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E2 and Square D Smart Breaker Panel Installation and Operation Manual









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1 Overview

1.1. The Smart Breaker System

The Smart Breaker products are designed to allow the Retail Solutions family of site controllers (RE-FLECS, Einstein, and E2) to command control panels that activate and deactivate lights. A breaker panel generally consists of a series of circuit breakers that are flipped from OFF to ON and from ON to OFF by commands sent from E2 through MODBUS or a Square D Smart Breaker Gateway board. Support for proof checking on individual breakers is also supported.

The Retail Solutions line of Smart Breaker products includes E2 MODBUS direct support or a Gateway for interfacing with Square D's Powerlink G3 breaker panels. For E2 MODBUS direct support, refer to **Section 2**, *E2 MODBUS Direct Support for Square D*. For Gateway support, refer to **Section 3**, *Square D Smart Breaker Gateway Board*.

1.2. Breaker Numbering on the Square D Master and Slave Panels

Figure 1-1 shows the numbering for all breaker slots on the Square D Powerlink panels (24-breaker panel shown), as they correspond to the breaker numbers mapped to groups in the HHT screen (see Section 3.6.1.2., *Configuration*). For the master panel (Panel #0), the odd-numbered breakers are on the same rail as the power supply, and the even-numbered breakers are on the odd-numbered breakers are on the same rail as the address selector, and the even-numbered breakers are on the opposite rail. In either case, all breakers are numbered in ascending order from the side closest the power supply or address selector to the opposite end of the rail.

1.2.1. Numbering Double and Triple Breakers

If double or triple breakers are being used in the Square D Master and Slave panels, they will be plugged into more than one slot on the Square D Powerlink panel. However, double and triple breakers only respond to ON/OFF commands sent to one of its address slots.

Double breakers occupy two slots in a Square D Panel. If a double breaker is on the left side of the panel use its first slot for the control address, and if on the right side of the panel, use its second slot for the control address. For example, if a double breaker is on the left in slots 3 and 5, the breaker address slot will be 3. If a double breaker is on the right in slots 4 and 6, the breaker address slot will be 6.

For triple breakers, use the center slot as the breaker address, as this will be the same for the left and right side of the panel. For both double and triple breakers, all unused slots should be left unaddressed (i.e, assigned to Group #0 in the Gateway or unassigned with E2 direct MODBUS control).



Figure 1-1 - MODBUS Gateway to Square D Panel Wiring

1.3. The Square D Powerlink Breaker Panel



Figure 1-2 - *Square D Powerlink Breaker Panel (24-Breaker Version Pictured)*

The **Square D Powerlink breaker panels** are driven by an on-board power supply that handles staggered activation of breakers, proof checking and autoreset. Retail Solutions site controllers communicate with the Square D Powerlink panels via its MODBUS network connection. The Retail Solutions controller directly commands the Square D Powerlink panel to turn its breakers to turn ON or OFF.

A Powerlink panel consists of two rails of breakers consisting of either 6, 9, 12, 15, 18, 21, or 24 breaker slots each, for a total of 12, 18, 24, 30, 36, 42, or 48 breakers.

1.3.1. Compatible Square D Panels

The E2 Square D Smart Breaker system requires one "master" panel to be equipped with a Powerlink G3 power supply module (see *Table 1-1* for part numbers).

Square D Part #	Description
NF120PSG3	Powerlink G3 Power Supply, 120V
NF240PSG3	Powerlink G3 Power Supply, 220/240V
NF277PSG3	Powerlink G3 Power Supply, 277V

Table 1-1 - Square D Powerlink G3 Power Supplies

The E2 Square D Smart Breaker system does NOT require, and cannot communicate with, Powerlink G3 controllers such as the NF500G3, NF1000G3, NF2000G3, or NF3000G3. If one of these controllers is present on the master panel, remove it before installing.

1.3.2. Connection To Master Panel #0 (Master)

Each Square D Smart breaker panel system has at least one panel that is the "master" panel. The master panel has a power supply that provides power to turn the breakers ON and OFF, both for itself and for expansion panels, or "slave" panels. The master panel's Square D network address is always #0; however, it is referred to in the Gateway's interface as "Panel #1."

For E2 MODBUS direct connection, a total of up to eight (8) panels (one "master" panel and seven "slave" panels) can be addressed per E2, with the "master" panel always set up as the first panel.

To network the master panel to the Square D Gateway, use two-connector shielded cable (Belden #8761 or equivalent). Connect the Gateway's MODBUS connector (located in the top right corner of the board) to the pluggable connector on the bottom side of the master panel's power supply (see *Figure 1-3*).



Figure 1-3 - MODBUS Gateway to Square D Panel Wiring

For E2 MODBUS direct support the Gateway is not used. Wire the MODBUS network directly to the pluggable connector on the bottom side of the master panel's power supply (*Figure 1-4*):



Figure 1-4 - E2 MODBUS to Square D Panel Wiring

1.3.3. Networking Square D Master Panel to Square D Expansion Rails

In addition to Panel #0 mentioned in **Section 1.3.2.**, *Connection To Master Panel #0 (Master)*, the Square D Gateway can communicate with expansion panels, or "slave panels." Expansion panels must be wired in series with the master panel and the Square D Gateway. The E2 MODBUS direct support can communicate with up to eight (8) Square D breaker panels (one "master" panel and seven "slave" panels).

Locate the address selector on each expansion panel. The address selector has a four-terminal plug-gable connector next to the rotary addressing switch (*Figure 1-5*).

Use Belden #27326 (4-conductor, 18 AWG Class 1 cable) or equivalent to wire the expansion panels to the MODBUS network. See *Figure 1-5*:



Figure 1-5 - MODBUS Square D Master Panel to Expansion Panel

1.3.4. Expansion Panel Cable Maximum Length

The total amount of wire connecting the Powerlink master panel to all slave panels is limited based on the type of power supply being used and the nominal voltage. *Table 1-2* lists the power supplies and their corresponding maximum cable lengths.

The maximum cable length does NOT include the cable connecting the master panel to the Gateway board or the E2 MODBUS network.

Power Supply Part #	Nominal Voltage	Max Cable Length
NF120PSG3	120V	400 ft (122 m)
NF240PSG3	220V	100 ft (30 m)
	240V	400 ft (122 m)
NF277PSG3	277V	400 ft (122 m)

Table 1-2 - Square D Powerlink G3 Power Supplies

1.3.5. Network Panel Addressing

When more than one Square D Smart breaker panel is networked with the Square D Gateway or E2, each panel must be given a unique network ID on the MODBUS network. The panel with the power supply (the master panel) is always automatically addressed as Panel #0. Expansion panels must be addressed by setting the rotary dial on the address selector. Each expansion panel should be numbered in sequence (#1, #2, and #3).

Powerlink panels have no on-board termination and must be terminated by placing a 150-ohm resistor, or by using the Retail Solutions terminal block (P/N 535-2711) between the B and A terminals on the MODBUS connector (*Figure 1-6*).



Figure 1-6 - Powerlink Panel MODBUS Termination (Expansion Rail Connector shown)

2 E2 MODBUS Direct Support for Square D

2.1. Licensing

The E2 Square D Breaker Panel application is available when activated with a license key that is obtained through Retail Solutions. To obtain a license, go to the E2 TCP/IP Setup screen and locate your controller's MAC Address. Press + T, or from the Main Menu:

- 1. Press **7** (System Configuration)
- 2. Press 4 (Remote Communications)
- 3. Press (TCP/IP Setup) to open the TCP/IP Setup screen and locate your E2's MAC Address (circled in *Figure 2-1*).

