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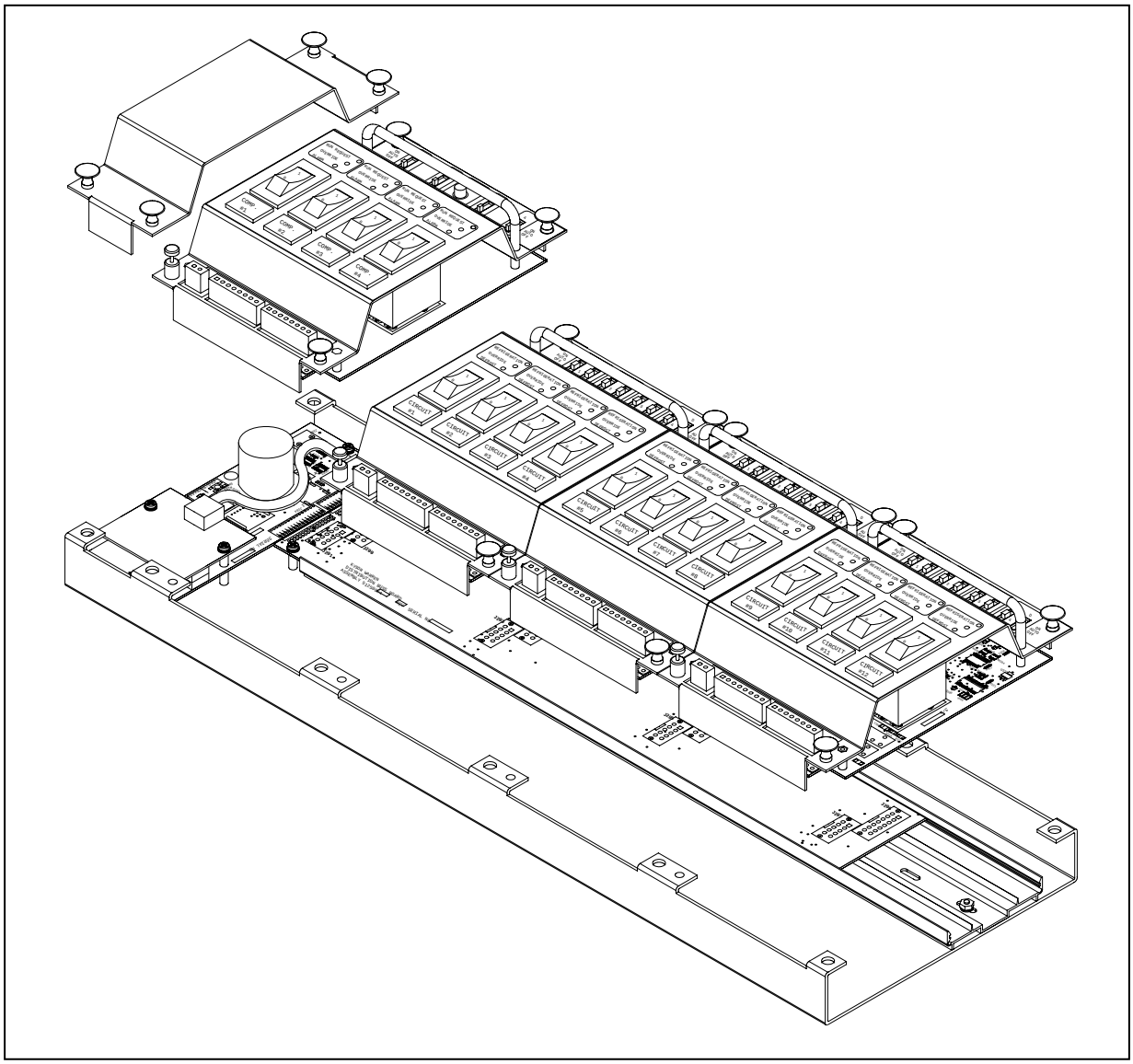
KWIC
(Kysor-Warren Interface Control)
Installation and Operations Manual



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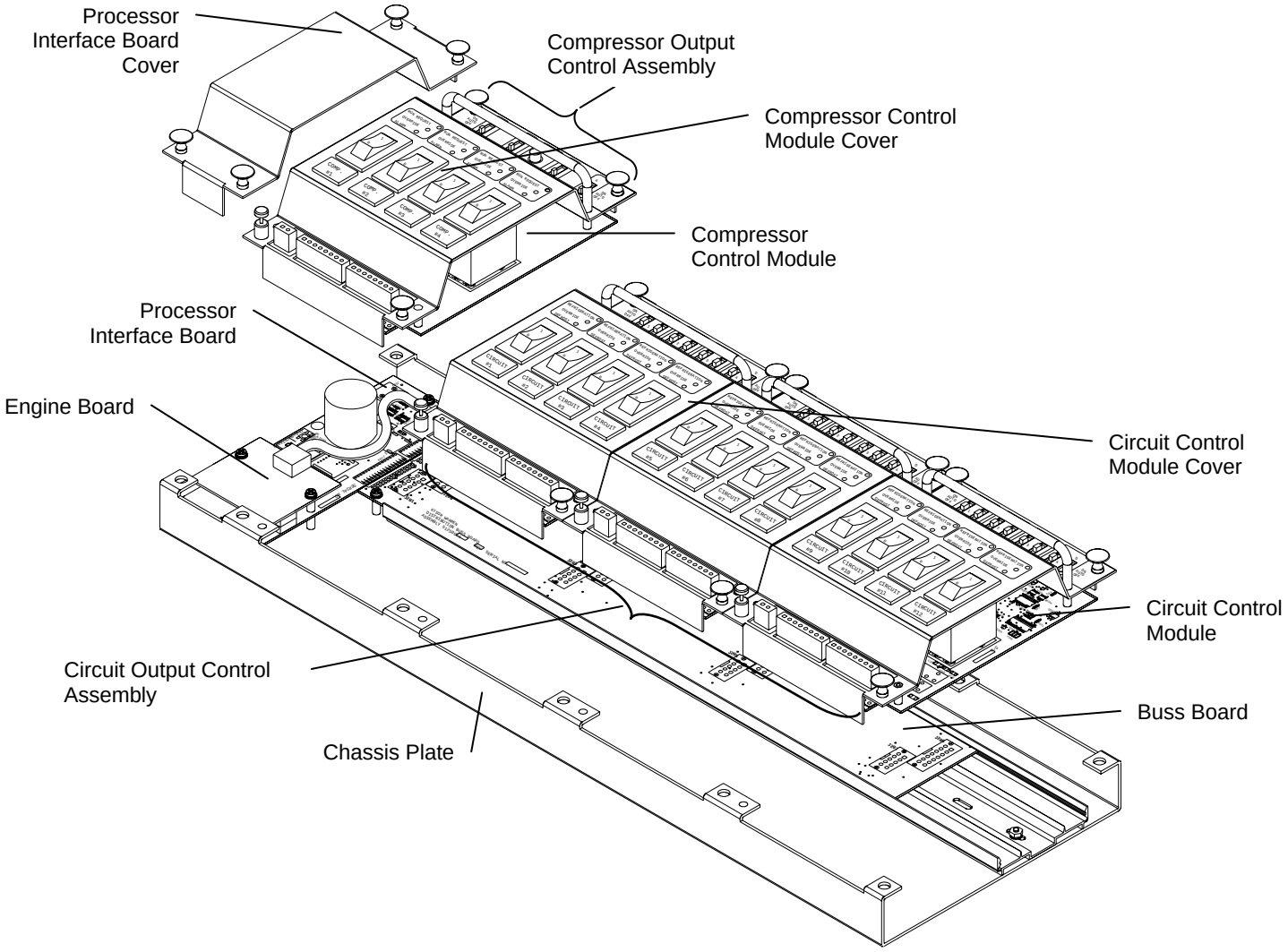
INTRODUCTION

The Kysor//Warren Interface Control (KWIC) Device incorporates all relays, circuit breakers, and control switches into one centralized output control device. This Device allows for centralized mounting of all circuit and compressor output modules. The KWIC Assembly replaces the need for a large portion of the control circuit installation process.

The centralized rack mount, a hallmark of the KWIC Device, holds a maximum of four control output modules per enclosure, and reduces control panel wiring by 60 percent, thus lowering wiring application mistakes.

Drawing 1, below shows the components of a KWIC Device.



DRAWING 1 – KWIC INTERFACE CONTROL COMPONENTS

HARDWARE SPECIFICATIONS

POWER REQUIREMENTS

Circuit Control Output Module 208VAC
(max. continuous current draw/whole module) ..... 10A @ 208VAC

Compressor Control Output Module 208VAC
(max. continuous current draw/whole module) ..... 15A @ 208VAC

Minimum Chassis Operating Voltage (per chassis) ..... 24VAC, 20VA Class 2

Chassis Connection ..... to secure safety ground

CIRCUIT CONTROL OUTPUT MODULE RELAYS/CIRCUIT BREAKER RATINGS

Circuit Breaker Contact Rating
power ..... 125/250V, 50/60 Hz
maximum current draw ..... 2.5A @ 208VAC (continuous)
Output Relay Holding Current ..... 4mA or greater
Output Control Relay Rating..... 2.5A @ 208VAC (continuous)
Control Circuit Configuration ..... Wet contact (based on supplied control voltage to the control output module)

COMPRESSOR CONTROL OUTPUT MODULE LOADS/CIRCUIT BREAKER RATINGS

Circuit Breaker Contact Rating
power ..... 125/250V, 50/60 Hz
maximum current draw ..... 2.5A @ 208VAC (continuous)
Output Relay Holding Current ..... 4mA or greater
Output Control Relay Rating..... 5.0A @ 208VAC (continuous)
Compressor Control Configuration ..... Wet contact (based on supplied control voltage to the control output module)

PHYSICAL CHARACTERISTICS

Dimensions..... 27” L × 9” H × 3.5” D
Weight
KWIC Chassis Assembly without Modules..... 3.9lbs.
Control Output Module (per module)..... 1.4lbs.

AMBIENT LIMITS

Operating Temperature..... 32°F to 110°F (0°C to 44°C)
Humidity..... 0 to 95% Relative Humidity

WIRING

Chassis Power Wiring (low voltage/24VAC)	2 wire, 18 awg, non-shielded twisted pair; Belden #8461 or equivalent
Control Output Module and Controlled Loads (line voltage)	per local code

COMMUNICATION ABILITY

Echelon®[1] (FTT 10A)	2 wire, 16 awg, unshielded twisted pair, Belden #8471 non-plenum or equivalent; 85102 plenum or equivalent
(maximum distance)	1600 ft. (follow Echelon Network Guidelines)
RS485	2 wire, 18 awg, shielded twisted pair; Belden #8760 or equivalent
(maximum distance)	per refrigeration control manufacturer's specifications
Driver Chassis to Expansion Chassis	6 conductor flat phone cable; G-C Thorsen 30-9965 or equivalent
(maximum distance)	20 ft.

[1] Echelon is a U.S. registered trademark of Echelon Corporation.

INSTALLATION INSTRUCTIONS

NOTE

All installation procedures must be performed in accordance with National Electric Code NFPA 70.

All KWIC Assemblies require 24VAC power supplied at the J105 connector on the PIB. To apply power to the J105 connection on the PIB, you must remove the cover.

THE KWIC ASSEMBLY/ UNPACKING

1. Remove the KWIC Chassis Plate and Base Assembly parts from their shipping container and inspect the parts for shipping damage.

2. Remove the order of control output modules from the shipping container and inspect the parts for shipping damage.

3. The order should include:
   a. Requested order of KWIC Chassis Assemblies and components
   b. Requested order of Control Output Modules
   c. Requested order of transformers

4. Select a mounting area on the refrigeration control cabinet. ECT recommends a middle rack eye-level location for easy viewing of the unit.

PRECAUTION

For optimum performance of your unit, ECT recommends the following mounting considerations:

Do not mount your unit near areas of

- Possible water
- Main air flow (because dirt could cause operation problems)
- Electricity (i.e., noisy areas such as near contactors)
- High vibration
- Close quarters (where it will get hot)

HARDWARE OVERVIEW

The KWIC Device is a networked refrigeration control output device. (See Drawing 5.) To accomplish output control, the KWIC Chassis Assembly will include an Engine with processor, a Processor Interface Board (PIB), and a Buss Board. A maximum of four Control Output Modules can be connected to the Buss Board. One KWIC Chassis Assembly controls a maximum of 16 refrigeration and defrost circuits OR a maximum of 16 compressors OR a combination of circuits and compressors that equal 16 output control points.

