**WARNING** notices as used in this instruction apply to hazards or unsafe practices that could result in personal injury or death.

**CAUTION** notices apply to hazards or unsafe practices that could result in property damage.

**NOTES** highlight procedures and contain information that assists the operator in understanding the information contained in this instruction.

### WARNING

**INSTRUCTION MANUALS**

DO NOT INSTALL, MAINTAIN, OR OPERATE THIS EQUIPMENT WITHOUT READING, UNDERSTANDING, AND FOLLOWING THE PROPER **Elsag Bailey** INSTRUCTIONS AND MANUALS; OTHERWISE, INJURY OR DAMAGE MAY RESULT.

**RADIO FREQUENCY INTERFERENCE**

MOST ELECTRONIC EQUIPMENT IS INFLUENCED BY RADIO FREQUENCY INTERFERENCE (RFI). CAUTION SHOULD BE EXERCISED WITH REGARD TO THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT IN THE AREA AROUND SUCH EQUIPMENT. PRUDENT PRACTICE DICTATES THAT SIGNS SHOULD BE POSTED IN THE VICINITY OF THE EQUIPMENT CAUTIONING AGAINST THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT.

**POSSIBLE PROCESS UPSETS**

MAINTENANCE MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL AND ONLY AFTER SECURING EQUIPMENT CONTROLLED BY THIS PRODUCT. ADJUSTING OR REMOVING THIS PRODUCT WHILE IT IS IN THE SYSTEM MAY UPSET THE PROCESS BEING CONTROLLED. SOME PROCESS UPSETS MAY CAUSE INJURY OR DAMAGE.

---

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The IEMMU11, IEMMU12, IEMMU21, and IEMMU22 are module mounting units used to house standard INFI 90 ® OPEN system modules and the BRC-100 Harmony Bridge Controller module of the Symphony™ Enterprise Management and Control System in system cabinets. The mounting units are available with a front or rear mount card chassis and are available with or without primary power distribution.

**NOTE:** The IEMMU11, IEMMU12, IEMMU21, and IEMMU22 Module Mounting Units can replace existing IEMMU01 and IEMMU02 Module Mounting Units.

This instruction explains how to install and maintain the module mounting unit.
List of Effective Pages

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<tr>
<td>Preface</td>
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<td>4-1 through 4-2</td>
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</tr>
<tr>
<td>5-1 through 5-4</td>
<td>Original</td>
</tr>
<tr>
<td>6-1</td>
<td>Original</td>
</tr>
<tr>
<td>Index-1 through Index-2</td>
<td>Original</td>
</tr>
</tbody>
</table>

When an update is received, insert the latest changed pages and dispose of the superseded pages.

**NOTE:** On an update page, the changed text or table is indicated by a vertical bar in the outer margin of the page adjacent to the changed area. A changed figure is indicated by a vertical bar in the outer margin next to the figure caption. The date the update was prepared will appear beside the page number.
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</tr>
</tbody>
</table>
## Safety Summary

### GENERAL WARNINGS

**Equipment Environment**
All components, whether in transportation, operation or storage, must be in a noncorrosive environment.

**Electrical Shock Hazard During Maintenance**
Disconnect power or take precautions to insure that contact with energized parts is avoided when servicing.

### SPECIFIC WARNINGS

Disconnect power before installing the processor bus adapter mounting bracket on the module mounting unit backplane. Failure to do so will result in contact with cabinet areas that could cause severe or fatal shock. (p. 3-5)

There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death. (p. 5-2)

Allow 30 seconds for the line filter capacitors to discharge before handling the power module. Failure to do so could result in severe or fatal shock. (p. 5-4)

Handle the module by surfaces other than the heat sink. The heat sink may be hot and may cause severe burns. (p. 5-4)

### SPECIFIC CAUTIONS

Installation of more than two power modules will result in loss of regulation and voids the warranty. Equipment damage will result. (p. 3-3)
Trademarks and Registrations

Registrations and trademarks used in this document include:

® INFI 90 Registered trademark of Elsag Bailey Process Automation
™ Symphony Trademark of Elsag Bailey Process Automation
SECTION 1 - INTRODUCTION

OVERVIEW

The IEMMU11, IEMMU12, IEMMU21, and IEMMU22 are module mounting units used to house standard INFI 90 OPEN system modules and the BRC-100 Harmony Bridge Controller module of the Symphony system in system cabinets.

NOTE: IEMMU11, IEMMU12, IEMMU21, and IEMMU22 Module Mounting Units can be used as replacements for IEMMU01 and IEMMU02 Module Mounting Units. They can also be installed along with IEMMU01 and IEMMU02 units; however, transition board assemblies are required for interconnection between IEMMU11, IEMMU12, IEMMU21, or IEMMU22 units and IEMMU01 or IEMMU02 units.

The module mounting unit consists of a sheet metal card chassis and a printed circuit board backplane assembly. The open top and bottom structure allow air to flow over the modules. Mounting flanges are provided for mounting the mounting unit in a standard Elsag Bailey 483-millimeter (19-inch) cabinet.

Modules can be installed and removed quickly and easily. The module is held in position by card guides, the connectors on the backplane, and the module’s front panel, captive fastening latches.

The backplane is a multilayer printed circuit board assembly containing electronic components, dipshunt sockets, connectors, and jumpers. In most cases, the mounting unit provides direct I/O cable coupling to the modules. The exception to this is when a BRC-100 Harmony Bridge Controller module is installed in the MMU. Refer to PROCESSOR BUS ADAPTER BRACKETS INSTALLATION in Section 3 for further explanation.

