Cutler-Hammer

IQ Analyzer

QUICKSTART GUIDE

CONTENTS

IMPORTANT NOTICE

Use this Guide to begin performing basic metering functions quickly, without reviewing complete instructions provided in the User's Manual. To more fully understand the wide array of features offered by your **IQ Analyzer**, it is **strongly recommended** that operators read the User's Manual.

Following initial power-up of the **IQ Analyzer**, the displayed "Meter Menu" values may not be what is anticipated for your specific system. The unit must first be programmed with "General Setup" information relating to your electrical system.

For additional information or technical assistance, contact:
A D VANCED PRODUCT SUPPORT CENTER 1-800-809-2772

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troduction

(USER'S MANUAL SECTIONS 1&2)

The **IQ Analyzer** is a compact, panel mounted, micro-processor based device for users who want to monitor all aspects of their electrical distribution system. It has been engineered to provide comprehensive metering, power quality analysis, remote input monitoring, control relaying, analog inputs/outputs and communications capabilities. It will replace dozens of existing individual meters, recorders, and relays.

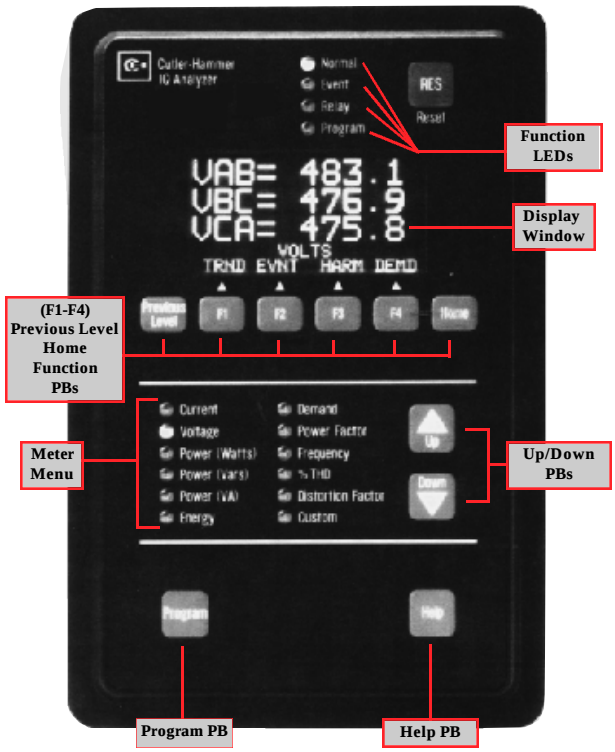
The **IQ Analyzer** displays a comprehensive list of metered parameters, historical values, harmonic profiles, peak demands and alarm data. Custom screens may be easily programmed to conveniently view parameter groupings, or to concurrently observe relationships as system conditions change. Information display options and device programming are accessible through a communications port via IMPACC (Integrated Monitoring Protection and Control Communications), or directly at the Operator Panel using Meter Menu and Function Keys.

The **IQ Analyzer** directly monitors 3-phase lines to 600 Vac without the need for external potential transformers. Above 600 Vac, external transformers are required.

The device complies with rigid ANSI C12.16 Class 10 revenue meter accuracy standards, and provides true rms readings through the 50th harmonic. Accuracy is maintained in applications with high distortion levels, including systems exhibiting 3.0 Crest Factor.

Operator Panel

(USER'S MANUAL SECTION 3)



Push Buttons (PBs)

(USER'S MANUAL SECTIONS 3&4)

Up/Down: Maneuver through metered values in Display Mode.

Home: Return to Display Mode from other modes. Toggle between Current and Demand in Meter Menu.

F1-F4: Used to enter analysis modes. Used to maneuver in program, analysis and reset modes.

Previous Level: Moves up one level in hierarchy (e.g., in Program mode from PGM/GEN/TYPE to PGM/GEN).

Reset: Enter/Exit Reset mode.

Program: Enter/Exit Program mode.

Help: Enter/Exit Help menu.