The Control Output Module includes circuit breakers, rocker switches, relays, and status LEDs for each controlled output.

NOTE

Refrigeration and defrost relays on the Circuit Control Output Module share one circuit breaker and rocker switch, but are designed with a hardware interlock to ensure that both do not energize simultaneously.

DUAL CHASSIS CONNECTION: Two KWIC Chassis Assemblies can be connected together for increased control capability. This connection creates a ***Driver*** and ***Expansion Assembly*** relationship. The Driver Chassis Assembly includes the Engine Board with processor. The processor on the driver will control output for the driver and expansion chassis.

IMPORTANT

The Expansion Assembly will not have an Engine Board. The Driver Chassis Engine Board will control output for both assemblies.

The Expansion Chassis receives control instruction via the Driver Chassis Assembly. You may link these Driver/Expansion Assemblies with other KWIC Device Driver/Expansion Assemblies on an Echelon or RS485 network.

NOTE

Limitations of the KWIC Network are specific to the refrigeration control that manages the interface with the KWIC Assemblies.

KWIC ASSEMBLY PART DESCRIPTION

CHASSIS ASSEMBLY

The Chassis Assembly includes the Chassis Plate, the Buss Board, the Processor Interface Board, and the Engine/Expansion Board. Each chassis assembly has an individual ECT part number (see Table 7 in Appendix A). Refer to this section for an overview of the Chassis Assembly.

NOTE

Each part in the assembly will have an ECT part replacement, however the complete Chassis Assembly Part # should be used when ordering new equipment (see Tables 7 & 8 in Appendix A).

The KWIC Device has three different Chassis Assemblies. They include the Echelon, RS485, and Expansion Assembly. Each of these chassis assemblies differs in the communication capability of the chassis design. The detailed communication differences between the chassis assemblies will be discussed later in this manual.

CHASSIS ASSEMBLY COMPONENTS

The Chassis Assembly comprises the following components:

1. ***Chassis Plate*** (Part # 1225012300)
2. ***Buss Board*** (Part # 5125002400)
   Processor Interface Board
   (Part # 51250034-1, Rev. A)
   Engine Board: (dependent on type ordered)
   Echelon Engine Board,
   (Part # 5130001400, Rev 0)
   RS485 Engine Board,
   (Part # 5130004400, Rev 0)
5. ***Processor Interface Board Cover***
   PIB Cover/Echelon (Part # CC/25011400)
   PIB Cover/RS485 (Part # CC/25011402)
   PIB Cover/Expansion (Part # CC/25011403)
6. ***Blank Module Cover Assembly***
   (Part # CC/25008400)

CHASSIS PLATE

The Chassis Plate, an aluminum back plate, provides mounting and electronic support for the KWIC Assembly. The Chassis Plate contains mounting holes for easy installation.

The Chassis Plate dimensions without the Control Output Modules installed are:

27”L × 9”W × 1 5/8”D

BUSS BOARD

Each Chassis Assembly includes a Buss Board mounted on a snap track attached to the Chassis. The Buss Board is interchangeable between the Echelon, RS485, and Expansion Chassis Assemblies.

The **BUSS BOARD** provides **CONNECTIONS** for the **Control Output Modules** and the **Processor Interface Board**. The **Buss Board** ***distributes*** the communication ***signals*** **to** and **from** the **Control Output Modules**.

NOTE

Switch SW200 on the Buss Board identifies whether the chassis assembly is a Driver Chassis Assembly or an Expansion Chassis Assembly via its setting.

Driver Chassis Assembly = SW200 “Up”
Expansion Chassis Assembly = SW200 “Down”

PROCESSOR INTERFACE BOARD (PIB)

The **PIB** works with the **Echelon, RS485,** or **Expansion Chassis Assemblies**. It provides the **INTERFACE** between the **Engine Board** that does the ***processing*** and the **Buss Board** that ***distributes signals*** to the **Control Output Modules**. Connect the following assembly components at the PIB (via their connectors):

- The Engine Board that houses the KWIC assembly processor chip
- The 24VAC functional power to the KWIC assembly
- A second KWIC assembly (called an Expansion Assembly)

ENGINE BOARD

The Engine Board incorporates the processor and the communication circuitry on the board. It attaches to the PIB, and via this connection communicates to the controlling device.

Communication addresses may also be configured via the DipSwitches on this board.

IMPORTANT

The DipSwitch communication and relay mapping settings are based on the controller type that interfaces with the KWIC Assembly.

NOTE

The KWIC Assembly can support Echelon and RS485 communication by installing the **application-specific** engine boards.

PROCESSOR INTERFACE BOARD (PIB) COVER

The Processor Interface Board (PIB) Cover, a metal covering over the PIB and Engine Board area, protects the PIB, which provides for improved operating performance. Make sure that it is fastened to the chassis before operating.

CONTROL OUTPUT MODULE

The Control Output Module is the component that switches the state of the control voltage to the loads. The Control Output Modules connect to the Buss Board.

NOTE

The Buss Board distributes the control signal to the Control Output Module.

The control output module incorporates multiple functionality into one module, replacing the need to install several different components and to wire them for control. The control output module includes the following components:

- rocker switch
- circuit breakers
- control relay(s) with override switches and status LEDs

These modules are easily removed and installed from the KWIC Assembly by unsnapping some fasteners and pulling the convenient handle that disengages the connection to the Buss Board.

HARDWARE INSTALLATION

The KWIC Assembly is an OEM-installed output control device. It must be interfaced with a refrigeration processing control.

IMPORTANT

This manual will not discuss the mechanical installation process of the KWIC Assemblies.

This process depends on the mechanical design of the refrigeration control panel; see the manufacturer's instructions for details.

The OEM will receive the KWIC Chassis Assembly as a base unit. Installation and setup procedures will differ depending on the **interface** (communication) type and **controller** type being applied.

This section provides **general hardware installation** information about the KWIC Assemblies.

For more information about the interface and controller type being applied, refer to the *Hardware Overview* section of this manual.

NOTE

The hardware installation procedures discussed are general to all controller interface types.

Refer to the *Set-Up* section of this manual for set-up procedures that are specific to each interface.

KWIC CHASSIS ASSEMBLY INSTALLATION

KWIC ASSEMBLY POWER REQUIREMENTS

Each KWIC Chassis Assembly requires 24VAC power supplied at the J105 connector on the PIB. To apply power to the J105 connection on the PIB, you must remove the cover.

The PIB cover is a metal cover that has four black nylon fasteners. The black fasteners must be loosened before removal. To remove the cover from the PIB, pull the fastener up, allowing the fastener to contract. Now you can separate the cover from the structure. The fastener will remain in the slightly smaller hole on the cover.

You must provide each KWIC Assembly power via a local transformer. The transformers used correlate directly to the assembly current draw as follows:

- ***For 1-2 Chassis Assemblies:***
  Use a Class 2, 24VAC, 40VA transformer
- ***For 3-4 Chassis Assemblies:***
  Use a Class 2, 24VAC, 80VA transformer

IMPORTANT

A **single** transformer should **not supply power** to **more than four** KWIC assemblies.

All **transformers** must be **installed locally** in the same electrical panel. They **must also have** the **same path to earth ground** as the KWIC Assemblies.

KWIC ASSEMBLY POWER WIRING CABLE SPECIFICATIONS

Chassis Power Wiring (low voltage/24VAC):
..... 2 wire, 18 awg,
unshielded twisted pair;
Belden #8461 or equivalent

KWIC DRIVER/EXPANSION ASSEMBLY INSTALLATION

A **KWIC Device Interface Expansion** allows two **KWIC Chassis Assemblies** to be connected to each other.

The Processor Interface Board (PIB) contains the Expansion Interface Connection **(connector J107)**. Connect the KWIC Assemblies together via this link (**connector J107**). Use an ECT Chassis Interconnect Cable to make the connection.

NOTE

Access this connector by removing the PIB Cover. It is near the top left corner on the PIB board.

IMPORTANT

The **MAXIMUM DISTANCE** between the driver and expansion assembly is **20 ft**. Use an **ECT Chassis Interconnect Cable** to make this connection.

The **ROUTING** of this communication line should be kept **clear** from **line voltage wiring**.

The **Expansion Chassis Assembly WILL NOT** have an Engine Board installed. It receives control messages from the driver assembly via the Chassis Interconnect Cable.

Switch **(SW200)** on the Buss Board of the Driver and Expansion Assemblies is located near the PIB. Make sure this switch (SW200) is set to **UP** for the **Driver Assembly** (labeled 1-4) and **DOWN** for the **Expansion Assembly** (labeled 5-8). (It is factory set prior to shipment.)

IMPORTANT

Verify the factory switch settings upon receipt. To view the portion of the Buss Board that houses the switch, remove the first output module from the assembly.

The channel group selector switch (SW200) settings are as follows:

- Driver Assembly: UP (1-4)
- Expansion Assembly: DOWN (5-8)

CONTROL OUTPUT MODULES

The Control Output Modules snap into the Buss Board and the Chassis Plate on the KWIC Chassis Assembly. Each KWIC Chassis Assembly houses a maximum of four control output modules.

The Control Output Module is protected by a metal cover. The cover has a top handle, three black nylon fasteners, and one thumbscrew (to provide a safety ground). Line up the fasteners and the thumbscrew with the holes on the Chassis Plate; push the fasteners down and tighten the screw to fasten the cover over the module. Upon removal, pop up on the fasteners to loosen them, loosen the thumbscrew, and pull the module out from the top handle.

WARNING

Make sure the **FASTENERS** and the **SCREW** are **LOOSENED** BEFORE **PULLING** the **COVER OFF**. **Pulling on a tightly fastened cover** from the top handle **will BEND** the circuit control **cover**!

NOTE

The modules are hot swappable. This means that you do not have to power down the KWIC Device (24VAC) before swapping a module. However, the control voltage connectors should have power interrupted via the control voltage breaker before removing the output module from the KWIC Assembly.

The module takes about 15 seconds to activate upon power up.

CIRCUIT DEFROST CONTROL MODULE REQUIREMENTS

Each Circuit Control Module on the KWIC Device requires that power be provided at the L1 and L2 connectors. The voltage applied at these connectors serves as the supply control voltage for all refrigeration and defrost control through that particular module.

The wiring specifications for control wiring should be specified by the local electrical code.

The loads for each circuit are connected on the terminal strip to the right of L1 and L2 connectors. Each circuit has two refrigeration and two defrost connections for control purposes.

For Example:

Circuit 1 on the module would be labeled as:

- R1 and C1 for refrigeration line and common
- D1 and C1 for defrost line and common

NOTE

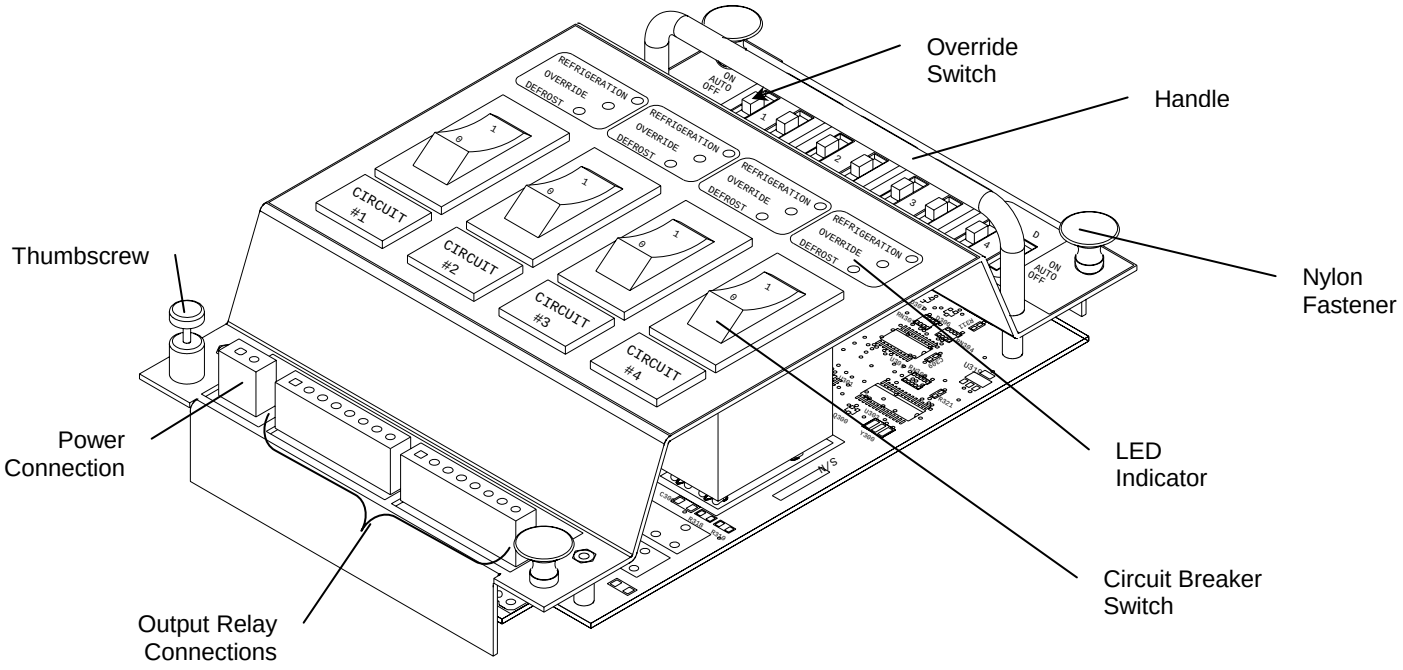
The interlocking relays will not allow defrost and refrigeration to energize at the same time for any given circuit.

