IQ CENTRAL ENERGY DISPLAY

Operational

Westinghouse
IQ Central
Energy Display

Alarm   Ack /
             Reset

Device Status   Display Status

    Active   Synchronizing

    Inactive   Program Mode

    No Response

Address Group   Step Up   Step Down

        Function   Value

    Device Readings   Step Up

    Group Readings

    Alarm Log
                                    Step Down

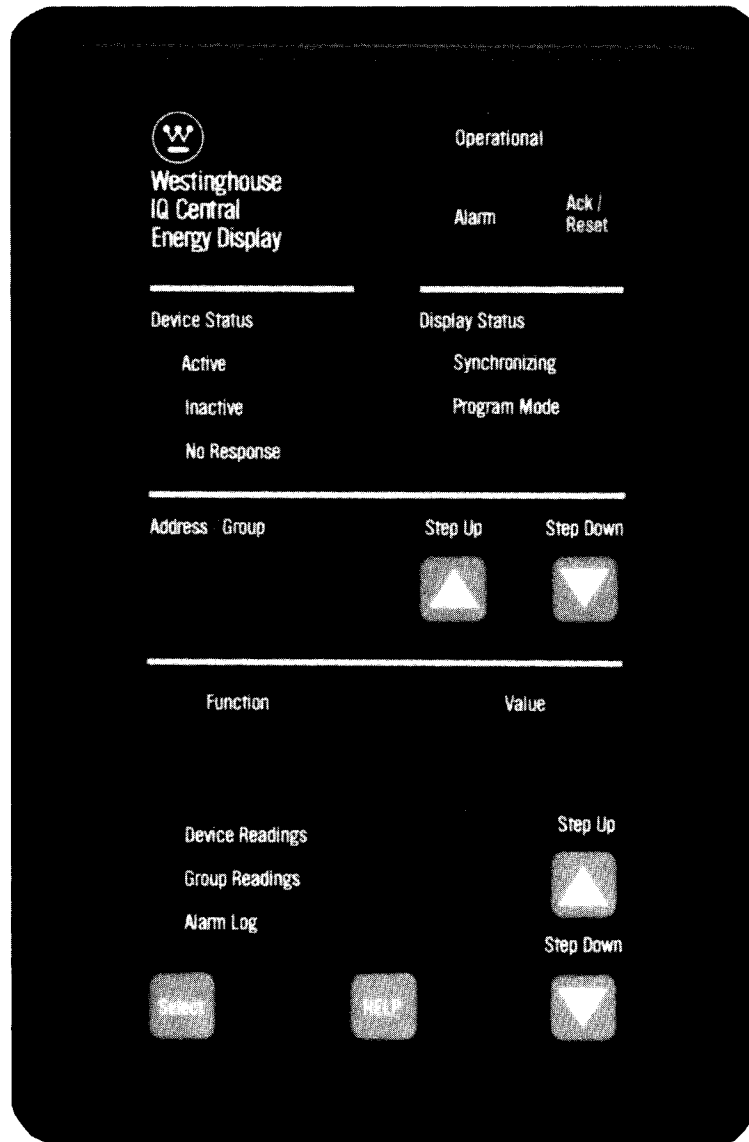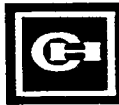## Westinghouse

NOTE

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

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TABLE OF CONTENTS

Section 1

INTRODUCTION

1.0 General — The IQ Central Energy Display (CED), Figure 1.1, is a microprocessor-based, self-contained, door-mounted device designed to monitor and display power and energy readings from up to 58 IQ Energy Sentinels and IQ Data Plus IIs (maximum 8 IQ Data Plus IIs). The two-way communication from the IQ Energy Sentinels and IQ Data Plus IIs to the IQ CED utilizes the INCOM communication protocol. This is accomplished using a single shielded twisted pair of conductors.

Parameters from IQ Energy Sentinels and IQ Data Plus IIs that the IQ CED displays include:

- Power (autoscaling in kilowatts, megawatts)

- Energy (autoscaling in kilowatt-hours, megawatt-hours, gigawatt-hours)

- Present power demand (kilowatts, megawatts, gigawatts – autoscaling) – average power in last demand window

- Peak power demand (kilowatts, megawatts, gigawatts – autoscaling)

- Group readings (up to 8 groups)
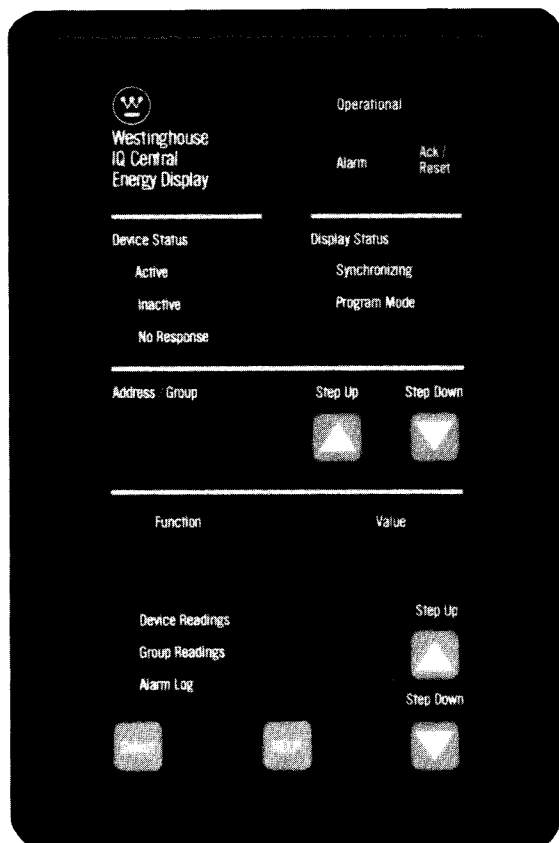
- Device status

Figure 1.1 — IQ Central Energy Display

- Historical alarm log

- Custom device description (user-programmable)

- Date/time

When used with the remote communications option, the IQ CED will pass complete device data (including IQ Data Plus II parameters not monitored by the IQ CED) to a computer, programmable controller, or other user system.

The IQ CED's primary functions are to:

1. Monitor and display at a common location the power energy, and peak demand from monitored feeders and mains. These values can be displayed from the individual devices or summed together in groups.

2. Synchronize the demand windows of all IQ Energy Sentinels and IQ Data Plus IIs (with Addressable Relay IIs).

The unit's secondary functions are to:

1. Enable watthour pulse initiator and demand/alarm relays. Contacts from these relays may be used to sound a remote alarm.

2. Provide for optional remote communications.

The remote communications option is available at any time by adding a communication module. No change in software is required.

1.1 Features and Options — Since the IQ CED is standardized, only one style is required when ordering new or spare units. The remote communications option can be accomplished at any time with the Product Operated Network Interface (PONI) module. This option enables the IQ CED to exchange external data with a host computer, programmable controller, or other system.

A HELP pushbutton is available at any time to further explain the function display.

A list of IQ CED features and benefits is given in Table 1.A.

1.2 Required External Hardware — A 120 or 240 VAC, 50 or 60 Hz supply is required to power the IQ CED.

For optional remote communications, a PONI module mounts on the rear of the IQ CED. No external power is needed for the communications module.

1.3 Use of Manual — This manual is designed for use during installation, troubleshooting and, if necessary, unit replacement. It also has information of specific importance for the user's application engineer who is planning the overall system.

The scope of this manual is broad enough to form the basis of new employee familiarization, refresher training sessions, and ongoing maintenance. The application engineer is strongly

advised to carefully read Sections 2 thru 5 before producing the system innerconnect diagrams. Installation teams should carefully read all of Section 3 **before** starting final installation. Maintenance personnel should be familiar with Section 6 before attempting to service the IQ CED.