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	DNS Server	2										
	DNS Server	3										
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Ent	er desired t	ext	1.1	lame of	the C	omain	Server					

Figure 2-1 - Locating the MAC Address on the TCP/IP Screen

4. Call Retail Solutions Customer Service at 770-425-2724 and have your MAC Address ready in order to obtain your unique license key.

Once you have received your unique license key, you can now activate the licensed feature(s) from the License Report screen. The License Report screen displays that E2 controller's unit type and firmware version, the list of all licensed features on that E2, the current number and maximum number of each of those applications allowed, and which additional features, (that require a license key), have been enabled. From the Main Menu:

- 1. Press **7** (System Configuration)
- 2. Press 9 (Licensing)
- 3. Press **F1** (Add Feature)

Enter your license key to activate the desired feature:

06-05 🔹 🧑 🔟	BX-400 Unit 1 💼 Add License	13:58:29 INS *ALARM
Licensed Features- 09/0 For controller model ty Feature	16/2005 – 13:58:24 – Rev: 2.20B12 Ipe: BX-400 Maximum In-Use Licens	e
GEN LON Demand Limit Cont Flexible Combiner Time Schedule Log Group CarrierOne ARTC/RTU Nose5 HUNG Zone Analog Sensor Ctr Loop/Sequence Ctr Digital Sensor Ctr RCB Lighting Control Trane SCC Air Handling Unit	Activate Feature Enter License key to activate a Feature: 	
Digital Import Point Analog Import Point	64 8 64 8	
iter desired text		

Figure 2-2 - Enter Your Unique License Key

4. Reboot the controller and open the License Report screen again to see the license key appear next to the activated feature (*Figure 2-3*):

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ID Control	28	ß	
HUNC Simulation	28	0	
Conversion Cell	129	0	
elubedo2 webilo	64	e	
anti-Sweat Control	18	e	
Heat/Cool Control	32	6	
1641	16	6	
RRO	32	6	
RDO	16	ព	
400	16	6	
chelon 1601	32	6	
chelon 880	16	ß	
Digital Combiner	128	5	
Pulse Accumulation	64	6	
onWorks Network	No Limit	6	
thernet Network	No Limit	5	
Color Displau	No Limit	6	
leb Services	No Limit	5	3BBC-FE91-E504-1623
ennox IMC	31	5	8B9F-075E-1921-FD7A
Power Monitoring	64	5	
IRLDS	16	6	
Analog Combiner	128	5	
nes 23 to 44 of 44			
ADD FEATURE			

Figure 2-3 - License Report Screen

2.2. Network Connection to E2

Connecting a Square D breaker panel to an E2 unit requires the E2 to be version 2.71 or above. Contact Retail Solutions for upgrade information if the controller is a version prior to 2.71.

If you are using a REFLECS, Einstein, or E2 prior to version 2.71, a Gateway board is required to communicate with the Square D Smart breaker panels. Refer to section **Section 3**, *Square D Smart Breaker Gateway Board* for more information.



Figure 2-4 - Square D Panel MODBUS Connection Layout



Figure 2-5 - Location of E2 COM Ports - E2 PIB Board

An E2 has up to three COM ports that can be assigned for MODBUS communication (COM2, an RS485 port on the E2 power interface board, and

COM4 and COM6, which are optional ports requiring expansion cards). COM ports can only be used for one function; in other words, if COM2 is set up as the I/O network, you cannot connect MODBUS devices to COM2. Ensure your E2 is equipped with an RS485 COM Card (P/N 637-4890) and configured in E2 General Services (, Serial tab) to enable COM4 or an E2 Expansion COM Card (P/N 637-4871) to enable COM6.

Connect the MODBUS network cable to the threeterminal connector on the COM port you wish to assign as MODBUS. Wire RS485+ to the Square D power supply B terminal. RS485- to the Square D power supply A terminal, and the shield cable to the Square D power supply minus (-) terminal.

If other MODBUS devices are on the same network segment as the Square D breaker panels, they should be wired prior to the first Square D breaker panel. This is due to the MODBUS network wire type change when going from a Square D "master" breaker panel to a Square D "slave" breaker panel.

CAUTION: When Square D Breaker Panels are on the network, any MODBUS devices on the network <u>cannot</u> have an address of 58. If a MODBUS device has an address of 58, it will cause the Square D Breaker Panels to go offline.

2.2.1. E2 Termination

If the E2 will be the first device in the daisy-chain, set the port's termination jumpers to the TERMI-NATED & BIASED position (all three jumpers UP); otherwise, set all jumpers DOWN if not the first device.

2.3. E2 Setup of Square D Breaker Panels

2.3.1. Set Up Network Ports

Before setting up a Square D breaker panel, the port on the E2 that has the MODBUS cable connected must be set up as a MODBUS port.

- 1. Log in to the E2 with Level 4 access.
- 2. Press followed by 7 3 1 General Controller Info.
- 3. Press to open the **Serial** tab of the General Controller Info setup screens:

Definition Description Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>	rai L2: Eng Units L3: ELT/FIT C3: FEEF N Server [C7: System C8: C9: C0: General Setup: 6ENERAL SERU C0: C0: C0: Ial Ualue C3: ELT/FIT C3: ELT/FIT C3: Ial Ualue Serial Serial Serial Serial Baud : 115.2 Kbaud 2 Serial Serial Serial Serial Parity None Stop Bits: 1 Serial	Concust	CO. Fog Upi	Icino2 . C2	Che TCD (TD	CE Door
But Server Los.	General Setup: GENERAL SERU General Setup: GENERAL SERU ial Value I Connection: Serial Baud :115.2 Kbaud 2 Baud :125.2 Kbaud 2 Baud :19.2 Kbaud Baud :19.2 Kbaud Baud :19.2 Kbaud Baud :115.2 Kbaud Baud :115.2 Kbaud Baud :115.2 Kbaud Hoden Port: No Moden Hoden Fort: No Moden Hoden Init: ATEOUTSD=1S10=408D2205\N0%CORK08Y08W0 Fax: Init : ATUHEOSD=1S10=408D2805\N0%CORK08Y08W0 DTHF Dur :100 Pause Dur : 2	Hob Sorvor	CZ: ENY UNI	LS LJ. SEFILL	C4: 107/17	Co. reer
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CONE Stop Bits : 1 CONS Concection: Hoden CONS Baud : 115.2 Kbaud CONS Moden Port: No Moden CONS Moden Type: CPC 33.6K Internal CONS Moden Type: CPC 33.6K Internal CONS Moden Init : ATEUOISD-1510=40&D2&Q5\N0%CO&K0&Y0&W0 CONS Fax Init : ATEUEOSD-1510=40&D2&Q5\N0%CO&K0&Y0&W0 CONS DINF Dur : 100 CONS DINF Dur : 100	2 Stop Bits : 1 8 Connection: Modem 8 Baud : 115.2 KDaud 3 Modem Port: No Nodem 9 Modem Injpe: CPC 33.6K Internal 1 Modem Injt: nTEBUTSD=1510=40&D2&Q5\N0%C0&K0&Y0&W0 1 Fax Init : nTUFBOSD=1510=40&D2&Q5\N0%C0&K0&Y0&W0 1 Fax Init : nTUFBOSD=1510=40&D2&Q5\N0%C0&K0&Y0&W0 1 THF Dur : 100 2 Pause Dur : 2	COM2 Parity	: None			
CUMB Connection: Moden COMB Baud : 115.2 Kbaud COMB Moden Port: No Moden COMB Moden Type: CPC 33.6K Internal COMB Moden Init: ATEU150=1510=40RD2RQ5\N0%C0RK0RY0RW0 COMB Fax Init : ATU1E0S0=1510=40RD2RQ5\N0%C0RK0RY0RW0 COMB Faxs Dur : 100 COMB Pause Dur : 2	3 Connection: Moden 3 Baud : 115.2 Kbaud 3 Moden Type: CPC 33.6K Internal 9 Moden Type: CPC 33.6K Internal 9 Moden Init: ATE00150-1510=40&D2&Q5\N0%CORK0&Y0&W0 Fax Init: ATU1E0S0-1510=40&D2&Q5\N0%CORK0&Y0&W0 DTMF Dur : 100 9 Pause Dur : 2	CUM2 Stop E	its:			
COMB Badd : 115,2 KBAUG COMB Noden Port: No Moden COMB Noden Type: CPC 33,6K Internal COMB Noden Init: ATEOUIS0-1510-40&D2&Q5\N0%C08K0&Y0&W0 COMB ATE Init : ATU/E0S0-1510-40&D2&Q5\N0%C08K0&Y0&W0 COMB DIWF Dur : 100 COMB DIWF Dur : 2	3 Hoden Port: No Moden 3 Moden Port: No Moden 3 Moden Type: CPC 33.6K Internal 3 Moden Init: ATE00150-1510-408D28Q5\N0%C08K08Y08W0 8 Fax Init: ATU1E0S0-1510-408D28Q5\N0%C08K08Y08W0 9 TNF Dur : ATU1E0S0-1510-408D28Q5\N0%C08K08Y08W0 9 TNF Dur : 100 8 Pause Dur : 2	CUM3 Connec	tion: Modem	100-00-0		
CONS NUMER FUTL: NO NOMEN CONS NUMER Type: CPC 33.6K Internal CONS Nodem Init: ATEOUIS0-1510-408028Q5\N0%C0RK0RV0RW0 CONS Fax Init : ATUIE0S0-1510-408028Q5\N0%C0RK0RV0RW0 CONS DINF Dur : 100 CONS DINF Dur : 100 CONS DINF Dur : 2	3 HOLEN FURLE NO HOULEN 3 HOLEN TUPE: CPC 33.6K Internal 3 HOLEN TUPE: CPC 33.6K Internal 3 HOLEN TUPE: CPC 33.6K Internal 9 Fax Init : ATUTEOSO-TS10=40RD2&Q5\N0%C0&K0®Y0RW0 0 THF Dur : 100 1 Pause Dur : 2	CUM3 Baud	: 115.2	KDaud		
CONS Nodew Type: 076 33.00 Internal CONS Nodew Injt: ATEUBUSE-1510-40022&Q5\N0%CORK0RY0&W0 CONS Fax Init : ATU1E0S0=1510=4002&Q5\N0%CORK0RY0&W0 CONS DIWF Dur : 100 CONS DIWF Dur : 2	Noden Nit: ATEUTSEN SIGENSE 10den Nit: ATEUTSEN SIGENSEQS\NØ%C0&K0&Y0&W0 3 Fax Init : ATU1E0S0=1S10=40&D2&Q5\NØ%C0&K0&Y0&W0 3 DTMF Dur : 100 9 Pause Dur : 2	COM3 Houen	TUPO: CPC 2	lem 2 6V Intornal		
CONS INVERTING ALL ALL ALL ALL ALL ALL ALL ALL ALL AL	Fast Init: atto: 00130 - 1518 - 4080 200 (11000 000 001 001 001 001 001 001 00	COM2 Modem	Init: ATERN	198-1910-40802805	N8%C 821/82 V 82.118	
COM3 DTMF Dur : 100 COM3 DTMF Dur : 2	B Pause Dur : 2	COM3 Fay Ir	it · ATUIF	050=1510=40&D2&Q5	N6%C 62K 62V 62116	
COM3 Pause Dur : 2	3 Pause Dur : 2	COM3 DIME D	mr :	166	ino jo ounour ouno	
		COM3 Pause	Dur :	2		
		oll using Ne	xt/Prev key	s Connection Ty	pe for COM2	
11 using Hext/Prev keys Connection Type For COM2	ising Next/Prev keys Connection Type for CON2	- DDEN TAD	F2 NEXT 1	AB E3 - EDIT	F4: 100K UP	ES: CAL

Figure 2-6 - *Serial Communications Manager Screen (E2 version 2.81 and above)*

- 4. This screen will have a "Connection" field for all COM ports on the E2. Highlight the COM port connection field that will be used, and press F4 LOOK UP. From the list of network types, select MODBUS 1-3. (E2 versions prior to 2.8 support one MODBUS port.)
- 5. Four fields will become visible underneath the COM port connection field, which pertain to the way the device communicates:

•**Baud** - Default setting is **19.2k**. Leave this field at the default value.

•Data Size - Leave this field at the default value (8).

•Parity - Leave this field at the default value (None).

•**Stop Bits -** Leave this field at the default value (1).

6. Press to save changes and exit.

2.3.2. Add and Connect Square D Breaker Panels

To enable communications between E2 and the Square D breaker panels, the devices must be added and addressed in E2.

- 1. Log in to the E2 with Level 4 access.
- 2. Press 7 7 2 Connected I/O Boards and Controllers.



Figure 2-7 - Connected I/O Screen (E2 version 2.81 and above)

- 3. On the Connected I/O screen under the **Third Party** tab, enter the number of Square D Panels in the **SqD Breaker Panel** number field. (For E2 versions prior to 2.8, it will be under the **Third Party Devices** section.)
- Press to return to the Network Setup menu, then select Network Summary (*Figure 2-8*).
- 5. Locate the Square D breaker panels you added to the network list (press and control to scroll through the list) and highlight with the cursor. The default name for a Square D breaker panel begins with a three-letter designator of the model type (SQD for Square D). If desired, enter a new name for each device in the Name field or press for Setup.

	Ne	twork Summary	_	FULL		*ALARI
Name	Туре	Network Ad	dress	Rev	Status	
THIS.03.1	RX300-Refrig	Etherne	t: 3	2.80A10	This Cont	roller
LONMARK_001	LonMark Device		2	0.00	Offline	
LONMARK 002	LonMark Device		3	0.00		
16AI_001	16AI	IONe	t: 1	0.00	No Port	
8R0_001	8R0	IONe	t: 1	0.00	No Port	
8D0 001	8D0	IONe	t: 1	0.00	No Port	
4A0 001	460	IONe	t: 1	0.00	No Port	
LEAK DETECT001	IRLDS	IONe	t: 1	0.00	No Port	
CL RSC 001	CtrlLink RSC	(No Network): -	0.00	Unknown	
CL CD 001	CtrlLink CD	(No Network): -	0.00	Unknown	
CL ACC001	CtrlLink ACC	MODBUS-	1: -	0.00	Unknown	
ISD2 COMP 001	ISD 2.0 Comp	MODBUS-	1: -	0.00	Unknown	
PERF ALERT 001	Performance Alert	MODBUS-	1: -	0.00	Unknown	
SQD BRKRPNL001	SqD Breaker Panel	MODBUS-	1:232	0.00	Offline	
SQD BRKRPNL002	SqD Breaker Panel	MODBUS-	1:234	0.00	Offline	
STATUS DSP 001	Status Display	Ethernet-	1: 1	0.00	Offline	
STATUS DSP_002	Status Display	Ethernet-	1: 2	0.00		
1- DELETE BORD	E2- STATUS		Ebs (NULSSIN		SETIID

Figure 2-8 - Network Summary Screen

Each Square D breaker panel is assigned a MOD-BUS address automatically when it is created. Each Square D panel has two addresses: one for the L rail and one for the R rail. There are three possible MOD-BUS ports. (For E2 versions 2.81 and above, if multiple routes are defined, select which network the device is connected to.)