Modes of Operation

Display Mode:

(USER'S MANUAL SECTIONS 5-2)

The **IQ Analyzer** monitors and displays a comprehensive list of metered parameters. The Meter Menu provides easy access (using Up / Down PBs) to the most commonly used metered parameters:

Current	Voltage	Power (Watts)
Power (Vars)	Power (VA)	Energy
Demand	Power Factor	Frequency
%THD	Distortion Factor	Custom

Several parameters will require multiple screens for complete display of all available information. Up / Down will toggle through all displays.

Analysis Modes:

(USER'S MANUAL SECTION 5-7)

Analysis screens show detailed system information relative to the selected category. All historical and event information is accessed in the analysis modes.

Trend Analysis	Event Analysis
Harmonic Analysis	Demand Analysis

Program Mode:

(USER'S MANUAL SECTION 5-4)

This password protected mode is used to configure the Unit. Use Program Mode to specify General Setup Settings and for advanced features.

Reset Mode:

(USER'S MANUAL SECTION 5-10)

Using this password protected mode, the operator can reset or clear certain items such as Min / Max values, Alarm Triggers, Relays and Peak Demand Values.

Help Mode:

(USER'S MANUAL SECTION 5-3)

The **IQ Analyzer** displays various Help screens and useful information relating to device operation, programming and troubleshooting.

Communications

(USER'S MANUAL SECTIONS 5-8)

The **IQ Analyzer** is an IMPACC (Integrated Monitoring Protection and Control Communications) compatible device. It can be remotely monitored, controlled and programmed when equipped with the communications option. The small, addressable communications module (IPONI), is mounted to the back of the **IQ Analyzer.**

Displayed Information

Display Type	Comments
Current	• Phase A, B, C, Average • Neutral • Ground (separate CT inputs for each)
Voltage	• Phase A-B, B-C, C-A, Average • Phase A-N, B-N, C-N, Average • Neutral - Ground
Power	• System[1] and Phase A, B, C • Real (Watts) • Reactive (vars) • Apparent (VA)
Energy	• Forward, Reverse, Net • Real (kWh) • Reactive (kvarh) • Apparent (kVAh - Net only)
Demand	• System Current (A) • System Real Power (kW) • System Reactive Power (kvar) • System Apparent Power (kVA)
Power Factor	• System and Phase A, B, C • Displacement[2] • Apparent[3]
Frequency	• Hz • Time • Date
% THD	• Currents Phase A, B, C Neutral • Voltages Phase A-B, B-C, C-A Phase A-N, B-N, C-N
Distortion Factor	• K-Factor[4] (of Event) • CBEMA Derating Factor[5] (THDF) • Crest Factor[6]
Custom	• Discrete Input and Output Status • Analog Input Reading • User can program two screens to display any combination of seven Meter Menu parameters per screen via the Custom Screens option under Display Manager. (PGM / DISPMGR / CUST)

[1] Line to neutral values do not apply for 3-wire system, use system values.

[2] Fundamental watts to VA.

[3] Total rms watts to VA.

[4] K-Factor: A derating factor that is essentially the sum of the squares of individual harmonic currents times the squares of their harmonic number (i.e., multiples of fundamental). One for each current is displayed with largest recorded in Event metered data.

[5] CBEMA Factor: A transformer harmonic derating factor defined as a pure sine wave's crest factor (1.414) divided by the measured crest factor.

[6] Crest Factor: The ratio of peak current to rms current.

General

(USER'S MANUAL SECTIONS 5-1)

When the **IQ Analyzer** is initially powered up, it is in Display Mode. The "Normal LED" will blink green and the "Current LED" will glow red. The display will show phases A, B and C currents in amperes for the system being monitored.

```
IA=   100.0
IB=    99.0
IC=    97.0
      AMPERES
 TRND EVNT HARM DEMD
```

Initial Meter Menu Current Screen

The Up and Down pushbuttons (PBs) provide fast access to other Meter Menu parameters such as those outlined in the table. The Function pushbuttons (F1-F4) access TRND, EVNT, HARM and DEMD from the Display Mode. These are Analysis Modes for Trend, Event, Harmonic and Demand information.

Note on Sign Convention

(USER'S MANUAL SECTIONS 5-22)

As a factory default, lagging vars and power factor are represented as negative values at the load. This is a negative sign convention consistent with P=VI. The alternative is a power engineering convention which uses P=VI such that consumption of power is positive. This sign convention can be changed in the Program Mode under Power/Energy Options in General Setup. Changing this setting will have no effect on the unsigned "LEADING KVAR-HR" and "LAGGING KVAR-HR" energy readings. However, the "NET KVAR-HR" energy will begin counting in the opposite direction.