1.4 Level of Repair — This manual is written with the assumption that only unit-level troubleshooting will be performed. If the cause of the malfunction is traced to the IQ CED, the unit should be replaced or returned to Westinghouse for factory repair.

Table 1.A

IQ CED FEATURES AND BENEFITS

Features	Benefits
• Microprocessor-based control	• Reliable service
• Non-volatile memory	• No lost programs or special back-up batteries
• Simplified Operator Panel	• No elaborate, complex keyboard or confusing, multi-function readings
• Ease of startup	• Quick assembly and installation • Self-learning system • Allow synch of demand windows
• Only one shielded two-wire twisted pair daisy-chained from device to IQ CED and three wires for 120 or 240 Vac supply • Unit auto-selects 120 or 240 Vac • Autoranging of metered values	• Minimum wiring
• Centralized monitoring	• Minimizes chances for errors • Eliminates need to interrogate each device
• Ease of adding remote communication	• No re-programming • Retrofit at any time
• Help pushbutton	• Provides enhanced indication of metered values and alarm conditions
• Alarm log	• Maintains historical alarm conditions for diagnostic purposes
• Device description	• User-programmable 8-character description to identify device
• Membrane NEMA Type 3R, 12 faceplate	• Can be used in harsh industrial environments

Section 2

HARDWARE DESCRIPTION

2.0 General — The purpose of this section is to familiarize the reader with the IQ CED hardware, its nomenclature, and its specifications.

2.1 Hardware Description — The IQ CED is designed to mount through a cutout in a panel. (This will generally be a cabinet's face or door.) Dimensions of the IQ CED are shown in Figure 2.1.

The hardware description is divided into the following:

- Operator Panel (Section 2.1.1)

- Rear Access Area (Section 2.1.2)

- External Hardware (Section 2.1.3)

2.1.1 Operator Panel — The operator panel (see Figure 2.2) is accessible from the outside of the panel or door, and provides a means to:

- Determine which feeder or main is being monitored.

- Monitor the actual metered power and energy values in the function window.

- Determine which metered value is being displayed by means of the STEP UP/DOWN pushbuttons located below the function window.

- Select metered values or device description to be displayed in the function window.

- Determine the device status.

- Determine that an alarm condition exists.

- Acknowledge that an alarm condition exists and silence a remote alarm by means of the ACK/RESET pushbutton.

- Reset the IQ CED after an alarm condition has occurred by means of the ACK/RESET pushbutton.

- Reset demand values by means of the ACK/RESET pushbutton.

- Provide a detailed description of the function/value display via the HELP pushbutton.

- Program device descriptions, device groups, and alarm settings.

The use of the operator panel is detailed in Section 5.

2.1.2 Rear Access Area — The rear of the IQ CED is accessible from the rear of the panel door. All wiring connections to the IQ CED are made at the chassis' rear.

Study Figure 2.3 and note the following items:

1. Connections with controlled external devices, if used, are made at the terminal block at contacts 1 through 6. The alarm relay energizes on pre-programmed alarm and no
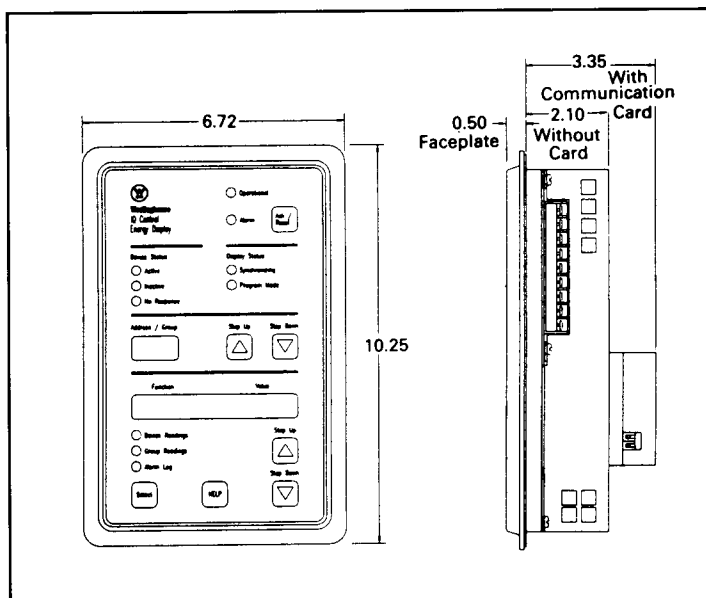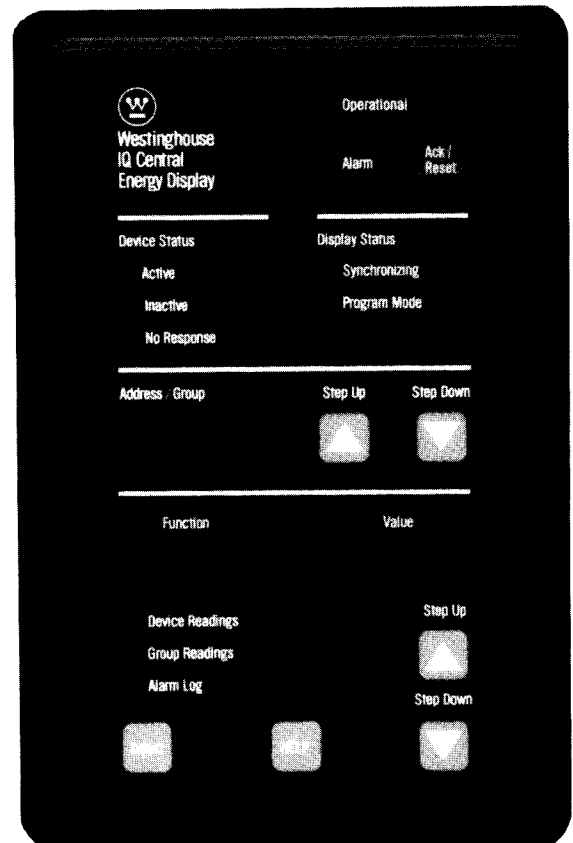

Figure 2.1

Figure 2.2

response conditions. The watt-hour pulse output is pro-
grammable from 1 KWH to 5 GWH. **The Terminal Block
label shows contacts in the de-energized position.**
(These connections may be made at the NO or NC pairs
(Form C) associated with the internal alarm relay.)

2. The 120 or 240 VAC input connects to the terminal block
at the contacts 7, 8, and 9.

3. A DIP switch located near the rear right side of the chassis
allows the user to access the program mode to program
individual devices, groups of devices, and alarm levels. In
addition, the time, date, and subnetwork communication
speed can be selected. (Note: IQ Energy Sentinels only
communicate at 9600 baud.)

4. A three contact terminal block is located on the right side
of the chassis to connect the IQ CED to the IQ Energy
Sentinels and IQ Data Plus IIs on its subnetwork.

Figure 2.3 — Rear Access Area

5. The synch pulse input contacts are located on the right
center side of the chassis. They are designed to accept an
external synch pulse, which the IQ CED will broadcast to
synchronize the demand windows of all Energy Sentinels
on the subnetwork. It will also broadcast a "close relay"
command to Addressable Relay IIs. These relays should
be wired to the synch pulse inputs of each IQ Data Plus IIs
and addressed from 901 to 908 to allow synchronizing of
each IQ Data Plus II.

6. A communications port, located on the right lower side of
the chassis, is designed to connect with the optional
communication module for remote communications.