The addresses start at 232 (displayed under the **Node/Board#** column in *Figure 2-8*) for the first panel ("master" panel) and 234 for the second panel ("slave" panel #1), 236 for the third panel ("slave" panel #2), up to a total of eight panels. One "master" and seven "slave" panels.

- 6. Locate the Square D breaker panels you set up, and look at each device's status in the **Status** field. You will see one of the following messages:
 - •*Online* The Square D breaker panel is communicating normally.

•*Offline* - The Square D breaker panel is not communicating, has not been commissioned, is not functional, or is not powered up. Verify the Square D breaker panel is powered up, wired correctly, and has the proper network address, baud rate, and parity (see **Section 4**, *Troubleshooting*). •*No Port* - No port is set up in the E2 Serial Configuration Manager to be a MODBUS port. Follow the instructions in **Section 2.3.1.**, *Set Up Network Ports*.

	Net	work Summary	FULL	*ALAI
Name	Туре	Network Address	Rev Stati	15
HIS.03.1	RX300-Refrig	Ethernet: 3	2.80A10 This	Controll
.ONMARK_001	LonMark Device	2	0.00 0Ffli	
ONMARK_002	LonMark Device	3	0.00 ÖFFI	
6AI_001	16AI	IONet: 1	0.00 No Po	ort
R0_001	8R0	IONet: 1	0.00 No Po	ort
DO_001	8D0	IONet: 1	0.00 No Po	ort
AO_001	460	IONet: 1	0.00 No Po	ort
EAK DETECT001	IRLDS	IONet: 1	0.00 No Po	ort
L RSC_001	CtrlLink RSC	(No Network): -	0.00 Unkne	own
L CD_001	CtrlLink CD	(No Network): -	0.00 Unkna	own
L ACC001	CtrlLink ACC	MODBUS-1: -	0.00 Unkno	own
SD2 COMP_001	ISD 2.0 Comp	HODBUS-1: -	0.00 Unkno	own
ERF ALERT_001	Performance Alert	MODBUS-1: -	0.00 linker	
QD BRKRPNL001	SqD Breaker Panel	HODBUS-1:232	0.00 (Offli	ine
QD BRKRPNL002	SqD Breaker Panel	MODBUS-1:234	0.00 OFT.	ane
TATUS DSP_001	Status Display	Ethernet-1: 1	0.00 OFFII	
TATUS DSP_002	Status Display	Ethernet-1: 2	0.00 OFFI	
	FOR STATUS			

Figure 2-9 - Square D Status on Network Summary Screen

2.4. Square D Application Setup in E2: Single Breaker

2.4.1. Add a Lighting Control Application

For each group of breakers to be controlled separately, set up a Lighting Control application from the Add New Application screen.

Press the weight key to access the Main Menu, then:

- 1. 6 Add/Delete Application
- 2. Add New Application

Press **F4** - **LOOK UP** to select **Lighting Control**. Enter the number of desired applications in the **How Many?** field.

2.4.2. Light Outputs and Proof Inputs Setup

Once the Lighting Control applications have been added, set up the light output and proof input for each Lighting application. (Proof input setup may be optional.) The outputs of a Lighting cell control the breakers on the Square D breaker panels, and the proof inputs of the Lighting cell are the Square D panel breaker status outputs.

2.4.2.1. Light Outputs Setup

If on the E2 Home screen, press F2 or F3 to access Lighting Control depending on whether a BX or CX E2 controller is being used.

- Under the Lighting **Outputs** tab, change the LIGHTS OUTPUT format by pressing
 F3 - EDIT and then 1. Alternate I/O Formats to Area Ctrl:Application:Property from the Board:Point format.
- For the *Area Ctrl* property, use F4 -LOOK UP to select the Square D breaker panel, for the *Application* property select lighting panel, and for the *Input* property select the breaker input number (BREAKER_IN_X).

-06-09 ● 🤭 🤅 e Ctrl-X to S	₪ Select CX Tabs	CX-400 Set	Unit 1 🖻	OAT: 84 OH: 59 Full	18:48:22 *ALARM*
1: Setup	C2:	C3: Min	On/Off C4:	C5: S	td Events
5:	C7: Maint O	ur C8: Inp	uts C9: 0	utputs CO: M	IORE
	Lig	hting Contra	01: 30% LIGHTS		
Outputs	Area C	trl Applic	ation Input		7
LIGHTS OUT	PUT : CX 1	SQD BRKR	RPNL001:BREAKER	_IN_1 L	
PROOF STAT	US :				
ACTIVE SCH	IED :			L	
SCHED TUCC	IS :				
SCHED TSCO	IS :				
ALG STATUS					
IN BYPASS					
nter Board/Co	ntroller Li	ghts output			
F1: PREV TAB	E2: NEXT T	AB F3:	EDIT F4:	LOOK UP E5:	CANCEL

Figure 2-10 - *Single Breaker Lighting Output Setup in E2 Lighting*

2.4.2.2. Proof Inputs Setup

To enable proofing, set **Enable Proofing** to **Yes** for each Lighting application under the **Setup** tab:

: Se	tup	C2:			C3: Mi	n On/Off	C4:		C5: 5	Std Even
i:		C7:	Maint	Ovr	C8: In	puts	C9: 01	itputs	C0: 1	HORE
			L	ightin	g Contr	ol: 30% L	IGHTS			
Se	etup		Valu	e						
Na	ane		36%	LIGHTS						
Us	se Alt Cont	rol:	No							
Er	nable Proof	ing:	Yes							
U≤	se Ext Scho	d :	No							
U	lev/Logic I	lode :	LOGI	C ONLY						
A)	lt Lt/Lgc I	iode :	LOGI	C ONLY						
Se	chedif Mode	2	SCHE	D ONLY						
A)	lt Schdif I	lode :	LLEV.	/LOGIC	ONLY					
Sc	chedule Typ	e :	MAST	ER						
Nu	ın Std Ever	its :		1						
Nu	ım Date Raı	iges :		5						
51	now Sched		Yes							
SI	now LLev		No							
SI	now Logic		Yes							
Er	nable Dimm	ing :	No							
1 K U	/ Load			9						

Figure 2-11 - Enable Proofing on Setup Tab

If using a single Square D breaker, associate the proof input (**PROOF IN**) with the Square D panel (*Figure 2-12*) and status of the breaker number from the **More** tab in the Lighting application:

Jse C	5-09 t rl-X	os 💷 to Se	lect	CX Tabs	CX-	400 Unit 1 SETUP	🖄 OA1	: 84 0 FULL	H: 59	18:52:1 *ALARM
C1: :	Setup		C2:		C3:	Min On/Off	C4:		C5: St	d Events
C6:			C7: I	Maint Ovr	C8:	Inputs	C9: Outp	uts	C0: HO	RE
				Light	ing Co	ntrol: 30%	LIGHTS			
	Proof			Area Ctr	1 App	plication	Output			
	Proof	Туре		ON Only						
	PROOF	IN		CX 1	:SQD	BRKRPNL 001 :	BREAKER_1			
	Proof	Delay	:	0:00:30						
	Proof	Latch		0:00:00						
	Clear	HNY M	atch:	NO						
	PP Fal.	T HQA	Pr1:	28						
Ente	er Prop	ertu	l Pro	of input						

Figure 2-12 - Single Breaker Proof Input Setup in E2 Lighting

- 1. Change the **PROOF IN** format by pressing **F3** - **EDIT** and then **1**. Alternate I/O **Formats** to *Area Ctrl:Application:Property* from the *Board:Point* format.
- For the Area Ctrl property, use F4 -LOOK UP to select the Square D breaker panel, for the Application property select lighting panel, and for the Output property select the breaker number (BREAKER_X).