IEMMU11 and IEMMU12 Module Mounting Units

The IEMMU11 and IEMMU12 module mounting units provide physical mounting for up to 12 system modules or ten system modules and a maximum of two IEPAS02, IEPDS01/02, IEPAF02, and IEPDF01/02 power modules. They also provide electrical distribution of I/O expander bus, module bus, and Controlway signals; distribution of regulated power supply voltages (+5 volts, +15 volts, −15 volts and 24 volts); and distribution of primary power.

Primary power is the 120/240 VAC or 24/48 VDC that supplies power to power modules (IEPAS02, IEPAF02, IEPDS01, IEPDF01, IEPDS02 and IEPDF02) that can be mounted in the
mounting units. Typically, systems that use IEMMU01/02 do not use distributed primary power to the mounting units. Systems that use Modular Power System II do not allow distributed primary power to the mounting units.

The IEMMU11 module mounting unit is used when the cabinet configuration requires a rear mount chassis with primary power distribution.

The IEMMU12 module mounting unit is used when the cabinet configuration requires a front mount chassis with primary power distribution.

IEMMU11 and IEMMU12 Module Mounting Units

The IEMMU21 and IEMMU22 module mounting units provide physical mounting for up to 12 system modules; provide electrical distribution of I/O expander bus, module bus, and Controlway signals; and distribution of regulated power supply voltages (+5 V, +15 V, and –15 V). The IEMMU21/22 module mounting units are the preferred choice for use with Modular Power System II.

The IEMMU21 module mounting unit is used when the cabinet configuration requires a rear mount chassis with no primary power distribution.

The IEMMU22 mounting unit is used when the cabinet configuration requires a front mount chassis with no primary power distribution.

IEMMU01 AND IEMMU02 REPLACEMENT

The IEMMU11, IEMMU12, IEMMU21, and IEMMU22 units are functional equivalents to existing IEMMU01 and IEMMU02 units. The I/O expander bus interconnect cables are different however. The new module mounting units utilize a grey ribbon cable (refer to Table 5-1 for part number) to connect I/O expander bus between adjacent units. This cable replaces the amber colored interconnect cable used on the IEMMU01 or IEMMU02 unit.

IEMMU01 AND IEMMU02 CONNECTION

A transition board (refer to Table 5-3 for part number) is needed if an IEMMU11, IEMMU12, IEMMU21, or IEMMU22 unit is to be connected to an IEMMU01 or IEMMU02 unit. The amber color interconnect cable connects from the IEMMU01 or IEMMU02 unit to the transition board plugged into the IEMMU11, IEMMU12, IEMMU21, or IEMMU22 unit backplane. Refer to TRANSITION BOARD INSTALLATION in Section 3 for details.
INTENDED USER

Personnel installing, operating, or maintaining the mounting units should read this manual before performing any installation, maintenance or replacement procedures. Installation requires an engineer or technician with experience in handling electronic circuitry.

FEATURES

The backplane in these mounting units has several features:

• I/O expander bus interconnect cables based on 2.54-millimeter (0.1-inch) center ribbon cable technology for enhanced robustness. Cables come in choice of two lengths: 38 millimeter (1.5 inches) and 171 millimeter (6.75 inches).

• Ability to segment Controlway or module bus into three segments on the backplane, which provides for increased density and lower costs.

• Available with or without primary power distribution. Module mounting unit with primary power distribution is only needed for AC and DC Modular Power Systems configured for primary power distribution.

INSTRUCTION CONTENT

This instruction contains the following sections:

Introduction Contains an overview of the mounting unit, a hardware description, and performance and environmental specifications.

Description and Operation Describes and explains the functional and electronic operation of the module mounting unit.

Installation Describes mounting procedures and location of the mounting unit in the cabinet. Provides information on I/O, expander bus, and module bus connectors as well as jumper settings for segmenting Controlway or module bus. This section also contains a processor bus adapter bracket installation procedure necessary to mount a processor bus adapter for a Harmony bridge controller module.

Maintenance Provides a maintenance schedule.

Repair/Replacement Procedures Details how to replace the mounting unit backplane assembly. It also contains the MMU parts list.

Support Services Describes the support services (training, documentation, etc.) available from Elsag Bailey.
HOW TO USE THIS INSTRUCTION

Read this instruction through in sequence. Read the installation section thoroughly. It is important to become familiar with the entire content of this instruction before installing the modules in the mounting unit.

1. Read and perform all steps in the installation section.

2. Refer to the maintenance section for scheduled maintenance requirements.

3. Refer to the repair/replacement procedures section to find instructions on how to replace the backplane printed circuit board assembly or the mounting unit.

4. Refer to the repair/replacement procedures section for a complete list of parts including part numbers and nomenclatures.

GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-1 lists definitions of abbreviations used in this instruction that are unique to Elsag Bailey or have a definition that is different from standard industry usage.

Table 1-1. Glossary of Terms and Abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlway</td>
<td>High speed, redundant, peer-to-peer communication link. Used to transfer information between intelligent modules within a process control unit.</td>
</tr>
<tr>
<td>MMU</td>
<td>Module mounting unit. A card chassis that provides electrical and communication support for system modules.</td>
</tr>
<tr>
<td>Module bus</td>
<td>Peer-to-peer communication link used to transfer information between intelligent modules within a process control unit.</td>
</tr>
</tbody>
</table>

DOCUMENT CONVENTIONS

The ? in a part number identifies any part number positions that are variable positions (e.g., 1949480?1). The ? is a place holder for the revision letter.