The circuit module (see Drawing 2 below) contains the following for each of the four circuits:

- Rocker Switch (with power indication light) to interrupt power to the circuit control
- Circuit Breaker rated 125/250VAC; 50/60Hz; trip rated at 2.5A continuous draw
- (2) Interlocked relays used for Refrigeration and Defrost Control
- (2) Three-position Override Switches; one for each relay
- (4) Wet contact control wiring connections; (line & common for refrigeration & defrost control)
- (3) LEDs that indicate state of refrigeration defrost and override condition.

NOTE

Figure 4 in Appendix C shows circuit module connection practices.



DRAWING 2 – CIRCUIT MODULE

CIRCUIT CONTROL MODULE FUNCTIONAL CHARACTERISTICS

CIRCUIT CONTROL SWITCH

Each circuit on a module has a rocker switch to interrupt control power.

NOTE

If the rocker switch is in the "Up" position, it is closed allowing the control to operate.

Placing the rocker switch in the "Down" position will interrupt the power to the circuit control.

IMPORTANT

When the rocker switch is "On" (in the "Up" position) it will be indicated by an illuminated light within the rocker switch.

CIRCUIT CONTROL LOGIC

Refrigeration control logic applies voltage to the valve when the relay is de-energized and applies voltage for defrost control when the relay is energized. This control logic places refrigeration "On" in the fail-safe mode. The control logic of the relays can be reversed during the software initialization process. This reverse logic capability is dependent on the capability of the refrigeration control.

CIRCUIT CONTROL OUTPUT MODULE OPERATION INDICATORS

Override Function: Each Circuit/Defrost module contains two override switches. They are located at the top of the module. One switch can override the refrigeration relay and one can override the defrost relay. The switch labeled with an "R" indicates refrigeration and the switch labeled with a "D" indicates defrost. The number of the circuits on the module is marked between the switches.

The override switches provide three selectable positions:

1. **ON**: Overrides the load to the on position
2. **AUTO**: Leaves the load in software control (Normal or Default setting)
3. **OFF**: Overrides the load to the off position

Usually the override switches are set to AUTO; this puts the unit in software control (i.e., the software will control the refrigeration and defrost loads.) However, the override switches can be used to put the controller in manual control. The override options (ON or OFF) are most commonly used as a troubleshooting tool.

NOTE

The defrost and refrigeration relay have a hardware interlock. This **interlock** WILL NOT ALLOW both **defrost and refrigeration** to be **on** at the **same time**.

To **OVERRIDE defrost** to the "**ON**" position, **SET** the **REFRIGERATION** to "**OFF**" **PRIOR to switching defrost** to "**ON**."

To **OVERRIDE refrigeration** to the "**ON**" **position**, **SET** the **DEFROST OVERRIDE** to the "**OFF**" **position PRIOR** to **setting refrigeration** to "**ON**."

LED Indicators: The circuit control cover contains three LEDs. These LEDs indicate the following operation status:

- Refrigeration (Green LED)
- Override (Red LED)
- Defrost (Yellow LED)

NOTE

When the **RED LED blinks CONTINUOUSLY**, it indicates that the unit is in **OVERRIDE**.

When the **GREEN LED** is **ON**, it indicates that the unit is in **REFRIGERATION CONTROL**.

When the **YELLOW LED** is on, it indicates that the unit is in **DEFROST CONTROL**.

COMPRESSOR CONTROL MODULE REQUIREMENTS

Each Compressor Control Module requires that power be provided at the L1 and L2 connectors. The voltage applied at these connectors will be the supply control voltage for all compressor control via that particular module.

The wiring specifications for control wiring should be specified by the local electric code.

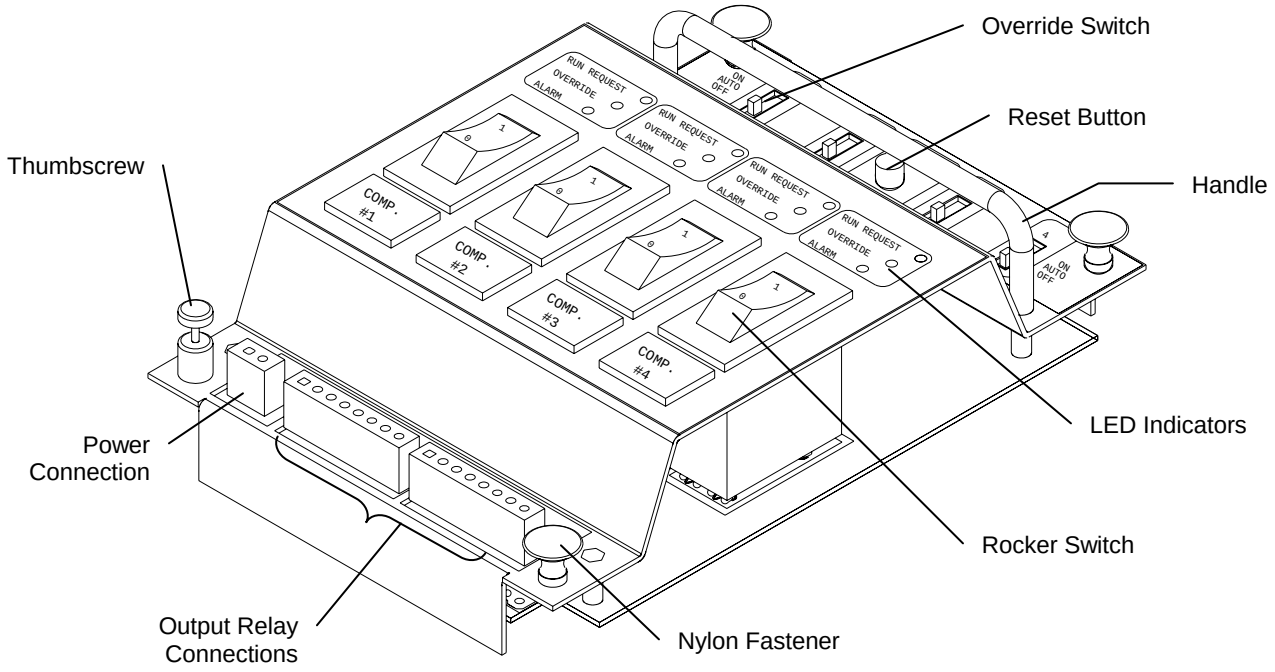
The load for each compressor is connected on the terminal strip to the right of the L1 and L2 connectors. Each compressor has two connections for the L1 phase and one connection at the L2 phase of the control circuit. (See Drawing 4 on the following page.)

The compressor module (see Drawing 3 below) contains the following:

- (4) Rocker Switches (with power indication light) to interrupt power to the compressor control.
- (4) Thermal Circuit Breakers; trip rated for 10A @ 208V continuous draw
- (4) Three-position Override Switches; one for each relay
- (4) LEDs that show state of compressor override condition
- (1) TX LED to verify satisfactory communication
- (1) L2 phase control voltage connection (per compressor)
- (1) L1 phase compressor coil connection (per compressor)
- (1) L1 phase auxiliary load connection (per compressor)
- (2) fault connections (per compressor)

NOTE

Figures 2B and 5 in Appendix C show detailed compressor module connections.



DRAWING 3 – COMPRESSOR MODULE

COMPRESSOR CONTROL VOLTAGE CONNECTIONS

The compressor control voltage connections have a total of **four connection points:**

1. **L1**
2. **L1 RETURN**
3. **L1**
4. **L2**

The **three connections** for compressor control are as follows:

1. **LOAD**
2. **AUX LOAD**
3. **VERIFY**

The **CONNECTION TYPES are connected** to the **CONNECTION POINTS** for compressor control in the following manner. (For a visual display, see Drawing 4 below.)

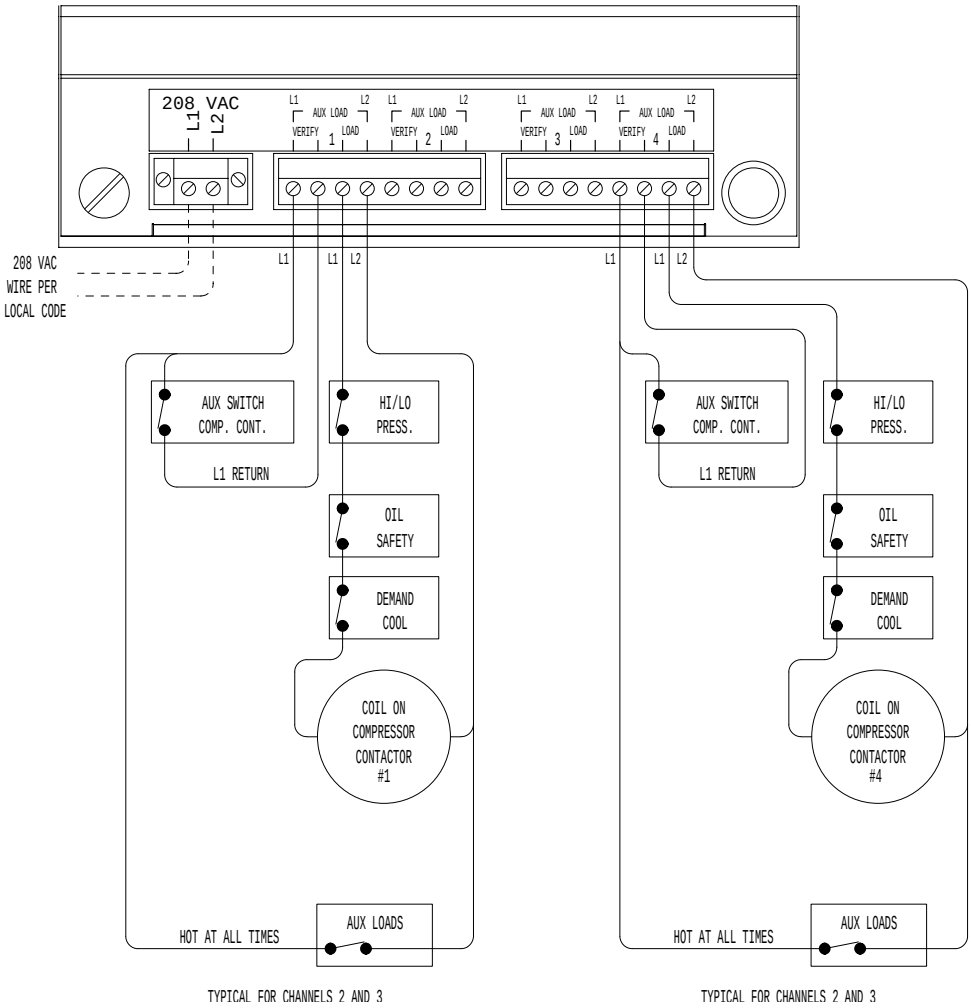
L1 and L2: LOAD connections for the compressor contactors.