2.1.3 External Hardware — Each IQ CED requires cus-
tomer-supplied 120 or 240 VAC, 50 or 60 Hz control power
wired into contacts 7, 8 and 9 (Figure 2.3).

2.2 Specifications — The specifications of the IQ CED are
contained in Table 2.A.

Table 2.A

GENERAL SPECIFICATIONS

Device's Power Requirement
10 VA Maximum

Frequency
50/60 Hz

Line Characteristics
120 or 240 Vac + 20%, –20%
(Autoselected)

Operating Temperature
0° to 70°C
(32° to 158°F)

Storage Temperature
–20° to 85°C
(–4° to 185°F)

Humidity
0 to 95% R.H.
noncondensing

Alarm Contact Ratings
10 amperes @ 240 VAC (Resistive)
10 amperes @ 30 VDC (Resistive)
1/3 HP   125, 250 VAC

Section 3

INSTALLATION AND STARTUP

3.0 Introduction — This section describes the following items associated with the installation and startup of the IQ CED:

- Mounting (Section 3.1)

- Wiring (Section 3.2)

- Initial Startup (Section 3.3)

Read all sections, especially Section 2 (Hardware Description) before using this section to install a IQ CED.


WARNING

Ensure that the incoming AC power and all "foreign" power sources are turned **OFF** and locked out before working on the IQ CED or its associated equipment. Failure to observe this practice can result in serious or fatal injury, and/or equipment damage.

3.1 Panel Preparation — This subsection describes the panel preparation and mounting of the IQ CED.

3.1.1 Cutout, Clearances — Since the IQ CED is typically mounted in a cabinet door, it is necessary to prepare a cutout in which it will be placed. The dimensions for this cutout, along with the location of six mounting holes are shown in Figure 3.1. Before actually cutting the panel, be sure that the required three-dimensional clearances for the IQ CED chassis allow mounting in the desired location. Dimensions for the IQ CED are shown in Figure 3.2.

Remain close to tolerances when making the cutouts and placing the holes for the mounting screw. The horizontal
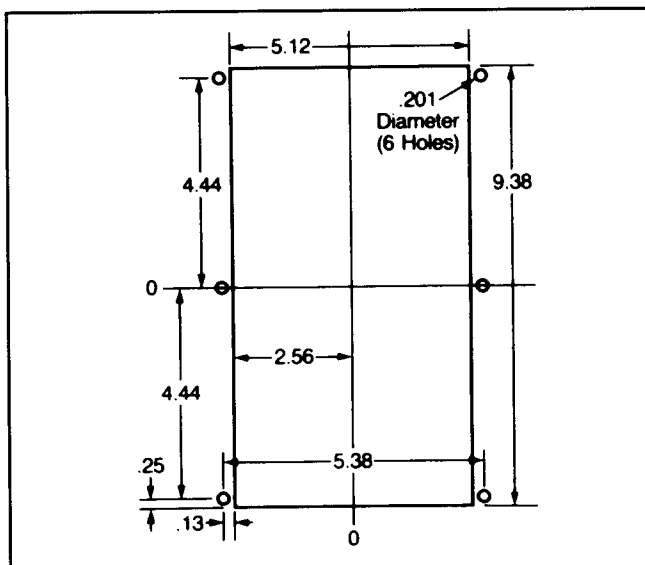
Figure 3.1 — Chassis Cutout Dimensions;
Tolerance: –0 and +0.050 in.

dimensions between the center of the mounting holes and the cutout's vertical edge must be within 0.0 and +0.050 in. (0.13 cm).
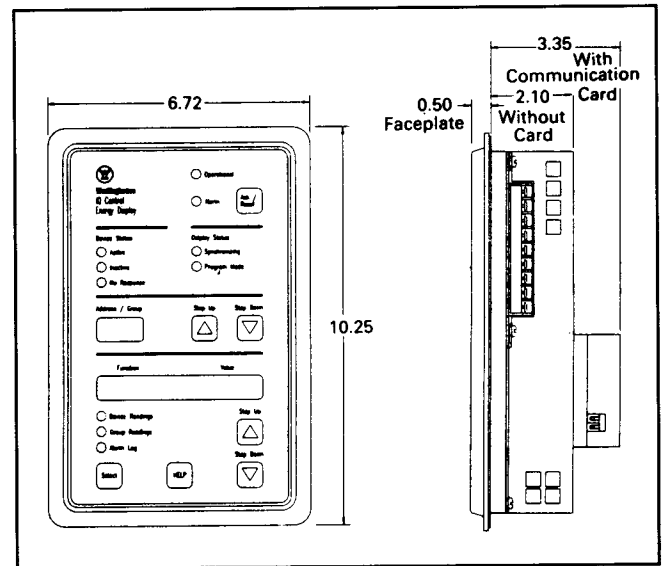
Figure 3.2 — IQ CED Dimensions

3.1.2 Mounting — Do not use a tap on the face since this will remove excess plastic from the holes. This will result in insufficient threaded material to secure the IQ CED to its mounting panel.

Place the IQ CED through the cutout in the panel. Be sure the operator panel faces outward. Use 0.5 in. (1.2 cm) long screws (included with the IQ CED) to mount the unit on a single-thickness panel. Be sure to start the screws from **inside** the panel so that they go through the metal first.

3.2 Wiring — The wiring of the IQ CED must follow a suitable wiring plan drawing. The term wiring plan, as used here, refers to the drawings made for the specific application. It describes all electrical connections between the IQ CED and external equipment. This drawing is designed by the user or OEM.

A typical wiring plan is shown in Figure 3.3. Note the following:

- NO and NC contacts from the alarm relays and watt-hour pulse output can be used to control external devices. These contacts are rated at 10 amperes for 240 VAC or 30 VDC. For ratings of 115 VDC and higher, interposing relays must be used.

- The wires to the IQ CED 9 point terminal block must not be larger than No. 14 AWG. Larger wire will not connect properly with the terminal block.

- The terminal block has No. 6-32 sems pressure saddle screws.

- Use of IMPACC Communications Wire (IMPCABLE) is recommended for interconnecting the devices in the IQ CED subnetwork. Alternatively, Belden 9463 or its Quabbin and Comm Scope equivalents may be utilized. In general, the following distance rules apply:

  1. The total length of communications wire in the IQ CED subnetwork may not exceed 7500 feet of IMPCABLE or 6000 feet of Belden 9463 or its Quabbin and Comm Scope equivalents.

  2. The total length of communications wire in any branch from the subnetwork's main run may not exceed 200 feet.

  If further information is desired, reference the IMPACC Wiring Specification.

- Addressable Relay IIs are needed to synchronize the IQ Data Plus II demand windows to the IQ CED synch command. The addresses on the three hexadecimal wheels of these Addressable Relay IIs **must** be **901 to 908**. The address of the Addressable Relay II need not correspond with a certain IQ Data Plus II address. To insure operation, the Addressable Relay II needs to have its relay pulse feature set ON and should be wired to the NO contacts of the Addressable Relay II.

3.3 Initial Startup — The information here is intended to be used when first applying AC power to the IQ CED.

NOTE

This device is designed to be installed, operated, and maintained by adequately trained workers. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, check-out, safe operation, or maintenance. Care must be exercised to comply with local, state and national regulations, as well as safety practices. All wiring must conform to applicable federal, state, and local codes.

DIP Switch Settings — The DIP switches located and accessed from the rear-right portion of the chassis must be properly set according to application requirements. Obtain the installation record sheet produced specifically for the application. A blank record sheet is shown in Table 3.A. The DIP switch contains four two-position switches which are set in combination (Figure 3.4). The switches are turned ON or OFF by sliding the switch. As you face the DIP switches, slide:

- To the LEFT to turn the switch OFF

- To the RIGHT to turn the switch ON

Figure 3.5 shows a side view of a single slide switch and how it is turned ON and OFF.