Manual Capture

(USER'S MANUAL SECTIONS 5-7.2.5.12)

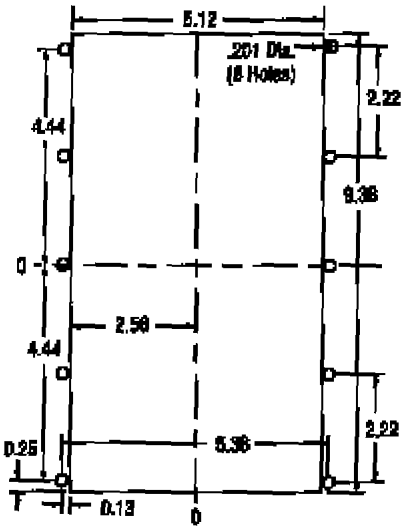
Capture and store system values for analysis and to aid in verifying proper operation of the **IQ Analyzer** by using Manual Capture. Enter the Harmonic Analysis Mode from Display Mode using the F3 Function PB. In the Harmonic Analysis Mode, the unit captures new system measurements when the F4 pushbutton (NEW) is pressed twice. (F3, F4, F4)

NOTE: *For proper operation, an Event Trigger must be set to Manual Capture. This can be done in the Event Triggers section of the Program Mode.*

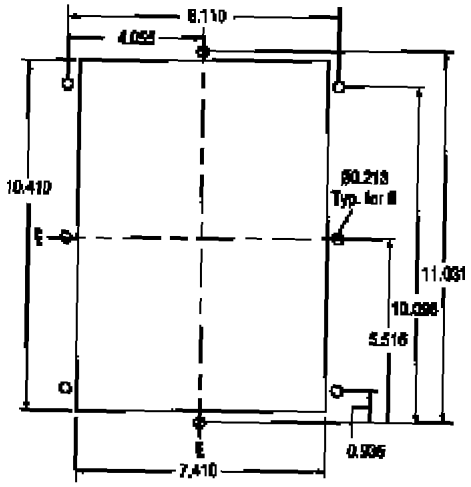
Mounting

(USER'S MANUAL SECTIONS 4-2)

The **IQ Analyzer** is typically mounted on an enclosure door. This installation makes it necessary to prepare a cutout into which the device will be placed. Top, bottom and two center side holes are used to mount the unit. A flange mounting option and separate NEMA 12/3R enclosure are available. Contact your local distributor or sales office.



FLUSH MOUNT DRILLING PATTERN



FLANGE MOUNT DRILLING PATTERN

Wiring

(USER'S MANUAL SECTIONS 4-3)

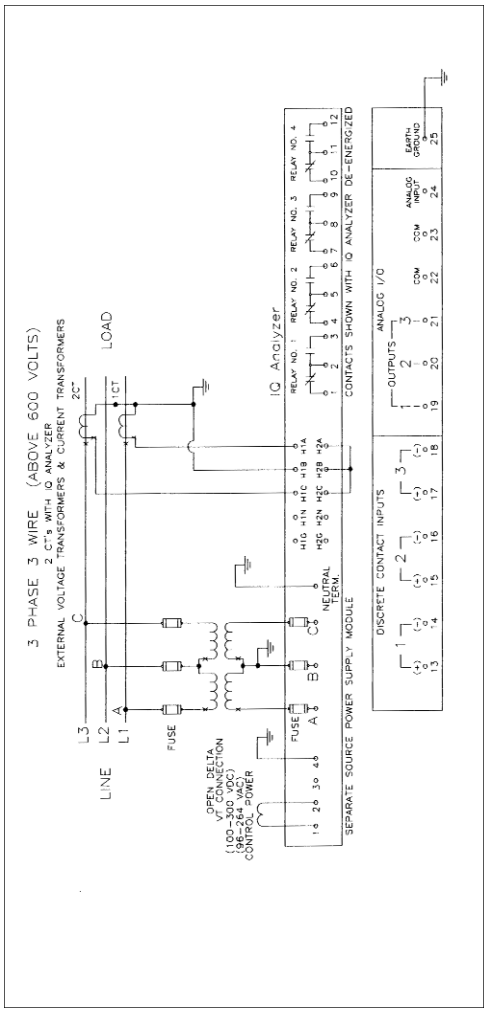
Wiring installation for the **IQ Analyzer** must follow a suitable Wiring Plan Drawing and conform to applicable Federal, State and Local codes.

