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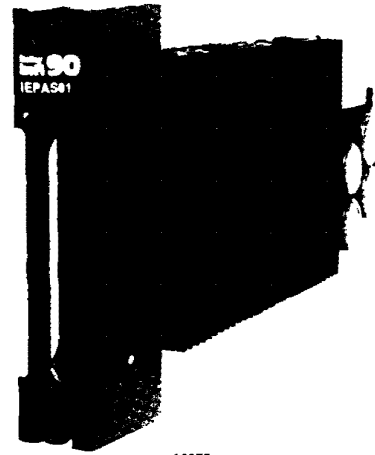
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Bailey infi 90®

E96-506

Instruction

Modular Power System



A0835

Bailey Seamless, Real-Time Process Management Solutions

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WARNING notices as used n th s manual apply to hazards or unsafe pract ces wh ch cou d resu t n personal njury or death
CAUTION not ces apply to hazards or unsafe pract ces wh ch cou d resu t n property damage
NOTES high ight procedures and conta n nformat on wh ch ass st the operator n understand ng the *information conta ned n this manua*

WARNING

INSTRUCTION MANUALS

DO NOT NSTALL MA NTA N OR OPERATE TH S EQU PMENT W THOUT READ NG UNDERSTAND NG AND FOLLOW NG THE PROPER **Bailey Controls** NSTRUCT ONS AND MANUALS OTHERW SE NJURY OR DAMAGE MAY RESULT

RADIO FREQUENCY INTERFERENCE

MOST ELECTRON C EQU PMENT S NFLUENCED BY RAD O FREQUENCY NTERFERENCE (RF) CAUT ON SHOULD BE EXERC SED W TH REGARD TO THE USE OF PORTABLE COMMUN CAT ONS EQU PMENT N THE AREA AROUND SUCH *EQU PMENT PRUDENT PRACT CE D CTATES THAT S GNS SHOULD BE POSTED N THE V C N TY OF THE EQU PMENT* CAUT ON NG AGA NST THE USE OF PORTABLE COMMUN CAT ONS EQU PMENT

POSSIBLE PROCESS UPSETS

MA NTENANCE MUST BE PERFORMED ONLY BY QUAL F ED PERSONNEL AND ONLY AFTE R SECUR NG EQU PMENT CONTROLLED BY TH S PRODUCT ADJUST NG OR REMOV NG TH S PRODUCT WH LE T S N THE SYSTEM MAY UPSET THE PROCESS BE NG CONTROLLED SOME PROCESS UPSETS MAY CAUSE NJURY OR DAMAGE

AVERTISSEMENT

MANUELS D'OPERATION

NE PAS METTRE EN PLACE REPARER OU FA RE FONT ONNER CE MATER EL SANS AV OR LU COMPR S ET SU V LES NSTRUCT ONS REGL MENT A RES DE **Bailey Controls** TOUTE NEGL GENCE A CET EGARD PURRA T ETRE UNE CAUSE D ACC DENT OU DE DEFAILLANCE DU MATER EL

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PERTES PROCEDE RENVERSEMENTS

L ENTRET EN DO T ETRE ASSURE PAR UN PERSONNEL QUAL F E ET EN CONS DERAT ON DE L ASPECT SECUR TA RE DES EQU PEMENTS CONTROLES PAR CE PRODU T L ADJUSTEMENT ET/OU L EXTRACT ON DE CE PRODU T LORSQU L EST NSERE A UN SYSTEME ACT F PEUT OCCAS ON NNER DES A COUPS AU PROCEDE CONTROLE SUR CERTA NS PROCEDES CES A COUPS PEUVENT E GALEMENT OCCAS ONNER DES DOMMAGES OU BLESSURES

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Preface

The Modular Power System supplies system and I/O power to the Infi 90 system This manual explains how the Power System operates through supportive text, diagrams and flowcharts It provides the user with introductory material and specific instructions for installation, operation, troubleshooting and maintenance for the system based on the IECAB01 System Cabinet and IEPEP03 Power Entry Panel.

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Safety Summary

GENERAL WARNINGS	**Equipment Environment** A l components whether in transportation operation or storage must be n a noncorrosive env ronment **Electrical Shock Hazard During Maintenance** D sconnect power or take precaut ons to ensure that co ntact w th energ zed parts s avo ded when serv c ng **Special Handling** Th s module uses Electrostat c Sens tive Devices (ESD)
SPECIFIC WARNINGS	Ensure that the c rcuit breaker for the l ne power supply s OFF as you do these steps Do not turn this breaker on unt the nstruct ons tel you (p 3-3) The plast c covers on the Modu e Mount ng Un t backp ane protect against nc denta contact w th AC Do nct remove these covers (p 3 8) To prevent shock when remov ng the power supply modu e wa t 5 seconds to a ow ine f ter capac tors to d scharge before han d ng module Then, s de the module the rest of the way out Do not grab the modu e by the heat s nk (t may be hot) support t by the bottom edge of the circuit board (p 3 10, 7 3) D sconnect power before nsta ing d pshunts for s ave modules on the MMU backp ane (slave expander bus) Fa lure to do do cou d resu t n severe or fata shock (p 3 10)
SPECIFIC CAUTIONS	Improper sw tch sett ng can cause permanent damage to the PF Board f exposed to the higher input voltage (p 3 10)