Observe the ON and OFF designations on the DIP switches shown in Figure 3.3. Always look for the OFF and ON desig-
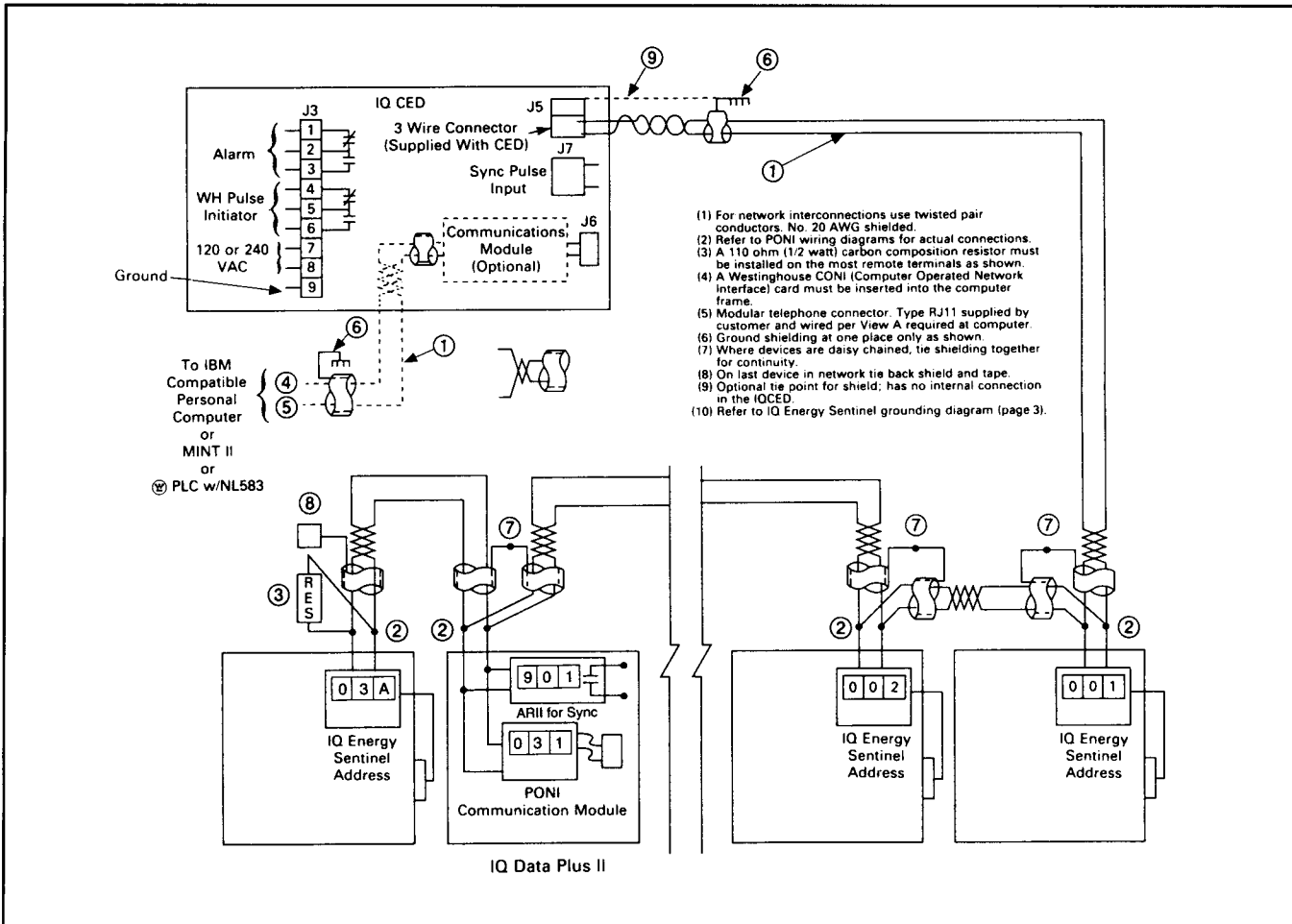
Figure 3.3 — Typical Wiring Diagram

Table 3.A

INSTALLATION RECORD SHEET

Address/ Group	Description	Peak Threshold	Alarm Inactive	Alarm No Response

Address/ Group	Description	Peak Threshold	Alarm Inactive	Alarm No Response

nations on the hardware or printed circuit board to be sure you are setting the switches correctly.

Figure 3.4 — DIP Switch
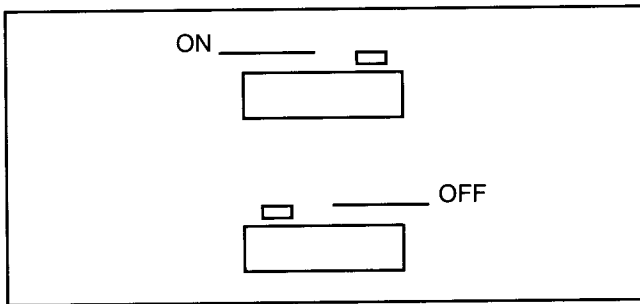
Figure 3.5 — DIP Switch (side view)

- **SW #1 - Program Mode**

  This switch should always be in the OFF mode except when altering IQ CED programming. Enabling this switch will give the user access to the password protected program mode. The default code when the unit is shipped from the factory is "44444".

- **SW #2 - Time**

  Enabling this switch will bring up the time when scrolling through the information displayed on the IQ CED.

- **SW #3 - Date**

  Enabling this switch will bring up the date when scrolling through the information displayed on the IQ CED.

- **SW #4 - Baud Rate**

  This switch informs the IQ CED what speed the subnetwork is communicating. All subnetwork devices must be set to communicate at the same speed. If there are IQ Energy Sentinels on the network, the baud rate must be set at 9600 baud.

After all the DIP switches are set according to the settings listed on the installation record sheet, the system is ready to have AC power applied. Follow the procedure listed in Section 3.3.2 when first applying power to the IQ CED.
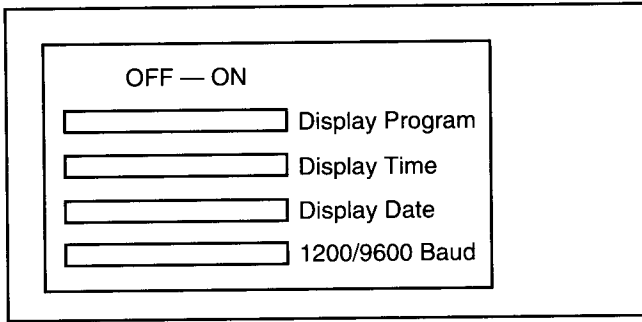
3.3.1 Before Power Application

- Verify that all wiring is correct, as shown on the wiring plan drawing.

- When possible, disable the IQ CED until the rest of the equipment has been checked.

- Set the address of each subnetwork device as per instructions in Section 3.4. It is recommended that all addresses assigned be noted for reference during learn mode.

Note: Each IQ CED and the local devices that communicate with it are considered a local network or subnetwork. **Do not** use a duplicate address for any device connected to the same IQ CED.

3.3.2 Initial Power Application

1. Apply 120 or 240 VAC power to the IQ CED (Refer to Section 4.1 (Power-Up).

2. Verify that all devices that are to be in the IQ CED subnetwork are in the connected position with their addresses set per Section 3.4.

Note: Any time a device is removed or added to the IQ CED subnetwork, the IQ CED must re-learn the network.