Wires to the terminal blocks must not be larger than AWG No. 14. Larger wire sizes may be used on the CT connections when using appropriate ring terminals.

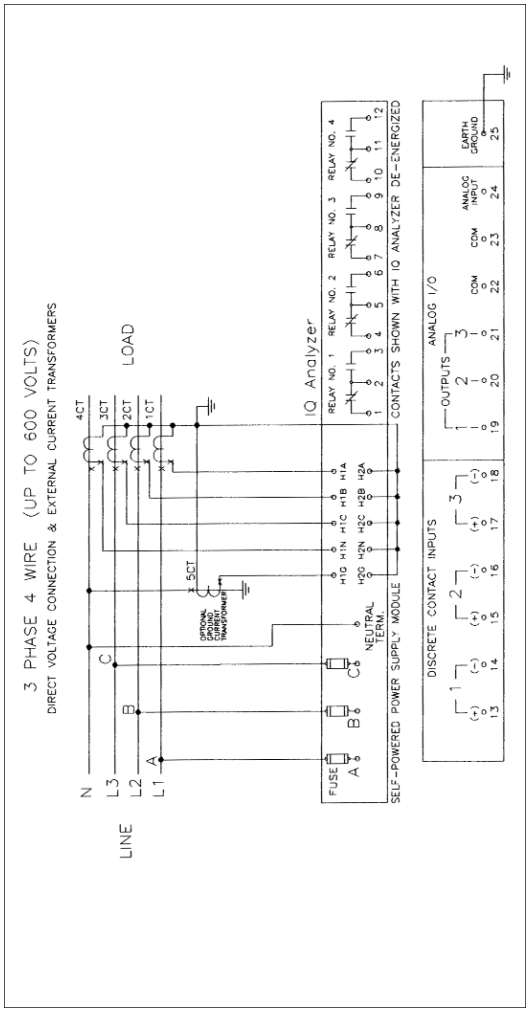
The following two figures show typical wiring diagrams. Additional wiring diagrams are shown in the User's Manual.

WARNING ⚠

Wiring procedures must be performed only by qualified personnel who are familiar with the **IQ Analyzer** and its associated electrical equipment. Ensure that incoming ac power (or foreign power) sources are turned off and locked out prior to performing any electrical work. Failure to do so may result in serious injury or death, or equipment damage. The only exception is when connecting/disconnecting ribbon cables at J2 or J3.



3 PHASE/3 WIRE (UP TO 600 VOLTS)



3 PHASE/4 WIRE (ABOVE 600 VOLTS)

WIRING

Programming

Quick Start Procedure

(USER'S MANUAL SECTIONS 4-5)

During initial setup of your **IQ Analyzer**, use Steps 1 - 5 below after the **IQ Analyzer** has been mounted and wired using Sections 4-2 and 4-3, along with Figures 4-9 to 4-34 of the User's Manual as a reference.

STEP #1:
Complete the General Setup Settings Worksheet. This will require an understanding of the electrical system configuration and transformer ratios.

STEP #2:
Enter the Program Mode of the **IQ Analyzer**. If this is an initial startup, use factory default passwords (10000 or 44444).
(Program, F2, F4)

STEP #3:
Enter General Setup Settings using the F1-F4 PBs from the information on page 13. (An example is shown on the following pages.)

STEP #4:
Examine, understand and verify Metered Values. Ensure display matches your system.

STEP #5:
Troubleshoot problems.
Use the guide provided, the Help Mode and / or the User's Manual as a reference in troubleshooting.