REFERENCE DOCUMENTS

Table 1-2 lists the documents referenced in this instruction or customer support documentation. Refer to this documentation as needed.
**Table 1-2. Reference Documents**

<table>
<thead>
<tr>
<th>Number</th>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-E96-506</td>
<td>AC Modular Power System</td>
</tr>
<tr>
<td>I-E96-508</td>
<td>DC Modular Power System</td>
</tr>
<tr>
<td>WBPEEUI210502?0</td>
<td>Modular Power System II</td>
</tr>
<tr>
<td>WBPEEUI230017?0</td>
<td>Harmony Bridge Controller</td>
</tr>
</tbody>
</table>

**NOMENCLATURE**

Table 1-3 is a list of mounting unit nomenclature.

**Table 1-3. Nomenclature**

<table>
<thead>
<tr>
<th>Nomenclature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEMMU11</td>
<td>Rear mount chassis module mounting unit with primary power distribution.</td>
</tr>
<tr>
<td>IEMMU12</td>
<td>Front mount chassis module mounting unit with primary power distribution.</td>
</tr>
<tr>
<td>IEMMU21</td>
<td>Rear mount chassis module mounting unit without primary power distribution.</td>
</tr>
<tr>
<td>IEMMU22</td>
<td>Front mount chassis module mounting unit without primary power distribution.</td>
</tr>
</tbody>
</table>

**RELATED HARDWARE**

Table 1-4 is a list of related hardware.

**Table 1-4. Related Hardware**

<table>
<thead>
<tr>
<th>Part Number/ Nomenclature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEPAF02</td>
<td>AC input field power module</td>
</tr>
<tr>
<td>IEPAS02</td>
<td>AC input system power module</td>
</tr>
<tr>
<td>IEPDS01</td>
<td>24 VDC input system power module</td>
</tr>
<tr>
<td>IEPDS02</td>
<td>48 VDC input system power module</td>
</tr>
<tr>
<td>IEPDF01</td>
<td>24 VDC input field power module</td>
</tr>
<tr>
<td>IEPDF02</td>
<td>48 VDC input field power module</td>
</tr>
<tr>
<td>IEPMU01</td>
<td>Power mounting unit</td>
</tr>
<tr>
<td>IEPMU02</td>
<td>Power mounting unit</td>
</tr>
<tr>
<td>1948506?8</td>
<td>System power bus bar</td>
</tr>
<tr>
<td>1948516?3</td>
<td>Input power bus bar</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

Table 1-5 lists the specifications for the IEMMU11, IEMMU12, IEMMU21, and IEMMU22 mounting units.
### Table 1-5. Specifications

<table>
<thead>
<tr>
<th>Property</th>
<th>Characteristic/Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>12 modules</td>
</tr>
<tr>
<td>Mounting</td>
<td>Standard 483-mm (19-in.) cabinet</td>
</tr>
<tr>
<td>Ambient temperature (operating)</td>
<td>Temperature rating within the enclosure or cabinet. Internal cabinet rating: 0° to 70°C (32° to 158°F)</td>
</tr>
<tr>
<td>Relative humidity (operating)</td>
<td>5% to 95% up to 55°C (131°F), noncondensing</td>
</tr>
<tr>
<td></td>
<td>5% to 45%, up to 70°C (158°F), noncondensing</td>
</tr>
<tr>
<td>Storage and transport temperature</td>
<td>–40° to 85°C (–40° to 185°F)</td>
</tr>
<tr>
<td>Storage and transport relative humidity</td>
<td>0% to 95%, noncondensing</td>
</tr>
<tr>
<td>Air quality</td>
<td>Noncorrosive</td>
</tr>
<tr>
<td>Primary power</td>
<td>120/240 VAC, 24/48 VDC (IEMMU11/IEMMU12 only)</td>
</tr>
<tr>
<td>Regulated DC voltages</td>
<td>+5 VDC, +15 VDC, –15 VDC, +24 VDC, MCOM, I/O COM</td>
</tr>
<tr>
<td>Amperage ratings</td>
<td>Refer to Table 1-6</td>
</tr>
<tr>
<td>EMI/RFI</td>
<td>Meets IEC 1000.3, level 3, 80 MHz to 1 GHz with no loss of function or false status information</td>
</tr>
<tr>
<td>Fast transient/burst susceptibility</td>
<td>Meets IEC 1000.4, level 3, mains 2 kV at 2.5 kHz, outputs 1 kV at 5.0 kHz with no loss of function or false status information</td>
</tr>
<tr>
<td>Transient surge</td>
<td>Meets IEC 1000.5, level 3, 2 kV with no loss of function or false status information</td>
</tr>
<tr>
<td>Electrostatic discharge</td>
<td>Meets IEC 1000.2 level 3, with no loss of function or false status information</td>
</tr>
<tr>
<td>Emissions</td>
<td>Meets CISPR11 with amendments 92/31/EEC and 93/68/EEC</td>
</tr>
<tr>
<td>Vibration</td>
<td>13.2 to 100 Hz, 0.7 Gs 2 to 13.2 Hz, 12 mm (0.47 in.) p-p displacement</td>
</tr>
<tr>
<td>Dimensions</td>
<td>483 mm by 178 mm by 304 mm (19 in. by 7 in by 12.2 in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>3.63 kg (8.0 lb.)</td>
</tr>
<tr>
<td>Certifications (pending)</td>
<td>CSA certified for use as process control equipment in an ordinary (nonhazardous) location</td>
</tr>
<tr>
<td></td>
<td>Nonincendive:</td>
</tr>
<tr>
<td></td>
<td>CSA: Class I, Division 2, Groups A,B,C,D</td>
</tr>
<tr>
<td></td>
<td>FM: Class I, Division 2, Groups A,B,C,D</td>
</tr>
<tr>
<td>Flammability (UL94)</td>
<td>Materials rated at V0, V1, V2 or V5 wires and cables rated UL VW-1</td>
</tr>
<tr>
<td>Installation category (IEC 1010-1)</td>
<td>Category I for outputs, Category II for mains</td>
</tr>
<tr>
<td></td>
<td>Pollution degree I</td>
</tr>
</tbody>
</table>