3.4 Address System — To enable the individual monitoring of IQ Energy Sentinels and IQ Data Plus IIs, each device is equipped with an adjustable address register. (Note: The IQ Data Plus II requires a communications module.) Addresses for each device can be set accordingly.

The IQ CED only recognizes hexadecimal addresses from **1 to 3A**. Using the address DIP switches on the IQ Energy Sentinel, the highest binary address would be (left to right from DIP switches 10 to 1) **0000111010**, with 1 signifying up. See Table 3.D for binary to hex conversion.

```
─────────────── NOTE ───────────────
If IQ Data Plus IIs on the subnetwork will be synchronized
with the IQ CED, then Addressable Relay IIs are needed for
each IQ Data Plus II. A maximum of 8 Addressable Relay
IIs can be placed on the IQ CED subnetwork. These
Addressable Relay IIs must have addresses 901 to 908. In
addition, each Addressable Relay II must have its relay
pulse ON. Check to confirm that the baud rate of the
Addressable Relay II matches the baud rate of the rest of
the subnetwork.
```

Table 3.B

Group	Description/Addresses	Peak Threshold

Table 3.C

System Parameters		Selected Value
Synchronization Type	Internal/External	
Synchronization Window	1 to 60 min (1 min. increments)	
WH Output Group	Off, G1 to G8	
WH Set	1KWH to 5 GWH (1KWH, 10 KWH, 100 KWH, and 1 MWH increments)	
Erase Alarms	Enable/Disable/Password	
Reset Peak	Enable/Disable/Password	
Password	Default – 44444	

Table 3.D

Binary	Hex	Dec	Binary	Hex	Dec
0000000001	1	1	0000011110	1E	30
0000000010	2	2	0000011111	1F	31
0000000011	3	3	0000100000	20	32
0000000100	4	4	0000100001	21	33
0000000101	5	5	0000100010	22	34
0000000110	6	6	0000100011	23	35
0000000111	7	7	0000100100	24	36
0000001000	8	8	0000100101	25	37
0000001001	9	9	0000100110	26	38
0000001010	A	10	0000100111	27	39
0000001011	B	11	0000101000	28	40
0000001100	C	12	0000101001	29	41
0000001101	D	13	0000101010	2A	42
0000001110	E	14	0000101011	2B	43
0000001111	F	15	0000101100	2C	44
0000010000	10	16	0000101101	2D	45
0000010001	11	17	0000101110	2E	46
0000010010	12	18	0000101111	2F	47
0000010011	13	19	0000110000	30	48
0000010100	14	20	0000110001	31	49
0000010101	15	21	0000110010	32	50
0000010110	16	22	0000110011	33	51
0000010111	17	23	0000110100	34	52
0000011000	18	24	0000110101	35	53
0000011001	19	25	0000110110	36	54
0000011010	1A	26	0000110111	37	55
0000011011	1B	27	0000111000	38	56
0000011100	1C	28	0000111001	39	57
0000011101	1D	29	0000111010	3A	58

Section 4

OPERATION

4.0 Introduction — This section describes the operation of the IQ CED.

4.1 Power-Up — On power-up, all LEDs and display segments are illuminated for two seconds except for the "Operational" and "Alarm" LEDs. The function window will then display "IQ CED". The IQ CED will perform an internal diagnostics check and then a check of the non-volatile RAM. If these tests are passed, the microcontroller will initialize the display to the address of the first device (IQ Energy Sentinel or IQ Data Plus II) on the IQ CED subnetwork. The user-programmed description of that unit will also be displayed. If no device is found in the non-volatile memory or if there is a non-volatile memory error, the message "NO UNITS" will appear on the screen. The IQ CED will then initiate a learn sequence. To enter the learn mode again, the program mode must be entered (Section 4.2).

NOTE

Prior to power-up, confirm that all DIP switches have been properly set (Section 3.3)

If devices are found, the IQ CED will go into its normal mode of requesting status and information from the IQ Energy Sentinels and IQ Data Plus IIs, whose addresses were previously stored in the IQ CED memory. All pushbuttons are active at this time.

Any problems encountered during the diagnostics check will result in an error message being displayed in the function window. (See Table 6.A for a list of error messages.)

If an incorrect non-volatile RAM check-sum is found, the IQ CED will initiate a learn mode operation automatically to reinitialize the system addresses. If a proper checksum cannot be written to the non-volatile RAM at the end of the learn mode operation, the IQ CED will display an error message in the function window. (See Table 6.A for a list of error messages.)

4.2 Program Mode — When DIP switch 1 on the back of the IQ CED is placed in the "program on" position (Figure 2.3) the user is given the option of entering the password protected program mode.

4.2.1 Entering Program Mode "Program On" (Password)

Once DIP switch 1 is placed in the Program On position, use the SELECT pushbutton until the Group Readings LED is selected. Use the Address STEP UP and STEP DOWN pushbuttons until "PROGRAM" is displayed in the function window. To ignore program mode, continue to STEP DOWN. To enter program mode, press the ACK/RESET pushbutton. The following message will appear in the function window:

    PW XXXXX

Use the STEP UP/DOWN pushbuttons to enter the password. Press SELECT after each digit. For IQ CEDs direct from the factory, the default password is "44444".

If the correct password has been entered, the IQ CED will automatically enter the program mode.

If the password is entered incorrectly, the IQ CED will continue to scroll through the Group Readings. To re-try entering the password use the STEP UP/DOWN pushbuttons to scroll until "PROGRAM" is displayed in the function window. Then repeat the password process.

See Section 4.2.6 to change the password.

4.2.2 Test Device — After completing the learn cycle, the following message will appear in the function window:

    TEST ?

If the ACK/RESET pushbutton is pressed, then the IQ CED will enter a test sequence. This is not recommended unless advised by the factory for troubleshooting. This function is used to test the unit and check the memory at the factory. The test sequence will suspend communications to both the subnetwork and the master computer.

If the SELECT pushbutton is pressed, the IQ CED will continue the program mode.

4.2.3 Learn Device

NOTE

It is recommended that while the addresses are being learned by the IQ CED, they also be noted by the operator to ensure all desired devices on the IQ CED subnetwork are logged into the IQ CED memory (see Table 3.A).

Once the program mode has been entered, the following message will appear in the function window:

    LEARN ?

If the ACK/RESET pushbutton is selected, the unit will begin learning all the devices on the IQ CED subnetwork. In the learn mode the IQ CED can either allow for the addition of a unit to an existing network or it can poll the subnetwork for all devices. The function window will first display "ADD UNIT" for 5 seconds to allow the addition of devices to an already existing network. See Section 4.3.2.1 for instructions on adding devices to a subnetwork. After 5 seconds the micro controller will display "LEARNING" and the IQ CED will automatically poll the subnetwork to learn all addresses between 001 and 03A (hexadecimal) on the IQ CED subnetwork.

The following descriptions are used to identify the devices found on the subnetwork:

IQ ES F	IQ Energy Sentinel F Frame
IQ ES J	IQ Energy Sentinel J Frame
IQ ES K	IQ Energy Sentinel K Frame
DATAPLUS	IQ Data Plus II

During the learn mode, all the LEDs, except "Operational," will be off. Note that the "Operational" LED will flash only while the CED is polling the network.

The IQ CED will hold this display for two seconds and then continue polling. "LEARNING" will blink until the next unit found. The "Operational" LED will continually flash until all 58 addresses have been polled, and then will turn off.

> **NOTE**
> If no devices are found, the message "Learn ?" will reappear.

> **NOTE**
> The addresses for the subnetwork devices must be from 1 to 3A (hexadecimal) with no two devices addressed identically. See Section 3.4 for more information on the addressing system.