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Sommaire De Securite

AVERTISSEMENT D'ORDRE GENERAL	**Environment de l'equipement** Ne pas soumettre les composants a une atmosphere corros ve ors du transport de l'entreposage ou de l utilisat on **Risques de chocs electriques lor de l'entretien** S assurer de debrancher l'al mentat on ou de prendre es precau tions necessaires a eviter tout conatact avec des composants sours tension lors de 'entretien **Precautions de Manutention** Ce module cont ent des composantes sensib es aux decharges e ectro stat ques
AVERTISSEMENT D'ORDRE SPECIFIQUE	Au moment d'effectuer ces etapes, ve er a ce que le d sjoncteur de l alimentation de ligne soit ETEINT N allumer le disjoncteur qu a etape ndiquee dans e manue (p 3 3) Les couvercles de p astique de a p aque arr ere du chass s de montage des modules (mmu) assurent une protection contre 'expos t on au courant alternat f Ne pas ret rer ces couverc es (p 3 8) Pour eviter les chocs electr ques attendre 5 secondes avant de toucher au module af n de permettre la d ssipation de energ e emmagas nee dans es condensateurs de f trat on On peut ensu te retirer e modu e comp etement en le tirant vers soi Ne pas ten r e module au n veau du diss pateur therm que mais p utot au niveau de la partie infer eure de la carte de dircu ts impr mes (p 3 10 7 3) Couper l al mentat on avant d nsta er les d pshunts sur a p aque arr ere du chassis de montage de modules (MMU) Toute neg gence a cet egard const tue un r sque de choc pouvant entrainer des b essures graves, voire moretl es (p 3 10)
ATTENTION D'ORDRE SPECIFIQUE	Un reglage inadequat des interrupteurs peut entrainer des dommages permanents a la carte PF (nterruption due a une panne d al mentation) s e e est soum se a la tens on d entree elevee (p 3-10)

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SECTION 1 – INTRODUCTION

OVERVIEW

The Infi 90 power system provides +5, +15, 15 and +24 VDC to power process control modules and field termination de vices

The system consists of the Power Entry Panel. Fan Assem bly, Power Supply Modules and their mounting unit, bus bars and associated wiring The power modules provide scalable power for logic and I/O functions through N+1 redundancy. In this type of redundancy, power modules equally share output If any power module fails, the remaining power modules adjust their outputs to meet the total system load Therefore, redundancy can be provided by one extra power module be yond the minimum number required to power the system

HARDWARE DESCRIPTION

Power Entry Panel

The Power Entry Panel supplies line power to the system cabinet There are two versions IEPEP01 and IEPEP03 The IEPEP01 is the basic version It has surge protection and Power Fail Interrupt detection, however, it does not have circuit breakers or dc voltage monitoring capabilities The IEPEP03 has additional features

The IEPEP03 transfers redundant power to the system cab inet and monitors system status It contains the AC Transfer Module and the Bus Monitor Module which perform these functions The AC Transfer Module monitors line voltage inputs to the system cabinet, provides automatic AC line transfer (for redundant AC lines) and generates a power fail interrupt (PFI) signal The Bus Monitor Module monitors the power system and provides status and customer alarm out- puts

Fan Assembly

The IEFAN0□ Fan Assembly provides air flow cooling for the power supply modules and process control modules in the system cabinet.

Power Supply Modules

There are two power supply modules IEPAS01 and IEPAF01 The IEPAS01 provides dc voltages of +5, +15, 15 and +24 The IEPAF01 provides +24 VDC only for field pow- ered devices

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Module Mounting Units

The Module Mounting Unit, IEMMU01, provides the housing, power connections and signals for power supply and process control modules

The IEMMU02 has the same functionality as the IEMMU01, but it is a rear mounted unit Its primary use is in smaller system cabinets like the MINI 90™ system

USER QUALIFICATIONS

This manual is not a tutorial Therefore, the user should have training as an electrical technician That is, he should know the basics of, and precautions for, working with AC/DC voltages, and how to use various measuring instruments such as digital voltmeters

MANUAL CONTENT

This manual provides introductory, installation, operation, calibration, troubleshooting and maintenance information Read and understand this document before placing the power system into service A summary of section content follows

Introduction An overview of the system, description of hardware, glossary of unique terms, reference documentation, and physical and electrical specifications

Theory of Operation A block diagram to explain how key parts of the system operate

Installation Handling, inspection, location and safety considerations, setup (e g , switch settings), interfacing

Operation – Start up, how to use, individual controls

Troubleshooting Error indications, corrective actions, problem determination and verification

Repair/Replacement Procedures Procedures for user repair and replacement

Support Services Replacement parts, warranty policy

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HOW TO USE THIS MANUAL

Read this manual in sequence To get the best use of this manual, read it from cover to cover, then go back to specific sections