General Setup Settings Worksheet

Type of system (select one)

❑ 3 Phase / 4 Wire ❑ 1 Phase / 3 Wire

❑ 3 Phase / 3 Wire ❑ 1 Phase / 2 Wire

Phase Rotation
(if Step 1 was 3 Phase, select one)

❑ ABC Rotation

❑ CBA Rotation

Choose Frequency (select one)

❑ 25Hz ❑ 50Hz

❑ 40Hz ❑ 60Hz

Incoming Line-to-Line Voltage
Enter from 100-600 Vac __ __ __

PT Primary Rating (120 volt secondary)
Enter from 120-500,000 volts

__ __ __ , __ __ __

CT Primary Rating (5A secondary)
Enter from 5-10,000A __ __ , __ __ __

GND CT Primary Rating (5A secondary)
Enter from 5-10,000A __ __ , __ __ __

Programming Options (select one)

❑ Faceplate Only
❑ Input3 Key Only
❑ Faceplate & IMPACC (recommended)
❑ Input3 Key & IMPACC

Energy Resolution for Wh, varh, & VAh
(select one)

❑ Kilowatt-hours

❑ Megawatt-hours

Var Sign Convention (select one)

❑ Lagging vars & PF negative at load

❑ Lagging vars & PF positive at load

Date and Time
Enter date and time if required

_____

Change Password
Enter new 5 digit password if required

__ __ __ __ __

Programming Example

(USER'S MANUAL SECTION 6)

Meter a typical load on a 480 volt, 3 phase 3 wire (ABC phase rotation), 60Hz system with 1200/5 CTs, 50/5 ground CTs and no PTs. (Assume Kilowatt-hour energy resolution, and lagging vars & Power Factor negative at load.)

NOTE: The **IQ Analyzer** must be programmed to a PT ratio of 120/120 or unity for the **IQ Analyzer** to recognize there are no PTs.

From Main Menu Press and Release Program PB — *Top Level Entry Screen Displayed*

```
PGM-MAIN
  LAST PROGRAMMED:
   6/11/97 11:48:07A
  INCOM ADDR:000
  SOFTWARE VER. 1.14
ENTER PASSWORD:00000
(00000=VIEW ONLY PW)
-->  UP  DOWN  ENTER
```

Press Up (F2), then Enter (F4) to input default password 10000 — *Incorrect Password Exits Program Mode Automatically*

Program Mode Top Level Menu Displayed — *General Setup Blinking*

```
PGM
  CHOOSE CATEGORY:
   GENERAL SETUP
   ANALOG INPUTS
   ANALOG OUTPUTS
   DISCRETE INPUTS
   EVENT TRIGGERS
SEL  UP  DOWN  ENTER
```

Press and Release Select (F1) PB — *Type of System Blinking*

```
PGM/GEN
 SELECT PARAMETER:
 TYPE OF SYSTEM
 FREQUENCY
 INCOMING L-L VOLTAGE
 PT PRIMARY RATING
 CT PRIMARY RATING
SEL  UP  DOWN  PGDN
```

Press and Release Select (F1) PB — *Choose Type of System with Parameters Displayed*

```
PGM/GEN/TYPE
 3 PHASE/4 WIRE
*3 PHASE/3 WIRE
 SINGLE PHASE/3 WIRE
 SINGLE PHASE/2 WIRE


SEL  UP  DOWN
```

Use F1-F3 PBs to Move an Select 3 Phase/3 Wire — *Phase Rotation with Parameters Displayed*

```
PGM/GEN/TYPE/3PH3W
*ABC - PHASE ROTATION
 CBA - PHASE ROTATION




     UP  DOWN  ENTER
```

Use F2-F4 PBs to Move and Enter "ABC" — *Type of System Blinking*

```
PGM/GEN
 SELECT PARAMETER:
 TYPE OF SYSTEM
 FREQUENCY
 INCOMING L-L VOLTAGE
 PT PRIMARY RATING
 CT PRIMARY RATING
SEL  UP  DOWN  PGDN
```

Use (F2) or (F3) PBs to Move to Frequency — *Frequency Blinking*

Press and Release Select (F1) PB — *Frequency Choices Displayed*

```
PGM/GEN/FREQ
   25 HZ
   40 HZ
   50 HZ
*  60 HZ


     UP  DOWN  ENTER
```

Use F2-F4 PBs to Move to and Enter 60Hz — *Type of System Blinking*

```
PGM/GEN
 SELECT PARAMETER:
 TYPE OF SYSTEM
 FREQUENCY
 INCOMING L-L VOLTAGE
 PT PRIMARY RATING
 CT PRIMARY RATING
SEL  UP  DOWN  PGDN
```

continued on next page

Use (F2) or (F3) PBs to Move to Incoming Line-Line Voltage — *Incoming L-L Voltage Blinking*