> **NOTE**
> It is necessary to have the IQ CED re-learn whenever a device is replaced on the IQ CED subnetwork.

If the SELECT pushbutton is pressed, the IQ CED will skip the learn sequence.

> **NOTE**
> Addresses for IQ Energy Sentinels and IQ Data Plus IIs will be displayed at the IQ CED in hexadecimal form.

4.2.4 Device Programming — The next function in the program mode is for the programming of individual devices on the subnetwork. The address of the first device found on the subnetwork will appear in the Address/Group LED window. The basic device description (Section 4.2.2) will appear in the function window. For example, if the first device on the subnetwork has a hexadecimal address of "3" and is a J frame IQ Energy Sentinel, the following will appear:

> 3
>
> IQ ES J

The first alphanumeric character in the function window will be blinking. By stepping through the Function STEP UP/DOWN pushbuttons, the character can be changed to create a customized description. When each individual character is finished, press the SELECT pushbutton to continue to the next digit. When the customized description is finished, press the SELECT pushbutton to the end of the display. Press the SELECT pushbutton to go on to the next parameter.

AL PEAK
After the customized description is entered, the IQ CED will question whether the device should alarm on a peak threshold. If an alarm is enabled, the IQ CED output relay will energize/

de-energize and the alarm LED will light.

Toggle between ENABLE and DISABLE with the STEP UP/DOWN pushbuttons. Push the SELECT pushbutton to save the selection and to continue. By pressing SELECT when the AL PEAK message is displayed, the function will be skipped and the peak threshold value will remain unchanged.

PEAK THR
If peak threshold alarming is enabled, the next parameter to enter is the peak threshold value. For each individual device, the range for the peak threshold is from 1 kW to 5 GW (1 kW, 10 kW, 100 kW, and 1 MW increments). Using the STEP UP/DOWN pushbuttons will allow the peak threshold to be set. By holding down the STEP UP/DOWN pushbuttons, the IQ CED will scroll through the watt settings more quickly. Push the SELECT pushbutton to save and to continue.

ALM NRES
The next parameter to be programmed is whether or not the IQ CED should alarm on a "No Response" status from a device. Toggle between ENABLE and DISABLE with the STEP UP/DOWN pushbuttons. Push the SELECT pushbutton to save and continue.

AL INAC
The next parameter to be programmed is whether or not the IQ CED should alarm on an "external trip" status from an IQ Data Plus II[1]. Toggle between ENABLE and DISABLE with the STEP UP/DOWN Pushbuttons. Push the SELECT pushbutton to save and continue.

At this point, programming for that particular device is done. The IQ CED will then proceed to the next device on its subnetwork.

When all of the devices on the subnetwork have been programmed, the statement

> DV DONE

will appear. Press the ACK/RESET pushbutton to continue the program mode.

4.2.5 Group Programming — At this point, the user is given the option of programming the individual devices into groups. By creating these groups, the energy and power values for the individual devices in the particular group could be summed up and accessed as a total on the IQ CED display.

Group programming can be accessed immediately after programming the individual devices.

G1
To enable/disable the programming of a group, use the STEP UP/DOWN pushbuttons. Press the SELECT pushbutton. Disabling G1 would bring up the next group, G2, and so on until all eight groups have been accessed.

GROUP
Once a group has been enabled, a customized description can

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[1] Other IQ Data Plus II trips (e.g., undervoltage or overvoltage) will not cause the IQ CED to alarm. Section 4.3 describes how the IQ CED displays an IQ Data Plus II trip when the device is viewed.

be entered. In the same method as with the individual devices, use the STEP UP/DOWN pushbuttons to toggle through the alphanumeric characters. Press SELECT after each character. At the end of the display, press SELECT to save and continue.

GRP ADDR

At this time, the addresses of all the individual devices must be programmed into the IQ CED. Press the SELECT pushbutton to scroll through the address of all the subnetwork devices. An individual device can be programmed into more than one group. If the first device on the network has an address of 3, the following will be displayed in the function window:

ADDR –3

Use the STEP UP/DOWN pushbuttons to toggle between "–" and "+." To add the device as part of the group, the operand must be "+". Press the SELECT pushbutton when finished, and the next device will appear. Program each device as "–" or "+" for the enabled group. The IQ CED will continue until each of the devices on the subnetwork have been accessed.

NOTE

If there is only one address on the subnetwork, use the STEP UP/DOWN pushbuttons to access the device address.

ALM PEAK

To enable alarming on the peak threshold, use the STEP UP/DOWN pushbuttons to toggle between enable/disable. Press the SELECT pushbutton when finished.

PEAK THR

If the peak threshold is enabled, a peak threshold value must be entered. This peak threshold is a sum of all the peak values of all the individual devices. The peak threshold range can be set from 1 kW to 5 GW. Use the STEP UP/DOWN pushbuttons to scroll through the values to set the group peak threshold. Increments are in 1 kW, 10 kW, 100 kW, and 1 MW.

Press the SELECT pushbutton when finished.

At this point, programming for that particular group is done. The IQ CED will then proceed to the next group.

When all of the devices on the subnetwork have been programmed, the statement

GR DONE

will appear. Press the ACK/RESET pushbutton to continue the program mode.

4.2.6 System Programming — Once the device and group programming are completed, there are some additional parameters that also need to be programmed.

SYNCTYPE

Use the STEP UP/DOWN pushbuttons to select between internal/external. If the IQ CED is to use its internal clock to synchronize the devices on its subnetwork, internal synchro-

nization should be selected. If the IQ CED is to synchronize the devices on its subnetwork through an external source (utility synchronization pulse), then external synchronization should be selected. Press SELECT when finished.

SYNC WIN

If the synchronization type chosen is internal, then the length of the demand window must be set. The length of the window can be entered from 1 to 60 minutes, in 1 minute increments. Use the STEP UP/DOWN pushbuttons to select the length of the demand window. Press SELECT when finished.

WH OUTPT

This feature will enable or disable the watt-hour pulse initiator output of the IQ CED based on a specific group selected. Use the STEP UP/DOWN pushbuttons to select OFF to disable, or the proper group. Press SELECT when finished.

WH SET

If the watt-hour pulse initiator output has been enabled, a value must be set to initiate the relay output. Use the STEP UP/DOWN pushbuttons to set the watt-hour value. A value from 1 kWh to 5 GWh can be set, in increments of 1 kWh, 10 kWh, 100 kWh, and 1 MWh.

Press SELECT when finished.

ERASE AL

This features allows the option of erasing any combination of the logged alarms. It can be enabled, disabled, or enabled with password protection. Toggle though the choices using the STEP UP/DOWN pushbuttons. Press SELECT when finished.

RST PEAK

This feature allows the peak demand value to be reset through the ACK/RESET pushbutton. It can be enabled, disabled, or enabled with password protection. Toggle through the choices using the STEP UP/DOWN pushbuttons. Press SELECT when finished.

SET CLOCK, SET DATE

If the dip switches in the back of the IQ CED are positioned to DISPLAY CLOCK and DISPLAY DATE, then the user is given the option of resetting or changing the time and/or date. The units are shipped from the factory set for Eastern Standard Time. Use SELECT to select the parameter to change (hour, minute, second, month, day, year) and use the Function/Value STEP UP/DOWN keys to change the value. Press either the Address/Group STEP UP or DOWN pushbutton to continue.

PW 44444

At this point, the user is given the option of changing the password. Use the STEP UP/DOWN pushbuttons to select the proper alphanumeric characters. Press SELECT after each individual character is set. Once the new password is complete, press ACK/RESET, and the new password will be in effect.

At this point, the program mode is completed. The IQ CED will then return back to Group Readings.