2.5. Square D Application Setup in E2: Multiple Breaker Grouping

NOTE: A Group can contain one or more breakers as defined by a user. Assigning multiple breakers to a group allows an entire group of breakers to be turned on or off simultaneously, instead of each individual breaker being turned on or off separately.

2.5.1. Setting Light Outputs

 To group multiple breakers to a single Lighting application, press F3 - EDIT and select 2. Set Multiple Outputs.

0−0 se	6-09 🔍 🞲 🛄 Ctrl-X to Se	lect CX Tabs	CX-400 Ur Setur	nit 1 🔝 OAT	: 84 OH: 59 1 FULL	8:53:4 *ALARI
:1:	Setup	C2:	C3: Min 0	n/Off C4:	C5: Std	Event
36:		C7: Maint Ovr	C8: Input	s C9: Outp	uts C0: MORE	
		Light	ting Control:	: 70% LIGHTS		
	Outputs	Area Cti	·l Applicat	tion Input		
	LIGHTS OUTP	UT : (M)	:(M)	:(H)	L	
	PROOF STATU	s :				
	ACTIVE SCHE	D :			L	
	SCHED TUCOS					
	SCHED TSCOS					
	ALG STATUS					
	IN BYPASS	:		8		
Ent	er Board/Con	troller Lig	nts output			

Figure 2-13 - Set Multiple Breakers in E2 Lighting

The Multiple Output Setup screen opens (*Figure 2-14*) where you can set up the *Area Ctrl*, *Application*, and *Property* Lighting outputs:

9-96-99	• 63				CX-	400 Unit SETUP	1	A	JAT: 8 FULL	8 OH: 59	18:54:5 *ALARN
				Mu	ltipl	e Output	Setu	p			
		Output:	CX	1	:78%	LIGHTS	:L	IGHTS	OUTPUT		
			Are	ea Ctr	·1 A	pplicati	on	Prop	erty		
Inputs	Using	Output:	CX	1	:SQD	BRKRPNL	991:B	REAKE	R_IN_2		
			CX	1	:SQD	BRKRPNL	901:B	REAKE	R_IN_6		
			CX	1	:SQD	BRKRPNL	901:B	REAKE	R_IN_10		
			CX	1	:SQD	BRKRPNL	901:B	REAKE	R_IN_12		
			CX	1	:SQD	BRKRPNL	901:B	REAKE	R_IN_8		
Enter F	Board/(Controlle	r								

Figure 2-14 - Multiple Output Setup View

 For the Area Ctrl property, press F4 -LOOK UP to select the Square D breaker panel, for the Application property select lighting panel, and for the Property output select the breaker input number (BREAKER_IN_X). Repeat for each breaker you wish to group to this Lighting application.

2.5.2. Proof Inputs Setup for Multiple Breaker Grouping

Press F2 or F3 to access the Lighting Control application from the Home screen depending on whether a BX or CX E2 controller is being used.

 To enable proofing, set Enable Proofing to Yes for each Lighting application under the Setup tab.

Ctrl-X to Select	CX Tabs	SETUP	FULL	*ALARM
Setup C2:		C3: Min On/Off	C4:	C5: Std Events
C7:	Maint Ovr	C8: Inputs	C9: Outputs	CO: MORE
	Lightin	ıg Control: 30% L	IGHTS	
Setup	Value			
Name	: 30% LIGHTS			
Use Alt Control	No			
Enable Proofing	Yes			
Use Ext Sched	: No			
Llev/Logic Mode	: LOGIC ONLY			
Alt Lt/Lgc Mode	: LOGIC ONLY			
Schedif Mode	SCHED ONLY			
Alt Schdif Mode	: LLEV/LOGIC	ONLY		
Schedule Type	MASTER			
Num Std Events	: 1			
Num Date Ranges	: G			
Show Sched	: Yes			
Show LLev	: No			
Show Logic	: Yes			
Enable Dimming	: No			
K o o o	8			

Figure 2-15 - Enable Proofing on Setup Tab

When grouping multiple breakers to a Lighting application, add a Digital Combiner application for proofing inputs. (To add an application, follow the steps for adding an application in **Section 2.4.1.**) Once added, go to the Digital Combiner application:

e Ctrl-X to Sel	lect CX Tabs	SETUP	FULL	UH: 59 18:58 *ALAR
1: General	C2: Comb Ins	C3: Ctrl Ins	C4: Outputs	C5:
	Digital	Combiners: 70% L	GHT PROOF	
General Name	Value : 70% LGH	T PROOF		
Eng Units Comb Method	ON-OFF			
ALI COMB MEC Emerg Out Output On Fa	inod: UUTE : OFF ail : OFF			
ENABLE				
croll using Nex	kt/Prev keys	Normal input c	ombination metho	1



2. For grouping, set the combination method to

AND under the **Comb Method** parameter in the General Setup and add a name that will associate the proof input group to the Lighting application.

- 3. Set the number of inputs to the number of breakers in the group.
- 4. Under the Comb Ins tab, change the DIG INPUT1 format by pressing 53 EDIT and then 1. Alternate I/O Formats to Area Ctrl:Application:Property from the Board:Point format.
- 5. For the *Area Ctrl* property, press **F4 LOOK UP** to select the Square D breaker panel, for the *Application* property select Lighting Panel, and for the *Inputs* property select the breaker numbers that are included in the group.

5-09 🔍 🞲 🛄 Ctrl-X to S	9 elect CX Tabs	CX-400 Unit 1 SETUP	I OAT: 5	83 OH: 59	18:59: *ALAR
General	C2: Comb Ins	C3: Ctrl Ins	C4: Outputs	C5:	
	Digital	Combiners: 70% LG	HT PROOF		
Comb Ins	Area Ct	rl Application	Output		
DIG INPUT1	: CX 1	:SQD BRKRPNL001:	BREAKER_2		
DIG INPUT2	: CX 1	:SQD BRKRPNL001:	BREAKER_6		
DIG INPUTS	: CX 1	:SQD BRKRPNL001:	BREAKER_8		
DIG INPUT4	: CX 1	:SQD BRKRPNL001:	BREAKER_10		
DIG INPUT5	: CX 1	:SQD BRKRPNL001:	BREAKER_12		
	ntroller Dia	ital inputs			

Figure 2-17 - Grouping Inputs in Digital Combiner

6. Go back to the Lighting application under the **More** tab and associate the Lighting group (*Figure 2-18*) with the Digital Combiner application:

lse	Ctrl-X	to Se	lect	CX Ta	bs		SETUP		FULL		*ALARI
C1:	Setup		C2:			C3:	Min On/Off	64:		C5: S	td Event
C6:			C7:	Maint	Ovr	C8:	Inputs	C9:	Outputs	C0: M	ORE
				L	ightir	ig Cor	ntrol: 70%	LIGHTS			
	Proof			Area	Ctr1	App	plication	Outp	out		1
	Proof	Туре		: ON 0	nly						
	PROOF	IN		CX 1		:70% L	LGHT PROOF:	OUTPUT			
	Proof	Delay		: 0:0	0:30						
	Proof	Latch		: 0:0	0:00						
	Clear	Anu M	atch	: No							
	orcai										
	Pr Fai	il Adv	Pri	:	20						
	Pr Fai	il Adv	Pri	:	20						
	Pr Fa	il Adv	Pri	:	20						
	Pr Fa	il Adv	Pri	:	20						
	Pr Fa	il Adv	Pri	:	20						
	Pr Fa	il Adv	Pri	:	20						
	Pr Fa	il Adv	Pri	:	20						
	Pr Fa:	il Adv	Pri	:	20						
	Pr Fa:	il Adv	Pri	:	20						
	Pr Fa:	il Adv	Pri	:	20						
Ent	Pr Fa:	il Adv	Pri	ler	20 Proof	input	ŧ				

Figure 2-18 - The Digital Combiner Used To Group Inputs

When using the Digital Combiner method above, the **Proof Type** must be set to **ON Only**.