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE
**Table 1-6. Amperage Ratings**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Power Supply Load IEMMU11/12 only (Maximum Amperage)</th>
<th>Module Load (Maximum Amperage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per Slot</td>
<td>Per MMU</td>
</tr>
<tr>
<td>Primary AC power</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Primary DC power</td>
<td>6.5</td>
<td>13</td>
</tr>
<tr>
<td>+5 V</td>
<td>13</td>
<td>20&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>+15 V</td>
<td>0.8</td>
<td>1.6</td>
</tr>
<tr>
<td>−15 V</td>
<td>0.8</td>
<td>1.6</td>
</tr>
<tr>
<td>+24 V</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

**NOTE:**
1. The stated current rating applies to current flowing into or out of P45 and P46.
SECTION 3 - INSTALLATION

INTRODUCTION

Normally the module mounting unit is already installed in the system cabinet and ready for service. Power and process control modules and the wiring and cable connections are usually completed. This section describes the jumper selections for Controlway and module bus segmenting and provides an illustration showing cable connections to and from the mounting unit. This section also contains the processor bus adapter (PBA) bracket installation procedure and tables and figures with the mounting unit backplane connector pin assignments. This information is provided in the event that repair or replacement is required.

TOOLS

The following tools are needed for module mounting unit installation and connection:

- Cable inserter for installing and removing the two five-conductor flat cables for power, PFI, and module status signals on the backplane (refer to Table 5-3 for Elsag Bailey part number).

  NOTE: The cable inserter is not needed if using individual wires for connecting power, PFI, and module status (Fig. 3-2).

- 16-inch Phillips-head screwdriver.
- 12-inch flatblade screwdriver.

CONTROLWAY AND MODULE BUS SEGMENTING

Jumpers J1 through J4 on the mounting unit backplane circuit board split the Controlway or module bus signal. Up to three segments can be created. J1 and J4 control bus B while J2 and J3 control bus A. With the jumpers set 2 to 3, the signal continues across the backplane. With the jumpers set 1 to 2, the signal is broken and connected to a separate pull-up circuit. Refer to Figure 3-1 for jumper locations and to Table 3-1 for jumper settings.
NOTE: Refer to Table 5-2 for the part numbers for the fasteners described in this installation procedure.

The module mounting unit is mounted to the cabinet mounting rails using four 10-32 clip nuts and four 10-32 × 0.5-inch screws. Notched flanges on the card chassis portion of the mounting unit are used for mounting.

The IEMMU11 and IEMMU21 mount from the rear of the cabinet and the IEMMU12 and IEMMU22 mount from the front of the cabinet.

The IEMMU11 and IEMMU21 mounting units provide physical mounting for up to 12 system modules, or ten system modules and a maximum of two power modules. The IEMMU12 and IEMMU22 mounting units provide physical mounting for up to 12 system modules.
Table 3-2 and Figure 3-2 provide connection information for systems using an AC modular power system, a DC modular power system, and Modular Power System II.

In standard configurations, interconnection between mounting units is accomplished using the NKEB01 expander bus cable. A longer NKEB02 expander bus cable is also available. For information about connecting an IEMU11, IEMU12, IEMU21, or IEMU22 unit to an IEMU01 or IEMU02 unit, refer to TRANSITION BOARD INSTALLATION in this section.

Installation and connection of the power system and power modules is described in their respective modular power system instruction. Refer to Table 1-2 for document numbers.

If all the module slots are not being filled, be certain to install the IMBLK01 blank faceplate in any module slot without a module. This plastic shield insures proper cooling (air flow).

TRANSITION BOARD INSTALLATION

When installing an IEMU11, IEMU12, IEMU21, or IEMU22 mounting unit into a cabinet that is using IEMU01 or IEMU02 mounting units, a transition board is required for the I/O expander bus connection between the different mounting units (e.g., IEMU22 unit connected to an IEMU01 unit).

1. The transition board is installed on the IEMU11, IEMU12, IEMU21, or IEMU22 mounting unit backplane. With the tabs on the connector (P58 or P60) open, carefully install the transition board on the pins of the connector and press into position. Be careful not to damage the pins.

   **NOTE:** Transition board assembly must be installed in the left-hand connector socket (as viewed from the rear) of the mounting unit backplane, connector P58 or P60.

2. Squeeze the two tabs on the connector together to lock the transition board in position.

3. Use expander bus interconnect cable (Fig. 3-2). Install the cable onto the transition board by positioning the two locating pins on the cable into the holes on the transition board.