1. Read and do the steps in the **Installation** section

2 Read the **Operation** section thoroughly before powering up the system

3 Refer to the **Troubleshooting** section for what to do if a problem occurs

4 Read the **Repair/Replacement Procedures** section if system repairs are needed

5 Use the **Support Services** section for a replacement parts list and warranty information.

NOMENCLATURE

Hardware	Nomenclature/ Part Number
AC F eld Power Modu e AC System Power Module	IEPAF01 IEPAS01
Cab net AC Bus Bar Cabinet DC Bus Bar Cable S ave Expander Bus MMU to MMU Cable, MMU to AC Bus Cab e, R bbon, MMU to DC Bus Bar	1948516 3 1948506 8 1948502A0340 6637818-1 1948509A5
Fan Assemb y 120 VAC 240 VAC	 EFAN01 EFAN02
Infi 90 System Cab net	ECAB01
Module Mounting Un t (Front Mount) Module Mounting Unit (Rear Mount)	IEMMU01 IEMMU02
Power Entry Panel w th PFI Board (No C rcu t Breakers)	IEPEP01
Power Entry Pane with AC Transfer and Bus Mon tor Modu es and C rcu t Breakers	EPEP03

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GLOSSARY

Term	Definition
ATM	AC Transfer Modu e Mon tors ınput voltage switches redundant I ne nputs
BIM	Bus nterface Modu e Communicates w th other modules on t ne Modu e Bus
BMM	Bus Monitor Modu e Mon tors bus voltages sends s gna f vo tages fal out of to erance
I/O	Inputs/Outputs
LIM	Loop nterface Modu e Links the process control un t to the P ant Loop
LIS	Loop Interface S ave L nks the process contro un t to the Superloop
Module Bus	Seria commun cat on nk between nte gent process contro modu es
MMU	Modu e Mount ng Un t
PAF	Power Supp y Modu e outputs +24 VDC on y (for f e d powered de v ces)
PAS	Power Supp y Module outputs +5, +15 15 and +24 VDC
PEP	Power Entry Panel
PFI	Power Fa nterrupt S gna generated by the PEP f oss of ac or out of to erance ınput
PCU	Process Contro Un t Rack type ndustr a cab net conta n r g contro s ave and power modu es
Process Control Module	Any of the nf 90 modu es Some examp es Mu ti Funct on Processor Modu e D g tal S ave Module
SBM	Super oop Bus Modu e Acts as the trans ator between the Modu e Bus and Super oop
Termination Module (TM)	Prov des nput/output connect on between plant equipment and pro cess modu es It s des nto a slot ın the Term nat on Mount ng Un t
Termination Unit (TU)	Prov des nput/output connect on between plant euq pment and pro cess modu es It ıs a f at c rcu t board for panel mount ng

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SPECIFICATIONS

INPUTS (IEPAS01/IEPAF01)		
Power Requirements **Operating**	102 VAC to 132 VAC 204 VAC to 264 VAC (120 and 240 VAC jumper configurable)	
Frequency	47 Hz to 63 Hz	
Input Current	1 6 amps maximum per Power Supply Modu e	
Inrush Current	<15 amps per supply module fu ly loaded	
INPUTS (SYSTEM)		
Harmonic Distortion	5%	
Maximum Interruption (non repet t ve)	1 cyc e	
Maximum Line Noise	+100% of l ne ampl tude (for 2 m croseconds every ha f cycle)	
Surge Protection	**Differential Mode**	**Common Mode**
120 VAC nput to PEP	295 to 350 vo ts max	500 to 650 volts max
240 VAC input to PEP	650 to 750 volts max	800 to 1 100 volts max
Transient Vo tage	6 000 Vpeak	
Trans ent Current	3 000 Apeak	
Input Leakage Current @ 240 VAC		
L ne to Neutral	1 1 mA	
Neutral to Ground	0 55 mA	
OUTPUTS (IEPAS01/IEPAF01)		
Output Voltage		
IEPAS01 Module	25 5 VDC +0 6% @ 4 amps **or** 5 1 VDC ±3% @ 10 amps **and** +15 VDC +6% @ 0.5 amps 15 VDC +6% @ 0 5 amps	
IEPAF01 Modu e	25 5 VDC +0 6% @ 4 amps	

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SPECIFICATIONS (cont nued)

OUTPUTS (IEPAS01/IEPAF01) (continued)	
Line Regulation	*0 5%*
Hold Up Time	≥20 ms, output ful y loaded
Heat Dissipation	25 watts per modu e maximum
OUTPUTS (System)	
Module and I/O Bus Voltage Requirements	
Bus Voltage	
+5 VDC	4 75 VDC m n mum 5 25 VDC max mum *50 mV peak to peak r pp e max mum*
+15 VDC	14 65 VDC m n mum 15 75 VDC max mum *100 mV peak to peak r pp e max mum*
15 VDC	14 65 VDC m n mum 15 75 VDC maximum *100 mV peak to peak r pp e max mum*
+24 VDC	25 5 VDC m n mum, 27 0 VDC max mum *100 mV peak to peak r pp e max mum*
Bus Monitor Trip Points	
Bus Voltage	
+5 VDC	4 76 VDC +0 06 VDC
+15 VDC	14 3 VDC +0 30 VDC
15 VDC	14 3 VDC +0 30 VDC
+24 VDC	23 0 VDC +0 40 VDC
AC Input Monitoring and Transfer	
Low Vo tage Detect	90 V rms +2 V rms for 120 VAC nominal input 180 V rms +4 V rms for 240 VAC nom na input
L ne Interrupt Detect T me	2 3 ms to 3 2 ms
Redundant AC Transfer Time	16 ms max mum (EPEP03 only)

