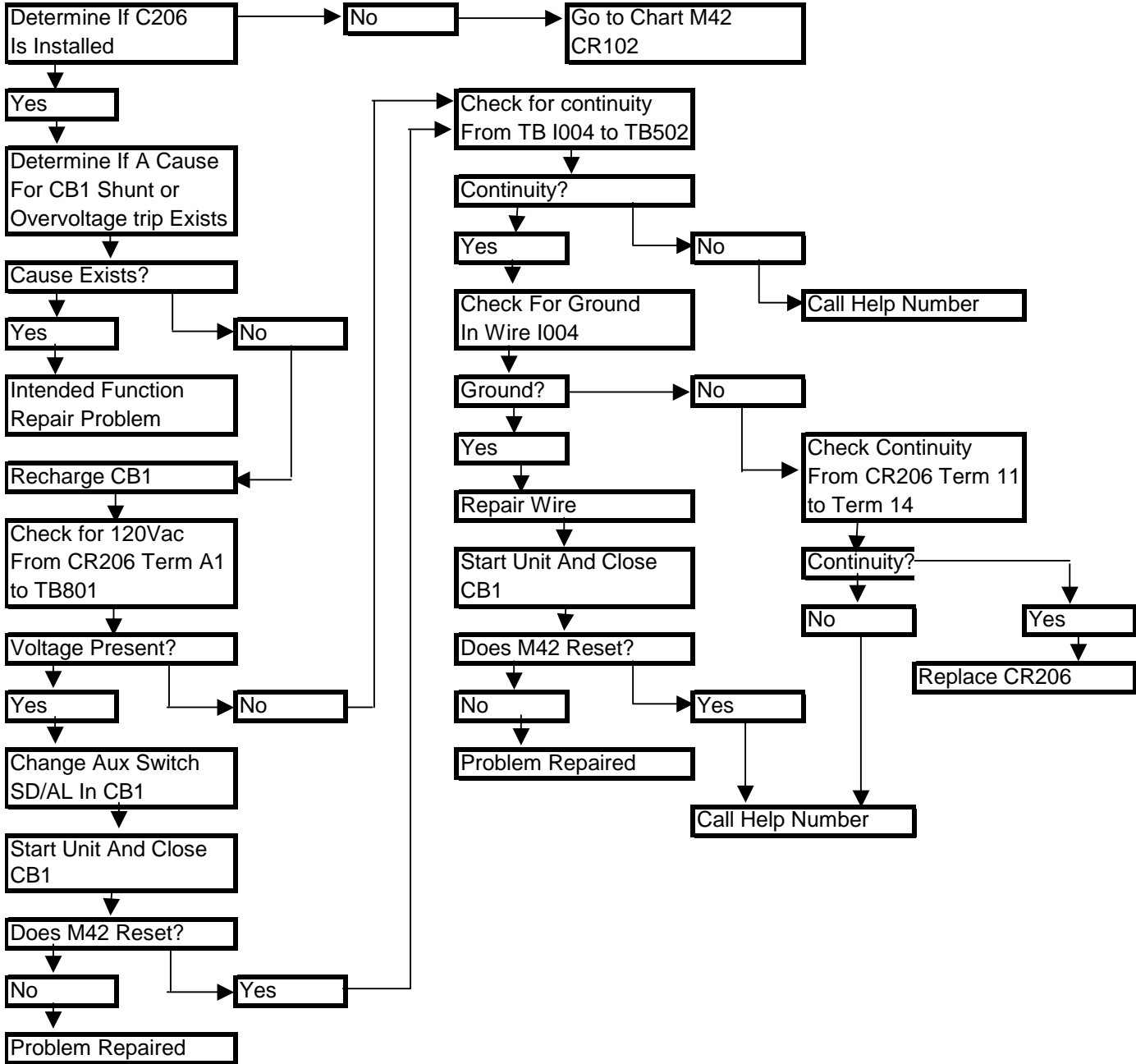
Fault Code M42 Protective Relay CR102

Induction Unit



Fault Code M42 Protective Relay CR206

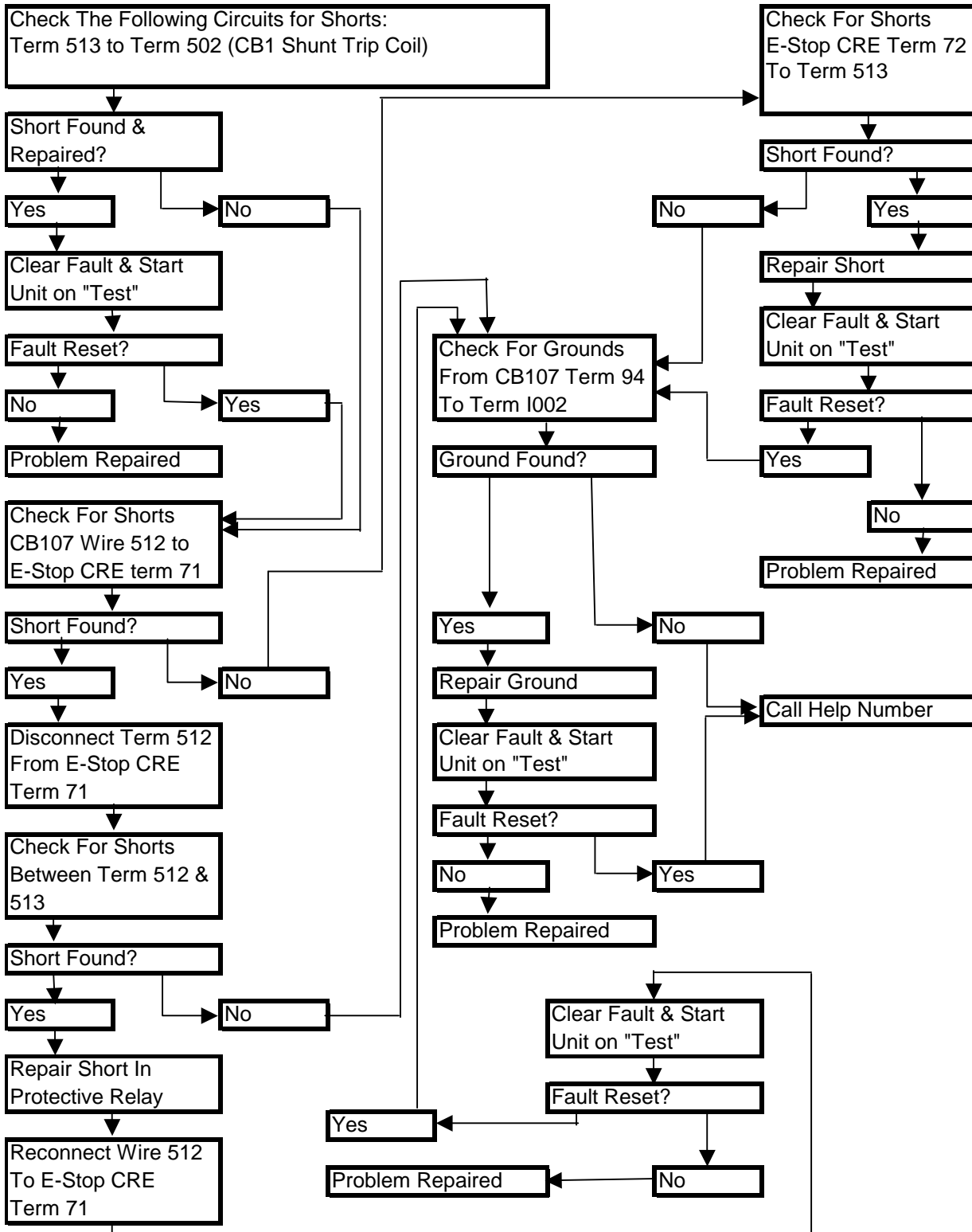
Induction Unit



Fault Code M43