4. Once in place, slide the red plastic locking tab on the cable to secure the cable in position.

CAUTION

Installation of more than two power modules will result in loss of regulation and voids the warranty. Equipment damage will result.
Table 3-2. MMU Cables (Fig. 3-2)

<table>
<thead>
<tr>
<th>Cable Number</th>
<th>Part Number/ Nomenclature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NKEB01 38-mm (1.5-in.) cable</td>
<td>(IEMMU11/12/21/22 only)</td>
</tr>
<tr>
<td></td>
<td>NKEB02 171.5-mm (6.75-in.) cable</td>
<td>(IEMMU11/12/21/22 only)</td>
</tr>
<tr>
<td></td>
<td>1948502?0340 Cable (IEMMU01/02 to transition board)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1948509?5 Cable — 2 required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6632285?54 0.84 sq-mm (18 AWG) wire — 10 required</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6637818?1 Cable</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6637818?2 Cable</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6640006?1 Three 0.84 sq-mm (18 AWG) twisted wires</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3-2. Module Mounting Unit Connections (Table 3-2)
NOTE: Refer to Table 5-2 for the part numbers for the fasteners described in this installation procedure.

A processor bus adapter (PBA) must be installed on the back of the module mounting unit when a BRC-100 Harmony Bridge Controller module is used. The PBA is necessary to connect the controller module to Hnet for communication with a Harmony I/O system. The Hnet bus is the communication path between a BRC-100 module and Harmony I/O blocks.

Installation requires attaching PBA mounting brackets to the back of the module mounting unit, then attaching a PBA assembly to the brackets in each controller module position. The following procedure details PBA mounting brackets installation. Refer to the Harmony Bridge Controller instruction for PBA assembly installation and cable connection.

To install the PBA mounting brackets:

1. Turn off power to the cabinet.
2. Remove the top five screws that secure the backplane assembly to the back of the MMU.
3. Install one PBA mounting bracket to the top of the module mounting unit backplane assembly using five of the 5-40 screws provided with the brackets (Fig. 3-3).
4. Remove the bottom five screws that secure the backplane assembly to the back of the MMU.
5. Install the other mounting bracket to the bottom of the backplane assembly using five 5-40 screws.

WARNING

Disconnect power before installing the processor bus adapter mounting bracket on the module mounting unit backplane. Failure to do so will result in contact with cabinet areas that could cause severe or fatal shock.

Refer to Table 3-3 for a description of connectors P36 through P40. Refer to Table 3-4 for a description of connectors P41 through P55. Figure 2-1 shows the locations of all connectors.

Table 3-5 provides a description of the output signal connectors, P25 through P35. Figure 3-4 shows the pin location.
Table 3-6 provides a description of the P1 connector. Figure 3-5 shows the pin location.

Table 3-7 provides a description of the P2 (I/O expander bus) connector. Figure 3-6 shows the pin location.
### Table 3-3. Input Power Signals

<table>
<thead>
<tr>
<th>Signal</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE</td>
<td>P36</td>
</tr>
<tr>
<td>NEUTRAL</td>
<td>P37</td>
</tr>
<tr>
<td>GROUND</td>
<td>P38</td>
</tr>
<tr>
<td>+24 V_IN</td>
<td>P40</td>
</tr>
<tr>
<td>DCIN_COM</td>
<td>P39</td>
</tr>
</tbody>
</table>

### Table 3-4. Module Bus and Regulated Power Supply Signals

<table>
<thead>
<tr>
<th>Signal</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5V</td>
<td>P45, P46</td>
</tr>
<tr>
<td>MCOM</td>
<td>P48, P49, P55</td>
</tr>
<tr>
<td>+15V</td>
<td>P50</td>
</tr>
<tr>
<td>-15V</td>
<td>P51</td>
</tr>
<tr>
<td>PFI</td>
<td>P52</td>
</tr>
<tr>
<td>STATUS</td>
<td>P41</td>
</tr>
<tr>
<td>I/O COM</td>
<td>P42</td>
</tr>
<tr>
<td>+24V_OUT</td>
<td>P44</td>
</tr>
<tr>
<td>MOD_BUSA</td>
<td>P53</td>
</tr>
<tr>
<td>MOD_BUSB</td>
<td>P54</td>
</tr>
</tbody>
</table>

### Table 3-5. Output Signals

<table>
<thead>
<tr>
<th>Signal</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE</td>
<td>P25 - P35, pin 1</td>
</tr>
<tr>
<td>NEUTRAL</td>
<td>P25 - P35, pin 2</td>
</tr>
<tr>
<td>GROUND</td>
<td>P25 - P35, pin 3</td>
</tr>
<tr>
<td>DCIN_COM</td>
<td>P25 - P35, pin 4</td>
</tr>
<tr>
<td>+24V_IN</td>
<td>P25 - P35, pin 5</td>
</tr>
<tr>
<td>MCOM</td>
<td>P25 - P35, pin 6</td>
</tr>
<tr>
<td>+5 V</td>
<td>P25 - P35, pin 7</td>
</tr>
<tr>
<td>I/O COM</td>
<td>P25 - P35, pin 8</td>
</tr>
<tr>
<td>+24V_OUT</td>
<td>P25 - P35, pin 9</td>
</tr>
</tbody>
</table>
Figure 3-4. P25 - P35 Pin Location

Table 3-6. P1 Connector

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+5 V</td>
</tr>
<tr>
<td>2</td>
<td>+5 V</td>
</tr>
<tr>
<td>3</td>
<td>STATUS</td>
</tr>
<tr>
<td>4</td>
<td>MOD_BUSB</td>
</tr>
<tr>
<td>5</td>
<td>MCOM</td>
</tr>
<tr>
<td>6</td>
<td>MCOM</td>
</tr>
<tr>
<td>7</td>
<td>+15 V</td>
</tr>
<tr>
<td>8</td>
<td>-15 V</td>
</tr>
<tr>
<td>9</td>
<td>PFI</td>
</tr>
<tr>
<td>10</td>
<td>Spare 2</td>
</tr>
<tr>
<td>11</td>
<td>MOD_BUSA</td>
</tr>
<tr>
<td>12</td>
<td>Spare 1</td>
</tr>
</tbody>
</table>
Figure 3-5. P1 Connector
Pin Location