L1 and L2: AUX LOAD connections for the head cooling fan or the crank case heater.

L1 and L1 RETURN: VERIFY connections for run verification off the auxiliary switch or the compressor contactor.

NOTE

Ensure that connections are made properly to avoid short-circuiting of the control voltage.



DRAWING 4 – COMPRESSOR MODULE CONTROL WIRING

COMPRESSOR CONTROL MODULE FUNCTIONAL CHARACTERISTICS

COMPRESSOR CONTROL SWITCH

Each compressor on a module has a rocker switch to interrupt control power to the compressor.

NOTE

If the rocker switch is in the "Up" position, it is closed allowing the compressor to operate.

Placing the rocker switch in the "Down" position will interrupt the power to the compressor.

IMPORTANT

When the rocker switch is "On" (in the "Up" position) it will be indicated by an illuminated light within the rocker switch.

COMPRESSOR CONTROL OUTPUT MODULE OPERATION INDICATORS

Override Function: Each compressor module contains four override switches. They are located at the top of the module.

The override switches provide three selectable positions:

1. **ON**: Overrides the compressor to the on position
2. **AUTO**: Leaves the compressor in software control (Normal or Default setting)
3. **OFF**: Overrides the compressor to the off position

The override switches should be set to AUTO; this position puts the unit in software control (i.e., the software will control the compressors.) The override switches can be used to bypass the controller and place the compressor in manual control.

LED Indicators: The compressor control cover contains three LEDs. These LEDs indicate the following operation status:

- Run Request (Green LED)
- Override (Red LED)
- Alarm (Red LED)

NOTE

When the green LED (Run Request) is on, it indicates that the compressor is being called for.

When the center red LED (override) blinks continuously, it indicates that the compressor control is in override.

When the bottom red alarm LED is on, it indicates that the compressor is held off by mechanical safeties or an electrical failure. Check and reset all safety switches in the control circuit!

When the bottom red alarm LED is flashing, it indicates that a fault occurred and then cleared. To stop the red LED from flashing, press the Fault Reset Button located in the upper middle portion of the compressor module.

Transmit LED: the top right corner of the module contains a red "TX" **Transmit LED**. This LED will flash to indicate satisfactory communication between the modules and the processor on the engine board.

ECHELON NETWORK CONNECTIONS

The Echelon Chassis Assembly supports Echelon communication with the KWIC. The Echelon Chassis Assembly consists of these parts:

- Echelon FTT-10A Chassis Assembly Part # CC/25004400
- Echelon Engine Board Part # 5130001400
- 16 gauge, two wire twisted pair non-shielded cable, Belden #8471 (non-plenum) or Belden #85102 (plenum) or equivalent

Make the Echelon network connection via the P1 connector on the Echelon Engine Board.

NOTE

This connection is **NOT** POLARITY SENSITIVE and DOES NOT **need** to be a **daisy chain** connection through all devices.

IMPORTANT

All Echelon network guidelines for FTT-10A Network installation must be followed.

Successful Echelon Network communications with the KWIC require specific hardware and software setup procedures. The hardware setup procedures are listed below. For more information regarding Echelon Network software setup, see the *Echelon FTT-10A Chassis Assembly Setup with the ECI RC-2000 Refrigeration Controller* section of this manual.

Hardware Installation Guidelines: Echelon Network Setup with the KWIC Device:

1. Ensure that all connections are secure by tugging on the connector and the wire.

2. Ensure that no wire strands touch across to each other, creating a cross-talk short situation.

3. Install no more than three daisy chain type connection legs from one central hub to the refrigeration control.

4. Install a maximum of one (1) 51 Ohm ¼ watt resistor in one of three ways:

   a. **across the P1 connector** at one engine board within the network;
   b. **across the signal** at the star hub; *or*
   c. **at** the refrigeration control

IMPORTANT

INSTALL only one 51 ohm resistor in the loop!

If more than one 51 ohm resistor is installed in the loop, it will degrade the network communications.

5. **DO NOT EXCEED** 1600 feet (the maximum distance of the entire network) **UNLESS** you install an **FTT-10A DCU Repeater Board**, Part # 20055400.

KWIC ECHELON FTT-10A CHASSIS ASSEMBLY OPERATIONS AND PROGRAMMING

INTRODUCTION

The KWIC Device controls the cycling of a refrigeration rack via Control Output Modules. Use the Echelon FTT-10A Chassis Assembly to communicate directly with the refrigeration control via an Echelon network. Via this network, the KWIC receives all control signal commands from the refrigeration controller and responds to control the loads.

The Echelon FTT-10A Chassis Assembly uses an Echelon Engine Board (located on the PIB). This board provides the processor that supports the Echelon communication.

NOTE

The Echelon Engine Board provides:

1. The connector to terminate the Echelon network. (Refer to the *Echelon Network Connection* part of the *Hardware Installation* section of this manual.)

2. Two Switch Blocks for this chassis assembly setup. They are marked S1 and S2, located left to right, respectively when looking directly at the KWIC Echelon FTT-10A Chassis Assembly.

3. Subnet and Node addressing capability on Switch Blocks 1 (S1) and 2 (S2), respectively.

ECHELON ADDRESSING

Echelon uses a tiered address protocol to recognize different devices on the network.

SUBNET ADDRESS

The “Subnet Address” is the higher level address. There are 255 subnet address identifiers on a single Echelon Domain within the Network.

NODE ADDRESS

The “Node Address” is a lower level address contained and identified within each subnet address. There are 127 node address identifiers assignable within a single subnet address.

NOTE

The refrigeration controller addresses the KWIC Echelon Assembly by checking for the subnet address and then the node address within the Echelon Network.

ECHELON ENGINE BOARD SWITCH BLOCKS

SWITCH BLOCK 1 (S1)

This Switch Block contains eight DipSwitches, 1-8. They are used to set a portion of the communication address called the subnet address. The subnet address is a portion of the Echelon address required to communicate on the Echelon network. The Echelon FTT-10A Chassis Assembly is designed to allow the refrigeration controller to assign this address through software initialization or by using the DipSwitch and reading the value from the switch. Details of the DipSwitch settings are available from the ECT Engineering Department.

NOTE

To assign a subnet address via a software initialization process, set all eight switches on S1 to the “Off” position.

SWITCH BLOCK 2 (S2)

This Switch Block contains eight DipSwitches; they are split into two groups: DipSwitches 1-3, and DipSwitches 4-8.

DipSwitches 1-3 are used to set a second portion of the Echelon communication address (node address). When these DipSwitches are set to off, the refrigeration controller initializes the node address via a software message.

NOTE

To assign a node address via a software initialization process, set DipSwitches 1-3 on Switch Block 2 (S2) to the "Off" position. The node address will then be assigned.

DipSwitches 4-8 on Switch Block 2 (S2) are used to reference the number of relays per board as assigned in the refrigeration controller. Each manufacturer of refrigeration controls may use a different software format for assigning boards and relay number per board. The KWIC Assembly may be set via these DipSwitches to support different formats relating to numbers of relays per board.

NOTE

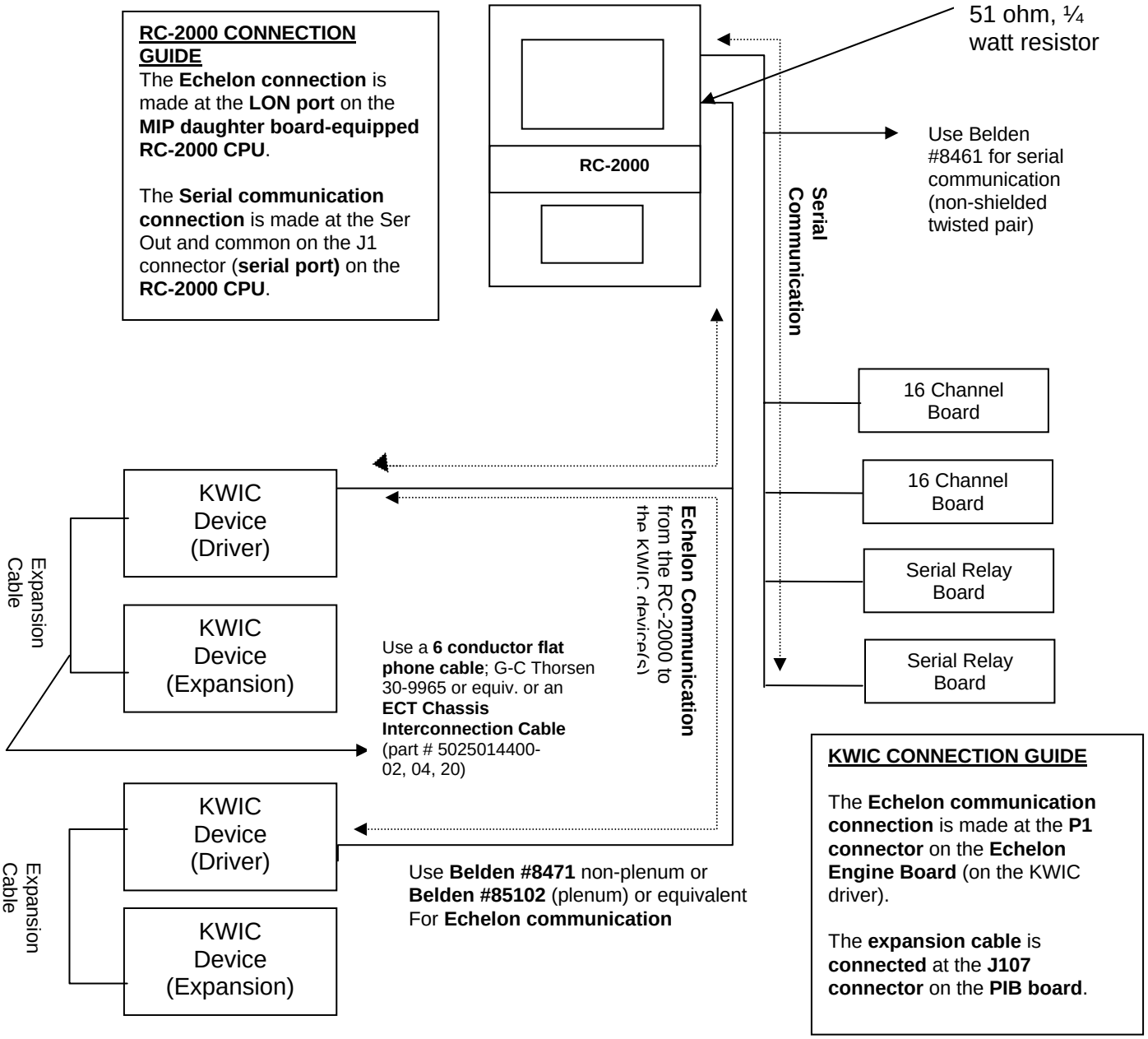
DipSwitches 4-8 on Switch Block 2 (S2) set to "Off" will support an eight relay per board I/O format. Table 1 below shows the I/O Control Formats capable with the KWIC Device.

TABLE 1–DIPSWITCH I/O FORMAT GUIDE

Switches Set "On"	Relays per Board
None	8
5, 7	10
5, 6	12
5, 6, 7	14
4	16

KWIC ECHELON FTT-10A CHASSIS ASSEMBLY SETUP WITH THE ECI RC-2000 REFRIGERATION CONTROLLER

The KWIC Device serves as part of a facility's refrigeration control network, and communicates to a refrigeration controller via an Echelon communication loop. It also accommodates a chassis expansion to another KWIC unit via an interconnect cable. Drawing 5 below shows a sample KWIC Refrigeration Control Network. The KWIC Devices are communicating with an RC-2000 Refrigeration Controller, and KWIC Expansion Assemblies.



DRAWING 5 – SAMPLE KWIC/ECHELON REFRIGERATION CONTROL NETWORK

RC-2000 SOFTWARE CAPABILITY

Before you install the Echelon Address for the KWIC Assemblies, the system output control needs to be reviewed to configure the RC-2000.

NOTE

The majority of the software setup is configured at the RC-2000.

The RC-2000 Version 4.40 or higher communicates with a maximum of nine digital output boards.