Press and Release Select (F1) PB — *L-L Voltage Rating with 3 Digits Displayed*

```
PGM/GEN/INVOLT
 INCOMING L-L VOLTAGE
 APPLIED TO VOLTAGE
 INPUT TERMINALS A,B,
 C, N OF IQ ANALYZER
 (100 TO 600 VAC):
       480
-->   UP  DOWN  ENTER
```

Use F1-F4 PBs to Establish and Enter 480 Volts — *Incoming L-L Voltage Blinking*

Use F2-F4 PBs to Move to PT Primary Rating — *PT Primary Rating Blinking*

Press and Release Select (F1) PB — *PT Primary Rating with 6 Digits Displayed*

```
PGM/GEN/PT
 PT PRIMARY L-L RATING
   120 TO 500,000 V
(SEE USER'S MANUAL IF
 NOT USING 120V
 SECONDARY PTS)
       000120:120
-->   UP  DOWN  ENTER
```

Use F1-F4 PBs to Establish and Enter 120 Volts — *PT Primary Rating Blinking*

Use F2-F4 PBs to Move to CT Primary Rating — *CT Primary Rating Blinking*

Press and Release Select (F1) PB — *CT Primary Rating with 5 Digits Displayed*

```
PGM/GEN/CT
 CURRENT TRANSFORMER
 PRIMARY RATING:
  5 TO 10,000 AMPS
  (MUST BE 5 AMP
   SECONDARY CT)
       01200:5
-->   UP  DOWN  ENTER
```

Use F1-F4 PBs to Establish and Enter 1200 A — *CT Primary Rating Blinking*

Use F2-F4 PBs to move to GND CT Primary Rating — *GND CT Primary Rating Blinking*

```
PGM/GEN
 SELECT PARAMETER:
 FREQUENCY
 INCOMING L-L VOLTAGE
 PT PRIMARY RATING
 CT PRIMARY RATING
 GND CT PRIMARY RATING
SEL  UP  DOWN  PGDN
```

Press and Release Select (F1) PB — *GND CT Primary Rating with 5 Digits Displayed*

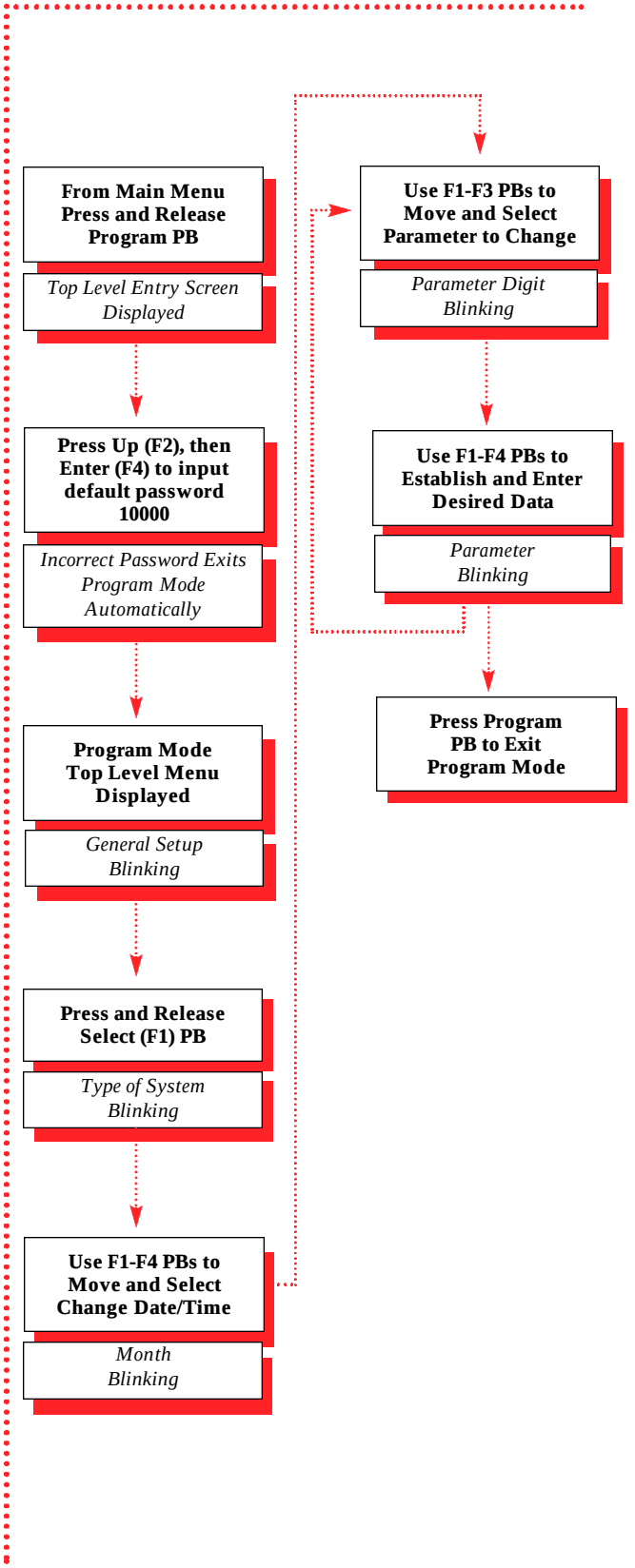
```
PGM/GEN/GCT
 GND CURR TRANSFORMER
 PRIMARY RATING:
  5 TO 10,000 AMPS
   (MUST BE 5 AMP
    SECONDARY CT)
       00050:5
-->   UP  DOWN  ENTER
```