Table 3-7. P2 Connector
(I/O Expander Bus)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Data Line</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A10</td>
<td>Data bit 1</td>
</tr>
<tr>
<td>2</td>
<td>A11</td>
<td>Data bit 0</td>
</tr>
<tr>
<td>3</td>
<td>A8</td>
<td>Data bit 3</td>
</tr>
<tr>
<td>4</td>
<td>A9</td>
<td>Data bit 2</td>
</tr>
<tr>
<td>5</td>
<td>A6</td>
<td>Data bit 5</td>
</tr>
<tr>
<td>6</td>
<td>A7</td>
<td>Data bit 4</td>
</tr>
<tr>
<td>7</td>
<td>A4</td>
<td>Data bit 7</td>
</tr>
<tr>
<td>8</td>
<td>A5</td>
<td>Data bit 6</td>
</tr>
<tr>
<td>9</td>
<td>A2</td>
<td>Bus clock</td>
</tr>
<tr>
<td>10</td>
<td>A3</td>
<td>Synchronization</td>
</tr>
<tr>
<td>11</td>
<td>A0</td>
<td>Reserved</td>
</tr>
<tr>
<td>12</td>
<td>A1</td>
<td>Reserved</td>
</tr>
</tbody>
</table>
Figure 3-6. P2 Connector Pin Location
The reliability of any stand-alone product or control system is affected by the maintenance of the equipment. Elsag Bailey recommends that all equipment users practice a preventive maintenance program that will keep the equipment operating at an optimum level.

This section presents procedures that the customer should be able to perform on site. These preventive maintenance procedures should be used as a guideline to assist in establishing good preventive maintenance practices.

Personnel performing preventive maintenance should meet the following qualifications.

- Maintenance personnel should be qualified electrical technicians or engineers that know the proper use of test equipment.
- Maintenance personnel should be familiar with the mounting unit, have experience working with process control systems, and know what precautions to take when working on live AC and DC systems.

Table 4-1 is the preventive maintenance schedule for the mounting unit. The table lists the preventive maintenance tasks in groups according to their specified maintenance interval.

**NOTE:** The preventive maintenance schedule is for general purposes only. Your application may require special attention.

An antistatic vacuum is the only tool required for maintenance procedures.
Table 4-1. Preventive Maintenance Schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check cabinet air filters. Clean or replace them as necessary.</td>
<td>3 months</td>
</tr>
<tr>
<td>Check the air filter more frequently in excessively dirty environments.</td>
<td></td>
</tr>
<tr>
<td>Check cabinet and mounting unit backplane assembly for dust.</td>
<td>Shutdown</td>
</tr>
<tr>
<td>Clean as necessary using an antistatic vacuum.</td>
<td></td>
</tr>
<tr>
<td>Check all signal, power and ground connections within the cabinet</td>
<td></td>
</tr>
<tr>
<td>that are associated with the mounting unit. Verify that they are</td>
<td></td>
</tr>
<tr>
<td>secure.</td>
<td></td>
</tr>
<tr>
<td>Complete all tasks in this table.</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 5 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

This section includes a listing of the module mounting unit part numbers and nomenclatures, and provides the procedures for removing and replacing the backplane printed circuit board assembly of the module mounting unit.

PARTS LIST

Tables 5-1 and 5-3 comprise the module mounting unit parts list.

### Table 5-1. Cables

<table>
<thead>
<tr>
<th>Part Number/ Nomenclature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NKEB01</td>
<td>38-mm (1.5-in.) expander bus interconnect cable (EMMU11/12/21/22 only)</td>
</tr>
<tr>
<td>NKEB02</td>
<td>171.5-mm (6.75-in.) expander bus interconnect cable (EMMU11/12/21/22 only)</td>
</tr>
<tr>
<td>1948502?0340</td>
<td>Expander bus interconnect cable (IEMMU01/02 to transition board)</td>
</tr>
<tr>
<td>1948509?5</td>
<td>Flat cable — connects power, PFI, and module status signals between MMU and power bus bar</td>
</tr>
<tr>
<td>6632285?54</td>
<td>0.84 sq-mm (18 AWG) wire, faston terminated — connects power, PFI, and module status signals between MMU and system power bus bar</td>
</tr>
<tr>
<td>6637818?1</td>
<td>AC power cable to input bus bar</td>
</tr>
<tr>
<td>6637818?2</td>
<td>DC power cable to input bus bar</td>
</tr>
<tr>
<td>6640006?1</td>
<td>Three 0.84 sq-mm (18 AWG) twisted wires, faston terminated for Controlway/module bus interconnection</td>
</tr>
</tbody>
</table>

### Table 5-2. Fasteners

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDOAC11008</td>
<td>5-40 × 0.5-in. screw</td>
</tr>
<tr>
<td>NIDHA16008</td>
<td>10-32 clip nut</td>
</tr>
<tr>
<td>NMPCC16002</td>
<td>10-32 × 0.5-in. screw</td>
</tr>
</tbody>
</table>

### Table 5-3. Miscellaneous Parts

<table>
<thead>
<tr>
<th>Part Number/ Nomenclature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMBLK01</td>
<td>Blank faceplate; located in empty slots in MMU</td>
</tr>
<tr>
<td>P-HA-MSC-PBA00000</td>
<td>Processor bus adapter mounting kit</td>
</tr>
<tr>
<td>1946715?12</td>
<td>12-position dipshunt connector</td>
</tr>
</tbody>
</table>
TOOLS

Tools required for replacement procedures are:

- Cable inserter for installing and removing the two five-conductor flat cables for power, PFI, and module status signals on the backplane (refer to Table 5-3 for Elsag Bailey part number).