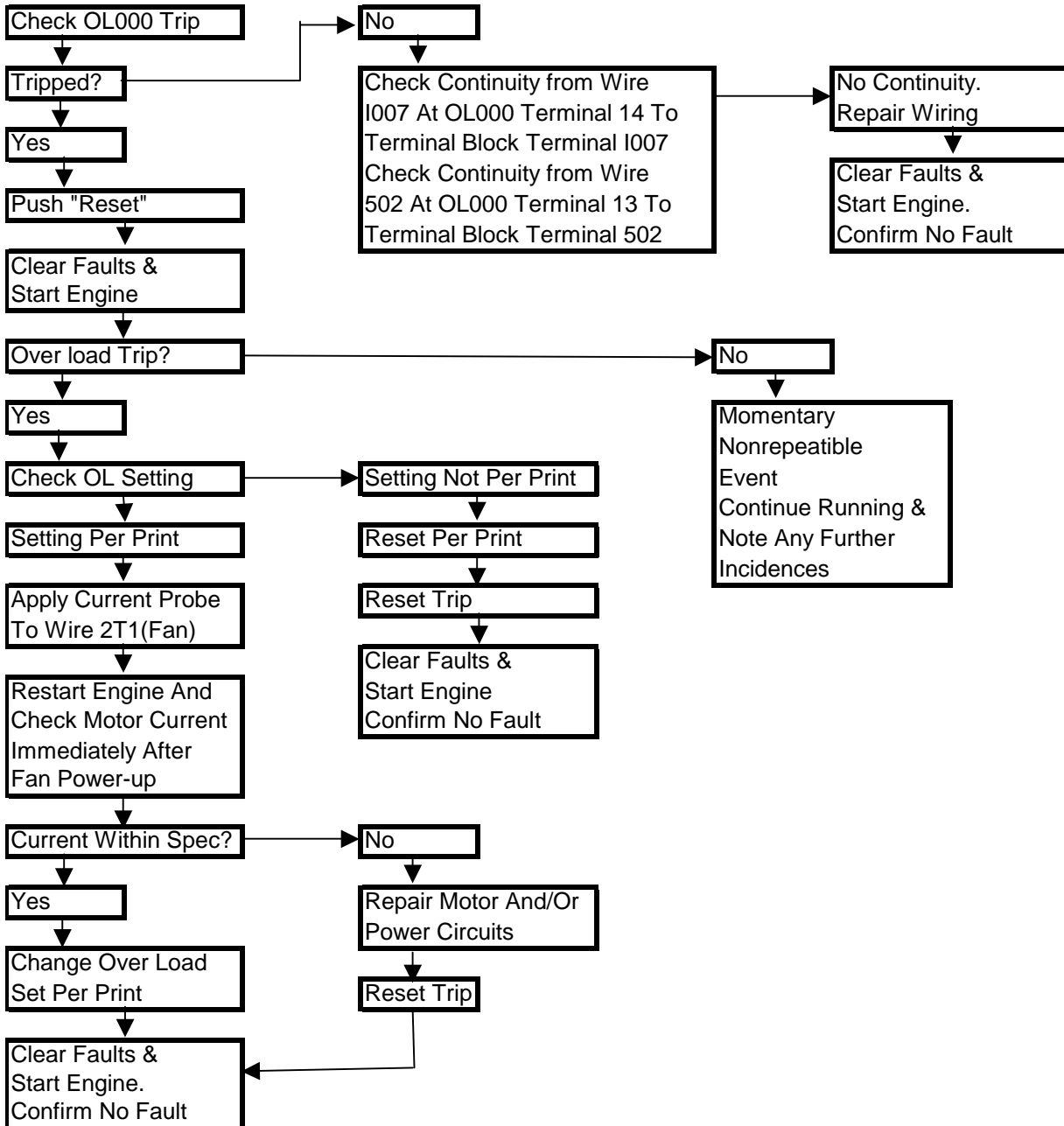
Protective Relay CB107

Induction Unit



Fault Code M44

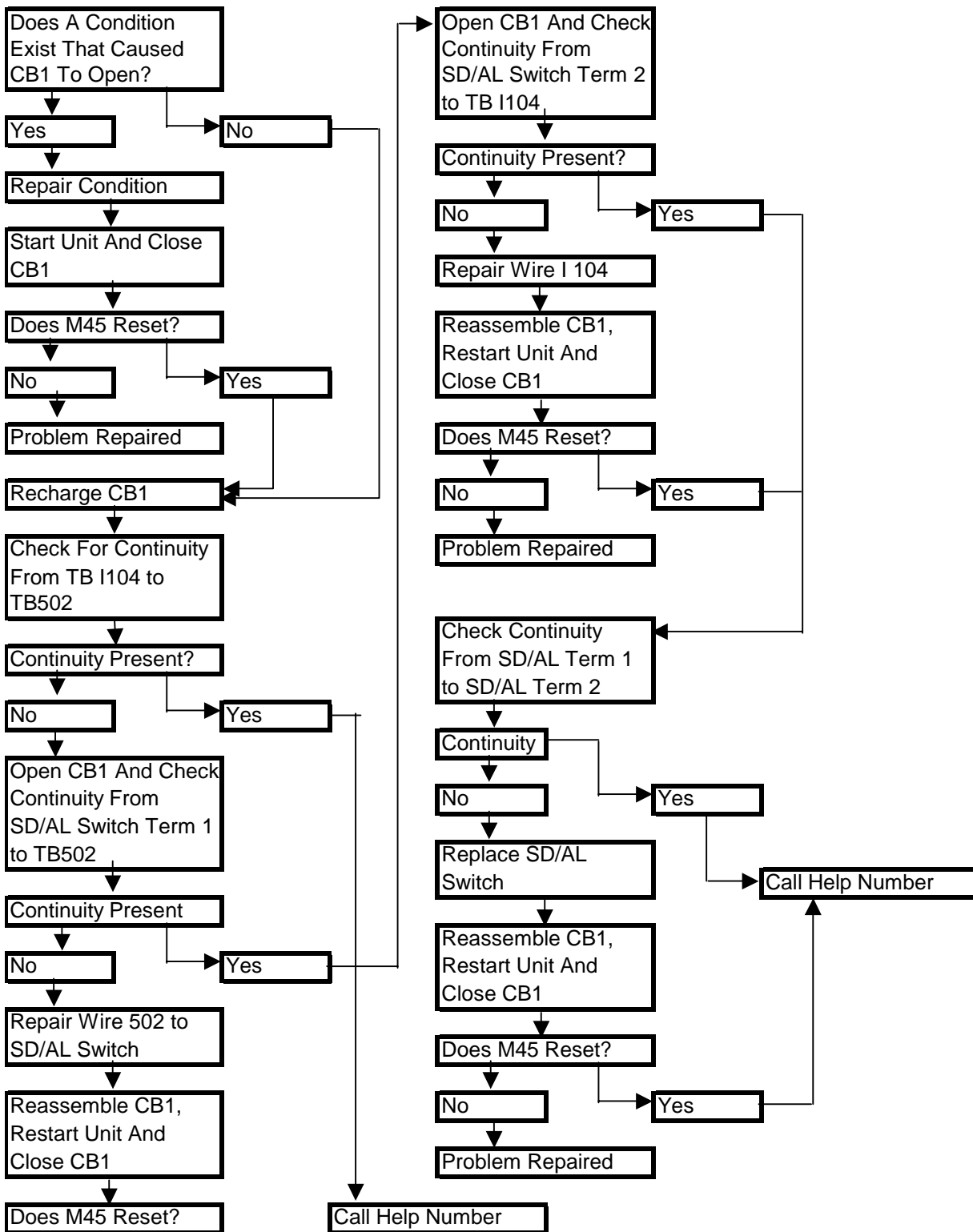
Box Vent Blower Motor



Fault Code M45 (24Vdc CB1 Motor Operator)