- 7. Under the More tab, change the PROOF IN format by pressing **F3** EDIT and then **1. Alternate I/O Formats** to *Area Ctrl:Application:Property* from the *Board:Point* format.
- 8. For the *Area Ctrl* property, press **F4 LOOK UP** to select the E2 Name, for the *Application* property select the Digital Combiner that you created, and for the *Output* property select **OUTPUT**.

3 Square D Smart Breaker Gateway Board

3.1. Overview



Figure 3-1 - Square D Gateway Layout

The Retail Solutions **Square D Smart Breaker Gateway Board** serves as an interface between the Retail Solutions refrigeration and building controllers (REFLECS, Einstein, and E2) and the Square D Powerlink breaker panels. The Gateway Board connects to the Retail Solutions controller via the RS485 I/O network (COM A & D on the REFLECS) and behaves identically to one 16AI input boards and two 8RO output boards, meaning any of the controller's lighting schedule applications may be used to control breakers on the Square D Powerlink panels by addressing them as output points.

The Gateway Board connects to up to four Square D Powerlink panels via a MODBUS network connection. Within the Gateway Board's software, breakers on the Powerlink panels can be grouped together so that one virtual output point can be used to control multiple breakers. Up to 16 groups of breakers can be created for up to four panels of 42 breakers each. Proof states for each breaker on the network are passed to the Gateway Board, which are then combined based on the breaker groupings into a single digital proof value for the entire group. This combined proof state is fed back to the Retail Solutions site controller via the board's "virtual 16AI points" for purposes of displaying and alarming.



Figure 3-2 - Square D Panel Layout

3.2. Mounting

The Square D Gateway is typically mounted in the same area as the Square D Breaker panels. The Gateway is designed to fit into a standard 3" snap track (supplied with the board) or may be mounted in a panel or on stand-offs. Follow the dimensions in *Figure 3-3* for panel mounting.



Figure 3-3 - Gateway Board Mounting Dimensions

3.2.1. Environmental Specifications

The Square D Gateway should be mounted in an environment with ambient temperature between -40°F and 150°F, with a non-condensing relative humidity between 5% and 95%.

3.2.2. Square D Breaker Panel Mounting

Refer to the documentation and diagrams supplied with your Square D breaker panel(s).

3.3. Power Wiring

3.3.1. Square D Smart Breaker Gateway

Input Voltage	24VAC, Class 2, center- tapped, 50/60Hz
Power	5VA

Table 3-1 - Gateway Power Requirements

The Square D Gateway requires 24VAC power from a Class 2 *center-tapped* transformer.

Retail Solutions supplies several sizes of centertapped transformers for powering multiple 16AIs, 8ROs, and other RS485 peripheral boards of the Einstein and REFLECS systems.

Refer to your controller's user manual for information on how to use the center-tapped transformers listed in *Table 3-2* to power multiple RS485 I/O devices.

Figure 3-4 and *Figure 3-5* show how to connect the 56VA and 80VA transformers to the Square D Gateway power connector.

	Three-Board	Six-Board
P/N	640-0056	640-0080
Power Rating	56 VA	80 VA

Table 3-2-Power Ratings for Retail Solutions Transformers



Figure 3-4 - *Pinout for the 56VA (640-0056) and 80VA (640-0080) Transformers*



Figure 3-5 - Power Wiring on Square D Gateway

3.4. Networking

3.4.1. Wiring the Square D Gateway to a Retail Solutions Site Controller (I/O Network)

Each Einstein or REFLECS site controller that will command a Square D Smart breaker panel must have a Square D Gateway installed on its RS485 I/O Network. For Einstein and E2 controllers, this means the Gateway will be installed on the I/O Network; for RMCC, BEC, BCU, and other REFLECS products, the Gateway will be installed on the COM A or COM D network.

3.4.1.1. Wire Connection

Using shielded two-conductor network cable (Belden #8761 or equivalent), connect the RS485 I/O Network wire to the three-terminal connector on the Gateway board as shown in *Figure 3-6*. For further information about how RS485 networks are configured, refer to your site controller's user manual.



Figure 3-6 - *Connecting the Square D Gateway to the RS485* Network

3.4.1.2. Gateway Board I/O Network Addressing

NOTE: The network dip switch on the Square D Gateway board does <u>not</u> set the board number. Board numbering must be done with a Hand-Held Terminal.

A Square D Gateway board behaves on the network as if it were one (1) 16AI board and two (2) 8RO boards. Though the Gateway board has a set of dip switches on it labeled "Network Switch," this switch is not used to set the board numbering. Board numbering must be done in the Gateway's software using a Hand-Held Terminal.

With the Gateway board powered up, plug a HHT in the board's HHT jack. When the screen titled "CPC SQUARED-GW" appears, press the down arrow key once to access the HHT screen used to set up network addressing.

16AI ADDR:	1
8RO ADDR:	1

Press the RIGHT arrow key to make the cursor appear, and enter the address of the virtual 16AI board this Gateway will represent.

Press the down arrow key to move the cursor to the 8RO ADDR field. The number you enter in this field will determine the address of the two virtual 8RO

boards. One board will use the address you enter, and the second will be the next address number in the sequence. For example, setting this field to 4 will cause the two virtual 8RO boards to be numbered 4 and 5.

3.4.1.3. Setting the Baud Rate Dip Switches

Dip switches 6 and 7 control the baud rate at which the Square D Gateway communicates with the site controller on the RS485 Network. These switches must be set to the same baud rate setting as the Einstein or REFLECS (usually 9600 baud).

The MODBUS baud rate used by the Gateway board to communicate with the Square D panels is fixed at 19200 baud, since this is the only baud rate used by this device.



Figure 3-7 - Dip Switch Setting for Square D Gateway Baud Rate

3.4.1.4. Setting the RS485 I/O Termination Jumpers

As part of a site controller's RS485 I/O (COM A or COM D) Network, a Gateway must be terminated if it is the end device of a daisy chain. Refer to the site controller's user manual for information about daisy chain networks and how they are terminated.

To terminate the Gateway, set the I/O Network Jumpers to the RIGHT position as shown in *Figure 3-8*. To unterminate the Gateway, set the jumpers to the LEFT position.



Figure 3-8 - Square D Gateway RS485 I/O Network Termination

3.4.2. Gateway with Square D Panel

Connection between the Gateway and the Square D Panel(s) is achieved through the MODBUS network connector at the top right of the Gateway board and the network connectors on the Square D panels.

3.4.2.1. MODBUS Network Termination



Figure 3-9 - Square D Gateway MODBUS Network Termination

Like the RS485 I/O network, the two end devices on the MODBUS network must be terminated. Typically, one of the end devices will be the Gateway board and the other a master or slave panel.

Figure 3-9 shows the location of the MODBUS termination jumpers on the Gateway board. Non-Gateway E2 Software Setup (Direct Connection to E2).

3.5. Site Controller Software Setup - Gateway Board

3.5.1. **REFLECS**

Each group set up in the Gateway has its own virtual 8RO and 16AI point command of the relay and proof feedback (respectively). Refer to your RE-FLECS controller's manual for set up instructions.