Use F1-F4 PBs to Establish and Enter 50 A — *GND CT Primary Rating Blinking*

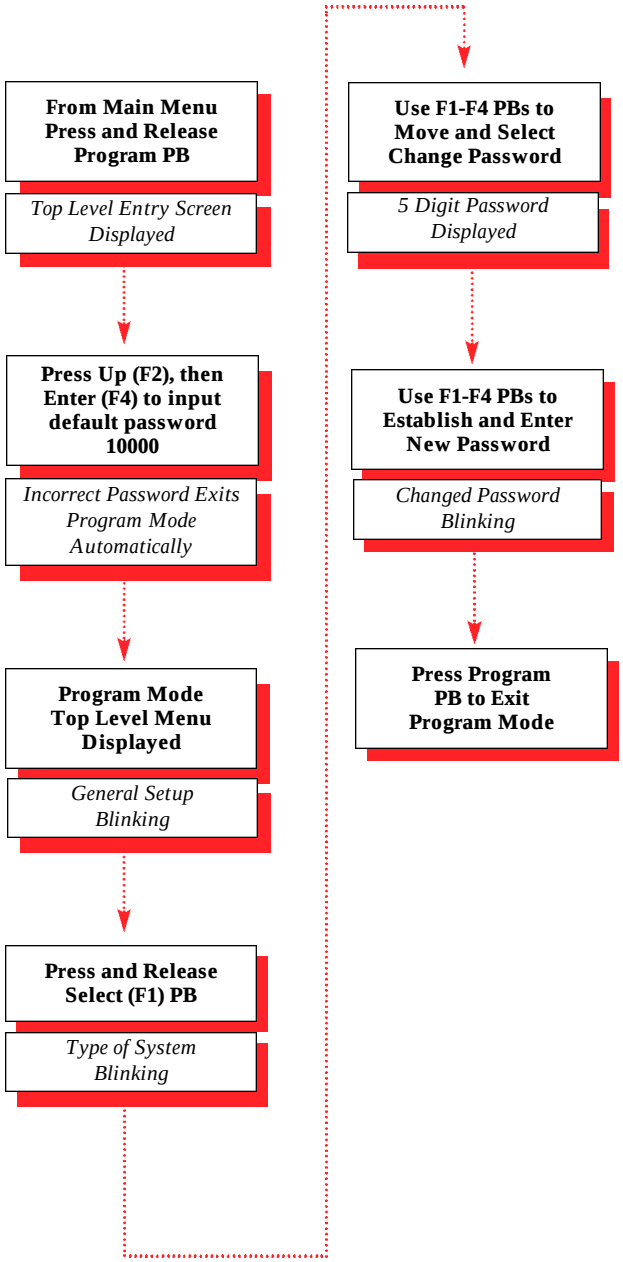
```
PGM/GEN
 SELECT PARAMETER:
 FREQUENCY
 INCOMING L-L VOLTAGE
 PT PRIMARY RATING
 CT PRIMARY RATING
 GND CT PRIMARY RATING
SEL  UP  DOWN  PGDN
```