Generator Circuit Breaker Fault

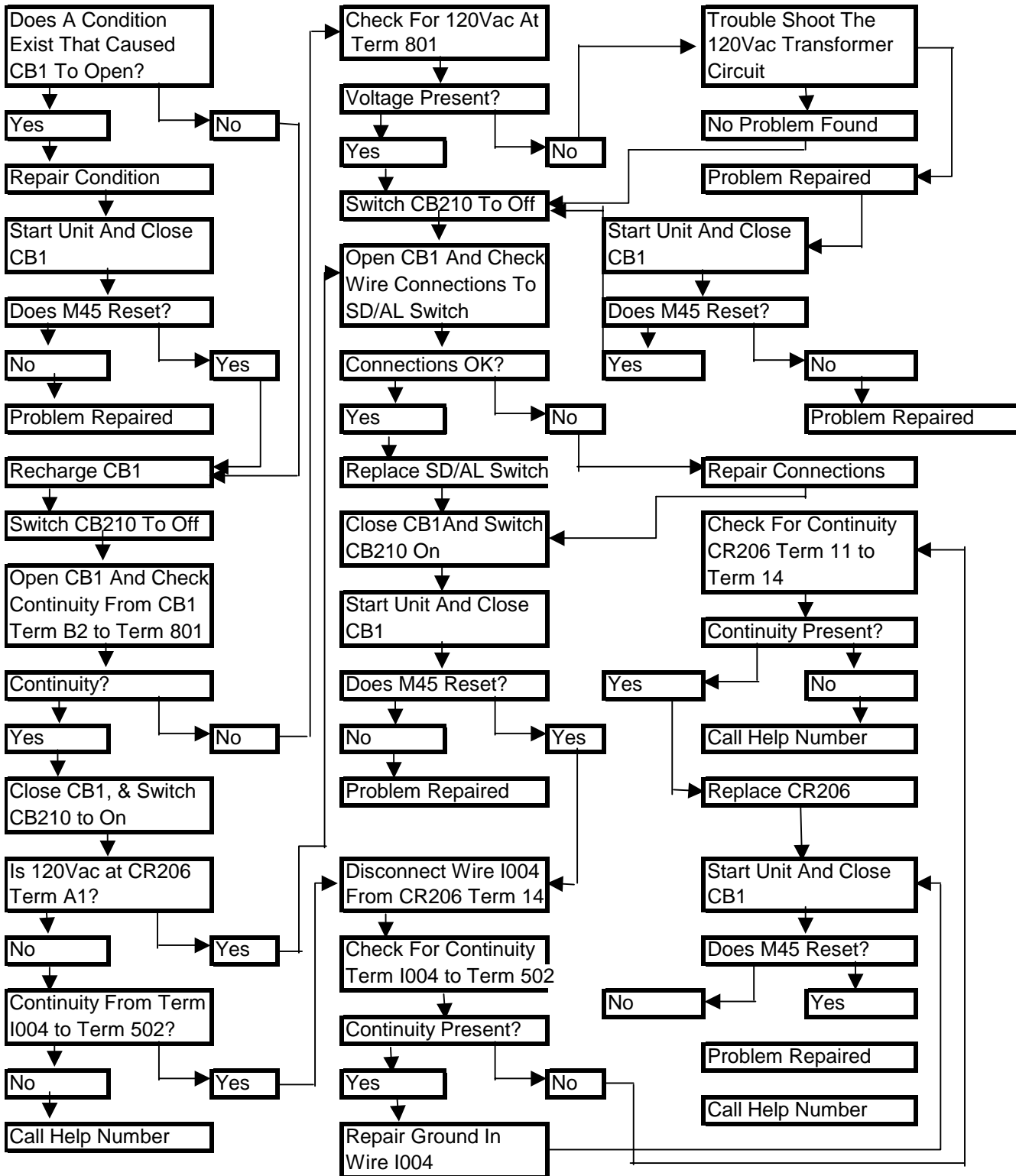
Induction Generator



Fault Code M45 (120Vac CB1 Motor Operator)

Generator Circuit Breaker Fault

Induction 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 46 will not be active

Fault Code M47 Low Catalyst Delta Temp

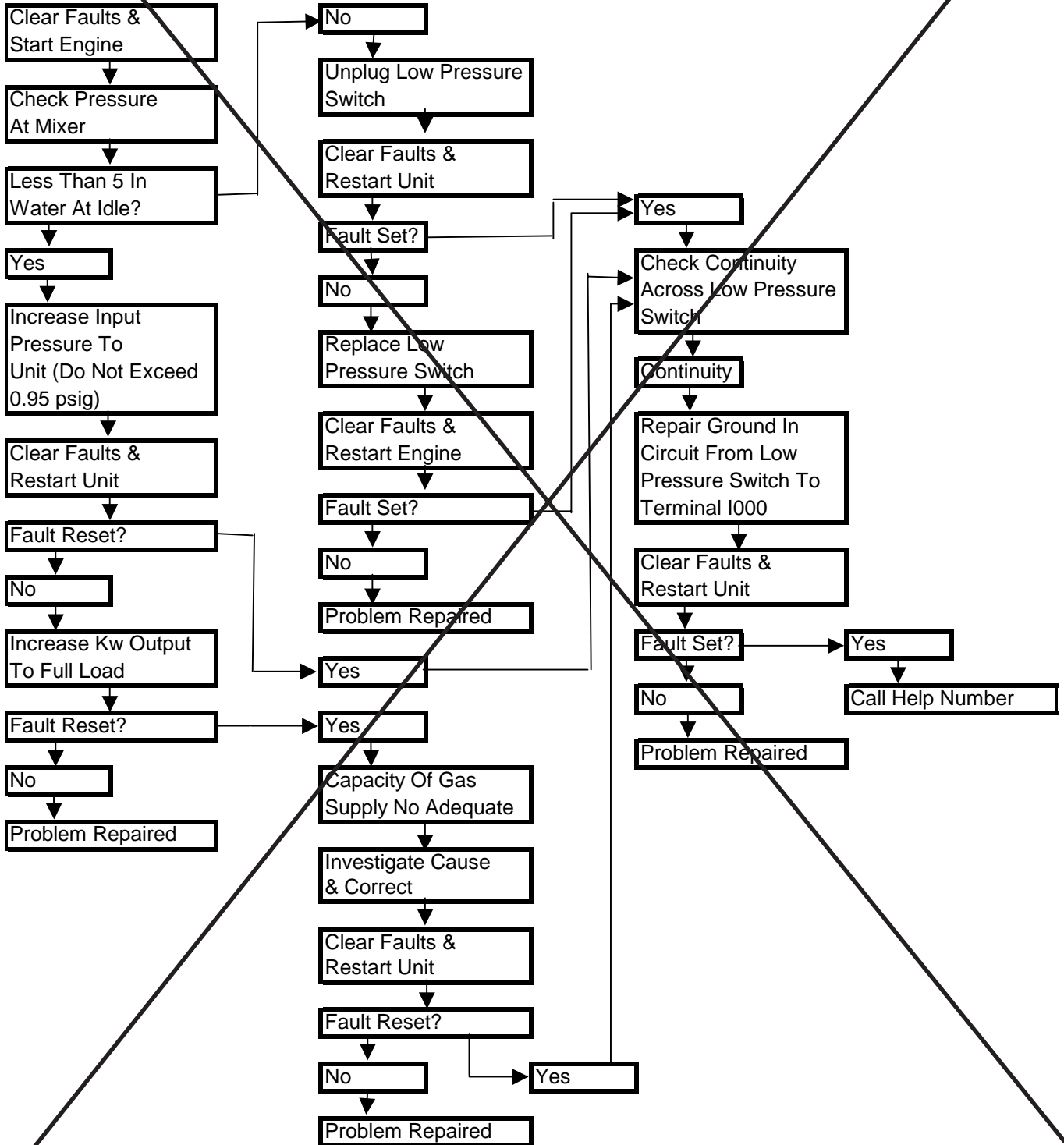
Synchronous & Induction Units

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.