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SPECIFICATIONS (cont nued)

OUTPUTS (System) (cont nued)	
Auxiliary Bus Voltage Monitor Trip Points	
Bus Voltage	
+24 VDC	+21 8 +0 4 VDC
+48 VDC	+43 7 +0 5 VDC
+125 VDC	+114 0 +1 0 VDC
Status and Alarm Requirements	
Power Modu e Status nput	Low True TTL Leve 2 mA max mum
Power Fa S gna Output	Low True TTL Leve 60 mA max mum (EPEP01 and IEPEP03)
Power System Status Output to Syst3m Common[1]	Low True, TTL Leve , 4 mA max mum
Custo-ner Alarm Output[1]	C ose to A arm 24 VDC max mum 120 mA (nductive oads require d ode suppress on)
Aux ary Status S gna nputs[1]	Low True TTL Leve 1 mA (Low ≤2 VDC, H gh >3 VDC)
GENERAL	
Radio Frequency Interference	Va ues not ava lab e at th s t me Keep cab net doors c osed D ɔ not use commun cat on equipment any c oser than 2 meters from the cabinet
Mounting	Power Supply Modules occupy one slot in the NF 90 Module Mount ng Un t (MMU) Fastens to MMU w th two half turn latches on the face p ate
Physical Dimens ons	
IECAB01 Cabinet	
He ght	87 nches (220 cm)
Width	24 inches (61 cm)
Depth	30 nches (76 cm)
We ght	800 pounds maximum (362 kg)

1 EPEP03 on y

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SPECIFICATIONS (cont nued)

GENERAL (cont nued)	
Physical Dimensions cont nued	
EPEP01	
He ght	5 2 nches (13 20 cm)
W dth	19 nches (48 26 cm)
Depth	4 5 inches (11 43 cm)
EPEP03	
He ght	6 9 nches (17 52 cm)
W dth	19 nches (48 26 cm)
Depth	27 nches (68 58 cm)
EFAN01/02	
He ght	1 75 nches (4 44 cm)
W dth	19 nches (48 26 cm)
Depth	13 nches (33 02 cm)
EMMU01/02	
Height	7 inches (17 78 cm)
Width	19 inches (48 26 cm)
Depth	12 5 inches (31.75 cm)
Environmental	
Room Ambient Temperature	0° to 55° C (32° to 131°F)
Maximum Module Ambient Temperature	70°C (158°F) Basep ate must not exceed 85°C (188°F)
Hum d ty	5% to 90%, +5% up to 55°C (131°F) noncondens ng 0% to 45% at 70°C (158°F) noncondens ng
Cool ng (Fan)	180 CFM typ ca
Atmospher c	Sea evel to 3 km (1 86 m es)
A r Qua ty	Noncorros ve
Certifications	Meets IEEE 472 1974 Surge Test requ rements CSA cert fcat on pend ng as process control equipment in an ord nary (nonhazardous) env ronment

Spec f ca ons Subject To Change W thout Nc tice

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REFERENCE DOCUMENTS

Refer to these Bailey instructions for related information.

I-E93 900 5	Site Preparation, Planning and Equipment Installation
I-E93 911	Termination Unit Manual

SIZING THE MODULAR POWER SYSTEM

The following text and equation explain how to determine the number of Power Supply Modules needed for a particular system

The output characteristics of the Modular Power System relate to the heat removal from main components on the circuit board These main components have a maximum temperature limit of 85°C (185°F) on their baseplate The heat from these devices dissipates through the heat sink attached to these components The thermal characteristics of the heat sink change as the air flow varies Worst case calculations show the efficiency of components to be 80% Heat sink dissipation of approximately 25 watts produces a 15°C (59°F) rise (maximum heat rise at 70°C (158°F) ambient temperature inside cabinet)

Overall power requirements for 5V and 24V power are known after specifying the hardware needed in a particular cabinet

Let

d	heat sink power dissipation derating factor 1 00 for both in a typical control room environment (30°C (80°F) maximum)
A	total 5V current requirements for system cabinet
B	total 24V current required for system cabinet
Q	number of supplies required for the system

$$Q = 1/d\ (A/10 + B/4)$$

System Calculation Example

Assume d 1 0 for a typical system cabinet in a control room environment

A	26 5 amps (5V cabinet requirement)
B	3 1 amps (24V cabinet requirement)

Substitute these values into the equation and solve for Q

$$Q = 1/1\ 0\ (26\ 5/10 + 3\ 1/4)$$

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Number of power modules required for system	Q	3 425
Rounded to the next highest integer		4 modules
With N+1 Redundancy		5 modules

Round the result to the next highest integer to satisfy system requirements If using redundancy, add an additional module or modules to the integer

Power module placement is important For optimum cooling, power modules **should not** be stacked at one end of the Module Mounting Unit See Figure 3 8 in the **Installation** section for further details