IMPORTANT

In order to use the **NINTH digital output board** it **MUST** be **configured** as a **NETWORK BOARD. The NINTH digital output board is available ONLY** in the **RC-2000** Version **4.40 and higher control software**.

The RC-2000, Version 4.40 uses a hybrid output communication scheme. With this scheme, you have two options:

1. To configure the Digital Output boards 1-8 to be the conventional serial type communication.

   Or

2. To select the Digital Output boards 1-9 for Network Communication via the Echelon Network.

NOTE

The RC-2000, Version 4.40 defaults to serial relay output control at the original start up. To communicate with the RC-2000 via the Echelon Network, you must determine how many output boards will be controlled and then configure the RC-2000 to meet the requirements.

DIGITAL OUTPUT SETUP FOR ECHELON COMMUNICATION

To set up the RC-2000/KWIC control interface, the programmer must first determine which digital output boards should be allocated for KWIC control.

ECT recommends that all KWIC Network Output Modules are allocated first and that all Serial Relay Boards are allocated second.

NOTE

Serial Digital Output boards will generally be used for condenser fan control, master hot gas etc. on a KWIC control system.

Prior to configuring the RC-2000 for serial/network output control, verify and document the configuration. Table 2 on the following page shows an example of how a hybrid digital output system may be configured.

TABLE 2 – DIGITAL OUTPUT CONTROL SYSTEM CONFIGURATION

DIGITAL OUTPUT BOARD NUMBER	DIGITAL OUTPUT CONTROL TYPE	LOADS CONTROLLED	NUMBER OF RELAYS ALLOCATED FOR USE IN PROGRAM	NETWORK NODE ADDRESS
1	Network	Compressor 1-4	4	001
1*	Network*	Compressor 5-8*	4*	001*
2	Network	Circuit 1-4 (Refrigeration and Defrost)	8	001
3	Network	Circuit 5-8 (Refrigeration and Defrost)	8	001
4	Network	Circuit 9-12 (Refrigeration and Defrost)	8	001
5	Network	Circuit 13-16 (Refrigeration and Defrost)	8	001
6	Serial	Condenser Fans, Split Relays	8	n/a
7	Serial	Condenser Fans, Split Relays	8	n/a
8	Serial	Evaporator Fans, Master Hot Gas, System Alarm	8	n/a

NOTE: This table (TABLE 2) is an **EXAMPLE** of **how to CONFIGURE A SYSTEM**. It is **NOT REQUIRED that the system BE DESIGNED** WITH THIS **EXACT CONFIGURATION!**

IMPORTANT: This table (TABLE 2) shows the digital outputs in Board 1 allocated for compressor control. Follow these guidelines when configuring a system with compressor and circuit output control:

- When **two compressor modules** are installed, allocate the first eight Board 1 (1-8) relays for them as shown in the table. Place them sequentially in the first and second position on the chassis.
  Begin the circuit module allocation with Board 2.

- When **one compressor module** is installed, allocate the first four Board 1 relays (1-4) for it. Place it in the first chassis position as shown above.
  Begin the circuit module allocation with Board 2 as shown.
  In this instance, Board 1 relays 5-8 will not be allocated.

TABLE 2 DESCRIPTION

Table 2 is a visual EXAMPLE in a table format of a recommended digital output system configuration. Table 2 is an example and it is not required to follow this layout since the RC-2000 offers flexibility in the digital output configuration. This table focuses on the serial relay boards being configured after the KWIC Output (Network) Modules.

It also displays how the RC-2000 Digital Output Configuration will allocate all eight relays to the KWIC Assembly with the corresponding node address.

SYSTEM DIGITAL OUTPUT ALLOCATION

SERIAL DIGITAL OUTPUTS

All ECI controls allocate eight relay points to be programmed for each serial digital output board. These eight relay points are allocated even when all eight are not used for control purposes.

NETWORK DIGITAL OUTPUTS

All ECI controls allocate eight relay points to be programmed for each network digital output board. The eight relay points are allocated even when all eight relay points are not used.

CIRCUIT OUTPUT MODULES

KWIC Device Circuit Output Modules are designed with eight relays per module. Each module controls four circuits; each circuit has a refrigeration and defrost relay. Hence, when a circuit module is allocated, it is programmed as eight channels on a serial digital output board.

For example, in the system configuration example in Table 2:

2-1 through 2-8 would be the RC-2000 programmed assignments for the first circuit module (see Table 2 on the previous page).

COMPRESSOR OUTPUT MODULES

KWIC Device Compressor Output Modules are designed with four relays per module. Each module controls four compressors. Hence, when a compressor module is allocated, it is programmed as four channels on a serial digital output board.

For example, in the system configuration example in Table 2:

1-1 through 1-4 would be the RC-2000 programmed assignments for the first compressor module, and 1-5 through 1-8 would the RC-2000 programmed assignments for the second compressor module.

RC-2000 DIGITAL OUTPUT CONFIGURATION PROGRAMMING

The RC-2000 must be configured to address network or serial digital output boards. To configure the digital output board interface type Version 4.40 and higher (of the RC-2000) provides the programmer with a new setup screen.

To access the Dig Out Interface screen, follow this path:

1. Enter [YOUR ACCESS CODE] into the Main Menu.
2. Press [7], System.
3. Press [7], Board/Channel Setup.
4. Press [2], Dig-Out Interface.

The screen below appears.

```
              DIG OUT INTERACE
Dig Out       Interface    Network Node
Board         Type
1             Network      001
2             Network      001
3             Network      001
4             Network      001
5             Network      001
6             Serial       n/a
7             Serial       n/a
8             Serial       n/a
9             NotUsed      n/a
```

NOTE: This **SCREEN EXAMPLE reflects a system configured as in Table 2**.

RC-2000 DIG OUT INTERFACE SCREEN EXPLANATION:

Interface Type: Select the interface type for each Dig Out Board here.
NOTE: Serial is the default. **Change your selection** to **network** for the corresponding **KWIC Device modules**!

Network Node: Will default to n/a unless Network is selected for interface type. Then it will revert to 001.
NOTE: This is a user-selectable setpoint. Each KWIC Echelon Assembly with an Engine Board must be connected to the RC-2000 controller. (The selectable range is 001-007).

Important:

Two KWIC Assemblies may be connected together via the Expansion Interface Connection as a Driver/Expansion unit. Two KWIC Assemblies connected together as a driver/expansion unit would be set up as the same node address. If two separate KWIC Echelon Assemblies with separate Echelon engines are connected to one RC-2000, each assembly must be setup with a separate node address.

DRAWING 6 – DIGITAL OUT INTERFACE SCREEN EXAMPLE/ RC-2000 DEVICE INTIALIZATION

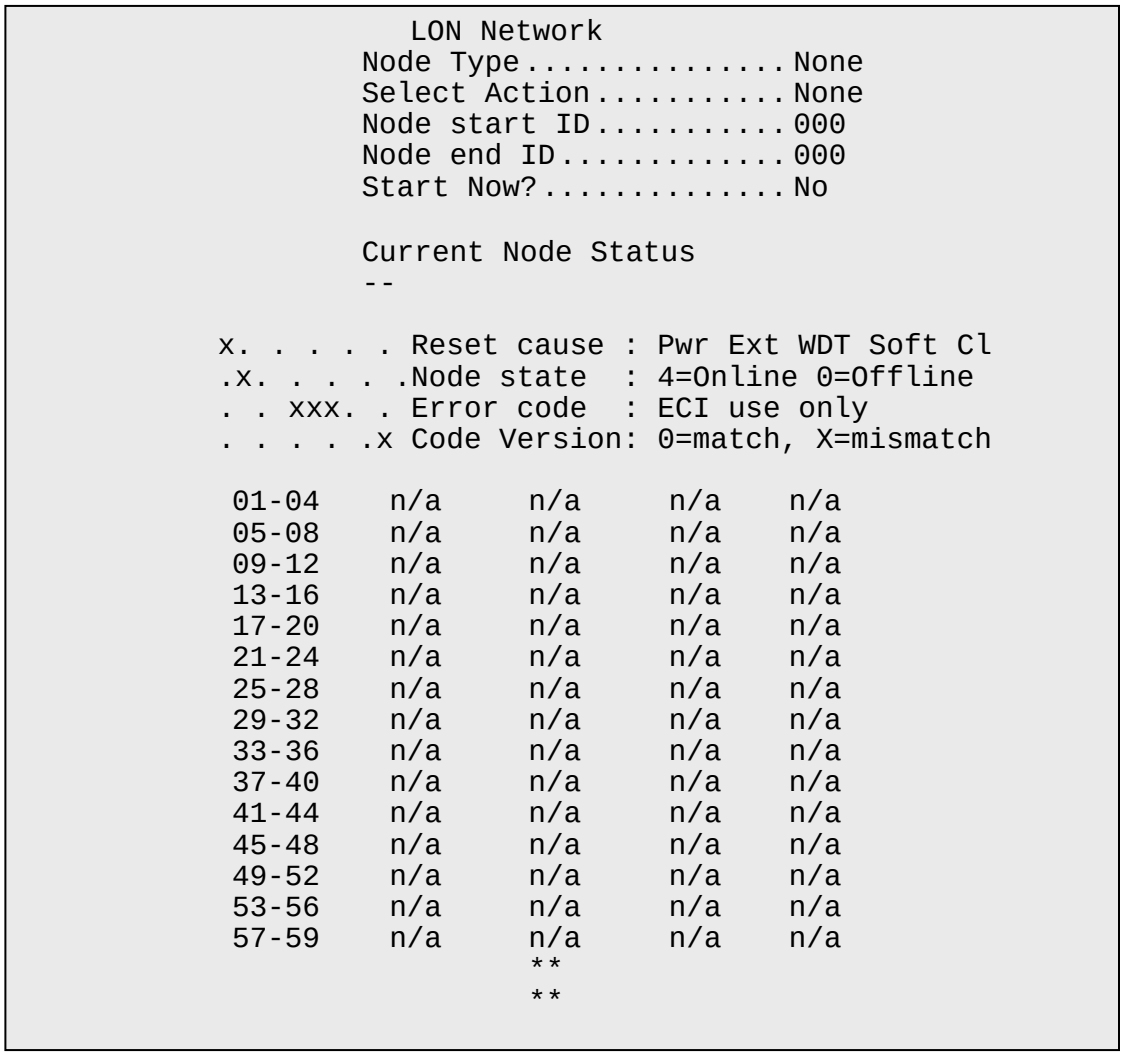
SUBNET/NODE ADDRESS INSTALLATION PROCESS

RC-2000 LON NETWORK SCREEN

An Echelon address must be assigned to each KWIC Echelon Assembly. This address will be the designator that the RC-2000 Controller uses to recognize and communicate to the KWIC Assembly via the Echelon network. Install the address via the RC-2000 LON Network Install Screen (see Drawing 7 below).

To access the required Install Screen at the ECI RC-2000 controller, follow the steps listed below.

1. Enter [YOUR ACCESS CODE] into the system.
2. Press [**8**], LON Network.
3. The LON Network screen appears. Use this screen to ID/configure and review status on the KWIC Echelon Assemblies.



Note: Reference this screen when performing the installation steps.

DRAWING 7 – RC-2000 LON NETWORK INSTALL SCREEN

ADDRESS INSTALLATION

The address installation must be done directly at the RC-2000 and the KWIC Echelon Assembly's Engine Board and PIB.

IMPORTANT

Prior to starting the installation process, be aware of the following points. (They will help ensure a successful address installation.)

1. Make sure that all DipSwitches on Switch Block 1 "S1" and Switch Block 2 "S2" on the Echelon Engine Board are set to the "Off" position.
2. The left middle portion of the PIB has an install button "SW100" labeled "CFG/SVC" and a system status LED "DS100" labeled "Status." This install button and status LED will be used to install and confirm the steps of the process.
3. If more than one KWIC Echelon Assembly with the Echelon Engine is connected to the RC-2000, each must be assigned a different node address.

NOTE

For address installation, make all software selections from the 'LON Network' Install screen. (See Drawing 7 for an example of this screen.)

INSTALL NODE FUNCTION

Follow the steps below to install the software address.