Press Program PB to exit Program Mode

Time/Date Programming Example



Password Programming Example



mptom	Probable Cause	Possible Solutions(s)
Operator Panel icator LED's off.	Line voltage level is deficient. Separate source control power is deficient. ac line connections (or optional external PTs) are not properly wired. Blown or loose fuse(s).	• **Locate cause of deficiency in ac line.** • **Locate deficiency in the ac control power line.** • **Verify that the ac line (and/or PTs) are wired properly.** • **Verify line voltage with multimeter. Check power module fuse(s) on affected phase(s). These are located just above voltage inputs (behind the cover of power module). Reseat or replace fuse(s) as necessary.[1]**
e or more volt- phases read orrectly.	Blown or loose fuse(s). Incorrect voltage settings.	• **Verify line voltage with multimeter. Check power module fuse(s) on affected phase(s) located just above the voltage inputs behind the cover of power module. Reseat or replace fuse(s) as necessary.[1]** • **Verify correct settings programmed in the IQ Analyzer for system type,L-L voltage and PT rating.**
wer parameters att, var, VA, wer Factor) d incorrectly.	Phasing for voltage and current is mismatched. CT polarity is reversed.	• **Capture an event and compare phase angles of Va, Vb, Vc, Ia, Ib, Ic to detect possible wiring error(s).** • **Verify connections per wiring diagrams.** • **Reverse CT leads. Verify proper wiring and grounding.**
orrect readings one or more rents.	Incorrect current transformer ratio setting.	• **Verify incoming current using a separate ammeter.** • **Verify proper CT ratio settings.** • **Check CT wiring and grounding.**

ower Module Fuse: Buss KTK-R-3/4 or equivalent (3/4 amp).

Unit displays: "Hardware Failure" "Register Failure" "Multiply Failure" "Divide Failure" "Logic Failure" "Add/Subtract Failure"	Possible IQ Analyzer hardware failure.	• **Reboot Unit by mometarily removing power cable at connector J2.** • **Replace Unit.**
Unit displays: "Internal RAM Error" "External RAM Error" "External ROM Error"	IQ Analyzer hardware error.	• **Reboot Unit.** • **Replace Unit.**
Unit displays: "Reverse Sequence"	IQ Analyzer has detected phasing difference between programmed setpoint and actual system parameters.	• **Verify actual system phasing. Capture an event and compare phase angles of Va, Vb, Vc, Ia, Ib, Ic to detect possible wiring error(s).** • **Verify that IQ Analyzer setpoint matches actual system phasing.** • **Verify IQ Analyzer connections.**
Unit fails to capture Harmonic Data when Manual Capture is pressed.	No manual capture event trigger has been programmed.	• **Enter Program Mode and set up an Event Trigger for Manual Capture.**
Unit fails to communicate over IMPACC network.	Wrong or conflicting address set on IPONI. Blown fuse on IQ Analyzer. Communications wiring error. IPONI failure.	• **Check that IPONI has a unique address on the system and that software is addressing proper unit.** • **Check input/output fuse adjacent to IQ Analyzer communication connector. Replace if necessary.[1]** • **Verify wiring is in conformance with IMPACC wiring rules.**
Display goes blank after several minutes.	Display Manager Screen Saver Option is set to blank rather than dim.	• **Press any pushbutton to activate display.** • **Program longer timeout in Meter Menu Return Time in Display Manger.**
Unit setpoints unchanged upon exiting program mode.	Unit was in View-Only mode using password (00000).	• **Re-enter program setpoints using proper password. Customer established or factory default (44444 or 10000).**

[1] I/O Fuse: Littlefuse Plug-in Microfuse, Catalog #273.250, 0.25A, 125V or equivalent.

Cutler-Hammer

For additional information or technical assistance, contact:
ADVANCED PRODUCT
SUPPORT CENTER 1-800-809-2772
www.cutlerhammer.eaton.com