NOTE. A maximum of two power supply modules may be placed in any Module Mounting Unit

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SECTION 2 – THEORY OF OPERATION

INTRODUCTION

This section uses block diagrams and supportive text to ex plain how the main functional blocks of the power system operate The first diagram, Figure 2 1, shows overall system architecture The remainder of the diagrams show circuit details for the AC Transfer Module, Bus Monitor Module and Power Supply Module

POWER DISTRIBUTION

Bus bars distribute AC and DC power throughout the cabinet The AC bus bar has three separate conductor layers The DC Bus Bar has eight separate conductor layers The use of bus bars reduces hand wiring and improves reliability

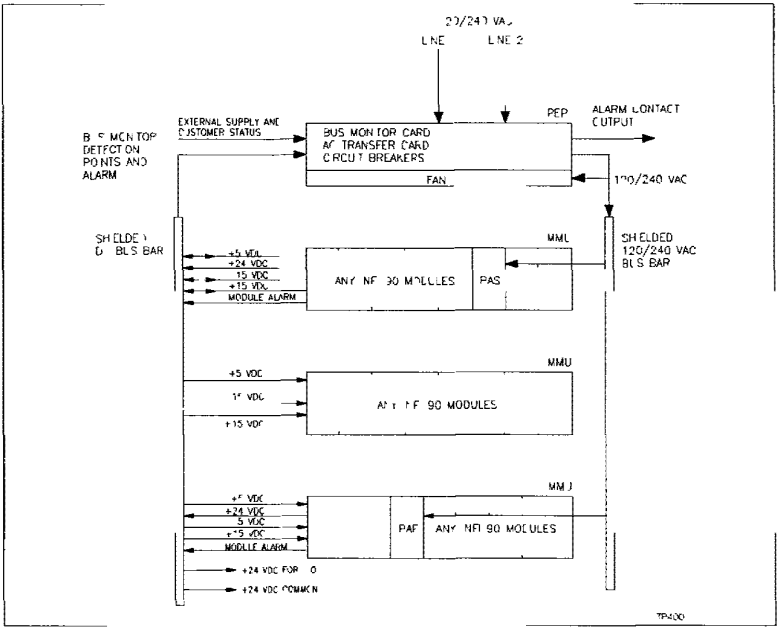


Figure 2 1. Modular Power System Architecture Block Diagram

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The AC bus bar distributes AC power from the Power Entry Panel to the Module Mounting Unit backplanes The bus bar has quick connect tabs to connect cables from the panel and to the mounting unit

The eight laver DC Bus Bar distributes regulated DC volt ages, Power Module Status and Power Fail Interrupt signals This bus bar also has quick connect tabs A cable from the Power Entry Panel to the DC bus bar allows the system to monitor bus voltages and status signals High current, multi conductor flat cables connect regulated voltage outputs and status signals from the MMU backplane to the bus bar Extra tabs are available at the bottom of the DC bus bar for con necting +24 VDC I/O power to field termination units or to other cabinets Tabs are also available to connect DC com mon and I/O common to the system safety common bus bar at the cabinet bottom

POWER ENTRY PANEL

IEPEP01

The IEPEP01 connects 120/240 VAC (50/60 Hz) line power to an Infi 90 system cabinet and distributes power to the Power Supply Modules and Fan Assembly This version has no circuit breakers There are two terminal blocks One is for line input, the other for output to the AC bus bar for distribu tion to the power modules The PEP has surge suppression and filtering to protect the power modules An internal circuit board monitors input line voltage It generates a Power Fail Interrupt (PFI) signal for low voltage or a loss of voltage The panel mounts in any standard 19 inch rack frame

IEPEP03

The IEPEP03 connects single or redundant 120/240 VAC (50/60 Hz) line power to an Infi 90 system cabinet It also distributes power to the Power Supply Modules and Fan As sembly This version has circuit breakers for each power line input Like the IEPEP01, this panel also has surge suppres sion and filtering

Two modules reside in the PEP They are the AC Transfer Module and Bus Monitor Module These modules and their functions are discussed next

AC Transfer Module

The AC Transfer Module (ATM) monitors both AC inputs and its own circuitry If an AC input is lost or faulty, the module automatically transfers to the redundant input The ATM generates a Power Fail Interrupt signal if both lines are lost or below the low voltage threshold It sends this signal to

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the Bus Monitor Module (BMM) The BMM sends the PFI signal to the appropriate process control modules, thereby interrupting their operation Visible through the front panel are three LED indicators The red/green LED at the top shows whether the module is operating normally (green) or not (red) The two other LEDs (LINE 1 and LINE 2) provide AC input status (green good, red bad)

Bus Monitor Module

The Bus Monitor Module (BMM) monitors the regulated bus voltages (+5, +15, 15 and +24 VDC) and module status from the distribution bus bar A cable connection between the bus bar and the J2 connector on the PEP provides the path The BMM can also monitor two additional external power supply voltages at the PEP terminal blocks User configured jumpers allow the module to monitor either 24, 48 or 125 VDC for up to two auxiliary power supplies There are two open collector or contact inputs for monitoring system status signals Two red/green LEDs on the module's faceplate provide status information The topmost LED shows whether the module is operating properly (green) or not (red) The System Status LED is red when voltages are low or other inputs are bad The Status Signal goes to the Communication System hardware, which is the Bus Interface Module for Plant Loop Systems, and the Network Interface Slave for Infi Net Systems Once on the Communication Loop, any Infi 90 operator interface can use the signal