1. Enter [YOUR ACCESS CODE] into the RC-2000.

2. Press [8], LON Network.

3. The LON Network screen appears. Refer to Drawing 7 for an example of this screen.

4. Install the node address by making the selections listed below in the LON Network screen.

   For:
   a. Node Type..... Enter [**KW Contr.**]
   b. Select Action .. Enter [**Install Node**]
   c. Node Start ID... Enter [**001**] or the [**Node address number to be installed**]
   d. Node End ID.... Enter [**001**] or [**Node ID number to be installed last**]
   e. Start Now?..... Enter [**Yes**]

5. On the **Current Node Status Line**, you will see this display "**Press Node 1 ServPin**"

6. Press and hold the [install button] on the PIB for one second.

7. After a successful node installation, you will see: The **Current Node Status Line** display:

   - A Clear Line or
   - 'Press Node # Serv Pin' (# = next Node in succession to install)

NOTE

The Echelon Engine has two LEDS. They consist of:

1. TX LD 7 (red)
2. RX LD5 (yellow)

They will flash for a period immediately after releasing the install button 'SW100.' When the LEDs flash, they indicate an active address message transfer.

CONFIGURE NODE FUNCTION

IMPORTANT

Prior to performing the Node Configure Function, ensure that the following conditions are met:

- All output modules are securely fastened to the KWIC Assemblies.
- The interconnect cable between the Echelon Assemblies and the Expansion Assemblies are connected.
- It is recommended that the RC-2000 is configured to the correct allocation of network digital output boards from within the RC-2000 Dig-Out Interface Screen. (See Drawing 6.)

Configure the Node Function in the LON Network screen. Access the LON Network screen by following these steps:

1. Enter [YOUR ACCESS CODE] into the RC-2000 upon start up.

2. Press [**8**], LON Network.

3. The LON Network screen appears. Refer to Drawing 7 for an example of this screen.

To configure the Node Function in the LON Network screen, follow these procedures:

a. Node Type..... Select [**KW Contr**]
b. Select Action..... Select [**Configure Node**]
c. Node Start ID..... Enter [**001**] or [**Node address number to be configured**]
d. Node End ID..... Enter [**001**] or [**Node ID number to be configured last in succession**]
e. Start Now? ..... Enter [**Yes**]

*No selection necessary

NOTE

AFTER COMPLETING Step 3 in the Configure Node Function steps, the **RC-2000 will configure the KWIC Echelon Assembly**. During that process, the status light 'DS100' will slowly blink a few times. **AFTER** a **successful configuration** is completed, the **status light** will **remain** "**steady on**." If the **Status LED 'DS100' does not remain "steady on" AFTER** the **configure node function steps are completed**, **REFER** to the **Check Node Function** section that follows for ways to verify if the addressing has been successful.

CHECK NODE FUNCTION

The RC-2000 software has a node verify function built into it. Use this function to verify successful node addressing.

To verify successful node address installation, enter the LON Network Screen, and perform the following steps:

1. Enter [YOUR ACCESS CODE] into the RC-2000 upon start up.
   Press [**8**], LON Network.
2. The LON Network screen appears. Refer to Drawing 7 for an example of this screen.
3. To check your node function in the LON Network screen, follow these steps:
   a. Node Type..... Select [**KW Contr**]
   b. Select Action ... Select [**Check Node**]
   c. Node Start ID .. defaults to 001*
   d. Node End ID.... defaults to end # configured*
   e. Start Now?..... Enter [**Yes**]

*No selection necessary

NOTE

The lower portion of the LON Network screen will display the node status. S40000 or C40000 indicates a successful node installation.

This Check Node process can be performed at any time throughout the installation process to verify status.

KWIC/RS485 NETWORK CONNECTIONS

The KWIC Device controls the cycling of a refrigeration rack via Control Output Modules. Use the RS485 Chassis Assembly to communicate directly with the refrigeration control via an RS485 network. Via this network, the KWIC Device receives all control signal commands from the refrigeration controller and responds to control the loads.

RS485 ENGINE BOARD

The KWIC Device communicates with various refrigeration controllers via the RS485 Engine Board. Drawing 8 details the RS485 Engine Board, and calls out the various connection and setup components. The RS-485 Engine board supports various firmware versions that allow it to communicate on different control system network protocols. Setup of a KWIC Device will depend on the characteristics of the refrigeration control's communication setup. Please refer to the specific refrigeration control application's chapter in this manual for detailed connections and set-up requirements.

NOTE

When ordering an ECT RS485 Engine Board or an ECT RS485 Chassis Assembly use the ECT part number that corresponds to the refrigeration control type for the application.

The RS485 Chassis Assembly supports RS485 communication with the KWIC. The RS485 Chassis Assembly consists of these parts:

- RS485 KWIC Chassis Assembly
- KWIC Expansion Assembly (if necessary)
- RS485 Engine Board (replacement)

NOTE

The Chassis Assembly, Expansion Assembly and Engine Board Part #'s for the RS485 Network are listed in the Parts List at the back of the manual. Reference the RS485 Chassis Assembly and the RS485 Engine Board Part Numbers via the controller being interfaced with the KWIC Device.

RS485 ENGINE BOARD CONNECTORS

The RS485 Engine Board provides three connection points for external cables: the P1 RS485 connector, the P2 serial upgrade firmware connector, and the J2 PIB interface connector.

P1 RS485 CONNECTOR

The P1 connector is used to connect a two wire shielded twisted pair cable for RS485 serial communications. The connector is labeled with the polarity of the connections.

NOTE

RS485 connections are polarity sensitive. Observe the polarity of connections when making the P1 connection. Failure to observe the polarity of this connection will result in unsatisfactory operation of the network.

P2 SERIAL FIRMWARE UPGRADE CONNECTOR

The P2 connector is used for serial programming of the KWIC Device. This connector provides the interface for the ECT RS485 Utility Upgrade software via a parallel cable. (This software is used to upgrade or change the firmware on the KWIC RS485 Engine Board.) **The P2 connector should ONLY be serviced by an authorized service technician.**

J2 PIB INTERFACE CONNECTOR

The J2 connector provides connection for an RJ-45 connector that has an eight conductor cable. This cable is factory installed. This connection provides an interface between the PIB and the RS485 Engine Board. The **J2 connector** is **factory installed**.

S4 TERMINATION SWITCH

Switch 4 (S4) on the Engine Board sets the termination for RS485 communication. Use the two S4 switches to set the network termination resistors on or off. If the S4 switches are slid to the left, network termination is off. If the S4 switches are slid to the right, network termination is on. Refer to the refrigeration control manual for RS485 Network Termination details.

SWITCH BLOCKS
S1 (SWITCH BLOCK #1)
S2 (SWITCH BLOCK #2)
S3 (SWITCH BLOCK #3)

These Switch Blocks each contain eight DipSwitches. Use them to set up an I/O address and other KWIC settings that enable refrigeration control interface on the RS485 network.

NOTE

These DipSwitch settings are dependent on the refrigeration control and its protocol requirements. Please refer to the chapter that contains the detailed setup information for the specific application.

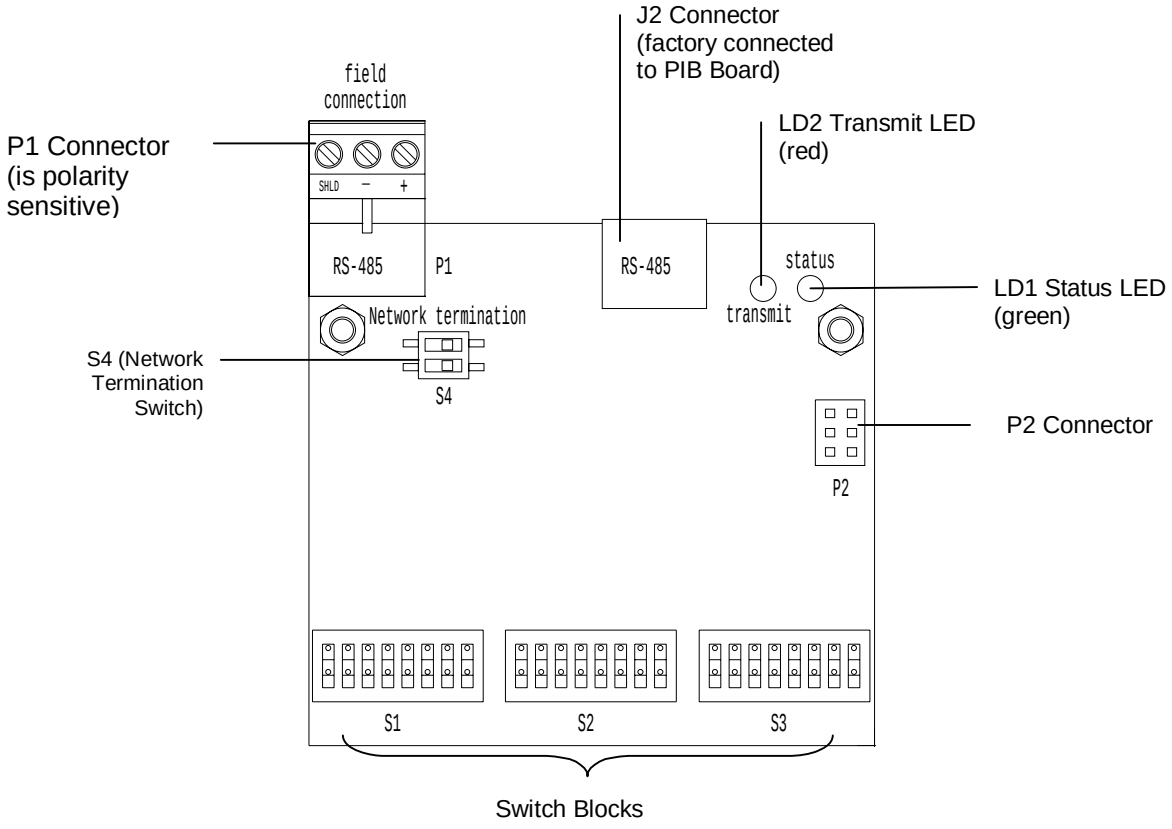
RS485 ENGINE BOARD LEDS

LD1 ST (GREEN LED)

The green status LED is labeled ST and LD1. This LED shows the current state of the engine board. Under normal operations, it is off. At power up the LED turns on and stays steady on through power up (about fifteen seconds). This LED is used to verify proper device operation (refer to the next section for more information on LD2 verification properties).

LD2 TX (RED LED)

The red transmit LED is labeled TX and LD2. Whenever the board communicates, this LED will show a steady blink; otherwise, it will be off.



DRAWING 8 – RS485 ENGINE BOARD

KWIC RS485/CPC CHASSIS ASSEMBLY OPERATIONS AND PROGRAMMING

INTRODUCTION

The RS485 Communication Network can operate under different protocol and hardware connection rules. The KWIC Device is designed to operate with various controls via the RS485 Communication Network by operating within the controller's network guidelines. This section refers to the KWIC RS485 interface with CPC RS485 I/O communications.

IMPORTANT

When installing a KWIC Device **ALWAYS** adhere to the network connection guidelines provided with the controller's user documentation.

HARDWARE CONNECTION GUIDELINES

The P1 connection on the KWIC RS485 Engine Board provides the interface to the RS485 CPC I/O communication.

When making these connections adhere to the guidelines listed below and on the next page to ensure satisfactory operation.

1. Use twisted pair shielded cable:
   Belden #8641 (non-plenum rated)
   or Belden 82641 or 88641 (plenum rated).
2. Observe the polarity of the connections.

NOTE

The RS485 communication requires three separate connections that are the positive, negative, and shield (ground) connections.

IMPORTANT

CPC's I/O Boards provide the shield connection in the middle position of the three connections.

The KWIC RS485 Engine Board provides the shield connection at the farthest right connection (Drawing 8 details the network connections on the RS485 Engine Board).

3. Ensure that all connections are secure by tugging on the wire at the connector.
4. Ensure that no stray strands touch across conductors or to ground. (This condition can create a cross talk situation that degrades communication.)
5. Observe the termination guidelines as per the CPC Installation and Operations Manual.

NOTE

RS485 communication requires resistor termination at a location in the communication loop. Refer to the CPC Installation and Operation Manual for location of the termination resistors.

IMPORTANT

If termination is required at the KWIC Device, place the two switches on the S4 switch block to the right or 'On' position.

(The two S4 termination switches will be shipped from the factory in the left or 'Off' position.)