Section 5

OPERATOR PANEL

5.0 Introduction — This section describes the operator panel of the IQ CED. The operation of the IQ CED as described in Section 4 should be read and understood before reading this section. This section is divided into the following three sub-sections:

- Pushbuttons (Section 5.1)
- LEDs (Section 5.2)
- Display Windows (Section 5.3)

5.1 Pushbuttons — The operator panel supports seven pushbuttons (Figure 5.1) that perform the following functions:
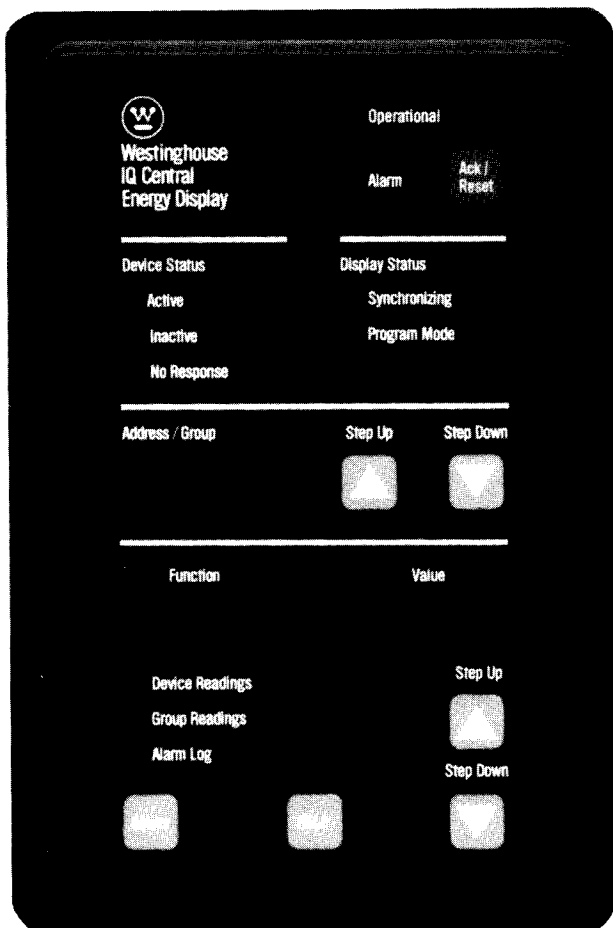
5.1.1 Ack/Reset

1. Following an inactive or no response (except for a communication network trip), the "Alarm" LED illuminates and the alarm relay changes state. Pressing this pushbutton will acknowledge the alarm and:

   a. Change the "Alarm" LED from steady on to off. Status LEDs will indicate if the condition still exists.

   b. Change the state of the alarm relay.

2. After acknowledging the alarm, the IQ CED will return to its normal display mode. The "Device" LED will be lit and the device description and address will appear in the display windows. This data has been automatically stored in an alarm log. The operator may review the data by selecting the "Alarm Log." Up to 10 alarm events are stored in the alarm log. If the IQ CED is programmed to erase alarms (Section 4.2.6), then individual events may be purged from the alarm log by the following:

   a. While "DELETE" is displayed in the function window, press the "Ack/Reset" pushbutton once.

   b. A "CONFIRM?" message will appear. Press the "Ack/Reset" pushbutton again to purge the event; push any other pushbutton to abort.

3. The "Ack/Reset" pushbutton allows the operator to exit the device program mode, group program mode, and after device descriptions have been entered, and the time and date have been set.

5.1.2 Address/Group Step Up/Down — These pushbuttons are used to step through the individual and group device addresses that are stored in the non-volatile memory of the IQ CED. The "Step Up/Down" pushbuttons raise/lower the device/group addresses accordingly. Each time one of these pushbuttons is pressed, the device address in the display window will change. The addresses are in a loop that allows the user to go back and forth from the highest and lowest addresses. For example, if device address 30 is the highest address in the memory and is being displayed, pressing the "Step Up" pushbutton will change the display to the lowest address.

These pushbuttons are also used in the program mode to enter the date and time.

5.1.3 Select — Pressing this pushbutton will direct the function window to display one of the following:

1. Device Readings
2. Group Readings
3. Alarm Log

5.1.4 Function/Value Field Step Up/Down — Pressing these

Figure 5.1 — Operator Panel

16

pushbuttons will step through the metered values or trip buffer data depending on which is selected on the IQ CED faceplate. Each time the pushbutton is pressed, the newly selected value is displayed in the function window.

5.1.5 Help — Pressing this pushbutton will provide expanded information with respect to the field selected. This help will be displayed in the form of a scrolling message in the function window.

5.2 LEDs — The operator panel LEDs are divided into four types:

5.2.1 Alarm LED

"Alarm" — This LED will illuminate if preprogrammed to in the following conditions:

- An IQ Data Plus II trips on "external trip."
- There is no response from a device address.
- The value of an individual or group peak demand exceeds the user-programmed maximum.

5.2.2 Device Status LEDs

- "Active" — Indicates the specific subnetwork product being monitored is operating properly.
- "Inactive" — Indicates the IQ Data Plus II selected is in an "external" trip condition. A solid LED indicates an external trip. A flashing LED indicates overvoltage, undervoltage, phase unbalance, phase loss, phase reversal, or malfunction trip.
- "No Response" — Indicates the subnetwork device being monitored has lost communications with the IQ CED.

Note: If the breaker connected to an IQ Energy Sentinel is off or tripped, the IQ Energy Sentinel will lose communications to the IQ CED.

5.2.3 Display Status LEDs

- "Synchronizing" — Indicates the IQ CED synch pulse output is being delivered to the subnetwork.
- "Program Mode" — Indicates the IQ CED is in program mode. A solid LED signifies program mode while a flashing LED signifies that a password is being entered.

5.2.4 Function Field LEDs

- "Device Readings" — Indicates the parameters being displayed are for individual devices on the IQ CED subnetwork. This includes the device address, user-programmed device description, power, energy, present demand, and peak demand.
- "Group Readings" — Indicates the values displayed are for groups of devices on the IQ CED subnetwork. This includes the group address, user-programmed device description, total power, total energy, present demand, and peak demand. Any number of devices, up to the subnetwork maximum, can be assigned to a group.
- "Alarm Log" — Indicates, while scrolling through, the last ten alarms that have occurred. Each alarm log contains the cause of the alarm, the readings at the time of the alarm, and the time and date of the alarm (if DIP switch enabled).

5.2.5 Operation LED — This LED flashes when the IQ CED is polling the network. Red indicates transmitting and green indicates receiving.

5.3 Display Windows — There are two LED display windows, each 1/2" high.

5.3.1 Address/Group — This two-digit alphanumeric window displays the address of the device being displayed on the IQ CED faceplate.

5.3.2 Function — This eight-digit alphanumeric window displays metered values, trip data, and user-programmed device descriptions.

Section 6

MAINTENANCE

6.0 General — This section describes maintenance procedures for the IQ CED. The information contained here is divided as follows:

- Error messages (Paragraph 6.1)

- Isolating a malfunction (Paragraph 6.2)

- Replacing the IQ CED (Paragraph 6.3)

Earlier sections of this manual, especially Section 2 – Hardware Description; Section 3 – Installation and Startup; 4 – Operation; and Section 5 – Operator Panel, should be read thoroughly to familiarize the maintenance personnel with the IQ CED.

The IQ CED continuously runs self diagnostics in the background to check unit integrity. These background diagnostic routines are transparent to the operator. (See table 6.A for error messages.)

6.1 Error Messages — This paragraph lists error messages that appear in the function window. The "Help" pushbutton and Table 6.A offer explanations to the error messages.