  NOTE: The cable inserter is not needed if using individual wires for connecting power, PFI, and module status (Fig. 3-2).

- 16-inch Phillips-head screwdriver.

- 12-inch flatblade screwdriver.

BACKPLANE ASSEMBLY REPLACEMENT

There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

To replace the printed circuit board backplane assembly:

1. Turn off power to the cabinet. Open the rear door of the cabinet to gain access to the mounting unit.

2. Tag and disconnect all the cables going to and from the backplane of the mounting unit. Do not disconnect the cables attached to the PBA assemblies if present. The cable connections can remain intact. Use Elsag Bailey’s cable inserter tool to remove the two five-conductor flat cables for PFI, power, and status signals.

<table>
<thead>
<tr>
<th>Part Number/ Nomenclature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946984?1</td>
<td>Jumper strap for J1 through J4</td>
</tr>
<tr>
<td>198494?1</td>
<td>Cable inserter for installing and removing five-conductor flat cables.</td>
</tr>
<tr>
<td>6642425?1</td>
<td>IEMMU11/12 backplane printed circuit board assembly</td>
</tr>
<tr>
<td>6642626?1</td>
<td>IEMMU21/22 backplane printed circuit board assembly</td>
</tr>
<tr>
<td>6638748?1</td>
<td>Mounting unit air shield; located in module slots of MMU backplane that do not have modules in place</td>
</tr>
<tr>
<td>6642695?1</td>
<td>Transition board assembly ¹ for connecting IEMMU01/02 unit to IEMMU11/12/21/22 unit</td>
</tr>
</tbody>
</table>

NOTE:
1. Transition board assembly must be installed in the left-hand connector socket (as viewed from the rear) of the mounting unit backplane, connector P58 or P60.
3. From the front of the cabinet, remove all of the system modules from the mounting unit. If the mounting unit contains any power modules, refer to POWER MODULE REMOVAL for the correct procedure and important safety guidelines.

**NOTE:** To remove the entire mounting unit from the cabinet, remove the four screws that attach it to the cabinet side rails.

4. If PBA assemblies are attached to the back of the MMU, remove them and the PBA mounting brackets. If not, go to step 5.

   a. Remove the two screws that fasten each PBA assembly to the PBA mounting brackets (Fig. 3-3). The cable connections can remain intact.

   b. Remove the five screws that hold the bottom PBA mounting bracket in place.

   **NOTE:** The screws that attach the two PBA mounting brackets also attach the backplane assembly. Be sure to hold the backplane assembly while removing the brackets.

   c. Remove the five screws that hold the top mounting bracket in place.

   d. Go to step 6.

5. Remove the ten screws securing the backplane assembly to the rack.

6. Before installing the new backplane assembly, make certain jumpers J1 through J4 are set correctly. Refer to CONTROLWAY AND MODULE BUS SEGMENTING in Section 3.

7. Before installing the new backplane assembly, make certain dipshunts in sockets XU1 through XU11 are configured the same as on the backplane being replaced.

8. If PBA assemblies and their mounting brackets were removed earlier, reinstall them. If not, go to step 9.

   a. Position the new backplane assembly on the mounting unit rack.

   b. Install one PBA mounting bracket to the top of the module mounting unit backplane assembly using the five screws previously removed (Fig. 3-3).

   c. Install the remaining mounting bracket to the bottom of the backplane assembly using the five screws previously removed.
d. Verify the PBA assembly cable connections are still intact and secure.

e. Install the PBA assemblies removed previously.

f. Go to step 10.

9. Position the new backplane assembly on the mounting unit rack. Install the ten screws previously removed.

10. From the rear of the cabinet, connect all cables removed in Step 2. Use the identification tags to aid in proper connection. Use the connector inserter tool to install the two five-conductor flat cables.

11. Turn on power to the cabinet.

12. From the front of the cabinet, align the top and bottom edges of the module circuit board with the guides in the mounting unit rack.

13. Hold the module by the thumbscrews on the faceplate and firmly push it into the slot. Push until the rear edge connectors are firmly seated in the backplane connectors.

14. Turn the thumbscrews until the module is secured in the mounting slot.

15. Verify the status LEDs turn green.

**POWER MODULE REMOVAL**

If the mounting unit has power modules installed, use the following procedures to remove them.

1. Use a flat blade screwdriver to turn the two concentric screws ¼-turn in either direction on the power module being removed.

2. Grasp the handle on the power module faceplate and partially pull the module from the mounting unit.

3. Allow at least 30 seconds for the line filter capacitors to discharge then remove it completely from the mounting unit.

**WARNING**

Allow 30 seconds for the line filter capacitors to discharge before handling the power module. Failure to do so could result in severe or fatal shock.

**WARNING**

Handle the module by surfaces other than the heat sink. The heat sink may be hot and may cause severe burns.
SECTION 6 - SUPPORT SERVICES

INTRODUCTION

Bailey Controls Company is ready to help in the use and repair of its products. Contact the nearest sales office to make requests for sales, applications, installation, repair, overhaul and maintenance contract services.