RS485 ADDRESSING

Each KWIC Device with the Expansion Chassis replaces a maximum of eight CPC relay boards. The KWIC Device will need to be setup via Switch Blocks S1, S2, and S3 on the RS485 Engine Board (see Drawing 8). When setting up the CPC RS485 Network, adhere to the guidelines discussed in the following sections to ensure satisfactory operation.

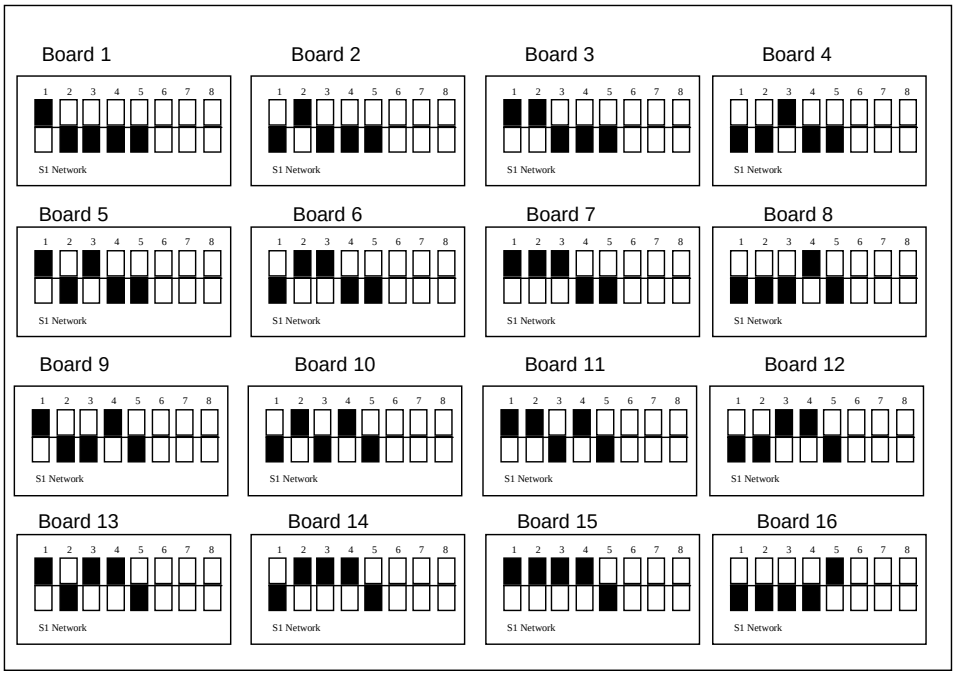
SWITCH BLOCK 1 (S1) DIPSWITCHES 1-5

Each Switch Block on the RS485 Engine Board contains eight DipSwitches. DipSwitches 1-5 on Switch Block 1 are used to set the I/O address of the first module on the KWIC Device. Each of the other modules on the KWIC Device will respond to the next address in succession, starting from the address of the first module.

NOTE

The first module of the assembly is addressed via DipSwitches 1 through 5 on Switch Block 1 (S1). The remaining modules will respond to a board address in sequence from the first module.

For example, if DipSwitch 1 is in the 'Up' position, it indicates that the first module starts with this board address. (See Drawing 9 below.)



Legend
Up = On
Down = Off

DRAWING 9 – SWITCH BLOCK 1 BOARD ADDRESS SETTINGS FOR CPC/KWIC RS485 CONTROL

SWITCH BLOCK 1 "S1" (DIPSWITCHES 6-7)

Each Switch Block contains eight DipSwitches. DipSwitches 6 & 7 on Switch Block 1 are used to set the baud rate of the I/O Communication as per the CPC network guidelines.

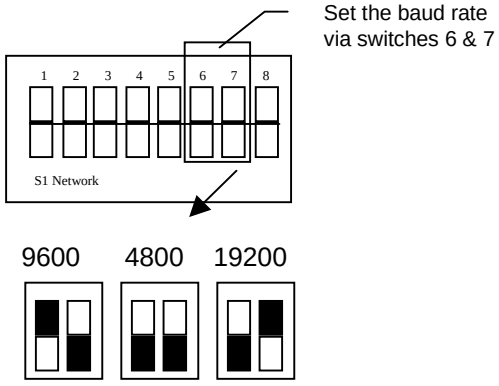
The baud rate options for the CPC RS485 network include these settings:

- 4800
- 9600
- 19200

Refer to the CPC Installation and Operations Manual for the recommended baud rate within the RS485 communication loop. Refer to Drawing 10 for a graphical display of 6 & 7 DipSwitch positions.

NOTE

The factory settings for the baud rate switches will be 9600 baud. (DipSwitch 6 will be set to on and DipSwitch 7 will be set to off as per the drawing below).



DRAWING 10 – SWITCH BLOCK 1 SETTINGS FOR DIPSWITCHES 6 & 7

SWITCH BLOCK 1 "S1" DIPSWITCH 8

Each Switch Block contains eight DipSwitches. Use DipSwitch 8 on Switch Block 1 to set the Remap Process. (For more information on the Remap Process, turn to the *System Remap Process* section at the end of this chapter.)

NOTE

The Remap Process should be performed after all three Switch Blocks have been set to the required positions.

IMPORTANT

DipSwitch 8 should remain in the down 'Off' position except when performing the remap process. If DipSwitch 8 is up, the Remap Process is enabled. If DipSwitch 8 is down, the Remap process is disabled.

SWITCH BLOCK 2 "S2" (DIPSWITCHES 1 & 2)

Each Switch Block contains eight DipSwitches. DipSwitch 1 and 2 on Switch Block 2 are used to set up the relay polarity for the modules.

DipSwitch 1 on Switch Block 2 "S2" is used to set the polarity of the relays on the KWIC Circuit Modules.

DipSwitch 2 on Switch Block 2 "S2" is used to set the polarity of the relays on the KWIC Compressor Modules.

TABLE 3 – SWITCH BLOCK 2 DIPSWITCH FUNCTIONS

Switch Block 2 DipSwitches	Function
DipSwitch 1	**Circuit Module EON/EOFF:** • Turn switch OFF (down) for **REFR** EOFF/**DEFR** EON or • Turn switch ON (up) for **REFR** EON/**DEFR** EOFF
DipSwitch 2	**Compressor Module EON/EOFF:** • Turn switch OFF (down) for Compressor EON or • Turn switch ON (up) for Compressor EOFF
NOTE DipSwitch 1 on Switch Block 2 will be factory set to the off position creating an EOFF condition for refrigeration loads and EON for defrost loads. DipSwitch 2 on Switch Block 2 will be factory set to the off position creating an EON condition for compressor loads.	

SWITCH BLOCK 2 "S2" (DIPSWITCHES 3-8)

Each Switch Block contains eight DipSwitches. DipSwitches 3-8 on Switch Block 2 are not used.

SWITCH BLOCK 3 "S3" (DIPSWITCHES 1-8)

Each Switch Block contains eight DipSwitches. DipSwitches 1-8 on Switch Block 3 are used to set up the number of CPC relay boards replaced by the KWIC Device (including the Expansion Assembly if used in the application).

Each Circuit Module replaces one CPC Relay Board and each group of two compressor modules replaces one CPC relay board.

The DipSwitch number on this block that is turned on corresponds to the number of CPC relay boards the KWIC Device is replacing, all other switches should be set to off. (If the KWIC Device replaces one CPC relay board then turn on DipSwitch 1. If it replaces two CPC relay boards, then turn on DipSwitch 2, etc.)

NOTE

All DipSwitches on Switch Block 3 will be shipped in the off position.

SYSTEM REMAP PROCESS

If the system is not responding to commands, it may need remapped. Perform the Start Up Procedure or Remap Process in the following instances:

- Upon the initial installation
- Upon installation changes because of new module types installed or movement of modules within the KWIC configuration.

NOTE
This process needs to be done before the KWIC Device will respond to commands.

You do not have to perform the remap process for DipSwitch changes or to replace failing modules of the same type.

Remap process – A procedure that allows you to remap or initialize the system.

Follow the steps below to remap the system:

1. Power down the KWIC Device by disconnecting the J105 24VAC connector on the PIB Board.
2. Set all DipSwitches on Switch Blocks S1, S2, and S3 as per the system guidelines.
3. Set Switch 8 on Switch Block 1 (S1) to the up 'ON' position.
4. Power up the KWIC Device by reconnecting the J105 24VAC connector on the PIB Board. [Upon restart of the KWIC Device, wait for the green LED (LD1 'ST') on the RS485 Engine board to go out (approximately 15 seconds).]
5. Push the Cnfg/Svc Switch on the PIB Board until the status light on the PIB Board lights.
6. Set Switch 8 on Switch Block 1 (S1) to the down 'OFF' position.
7. Watch for the green LED (LD1 ST) on the RS485 Engine to go off (when the green LED goes off, the remap process is finished. The system is ready for operation).

NOTE
If any switch is changed, the change will not take effect until power is removed and reapplied.

POWER-UP PROCEDURE

Upon power-up, the green ST LED (LD2) on the RS485 Engine Board should light up. During the power-up procedure (approximately fifteen seconds), the KWIC performs several self-diagnostic routines and will not respond to commands. After power-up is complete, LD2 will go out; this indicates proper KWIC Device operation.

IMPORTANT
The LD2 should go off after the power up procedure (approximately 15 seconds). When the LD2 stays on after power-up, it is an indication of either software program or hardware hookup error.

If the ST LED blinks, it generally indicates a hardware hookup error. The Engine Board may need replaced.

If the ST LED stays on steady, it generally indicates a problem with the software program. The Engine Board may need reprogrammed. Consult an authorized service technician if you think this may be the case.

TROUBLESHOOTING

TABLE 4 – PIB STATUS LED (DS100) CHECKS/KWIC ECHELON CHASSIS ASSEMBLY

STATE OF STATUS LED 'DS100' ON THE PIB BOARD	CONDITION
Steady On	Configured with satisfactory operation
Fast Blink	Alarm condition in KWIC processor Note: Try to configure the node again
Steady Off (after the Install Node and Configure Node functions)	KWIC in Fail Safe (no active communications)
Steady Off (Before Configure Node has been performed.)	Need to install and configure the KWIC Assembly

ECHELON HARDWARE VISUAL CHECK

The status LED will indicate certain conditions on the KWIC Echelon Assembly. Table 4 shows the status checks you can perform via this LED's properties.

ALARM CONDITION STEPS AT THE KWIC ECHELON ASSEMBLY

If the status LED on the PIB fast blinks (see Table 4 above), your KWIC device may be in an alarm condition. If you suspect the KWIC Assembly is in alarm condition, perform a Check Node to try to determine the Echelon Error Code (see Table 5). Follow the Troubleshooting Procedure listed in Table 5 for the Error Code you have determined.

The list that follows catalogs the most common reasons you may find the system in an alarm condition:

1. If an Output Module on a KWIC Assembly is replaced with a different type of output module after the original Configure Function was performed.
2. If a KWIC Echelon Assembly is configured without all programmed Output Modules installed at the time of configure.
3. If a KWIC Echelon Assembly is configured without the Expansion Assembly connected to the Echelon Assembly via the interconnect cable at the time of configuration.
4. If the RC-2000 is reconfigured to modify the number of Network Digital Output boards within the system (either adding or removing a Network Output Module after the KWIC Assembly was already configured).
5. If an Output Module on a KWIC Assembly has malfunctioned.

NOTE

Hot Swappable Output Modules on a KWIC Output Module may be removed and replaced with the same type of module without reconfiguring the KWIC Assembly.

KWIC/ECHELON HARDWARE CHECKS

Improper hardware hookup will cause the KWIC device to malfunction. To determine if the KWIC device's hardware is hooked up correctly make sure the following is done:

Make sure **24VAC POWER** is present at the **J105 connector's top two pins**.

Remove the first output module from the Kysor assembly to see the **channel group selector switch (SW200) on the Buss board**. The switch should be set as follows:

- **"Up:" 1-4** (for the **Assembly** with the **Echelon Engine**) and
- **"Down" 5-8** (for the **KWIC Assembly** used for **expansion**)

Make sure all output modules are connected to both the driver assembly and the expansion assembly.

NOTE: If **ALL** output modules are not installed, **reconfigure** the KWIC assembly.

When using a KWIC **EXPANSION** Assembly, ***make sure*** it is **CONNECTED** to the KWIC **Driver** Assembly in the Expansion port with ECT Chassis Interconnect cable (Part # 5025014400-02, -04, or –20).