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

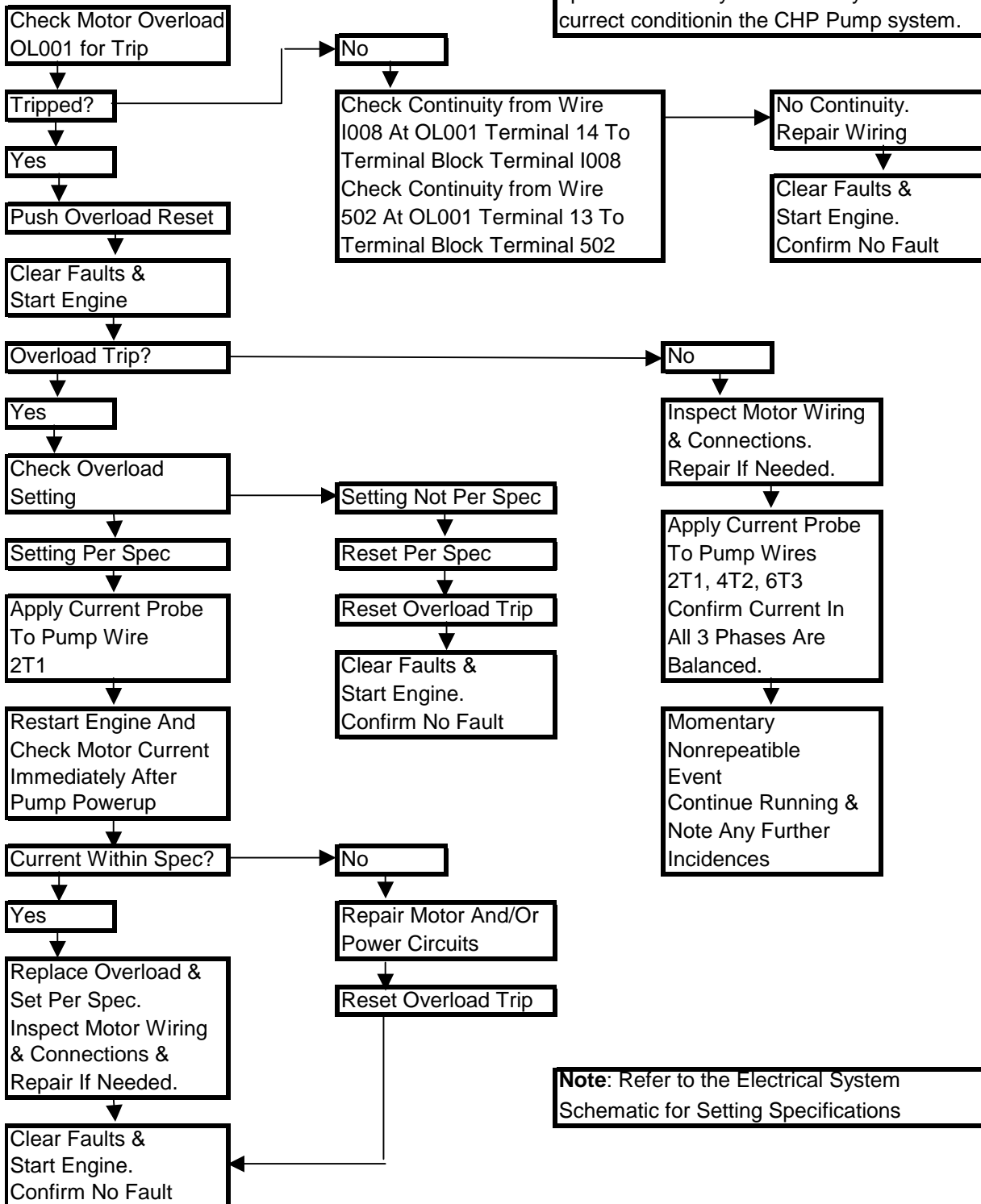
Fault Code M61 Low Gas Pressure



Fault Code M63 CHP Coolant Pump Motor Induction 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.



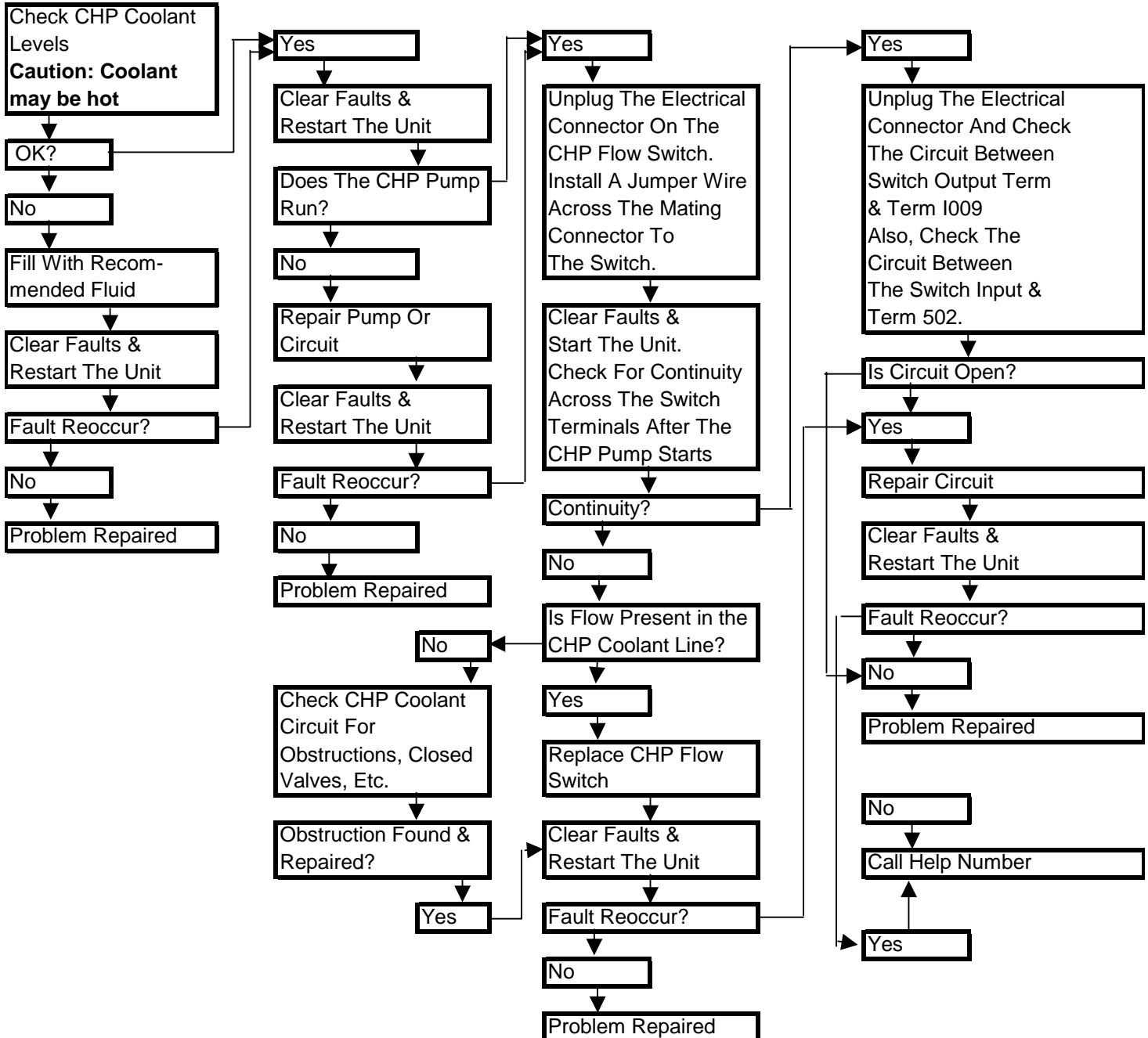
Note: Refer to the Electrical System Schematic for Setting Specifications