There are two alarms PWR SYS ALARM and BUS VOLT ALARM The PWR SYS ALARM becomes active when a power system problem occurs The BUS VOLT ALARM becomes active when any bus voltage (+5, +15, 15 or +24 VDC) falls out of tolerance The BMM also generates a Power Fail Interrupt (PFI) signal if it receives a PFI from the AC Transfer Module, or if the +5 VDC bus voltage is low It distributes this signal to process control modules in the Infi 90 system cabinet

NOTE: The Bus Monitor Module receives power from the AC Transfer Module Therefore the AC Transfer Module must be in place and operating properly before the Bus Monitor Module will work

FAN ASSEMBLY

The Fan Assembly (IEFAN01/02) contains six fans that mount in one chassis Its purpose is to keep the power supplies cool The fans draw cooling air up through the Module Mounting assemblies and force it through exhaust vents (when present) in the top of the cabinet door

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MODULE MOUNTING UNIT

The Module Mounting Unit (IEMMU01/02) provides mount ing for the power modules and process control modules Two five conductor flat cables link the Power Fail Interrupt and Power Module Status signals, +5, +15, 15 and +24 VDC from the DC Bus Bar to the MMU A three wire cable from the AC Bus Bar to the MMU backplane supplies the power modules with AC

Cables are required to connect the communication busses between multiple MMUs The Module Bus uses a three wire, twisted cable, while the Slave Expander Bus uses a flat, 40 conductor ribbon cable

POWER SUPPLY MODULES

The AC System Power Module (IEPAS01) converts the 120/240 VAC at the MMU backplane to a primary voltage of 325 VDC nominal DC to DC Converters convert this pri mary voltage to secondary regulated voltages of +5, +15, 15 and +24 VDC These voltages travel through the DC Bus Bar to other Module Mounting Units for distribution to process control modules See Figures 2 2 and 2 3

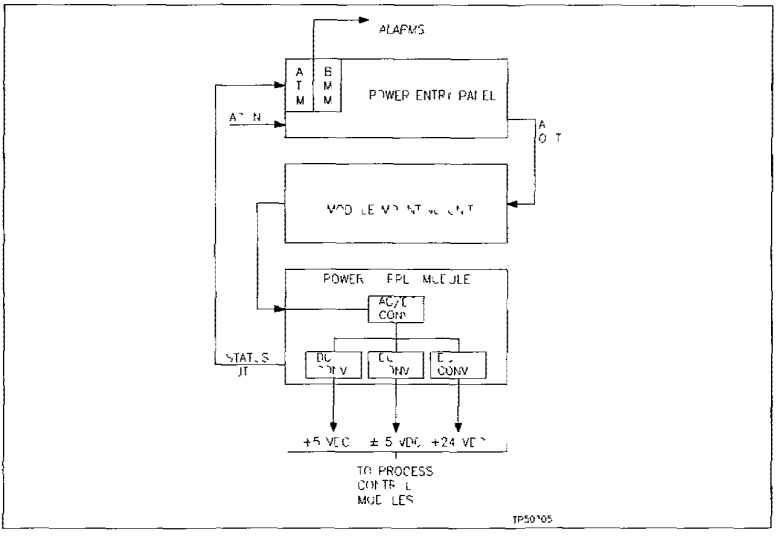


Figure 2 2 Block Diagram Power Distribution to the PAS

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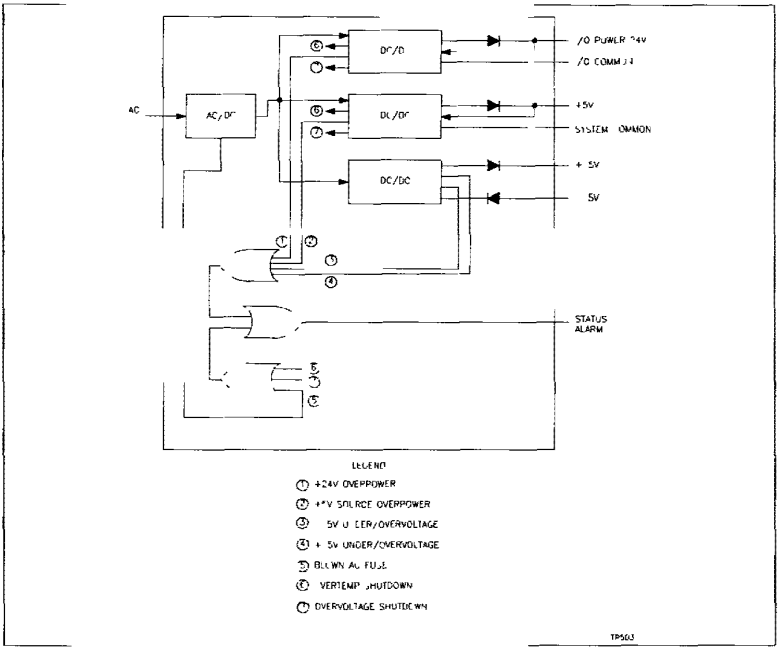