3.5.2. E2 and Einstein

3.5.2.1. Board and Application Setup

Set up the number of boards (one 16AI and two 8ROs) on the I/O Network from the Connected I/O screen. Press the key to open the Main Menu and press:

- 1. ⁷System Configuration
- 2. [&] 7 Network Setup
- . Connected I/O Boards and Controllers

(If using an Einstein controller, from the Main Status/Home screen, press ^{F8} (Actions), ⁴ Network Status/Setup, and then ² Connected I/O Boards & Controllers.)

5-25-07 🔹 🕼 🛄	BX-300 Unit 1 💼 CONNECTED I/O	6:21:14
1 Unit Number	THIS.01.1 Unit Name	
Num Ctrl Tune	Nun Ctrl Tune	
1 16AI	Ø ARTC/RTU	
2 8R0	0 MultiFlex RCB	
9 8D0		
0 4AO		
0 IRLDS		
ECT Devices		
0 CT Drive		
_Third Party Devices		
_Third Party Devices		
_Third Party Devices _Echelon Devices		
_Third Party Devices _Echelon Devices 0 RT100-Roof Top		
_Third Party Devices _Echelon Devices 0 RT100-Roof Top 0 Echelon 16AI 0 Echelon 16AI		
-Third Party Devices -Echelon Devices 0 RT100-Roof Top 0 Echelon 16A1 0 Echelon 8R0		
_Third Party Devices _Echelon Devices 0 R1100-Roof Top 0 Echelon 16A1 0 Echelon 8R0		
_Third Party Devices _Echelon Devices 0 RT100-Roof Top 0 Echelon 16Al 0 Echelon 8RU		
_Third Party Devices _Echelon Devices 0 RT100-Roof Top 0 Echelon 16AI 0 Echelon 8R0 	lesired number of these controllers	

Figure 3-10 - Connected I/O Boards Screen

Add one 16AI and two 8RO boards on this screen, and press row to save and exit.

3.5.2.2. Adding Lighting Schedule Applications

For each group of breakers to be controlled separately, set up a Lighting Control application from the Add New Application screen.

Press the Main Menu, then:

- 1. ⁶ Add/Delete Application
- 2. Add New Application
- 3. **F4** LOOK UP to select **Lighting Control**. Enter the number of desired applications in the **How Many?** field.

(If using an Einstein controller, from the Home screen or Enhanced Lighting Status screen, press ^{F8} (Actions), ⁸Z (Control Appl Setup), and then ¹ (Add Control Application). Press ^{F7} (Look Up) to select **Enhanced Lighting**. Press ^{F9} (Home) to return to the Home screen.)

TRY THIS: When creating a name for your Lighting application, incorporate the application's corresponding group number into the name. For example, PARKLIGHTS01 associates the parking lot breakers with Group 1.

3.5.2.3. Proof Inputs and Light Outputs Setup

Once the Lighting Control applications have been added, set up the proof inputs and light outputs for each Lighting application. The outputs of a Lighting cell control the breakers on the Square D panels, and the inputs are the combined proofs of all the breakers that are part of the group being controlled by the application.

Proof Inputs Setup

Set up 16AI board inputs in Proof Setup. To enable proofing, set **Enable Proofing** to **Yes** for each Lighting application by accessing the Lighting Control Setup screen. From the Main Menu:

- 1. Press **F3** (Lighting) and select the a Lighting application.
- 2. [F5] (Setup) to go the Setup screen for that Lighting application.

(If using an Einstein controller, from the Home screen or Enhanced Lighting Status screen, press (Actions), (Setup), and choose the **S1:Setup** tab. Note that the Proof tab is **S8** and the Outputs tab is **S9**).

Setup	C2:	C3: Min On/Off	64:	C5: Std Event
	C7: Maint Ov	r C8: Inputs	C9: Outputs	CO: MORE
	Ligh	ting Control: 30%	LIGHTS	
	-	-		
Setup	Value			
Name	: 30% LIG	HTS		
Use Alt Co	ntrol: No			
Enable Pro	ofing: Yes			
Use Ext Sc	hed : No			
Llev/Logic	Mode: LOGIC 0	INLY		
Alt Lt/Lgc	Mode: LOGIC 0	INLY		
Schedif Mo	de :SCHED O	INLY		
Alt Schdif	Mode: LLEV/LO	GIC ONLY		
Schedule T	ype : MASTER			
Num Std Ev	ents :	1		
Num Date R	anges:	0		
Show Sched	: Yes			
Show LLev	: No			
Show Logic	: Yes			
Enable Dim	ning : No			
KW Load		8		

Figure 3-11 - Set Up Lighting Control

- 3. Under the **C1:Setup** tab, set **Enable Proof**ing to **Yes**. (**C0:MORE** tab becomes visible once you cursor across the tabs. See *Figure 3-12*.)
- 4. Press **F2** (Next Tab) or **F1** (Prev Tab) to cursor over to **C0:MORE** tab.



Figure 3-12 - Lighting Proof Setup Screen

5. Set **Proof Type** to **ON Only**. If the light circuit is read as open when it should normally be closed, the 16AI board will send a "fail" input relay to the controller. The Gateway

proofs both ON and OFF so that the desired proof type such as as **ALL Values**, **ON Only**, or **OFF Only** can be selected. If any breaker within a group fails the proof, the entire group will fail the proof.

- 6. In the **PROOF IN** input, enter the virtual board and point address of the proof input on the gateway for the lighting group.
- 7. Set **Proof Delay** to a minimum of two minutes. (0:02:00)
- 8. Press **F2** (Next Tab) or **F1** (Prev Tab) to cursor over to **C9: Outputs** tab.

NOTE: If a breaker is assigned to a group that is not set up, a proof failure message will occur.

Light Outputs Setup

The Lighting Outputs Setup screen is where you will set up the 8RO board and point numbers for each group for all Lighting applications.

Refer to *Table 5-3* to associate the inputs and outputs with their corresponding group, board and point numbers.

C7: Main	t Ovr C8: I	nputs C	9: Autouts	CO: MOD	
or ridgi					1
	Lighting Cont	rol: 30% LIC	HTS		
	Boar	'd	Point		
FPUT :		:		L	
rus :	:				
HED :				L	
is se					
is se					
s :					
	TPUT : TUS : HED : DS : DS : S : S :	TPUT : BOURT TUS : : HED : : US : : US : : S : : : :	TPUT : : : TUS : : : HED : : : US : : : US : : : S : : : S : : :	Image: Public bland Public plant TPUT : : TUS : : HED : : US : : US : : US : : S : : S : : S : : S : :	IPUT IPUT <th< td=""></th<>

Figure 3-13 - Lighting Outputs Setup Screen

For more information on setting up Lighting Schedules, refer to section **11.10 Lighting Schedules** in the *E2 RX, BX, and CX I&O Manual* (*P/N 026-1610*).

3.6. Software Setup

3.6.1. Smart Breaker Gateway (HHT)

Connect the HHT to the Gateway board via the HHT jack (refer to *Figure 3-1*). Use the HHT to assign individual breakers to a particular group.

HHT Keys	Function
F1	Home screen key
F2	Quick access to status informa- tion
* *	Left and right arrow keys point to the desired field to be config- ured
↓	Up and down arrow keys scroll through all breakers on panel screens
Cancel	Deletes number you have cho- sen and changes it to zero, and cancels overrides on selected field
Enter	Saves changes (optional - use the down arrow)
-	Toggles between override ON and OFF
•	Toggles between override ON and OFF

Table 3-3 - 8RO Mapping

3.6.1.1. HHT Screens

The Home screen is the first screen that appears. Press F1 at any time to return to the Home screen:



Figure 3-14 - Home Screen

Press the down arrow key to move to the Starting Board Addresses screen.