REPLACEMENT PARTS AND ORDERING INFORMATION

NOTE: It is impractical to specify a recommended quantity of spare parts because Bailey Controls Company custom designs every system. Contact Bailey Controls Company for help determining the quantity of spare parts to keep on hand for your particular system.

When making repairs at your facility, order replacement parts from a Bailey Controls Company sales office. Provide the following information.

1. Part description, part number and quantity.
2. Model and serial number (if applicable).
3. Instruction number and page number of reference.

Refer to Table PARTS LIST in Section 5 for a list of part numbers and nomenclatures.

TRAINING

Bailey Controls Company has a modern training facility available for training your personnel. On-site training is also available. Contact a sales office for specific information and scheduling.

TECHNICAL DOCUMENTATION

Additional copies of this instruction, or other Bailey Controls Company instruction, can be obtained from the nearest sales office at a reasonable charge.
SECTION 2 - DESCRIPTION AND OPERATION

INTRODUCTION

This section describes and explains the functional and electronic operation of the IEMMU11, IEMMU12, IEMMU21, and IEMMU22 Module Mounting Units.

INPUT POWER AND POWER DISTRIBUTION

Regulated power supply voltages (+5 VDC, +15 VDC, −15 VDC, and +24 VDC), PFI, and STATUS signals are distributed to the system through the system power bus bar located inside the cabinet. Power is transferred to the mounting unit from the bus bar through cables. Refer to Figure 3-2 for proper cable usage.

Input AC and DC power is supplied to the IEMMU11 and IEMMU12 units through the input power bus bar located inside the cabinet. Power is transferred to the mounting unit from the bus bar through cables. Refer to Figure 3-2 for proper cable usage.

The IEMMU21 and IEMMU22 units do not provide for distributed input AC and DC power and do not connect to the input power bus bar.

POWER MODULE INPUT POWER

Each IEMMU11 and IEMMU12 unit is capable of housing two power modules (AC or DC). The power module receives its input power through the MMU backplane assembly on connectors P25 through P35 (Fig. 2-1). Pins one, two, and three of connectors P25 through P35 carry the AC power on the backplane assembly while pins four and five carry the DC input power. The input power enters the mounting unit assembly through connectors P36 through P40. Refer to BACKPLANE I/O CONNECTORS in Section 3 for additional information.

NOTES:
1. Power modules cannot be installed in slot 12 of the mounting unit.
2. Power modules cannot be installed in IEMMU21 or IEMMU22 units.
**OUTPUT POWER**

Output power to operate system modules is distributed to the modules through backplane assembly connectors. Table 2-1 lists the module mounting unit connectors that connect regulated DC voltages from the system power bus bar.

![Figure 2-1. MMU Backplane Connector Locations (Module Side)](image)

<table>
<thead>
<tr>
<th>Signal</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5 VDC</td>
<td>P45 and P46</td>
</tr>
<tr>
<td>+15 VDC</td>
<td>P50</td>
</tr>
<tr>
<td>−15 VDC</td>
<td>P51</td>
</tr>
<tr>
<td>+24 VDC</td>
<td>P44</td>
</tr>
<tr>
<td>Module common (MCOM)</td>
<td>P48 and P49</td>
</tr>
<tr>
<td>I/O COM</td>
<td>P42</td>
</tr>
</tbody>
</table>

The system modules which are housed in the mounting unit assembly connect to these bus voltages through connectors P1-1 through P1-12 on the backplane assembly. Refer to **BACKPLANE I/O CONNECTORS** in Section 3 for additional information.

Power modules installed in the MMU provide +5 and +24 VDC to the system through connectors P25 through P35 on the backplane assembly (Fig. 2-1). The +15 and −15 VDC are transferred through connectors P1-1 through P1-11.
I/O EXPANDER BUS

Connectors P57 through P60 (located on the four corners of the board) allow connecting the system I/O expander bus between each individual mounting unit (Fig. 2-1). The system modules located in each mounting unit connect to the expander bus through connectors P2-1 through P2-12 on the backplane assembly. The I/O expander bus connects to P2 connector on the system modules.

**NOTE:** I/O expander bus cables are shown in Figure 3-2. If mixing IEMMU11/12/21/22 and IEMMU01/02 mounting units, a transition board is required. The board will not work unless it is used in the left-hand socket of the backplane connector (P58 or P60). The IEMMU01/02 I/O expander bus cable connects to the transition board (refer to Table 5-1 for part number). Additional information is given in TRANSITION BOARD INSTALLATION in Section 3.

Dipshunts are located in XU1 through XU11 to allow breaking the expander bus connection between modules as required and dependent on the module configuration.

**NOTE:** The number one expander bus slot is connected to P57 and P59 whether XU1 is present or not present. The number 12 expander bus slot is connected to P58 and P60 whether XU11 is present or not present.

CONTROLWAY AND MODULE BUS

Controlway or module bus A enters the mounting unit through connector P53. The signal is distributed through the mounting unit across the backplane assembly and connects to the P1 connector on the system modules. The bus can be divided into three segments using jumpers J2 and J3. Refer to CONTROLWAY AND MODULE BUS SEGMENTING in Section 3 for detailed information.

Bus B enters the mounting unit through connector P54. The signal is distributed through the mounting unit across the backplane assembly and connects to pin 4 on the P1 connectors. The bus can be divided into three segments using jumpers J1 and J4. Refer to CONTROLWAY AND MODULE BUS SEGMENTING in Section 3 for detailed information.

OVERCURRENT PROTECTION

All input power to the mounting unit is fused and filtered through a power entry panel. The power supplies providing the regulated voltages are fused and filtered.
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