Check the cable connection for the Echelon communication at the P1 connection on the Echelon Engine and at the LON connector on the MIP Daughterboard on the RC-2000.

IMPORTANT: The Echelon communication at the P1 connection on the Echelon Engine must be secure for the device to communicate properly.

Check that one 51ohm ¼ watt resistor is connected across the connector at either the P1 connection on the KWIC Echelon engine or the LON connector at the MIP Daughterboard at the RC-2000.

IMPORTANT: No more than one 51ohm resistor should be installed on a single network.

Make sure that the yellow LON LED (LD1) is lit on the RC-2000.

Suggestion: If it is not lit, reset the RC-2000 by interrupting the power.

Check the status. If the status does not end with the four digits [0000], then refer to Table 5 for a description of specific error codes. If the error code is not listed, then perform the node check procedure found in the software setup section of this manual.

IMPORTANT: The digital output interface setup shouldn't have more outputs allocated than the KWIC assemblies have modules to support.

RC-2000/KWIC ECHELON ASSEMBLY COMMUNICATIONS

To determine if the KWIC malfunction is the result of improper communication setup follow the procedures listed below.

Look at the red status LED, DS100 on the PIB. Make sure it is lit steady on.

Place the programmed relays in override at the RC-2000 via the software.

All KWIC relay light indicators should react according to override.

Enter the Board Status screen in the RC-2000.

The KWIC modules and all programmed KWIC boards for Digital Output should display as **ONLINE**.

To access the Board Status Screen, follow this path:

a. Press [EXIT] until you arrive at the Main Menu.
b. Press [7], System.
c. Press [5], I/O List.
d. Press [5], Board Status.

IMPORTANT

The system status LED should be lit if the above checks are verified.

If it is not, the KWIC may be malfunctioning because of a hardware problem.

Check DipSwitches S1 and S2 on the Echelon Engine.

ALL SWITCHES should be set to OFF.

TABLE 5 – RC-2000-KWIC ERROR MESSAGES

ECI ERROR CODE #	MEANING	TROUBLESHOOTING PROCEDURE
1	KWIC Assembly has lost reliable communications with RC-2000.	1. Check the Dig Out Interface Screen. 2. Make sure boards are assigned as Network.
2	Switch Block S2, Switches 1 through 5 (no. of relays per relay board) are set incorrectly.	All switches on Switch Blocks S1 and S2 should be off for the RC-2000.
3	Switch Block S2 Switches 1 through 5 (no. of relays per relay board) are set incorrectly.	All switches on Switch Blocks S1 and S2 should be off for the RC-2000.
4	KWIC Assembly does not have enough control points installed to support all control point assignments assigned in RC-2000.	• A malfunctioning module was installed. OR • More modules need to be installed.
17	Module installed in Channel 1 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new one.
18	Module installed in Channel 2 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new one.
19	Module installed in Channel 3 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new one.
20	Module installed in Channel 4 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new one.
21	Module installed in Channel 5 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new one.

ECI ERROR CODES	MEANING	TROUBLESHOOTING PROCEDURE
22	Module installed in Channel 6 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new one.
23	Module installed in Channel 7 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new one.
24	Module installed in Channel 8 of KWIC Driver Chassis Assembly has • been removed, • been replaced with a different type of module, or • has malfunctioned.	1. First, replace any removed modules. 2. If problem still exists, verify the module is the correct type (i.e., circuit or compressor). 3. Otherwise, replace the malfunctioning module with new on.
25	Switch Block S2, Switches 1 through 5 (no. of relays per relay board) are all off.	This is a WARNING, not an error. This warning is common during installations and after power resets. NOTE For the RC-2000 this message is normal during installation and after power resets.
26	Switch Block S1, Switches 1 through 8 (subnet address) are set incorrectly.	All switches on Switch Blocks S1 and S2 should be off for the RC-2000.
27	Switch Block S2, switches 6 through 8 (node address) are set incorrectly.	All switches on Switch Blocks S1 and S2 should be off for the RC-2000.

KWIC/RS485 ASSEMBLY TROUBLESHOOTING

To determine if the KWIC malfunction is the result of improper RS485 communication setup, follow the procedures listed below:

Look at the green status LED (LD2) on the RS485 Engine Board. Upon power up it goes on, and remains on during the power up procedure (approximately 15 seconds). After power-up, however, the green light should go off.

If the status LED remains on AFTER the power-up procedure, a problem has been detected in either the program or hardware.

KWIC/RS485 HARDWARE CHECKS

Perform the following checks to determine if the KWIC malfunction is the result of a hookup error:

1. Check the wiring of the P1 connector on the RS485 Engine Board. This connector is for the RS485 network connections. Observe the polarity on this connection to make sure it is correct throughout the loop.
2. Check connector J105 on the PIB Engine Board, this connector is for power connection. Make sure that 24VAC is applied at the J105 connector's top two pins.
3. Remove the first output module from the Kysor Assembly to see the channel group selector switch (SW200) on the Buss Board. The switch should be set as follows:
   - "Up:" 1-4 for the KWIC RS485 Assembly
   - "Down:" 5-8 for the KWIC Expansion Assembly
4. Make sure all output modules are connected to both the Driver Assembly and the Expansion Assembly.

> **NOTE**
> If ALL Output modules are not installed, remap the KWIC Assembly.

5. When using a KWIC Expansion Assembly, make sure it is connected to the KWIC Driver Assembly in the Expansion port with ECT Chassis Interconnect cable (Part # 5025014400-02, -04, or –20).
6. On the RS485 Engine Board, verify that Switch Block 1 is properly set for board addressing.
7. On Switch Block 1, DipSwitches 6 & 7, verify that the baud rate setting is correct, as compared to the other I/O boards, and the CPC controller.
8. On Switch Block 2, check DipSwitches 1 & 2 for uniform polarity settings within the RS485 communication loop.

TABLE 6 – PIB STATUS LED (DS100) CHECKS/KWIC RS485 CHASSIS ASSEMBLY

STATE OF STATUS LED 'DS100' ON THE PIB BOARD	CONDITION
Steady On	Installed with satisfactory operation
Fast Blink	Alarm condition in KWIC processor Note: Try to remap the system again
Steady Off (after the installation and remap)	KWIC in Fail Safe (no active communications)
Steady Off (Before Installation has been performed.)	Need to install and remap the system

START UP/REMAP PROCEDURE

If the system is not responding to commands, it may need remapped.

NOTE

You must perform the remap/initialization process upon initial KWIC Device start up or KWIC Device configuration changes.

You do not have to perform the remap process for DipSwitch changes or to replace failing modules of the same type.

REMAP SYSTEM STEPS

Follow the steps below if the system needs remapped.

1. Power down the KWIC Device by disconnecting the J105 24VAC connector on the PIB Board.
2. Set all DipSwitches on Switch Blocks S1, S2, and S3 as per the system guidelines.
3. Set Switch 8 on Switch Block 1 (S1) to the up 'ON' position.
4. Power up the KWIC Device by reconnecting the J105 24VAC connector on the PIB Board. [Upon restart of the KWIC Device, wait for the green LED (LD1 'ST') on the RS485 Engine board to go out (approximately 15 seconds).]
5. Push the Cnfg/Svc Switch on the PIB Board until the status light on the PIB Board lights.
6. Set Switch 8 on Switch Block 1 (S1) to the down 'OFF' position.
7. Watch for the green LED (LD1 ST) on the RS485 Engine to go off (when the green LED goes off, the remap process is finished. The system is ready for operation).

NOTE

If any switch is changed, the change will not take effect until power is removed and reapplied.

The malfunction within the unit may be the result of the software programming if:

- hardware settings check out okay,
- the system does not need remapped,
- after performing the remap process, the KWIC Device still does not respond to commands.

If you think this may be the case, consult an authorized service technician.

APPENDIX A – NEW ORDER AND REPLACEMENT PART LISTING

KWIC ASSEMBLY PARTS LISTING

NEW ORDER PARTS

The following tables list all ECT part numbers for KWIC assemblies and components. Refer to **Table 7** when ordering **new parts** and **Table 8** when ordering **replacement parts**.

Table 7 references all part numbers that should be used when placing new orders.

TABLE 7– KWIC ASSEMBLY NEW ORDER PART NUMBERS

KWIC/NEW PARTS		PART # (NEW ORDER)
Assembly Options	**Echelon FTT-10A Chassis Assembly**	CC/25004400
	RS-485 Chassis Assembly (CPC)	CC/25004403
	Dry Contact Assembly (no engine board required)	CC/25004402
	Expansion Chassis Assembly (no engine board required)	CC/25004401
Output Module Options	**Control Output Module:** (a maximum of four per assembly)	
	1. Circuit Module	CC/25005400
	2. Compressor Module	CC/25006400
	3. Blank Module Cover Assembly	CC/25008400
Connection Cables	**Chassis Interconnection Cable**	
	1. 2 foot interconnect cable	5025014400-02
	2. 4 foot interconnect cable	5025014400-04
	3. 20 foot interconnect cable	5025014400-20

REPLACEMENT PARTS

Table 8 references all part numbers that should be used when placing new orders for replacement parts.

TABLE 8– KWIC ASSEMBLY REPLACEMENT PART NUMBERS

KWIC/REPLACEMENT PARTS	REPLACEMENT PART #
Chassis Plate	1225012300
Buss Board:	5125002400, Rev. A
Processor Interface Board (PIB):	51250034-1, Rev. A
Engine Board:	
1. Echelon Engine Board	5130001400, Rev. 0
2. RS485 Engine Board (CPC)	5130004400, Rev. 0
PIB Cover:	
1. PIB Cover/Echelon	CC/25011400
2. PIB Cover/RS485	CC/25011402
3. PIB Cover/Expansion	CC/25011403
Control Output Module Options	
1. Circuit Module	CC/25005400
2. Compressor Module	CC/25006400
3. Blank Module Cover Assembly	CC/25008400
KWIC ACCESSORIES	
Crimping Tool	CC/CRIMP-1
RJ-11 Connectors, 2 per kit	RJ-11 CONN
6 Conductor Cable, 1000’	01637402

APPENDIX B – GLOSSARY OF TERMS

KWIC DEVICE COMPONENTS:

Chassis Plate: The Base Mounting Plate of the KWIC Assembly.
Note: It is an aluminum back plate for mounting and supporting all of the electronics in the KWIC assembly.

Chassis Assembly: Includes the chassis plate and attached buss board, the processor interface board (PIB), and the engine board (if required). Also includes the PIB cover and the blank module cover assembly. Supports Echelon or RS485 communication, depending on the type installed.

KWIC Device Assembly: The Chassis Assembly plus attached control output modules.

Buss Board: Provides connections for the control output modules and the processor interface board. It distributes communication signals to and from the control output modules.

Processor Interface Board (PIB): Provides the interface between the engine board that does the processing and the buss board that distributes the signals to the control output modules.

Engine Board: Incorporates the processor and the communication circuitry on the board. It attaches to the PIB.

Processor Interface Board Cover: A metal covering over the PIB and Engine Board area.

Circuit Output Module: Supports output control from the KWIC Assembly. Connects into the buss board and will control a maximum of four refrigeration circuits per chassis module.

Compressor Output Module: Supports output control from the KWIC Assembly. Connects into the buss board and will control a maximum of four compressors per chassis module.

APPENDIX C
INSTALLATION DIAGRAMS AND FIGURES

FIGURE 1: KYSOR//WARREN KWIC ASSEMBLY TRANSFORMER POWER WIRING
FIGURE 2: KYSOR//WARREN KWIC ASSEMBLY LOAD CONNECTION DIAGRAM
FIGURE 2A: KYSOR//WARREN KWIC ASSEMBLY CIRCUIT LOAD CONNECTION DIAGRAM
FIGURE 2B: KYSOR//WARREN KWIC ASSEMBLY COMPRESSOR LOAD CONNECTION DIAGRAM
FIGURE 3: KYSOR//WARREN KWIC ASSEMBLY ECHELON/PIB CONNECTION
FIGURE 3A: KYSOR//WARREN KWIC ASSEMBLY RS-485/PIB CONNECTION
FIGURE 4: KYSOR//WARREN KWIC CIRCUIT MODULE FEATURES AND FUNCTIONS
FIGURE 5: KYSOR//WARREN KWIC COMPRESSOR MODULE FEATURES AND FUNCTIONS