Fault Code M64 Low CHP Coolant Flow

Induction 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.



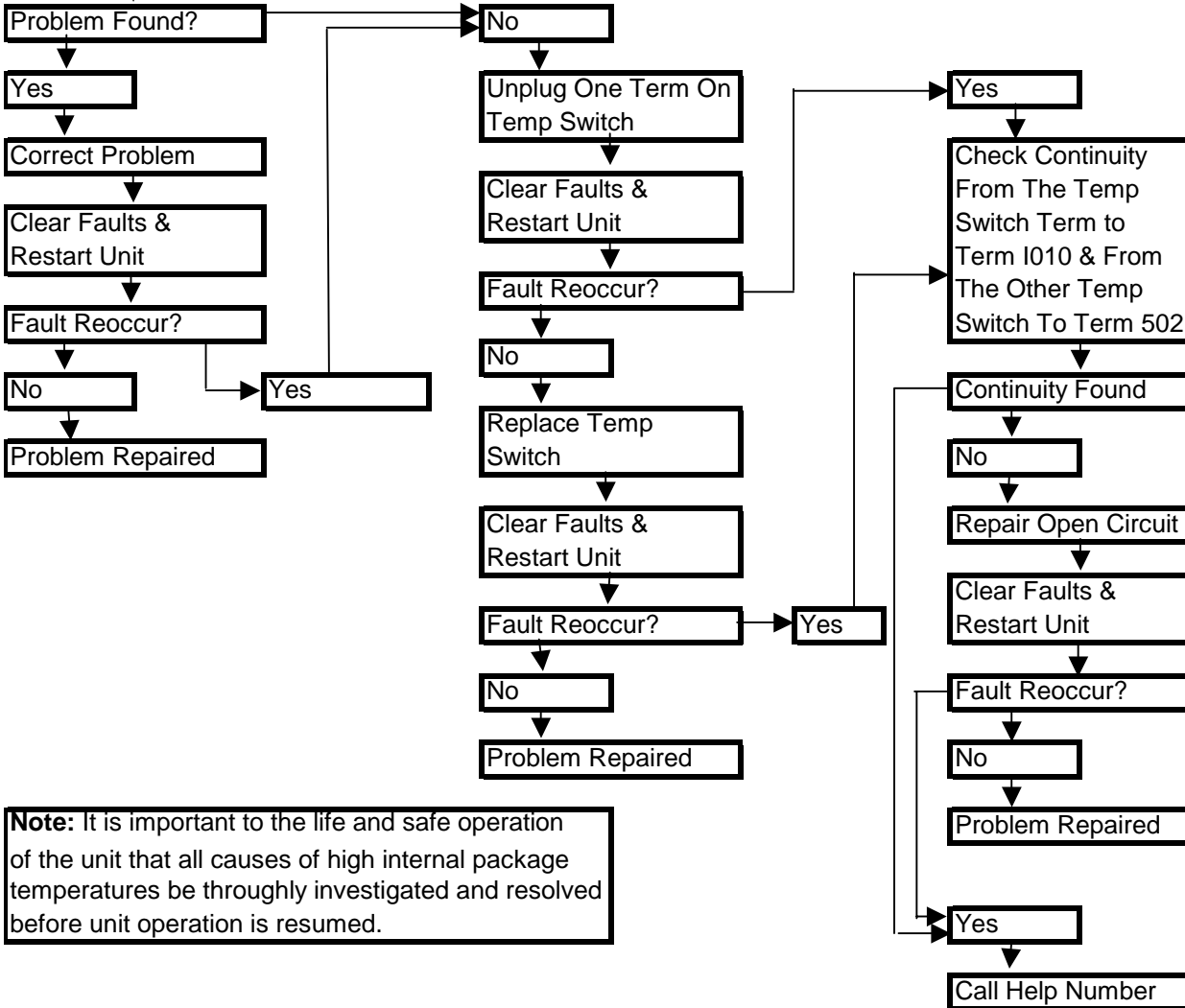
Fault Code M65 Thermal Interlock

Induction 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.

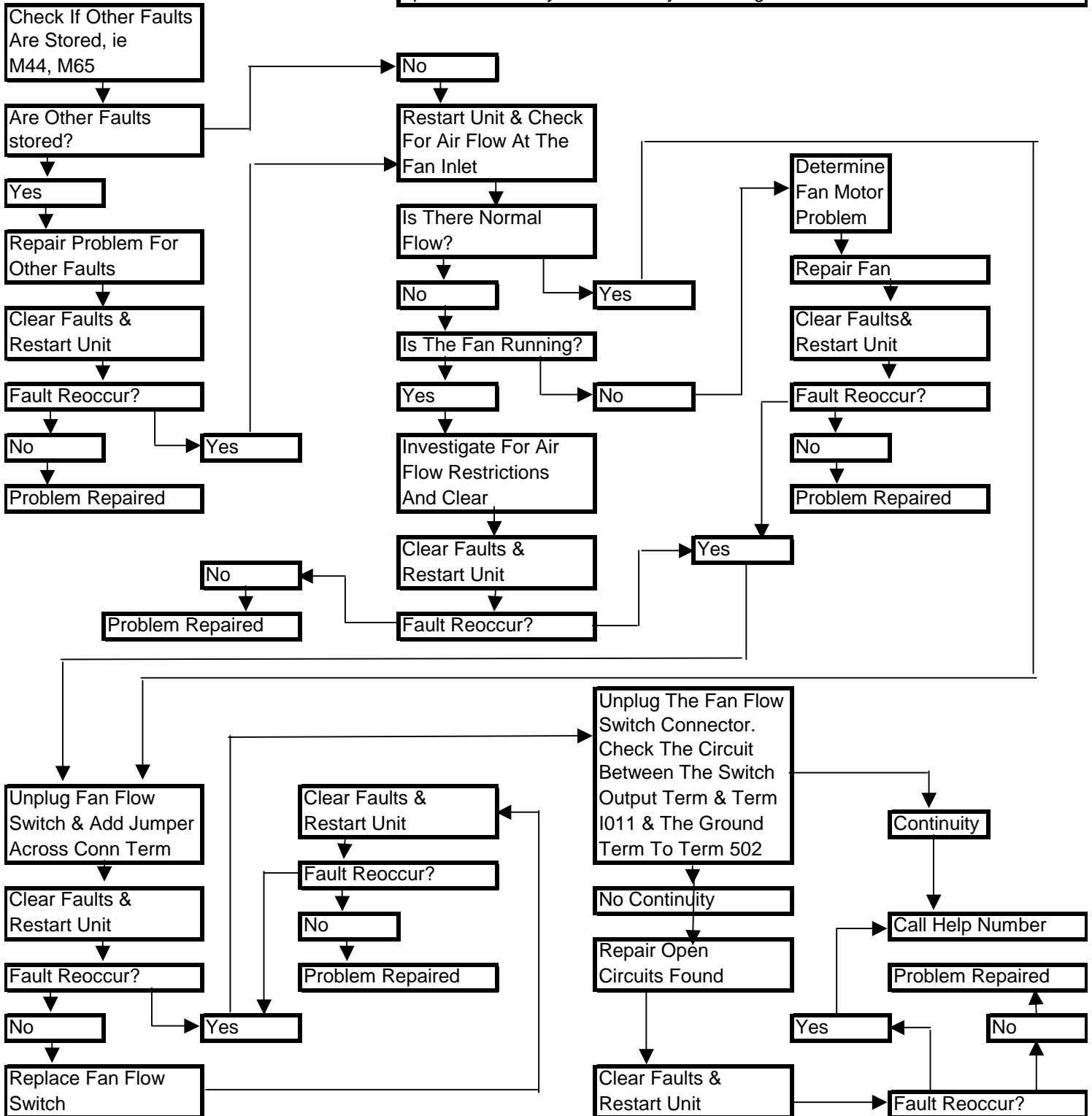
Thoroughly Investigate All Potential Causes For High Box Temperature
Exhaust Blankets Not Covering
Exhaust System Leak
Other Codes Set, ie
M63, M66