Figure 2-3 Block Diagram PAS Converter and Status Circuitry

All output voltages are preset at the factory In an N+1 redundant environment, proper operation of each module's output is based on this preset voltage If an output requires more current, the module automatically compensates

NOTE: The factory preset voltages are not field adjustable

The AC Field Power Module (IEPAF01) is functionally the same as the IEPAS01 except that it provides only +24 VDC The IEPAF01 provides power to field termination devices when separate termination cabinets are used, or when it is desirable to separate the I/O power supplies from the module power supplies

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STATUS SIGNALS

The block diagram in Figure 2 4 shows the flow of status signals through the system The following text explains this flow

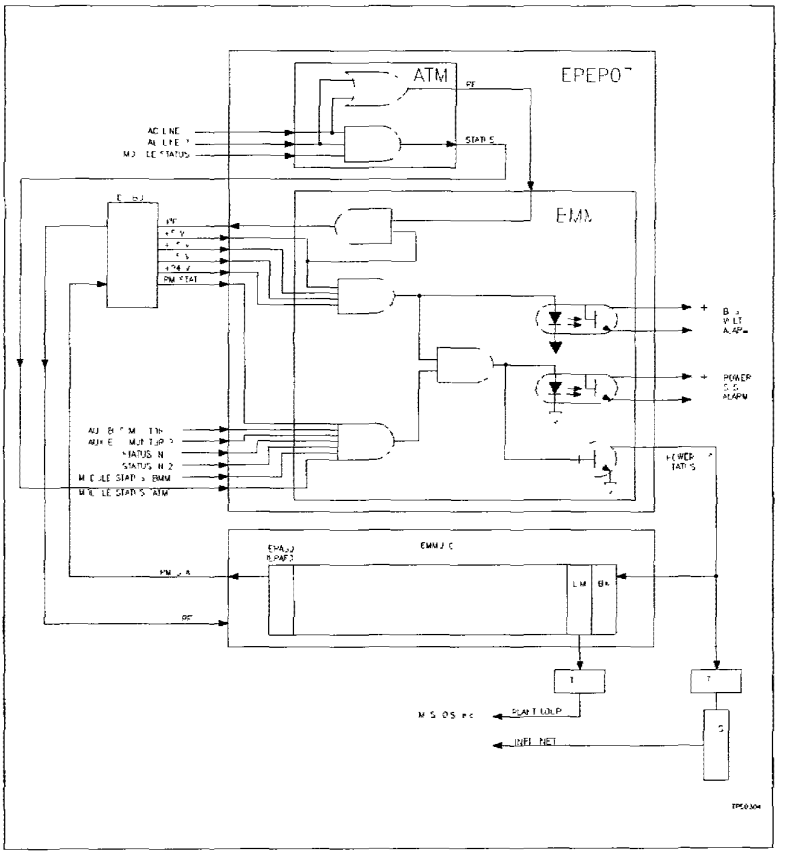


Figure 2 4 Status Signal Block Diagram

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Power System Status

All status lines (AC line, Bus Voltages, External Power In puts, External Customer Status Inputs and Power Module Status) are ANDed in the Bus Monitor Module Internal Bus Monitor circuitry determines if any status line is bad If any status is bad, the Bus Monitor Module generates a low true output signal to the communication system hardware, which is the Bus Interface Module for Plant Loop Systems, and the Network Interface Slave for Infi Net Systems

Bus Voltage Status

The DC Bus voltages are ANDed together in the BMM and output to an isolated customer alarm output If any bus volt age signal falls out of specification, a Bus Voltage Alarm is generated

Power Module Status

The Power Modules generate their own status signals These signals travel on the Bus Bar to the the Bus Monitor Module The Bus Monitor Module then ANDs this signal with the other status signals If it or any other signal is bad, a Power System Status alarm is generated

Customer Alarm Outputs

There are two customer alarm outputs Bus Voltage and Power System Status Alarm The Bus Voltage alarm is nor mally closed It activates (opens) if any bus voltage goes low or is lost The Power System Status Alarm activates for any bad status These outputs are optically isolated and can drive relays or annunciator panels

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SECTION 3 – INSTALLATION

INTRODUCTION

Completely install and prepare (i.e., attach wiring to terminal blocks, etc.) the hardware before applying power. This section explains hardware preparation in detail.

UNPACKING AND INSPECTION

The power modules are in separate packages from the rest of the power system. Handle these modules per the steps in **Handling**.

HANDLING

NOTE: Always use Bailey's Field Static Kit (wrist strap, ground cord assembly, gator clip, P/N 1948385A2) when working with modules. The kit is designed to connect a technician and the static dissipative work surface to the same ground point to prevent damage to the modules by electrostatic discharge.

Special Handling

The Power Supply Modules use Electrostatic Sensitive (ESD) devices. Follow Steps 1 through 4 when handling.

1. Keep the modules in their special anti-static bag until you are ready to install them in the system. Save the bag for future use.
2. Ground the anti-static bag before opening.
3. Verify that all devices connected to the module are properly grounded before using them.
4. Avoid touching the circuitry when handling the module.