6.2 Troubleshooting — This paragraph lists procedures to follow when the IQ CED is not operating properly. Table 6.B lists the probable causes and solutions for each of a number of symptoms.

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┌─────────────────────── CAUTION ───────────────────────┐
│ All maintenance procedures must be performed only by   │
│ qualified personnel who are familiar with the IQ CED and│
│ the associated devices being monitored. Failure to observe│
│ this caution can result in equipment damage.           │
└────────────────────────────────────────────────────────┘
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┌──────────────────────── NOTE ─────────────────────────┐
│ For technical assistance with the IQ CED, contact the  │
│ Advanced Products Support Center at (800) 542-7883.    │
└────────────────────────────────────────────────────────┘
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Table 6.A

ERROR MESSAGES

Error Message	Description
RETRY	A BCH communication error occurred during learn mode; IQ CED will automatically retry communications to the displayed address.
COMM ERR	3 consecutive BCH errors occurred when communicating to the displayed address. The address is ignored and the learn mode continues.
NO UNITS	No IQ devices were found on the subnetwork. Check communications link and toggle the program switch (SW1 #1).
NVM ERR	Corrupt data was found in both non-volatile memories during the power-on test sequence. The IQ CED will automatically invoke the learn mode to restore the subnetwork configuration.
RTC BAD	A Real Time Clock malfunction was detected by the background diagnostic routines.
NVM BAD	A non-volatile memory malfunction was detected by the background diagnostic routines.
LGC BAD	A random logic malfunction was detected by the background diagnostic routines.
ROM BAD	A stored program malfunction was detected by the background diagnostic routines.
Warning Message	**Description**
DELETE	Operator is invoking the delete function to remove data from the non-volatile memory. This function is a confirmed process. Press "Ack/Reset" to proceed.
CONFIRM?	Safety check to prevent accidental deletion of non-volatile data. Press "Ack/Reset" to delete data; press any other pushbutton to abort.

Section 6

MAINTENANCE

6.0 General — This section describes maintenance procedures for the IQ CED. The information contained here is divided as follows:

- Error messages (Paragraph 6.1)
- Isolating a malfunction (Paragraph 6.2)
- Replacing the IQ CED (Paragraph 6.3)

Earlier sections of this manual, especially Section 2 – Hardware Description; Section 3 – Installation and Startup; 4 – Operation; and Section 5 – Operator Panel, should be read thoroughly to familiarize the maintenance personnel with the IQ CED.

The IQ CED continuously runs self diagnostics in the background to check unit integrity. These background diagnostic routines are transparent to the operator. (See table 6.A for error messages.)

6.1 Error Messages — This paragraph lists error messages that appear in the function window. The "Help" pushbutton and Table 6.A offer explanations to the error messages.

6.2 Troubleshooting — This paragraph lists procedures to follow when the IQ CED is not operating properly. Table 6.B lists the probable causes and solutions for each of a number of symptoms.

CAUTION

All maintenance procedures must be performed only by qualified personnel who are familiar with the IQ CED and the associated devices being monitored. Failure to observe this caution can result in equipment damage.

NOTE

For technical assistance with the IQ CED, contact the Advanced Products Support Center at (800) 542-7883.

Table 6.A

ERROR MESSAGES

Error Message	Description
RETRY	A BCH communication error occurred during learn mode; IQ CED will automatically retry communications to the displayed address.
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NO UNITS	No IQ devices were found on the subnetwork. Check communications link and toggle the program switch (SW1 #1).
NVM ERR	Corrupt data was found in both non-volatile memories during the power-on test sequence. The IQ CED will automatically invoke the learn mode to restore the subnetwork configuration.
RTC BAD	A Real Time Clock malfunction was detected by the background diagnostic routines.
NVM BAD	A non-volatile memory malfunction was detected by the background diagnostic routines.
LGC BAD	A random logic malfunction was detected by the background diagnostic routines.
ROM BAD	A stored program malfunction was detected by the background diagnostic routines.
Warning Message	**Description**
DELETE	Operator is invoking the delete function to remove data from the non-volatile memory. This function is a confirmed process. Press "Ack/Reset" to proceed.
CONFIRM?	Safety check to prevent accidental deletion of non-volatile data. Press "Ack/Reset" to delete data; press any other pushbutton to abort.

Table 6.B

TROUBLESHOOTING

Symptom	Probable Cause(s)	Solution
All operator panel LEDs off	• 120 or 240 Vac power supply is deficient	• Check power supply • Check wiring between power supply and CED
	• IQ CED is malfunctioning	• Replace the unit (See Paragraph 6.3)
On power-up, any LED or display segment is off except the "Operational" LED	• Defective LED or display	• Replace the unit (See Paragraph 6.3)
"Operational" LED off	• 120 or 240 Vac power supply is deficient	• Check power supply • Check wiring between power supply and CED
	• Defective LED	• Replace the unit (See Paragraph 6.3)
	• Mode switch in learn network position	• Move mode switch to operational position
Address of a specific breaker(s) is not displayed	• Address not in IQ CED memory	• Put mode switch in program position and then return it to operational position. View breaker display window to determine if address is on network. a) Check that breaker is in operate position b) Check that IQ device is operational c) Check that address of device is between 001 and 03A (see Table 3.D) d) Check that the baud rate of the device is the same as the CED subnetwork baud rate e) Check communications wiring between the CED and IQ device
"Operational" LED flashes red only	• Defective communications • IQ CED not receiving information	• Verify IQ devices on the IQ CED subnetwork are functional • Verify devices on the IQ CED subnetwork have valid address setting • Verify continuity of twisted pair communication wire
	• IQ CED is malfunctioning	• Replace the unit (See Paragraph 6.3)

20

Table 6.B (cont.)

TROUBLESHOOTING

Symptom	Probable Cause(s)	Solution
"No Response" LED on, breaker address normal	• Defective communications	• Verify IQ device is functional • Verify continuity of twisted pair communication wire
	• Breaker not in connected position	• Verify breaker is in connected position
"Alarm" LED on but the "Inactive" or "No Response" LED is not on	• Device address display window shows an address other than the alarmed device(s)	• Use "Step Up/Down" pushbuttons to step through device addresses until device status and function window indicate the alarmed device(s)

6.3 Unit Replacement — Follow this procedure to replace the IQ CED.

Step 1 — Remove AC power at the main disconnect or isolation switch of the 120 or 240 Vac supply. If the switch is located at a distance from the IQ CED, lock it out to guard against personnel accidentally turning it on.

Step 2 — Verify that all "foreign" power sources wired to the IQ CED are de-energized. These may be present on the Alarm Terminal Block.

Step 3 — Before disconnecting any wires from the unit, make sure they are individually identified to assure correct reconnection. Make a sketch to help with the task of terminal and wire identification.

Step 4 — If an optional cable connects with the Communications Port, carefully unplug it. The connectors may be screwed together.

Step 5 — Loosen each screw terminal where there is a wire connection. Remove the associated wire.

CAUTION

Be prepared to support the IQ CED from its front side once most of the screws are loosened or removed. Without such support, the unit could fall or the panel could be damaged.

Step 6 — Remove the 6 mounting screws holding the unit against the door or panel. These are accessed from the rear of the IQ CED.

Step 7 — Carefully lay the screws aside for later use.

Step 8 — Read Paragraph 3.1.2 before attempting to mount the replacement unit.

Step 9 — Reverse the procedure noted in Steps 4 thru 6.

Step 10 — Using the sketch noted in Step 3 above, replace each wire at the correct terminal. Be sure each is firmly tightened.

Step 11 — Restore AC power (see Paragraph 3.3.2 – Initial Power Application).