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

Induction Units



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.



This Page Intentionally Left Blank



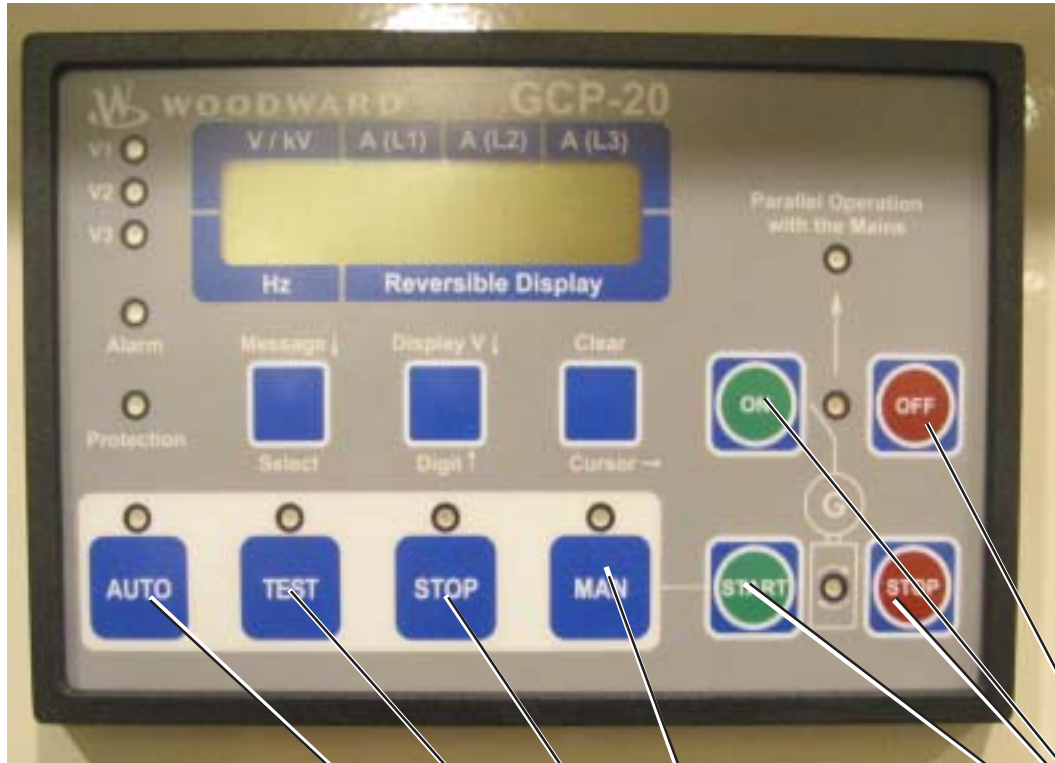
**ENI 65 Induction
Operator Manual**

Page Issued
11-07

Replaces

GCP-21 GENERAL OPERATING INSTRUCTIONS

The following are instructions for the common operating functions of the ENI 65 with the GCP-21 Controller:



Start On Test

The purpose for this function is to run the engine only. This is useful to check engine repairs for leakage or function without involving the power generation system.

Press the “TEST” button.

The ENI 65 engine will start using the preprogrammed start sequence. The Generator Breaker (CB1) will not close.

To stop the engine, press the “STOP” button

The engine stops immediately.

Controls For MANUAL Function

STOP Function For Test or AUTO Function

TEST Mode Function

AUTO Mode Function

Start On Auto

The normal operation of the ENI 65 is accomplished with the "AUTO" button.

Press the "AUTO" button.

The ENI 65 initiates the start program, then when all criteria are met, closes the generator breaker (CB1).

The generator then ramps up to the preset power output level.

To stop the ENI 65:

Press "STOP"

The ENI 65 ramps the power output down to zero, opens the generator breaker (CB1) and carries out the cool down and shut down programs.

Manual Operation

The ENI 65 can be operated manually.

Press the "MANUAL" button

This prepares the ENI 65 for manual operation.

Press and hold the "START" button

This initiates the engine start program. Engine rotation is indicated by the light between "START" and "STOP" buttons.

The engine can be stopped by pressing the "STOP" button.

Press the "ON" button located above the "START" button

This closes the generator breaker (CB1) when all criteria are met. This powers the generator bus to the remote switch gear. The indicator light next to the button will indicate when the generator breaker (CB1) is closed.

When the remote switch gear satisfies all criteria, the breaker to the grid closes. This is indicated by the top light.

The ENI 65 is closed down in "MANUAL" mode by the following sequence:

Press the "OFF" button located above the "STOP" button.

This causes the generator breaker (CB1) to open and takes the ENI 65 off line.

Press the "STOP" button to the far right of the controller.

This causes the engine to stop immediately.

Clearing Faults

When the GCP-21 detects an out of specification condition, a "FAULT" is set. This condition is indicated by the "ALARM" light being on.

In order for the ENI 65 to be returned to service, the cause for the alarm must be determined, necessary repairs or adjustments made, and the "ALARM" (FAULT) cleared.

WARNING:

The action of clearing the "ALARM" may cause the engine to immediately start. Before the alarm is cleared, it is vital the reason for the alarm be determined and corrected or serious damage to the ENI 65 may result. All individuals must be clear of the ENI 65 before the alarm is cleared or serious injury could result.