Figure 3-15 - Starting Board Addresses Screen

The Gateway emulates one 16AI and two 8ROs on the I/O Network. Set the 16AI and 8RO addresses using the left or right arrow keys to activate the corresponding fields, and number the boards accordingly. The 16AI address should be the first unused board number with a valid range of 1-16. The 8RO should be the next available 8RO I/O Network address with a valid range of 1-31.

For example, if you currently have three 16AIs and six 8ROs, set the 16AI address to 4 and the 8RO address to 7. If you add a 16AI and 8RO after the Gateway, set their addresses as follows: 16AI to 5 and the 8RO to 9.

Next, arrow down to the Option screen:

Figure 3-16 - Option Screen

Option No.	Function		
1	Status information that can be overridden. (An asterisk "*" sig- nifies a proof failure)		
2	Diagnostics for troubleshooting		
3	Configuration settings		

Table 3-4 - Option Choices Chart

3.6.1.2. Configuration

Use the left or right arrows to activate the **OP**-**TION:** field and choose the desired option number. (Select **3** to start configuring each Panel's breakers to groups.) Press the down arrow to move to the next screen.

	PANEL 1					
BRK	1	GRP	1			
BRK	2	GRP	1			
BRK	3	GRP	1			

Figure 3-17 - Panel 1 Breakers to Group Screen

From this screen you can begin assigning breakers on panels 1 through 4 to breaker groups. Refer to *Figure 1-1* for a diagram of the Square D Powerlink panel and the numbered breaker addresses.

NOTE: The address numbers of the Square D panels <u>do not</u> correspond to what the HHT Gateway interface calls "panel numbers." The master panel is referred to in the HHT interface as "Panel #1," even though its network address is zero. Also, the panels addressed #1, #2, and #3 are referred to in the interface as Panel #2, Panel #3, and Panel #4 respectively.

Use the left and right arrow keys to configure the breaker's group number. Change the group number to the group you want to associate the breaker with (a maximum number of 16).

A group number field becomes active when you see the arrow appear next to the number. Use the down arrow key to scroll through all 42 breakers on each of the four panels and set the group numbers as you scroll through the breakers.



3.6.1.3. Status

From the Option screen, select **1** for Status. The Status screen shows the status of the 16 groups and shows the ON or OFF state of each group and any proof failures (a proof failure is indicated by "*" after the ON or OFF state). Press the down arrow key to scroll through the groups. After the groups are displayed, continue pressing the down arrow key to see the ON or OFF state and any proof failures of each of the 42 breakers and all panels.

If a group is not assigned or set to zero, a "-" will appear as the breaker status.

ceed 400 ft (100 feet for 220V panels).

6. *Check Network Termination* - The two devices on either end of the MODBUS network should be terminated, with all other devices in the daisy chain unterminated. Check jumper settings for all devices on the network.

0 P T 1	[ON: 1	
1 =	STATUS	
2=	DIAGS	
3=	CONFIG	

Figure 3-18 - Option Screen

4 Troubleshooting

Troubleshooting Square D Breaker Panels and the MODBUS Network

Problem: Square D Breaker Panel Offline

- Check Wiring Verify the Square D breaker panel is properly connected to the MODBUS cable. Verify the network polarity is correct (MODBUS 485+ to Square D terminal B, MODBUS 485- to Square D terminal A, MODBUS shield to terminal -) and there are no loose wires. If none of the Square D breaker panels are online, check wiring connections on the E2. Check the cable jackets to make sure all network cable is Belden #8761 or equivalent.
- Verify MODBUS Port Setup Press + M on the E2 front panel. Verify COM2, COM4, or COM6 is set up as a MODBUS port. If so, verify that the MODBUS cable is connected to the proper connectors. Verify the COM port fields (*Figure 2-5*) are properly set for ECT MODBUS (19.2k baud, data size=8 bits, Parity=NONE, stop bits=1).
- 3. Check Square D Breaker Panel Slave Address Selector Numbering - Verify that the slave selector matches the "address selector" parameter under the Devices tab in E2.
- 4. Verify Slave Bus Interconnect Cable For panels with both L and R rails, verify the slave bus interconnect cable is connected to one end to the L and the other to the R. Both ends of the cable are connected to both the L and R rails.
- Verify 4 Conductor Wiring Between The Master Panel And Slave Panels - Verify the B A - + polarity is consistent from master to slave panels, and the max length does not ex-

5 Worksheets

5.1. Breaker Group Assignment

Use the workspace below to assign breakers to groups. If using the Gateway board, refer to *Table 5-3* for group number board and point assignment.

Panel 1 Breakers		Panel 2 Breakers		Panel 3 Breakers		Panel 4 Breakers	
Group#	Group#	Group#	Group#	Group#	Group#	Group#	Group#
1	22	1	22	1	22	1	22
2	23	2	23	2	23	2	23
3	24	3	24	3	24	3	24
4	25	4	25	4	25	4	25
5	26	5	26	5	26	5	26
6	27	6	27	6	27	6	27
7	28	7	28	7	28	7	28
8	29	8	29	8	29	8	29
9	30	9	30	9	30	9	30
10	31	10	31	10	31	10	31
11	32	11	32	11	32	11	32
12	33	12	33	12	33	12	33
13	34	13	34	13	34	13	34
14	35	14	35	14	35	14	35
15	36	15	36	15	36	15	36
16	37	16	37	16	37	16	37
17	38	17	38	17	38	17	38
18	39	18	39	18	39	18	39
19	40	19	40	19	40	19	40
20	41	20	41	20	41	20	41
21	42	21	42	21	42	21	42

Table 5-1 - Assign Breakers to Group Numbers

5.2. Gateway Board Group to Point Number Calculation

This worksheet is for mapping breaker group numbers to board and points (**Bd**:**Pt**). Up to a maximum of 16 groups can be set up, but an unlimited amount of breakers can be assigned to any given group.

Table 5-2 shows the correlation between the group numbers and the virtual 16AI and 8RO points of the Gateway. *Y* represents the 16AI address and *X* represents the 8RO address of the Gateway configured in **Section 3.6.1.1.**, *HHT Screens* as shown in *Figure 3-15*.

Light Sched- ule	Proof In (Bd)	Proof In (Pt)	Lights Output (Bd)	Lights Output (Pt)
Group	16Al Addr	16AI Points	8RO Addr	8RO Points
1	Y	1	X	1
2	Y	2	X	2
3	Y	3	X	3
4	Y	4	X	4
5	Y	5	X	5
6	Y	6	X	6
7	Y	7	X	7
8	Y	8	X	8
9	Y	9	X+1	1
10	Y	10	X+1	2
11	Y	11	X+1	3
12	Y	12	X+1	4
13	Y	13	X+1	5
14	Y	14	X+1	6
15	Y	15	X+1	7
16	Y	16	X+1	8

Table 5-2 - Mapping Group Numbers to Point Numbers

5.3. Gateway Board Group to Point Number Mapping

16AI Address = _____ Fill in the Gateway 16AI board address that you set with the HHT.

8RO Address = _____Fill in the Gateway 8RO board address that you set with the HHT for Groups 1-8. For Groups 9-16, use the next consecutive 8RO board address (add 1).

Light Sched- ule	Proof In (Bd)	Proof In (Pt)	Lights Output (Bd)	Lights Output (Pt)	Group Name
Group	16AI Addr	16AI Points	8RO Addr	8RO Points	
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	
7		7		7	
8		8		8	
9		9		1	
10		10		2	
11		11		3	
12		12		4	
13		13		5	
14		14		6	
15		15		7	
16		16		8	

Table 5-3 - Mapping Group Numbers to Point Numbers