The following actions must be taken if an alarm is set:

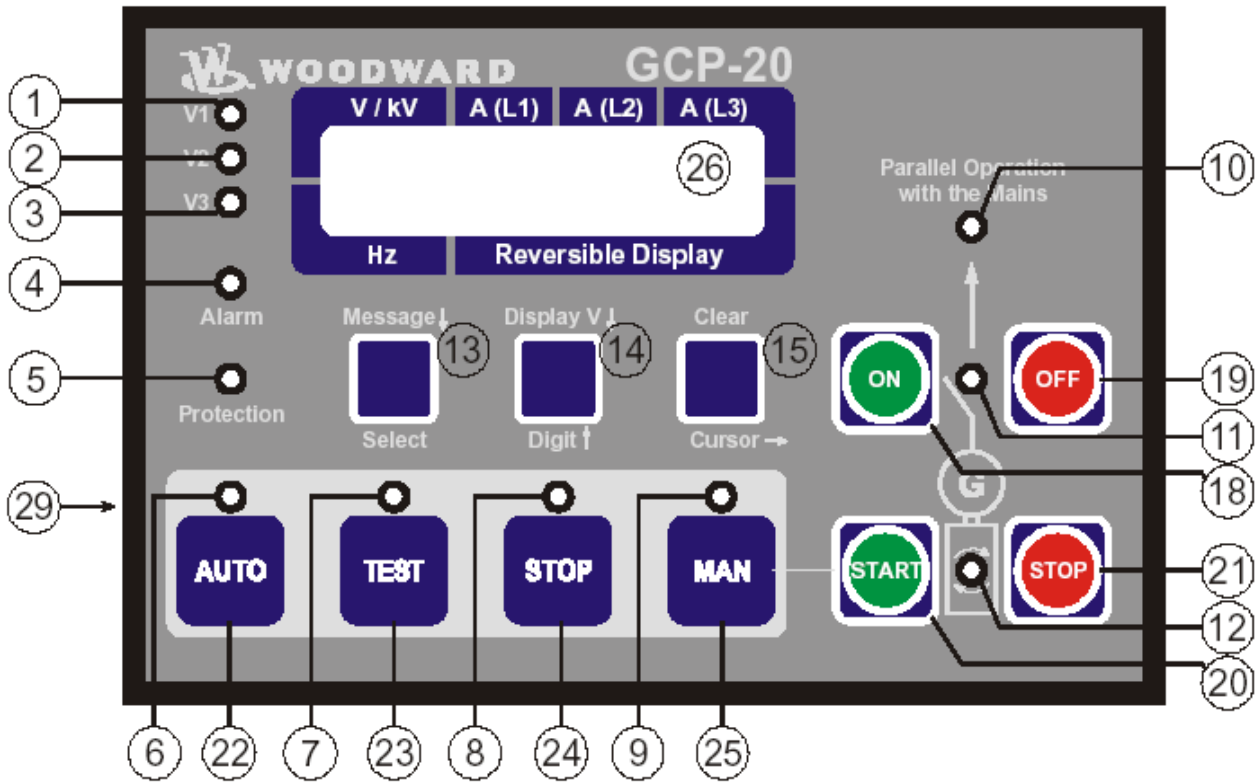
1. The alarm cause indication must be displayed on the GCP-21 screen.
 - a. The alarm condition will be displayed on the screen if the alarm light is on. Check the display and take appropriate action to correct the condition.

- b. If a Remote Fault is indicated, it will be necessary to read the fault detail on the PLC. Refer to “Section F” , Pages F-2 & F-3 for instructions.
- c. Repair the cause of the alarm.
- d. Be sure everyone is clear of the ENI 65
- e. Press and hold “CURSER/CLEAR” button. This will clear the cause for the alarm.

















OPERATOR INTERFACE

DETAILED FUNCTION EXPLANATION

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.



FUNCTIONS OF THE BUTTONS

Operating mode Automatic													
													
	annun- ciation	display	clear	STOP	MAN	AUTO	TEST	START	STOP	ON	OFF	ON	OFF
MANUAL													
Start engine					1 st			2 nd					
Stop engine					1 st				2 nd				
GCB close					1 st					2 nd			
GCB open					1 st						2 nd		
MCB close					1 st							2 nd	
MCB open					1 st								2 nd
AUTOMATIC													
Start engine						1 st							
Stop engine				Yes		1 st							
GCB close						1 st							
GCB open						1 st							
MCB close						1 st							
MCB open						1 st							
TEST													
Start engine							1 st						
Start load test							1 st			2 nd			
Terminate load test											1 st		
Terminate load test (depending on type of switch)												1 st	
STOP				1 st									
Operating mode "Parameterize"													
													
	Select	Digit	Cursor										
Start configuration		1 st	1 st										
Confirm input/next mask	1 st												
Previous mask	1 st		1 st										
Next pos./change text			1 st										
Increase position		1 st											
End configuration		1 st	1 st										

LED FUNCTIONS

Lamp test The LEDs may be checked by means of a lamp test. To do so, please press the button "message↓" and repeat pressing the button until the display "00.0 LED-TBST" appears in the bottom line of the display. Then press the button "display V↓". All LEDs are lighting up now. The LEDs "AUTO", "TEST" and "STOP" and "MANUAL" light up one after the other.

.....LED
"U1 .. U2 .. U3" **Voltage control** color "GREEN"

The light-emitting diodes "U1", "U2" and "U3" indicate which voltage (U_{L1N} , U_{L2N} , U_{L3N} , U_{L12} , U_{L23} or U_{L31}) is currently indicated. This applies both to the generator and the rated voltage display.

.....LED
"alarm" **Alarm** color "RED"

If the LED "alarm" lights up, the unit has detected an alarm which is processed according to the its alarm class. The message and the type of alarm are shown on the LC display. If this LED flashes, a new alarm has occurred within the last two minutes. Via brief acknowledgment, this switches to continuous illumination, and the centralized alarm (horn) is ceased.

.....LED
"protection" **Engine monitoring** color "GREEN"

If the LED "protection" lights up, the engine monitoring is active, i. e. in addition to the permanently monitored alarm inputs, the alarm inputs with delayed programming are also monitored. Generator underspeed, undervoltage and reverse power are also monitored.

.....LED
"AUTO" **Operating mode "AUTOMATIC"** color "GREEN"

If the LED is lighting, the operating mode "AUTOMATIC" aktive.

.....LED
"TEST" **Operating mode "TEST"** color "YELLOW"

If the LED is lighting, the operating mode "TEST" is active.

.....LED
"STOP" **Operating mode "STOP"** Color "RED"

If the LED is lighting, the operating mode "STOP" is selected.

.....LED
"MAN" **Operating mode "MANUAL"** color "GREEN"

If the LED is lighting, the operating mode "MANUAL" is active. The operating buttons (direct control of the power circuit breakers) and the buttons (Start-Stop-direct control of the genset) are active.

.....LED **Mains circuit breaker ON / parallel with mains** color "GREEN"

[GCP-21]&[AMG 3/N1PB] Units equipped with a power circuit breaker or units which have become a 1-LS-unit due to external wiring [see chapter 2.1.2 "... equipments with one power circuit breaker" on page 16]: The LED "parallel with mains" indicates that the unit is operating in parallel with

.....LED
"GCB ON" **Generator power circuit breaker ON** color "GREEN"

The LED "Gen - CB ON" indicates that the generator power circuit breaker is closed.

.....LED
"genset is rotating" **Operating condition "genset / engine rotating"** color "GREEN"

If this LED is blinking, the ignition speed has been exceeded. As soon as the speed reaches the frequency band, i.e. $\pm 3\%$ of the preset rated frequency, the LED lights with steady light.

BUTTON FUNCTION DESCRIPTION

In order to facilitate the setting of the parameters, the buttons have an AUTOROLL function. It allows to switch to the next setting and parameterizing screens, the digits, or the cursor position. The AUTOROLL function will only be activated when the user depresses the corresponding keys for a certain period of time.

<p>..... BUTTON "message↓..select"</p>	<p>Message↓..Select color "NONE"</p>
	<p>Normal operation "message↓" - Pressing this button causes an advance of the display of the operating and alarm messages.</p> <p>Configuration "select" - Jumps to the next input mask. If the value which was originally displayed has been changed by pressing the buttons "digit↑" or "cursor→" the newly adjusted value is stored by pressing the button "Selection" once. By pressing this button again, the user causes the system to display the next entry screen.</p>
<p>..... BUTTON "display V↓..digit↑"</p>	<p>Display U↓..Digit↑ color "NONE"</p>
	<p>Normal operation "display V↓" - Pressing this button causes an advance of the display of the generator and mains frequency display.</p> <p>Note: If this button is being pressed for at least 5 seconds, the counter which is currently displayed is reset (only on code level 2).</p> <p>Configuration "digit↑" - With this button, the position at which the cursor is currently pointing is increased by one digit. The increase is restricted by the admissible limits (see list of parameters included in the Annex). In case the maximum number is reached which can be set, the number automatically returns to the lowest admissible number.</p>



DANGER !!!

The unit may start unintentionally if an alarm, which caused the unit to shut down, is acknowledged and a release is still present. Before acknowledging the alarm, check the cause of the alarm, in order to protect operating personnel located in the vicinity of the system against injuries, and to protect the motor against unintentional destruction.

⇒ NEVER press the acknowledgement button, if the cause of the alarm cannot or not clearly be detected! The destruction of the engine cannot otherwise be ruled out !

..... BUTTON "clear..cursor→"	Acknowledgement..Cursor →	color "NONE"
	<p>Normal operation "clear" - With this button, alarm messages are acknowledged, i.e. the alarm displays on the LC-display disappear and the LED "alarm" goes out. The operating variable display is set on the basic screen. Alarm class F2 and F3 alarms can only be acknowledged in the "STOP" and "MANUAL" operating modes.</p> <p>Configuration"cursor→" - with this button, the cursor is shifted one position to the right. When the last right-hand position is reached, the cursor automatically moves to the first position left-hand of the value to be entered.</p>	

..... BUTTON "GCB ON/OFF"	Generator-CB "ON / OFF"	color "RED / GREEN"
	<p>(only released, if the manual operation (button "MANUAL") or the test operation "button "TEST") have been selected).</p> <p>Button "GCB ON" Depending on the preset circuit breaker logic, the closing of the GCB is released by pressing the button " ON. This process can be aborted if the "GCB OFF" or "MCB ON" button is actuated or the operating mode is changed.</p> <p>Button "GCB OFF" By pressing the button "GCB OFF" the generator power circuit breaker can be opened, or a synchronisation of the MCB can be aborted. (depending on the logic of the power circuit breaker).</p>	

<p>..... BUTTONS "Manual START / STOP"</p> <p>[only possible while in operating mode MANUAL]</p>	<p>Operating mode engine "Start / Stop" color "GREEN / RED"</p> <hr/> <p>START By pressing the button, the genset is started. The starter and the operating relay are activated by pressing the button. After reaching the ignition speed, the starter is deactivated, while the operating relay remains picked up. The button can now be re-pressed.</p> <p>STOP With this button, the genset is stopped by resetting back the operating relay. There is no coasting.</p>
<p>..... BUTTON "AUTO"</p>	<p>Operating mode "AUTOMATIC" color "NONE"</p> <hr/> <p>"AUTO" The genset is automatically started and stopped, and the power circuit breaker are activated automatically. The two control inputs "Automatic 1" and "Automatic 2" are used to specify various modes in "AUTOMATIC" operating mode (also see description of control inputs). Emergency power and sprinkler operation is carried out regardless of the status of the discrete inputs "Automatic 1" and "Automatic 2".</p> <ul style="list-style-type: none"> • Discrete input "Automatic 1" set The setpoint value of the active load 1 is adjusted. • Discrete input "Automatic 2" set The setpoint value of the active load 2, or an external setpoint value via the interface, is adjusted (selectable while in configuration mode).
<p>..... BUTTON "TEST"</p>	<p>Operating mode "TEST" color "WHITE"</p> <hr/> <p>"TEST" By pressing the button "TEST" the genset is started, the engine monitoring is activated, and the power circuit breakers are not operated. This is carried out in the event of mains failure and when emergency power is switched on.</p> <p><i>[GCP-21/22]&[AMG 3/NxPB]</i> Start of a "LOAD TEST" By pressing the button "GCB ON" a load test is made possible. In addition to the "TEST" mode functions, the GCB is synchronized.</p> <p><i>[GCP-21/22]&[AMG 3/NxPB]</i> Termination of a "LOAD TEST" The "LOAD TEST" can be terminated after pressing the button "GCB open" or "MCB ON" (depending on the logic of the circuit breaker). In "STOP" or "AUTOMATIC" automatic mode without request signal, the unit is bucked with a reduction in power.</p>
<p>..... BUTTON "STOP"</p>	<p>Operating mode "STOP" color "RED"</p> <hr/> <p>"STOP" By selecting the operating mode "STOP" the genset is stopped in any case. The shutdown process is as follows: Shutdown procedure:</p> <ul style="list-style-type: none"> • The operating mode "STOP" is selected, • the active load is reduced, • the GCB is opened when reaching 3 % of the rated active load of the generator, • a coasting to cool down the genset is carried out according to the preset parameters.

..... **BUTTON** Operating mode "MANUAL" color "NONE"
 "MAN"

"MAN" With the operating mode "MANUAL" the buttons are activated to control the equipment manually. The automatic control of the power circuit breakers and the unit is blocked. Important automatic processes remain in operation (e. g. engine monitoring and the mains monitoring function for the mains parallel operation). Sprinkler and emergency power operation are not active.

Display

.....*DISPLAY*
 "LC-display"

LC-display

The LC-display marked outputs the corresponding messages and values, depending on the operating mode which is currently activated. In configuration mode, the individual parameters are displayed and changed. While in automatic mode, the performance quantities (e. g. voltage and currents) can be retrieved.

- Top line**
- In the field "V/kV" the generator voltage is indicated in dependence of the light-emitting diodes U1, U2 and U3.
 - In the fields "A(L1)", "A(L2)" and "A(L3)" the generator wire currents are separately indicated for each phase.

Bottom line In the field "Operating and alarm messages" the following masks appear:

Basic indication mask

- Display of the generator-cos φ and the generator active load
- or
- the current action of the unit (synchronization, starting, etc.)

Subordinate screen mask: Depending on the unit's equipment,

- the engine speed,
- the mains voltage,
- the mains voltage/mains performance [GCP-21/22]&[AMG 3/NxPB],
- the mains cos φ ,
- the analog input quantities,
- the generator active energy,
- the running hours,
- the remaining time until the maintenance call,
- the genset starting counter,
- the battery voltage (supply voltage),
- the number of subscribers of the load sharing [N2PB or option W/O],
- the maximum generator current (slave pointer)
- the last four alarm messages

are displayed.

These masks are displayed one after the other by pressing the button "message↓". When the last display screen has been reached, the basic screen is displayed. If alarms have occurred, their message texts are displayed in the sequence of their occurrence in the display screens before the basic screen. Only the first 4 alarms are indicated. All subsequent alarms are no longer indicated, however normally processed. If any functions of the unit are active (e.g. synchronisation of the GCB), the basic display mask is superimposed by the corresponding message (e.g. "Synchronous. synchronization"). Following the termination of the unit function, the basic mask is displayed again.

This Page Intentionally Left Blank



**ENI 65 Induction
Operator Manual**

Page Issued
11-07

Replaces