General Handling

1. Examine the hardware immediately to verify that it has not been damaged in transit.
2. Notify the nearest Bailey Controls Sales Office of any such damage.
3. File a claim for any damage with the transportation company that handled the shipment.
4. Use the original packing material and container to store the hardware.

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5 Store the hardware in an environment of good air quality, free from temperature and moisture extremes

SYSTEM INSTALLATION

The following factors determine location of the system cabinet

1 Humidity must not go above 95% noncondensing at 55° (131°F)

2 Floor must have load bearing of 800 pounds

3 A 3 foot clearance both front and back for opening cabinet doors

4 A source for single phase 120/240 VAC, 30 amp standard service must be available

Refer to Product Instruction I E93 900 5, Site Planning Preparation and Equipment Installation for additional information

The standard cabinet configuration is Power Entry Panel at the top, with the Fan Assembly placed between the Power Entry Panel and the Module Mounting Units See Figure 3 1

NOTE Normally your cabinet is fully wired and ready to go upon receipt The following information is provided in the event that you need to repair replace rewire add etc

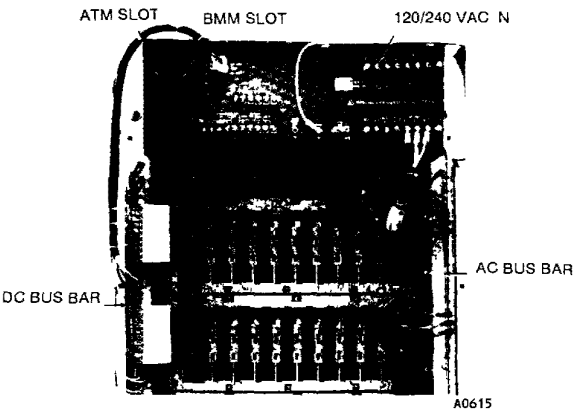


Figure 3 1 System Cabinet (Rear View)

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Power Entry Panel (IEPEP03)

WARNING	**Ensure that the circuit breaker for the line power supply is OFF as you do these steps. Do not turn this breaker on until the instructions tell you.**
AVERTISEMENT	**Au moment d'effectuer ces etapes, veiller a ce que le disjoncteur de l'alimentation de ligne soit ETEINT. N'allumer le disjoncteur qu'a l'etape indiquee dans le manuel.**

NOTE Plug your wrist strap ground cord into the receptacle labeled WRIST STRAP GND when working with the system

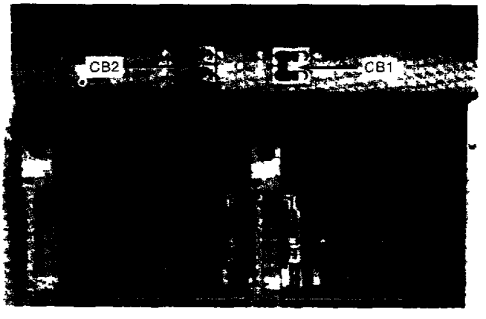
1 Place circuit breakers **CB1** and **CB2** (Figure 3 2) on the front of the panel to the **OFF** position before connecting AC power input wiring

2 Connect 120 VAC or 240 VAC primary ac power to **TB1 1, TB1-2** and **TB1 3.**

3 Connect the secondary ac power input (if used) to **TB1 4, TB1-5** and **TB1-6.** Both inputs must be the same nominal voltage level

If only one ac power input is being used, proceed with Step 4 If not, skip to Step 5

4 Connect **TB1-1** to **TB1 4, TB1 2** to **TB1-5,** and **TB1 3** to **TB1-6.** Use 12 AWG minimum, 6 AWG maximum Note



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Figure 3 2 Circuit Breakers CB1/CB2

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that this step avoids false bad status information because it connects line 1 and line 2 inputs together

5 Connect cable 6637813 1 from **J2** on the Power Entry Panel to the **DC Bus Bar.** This provides connections to sam ple the DC bus voltages, monitor the Power Module Status Signal and to output a Power Fail Interrupt signal See the wiring diagrams at the end of this manual (Foldout 1) for correct DC bus bar connections

6 Connect cable 6637814 1 from **TB2** terminals **4**, **5**, and **6** on the panel to the AC bus bar for distribution of ac power to the Module Mounting Unit

7 Connect cable 6637818 1 from the AC bus bar to each Module Mounting Unit backplane

8 Connect the Fan Assembly power cable to connector **J4** labeled **FAN OUT** on the panel

9 Connect a wire equivalent to power wiring but not less than 10 AWG from the **GND** stud of the panel to the cabinet frame for AC safety grounding

10 There are two extra voltage monitor inputs available to monitor customer external power supply voltages Use ter minal block **TB4** labeled **AUX BUS MONITOR** for this purpose Attach one input to terminals **1(+)** and **2(-)** labeled **CH1.** Connect the other input to terminals **3(+)** and **4(-)** labeled **CH2** Inputs can be +24, +48 or +125 VDC Set jumpers J1 and J2 for the desired voltage Refer to Table 3 2 in the **Bus Monitor Module** section

11 Wire the auxiliary status inputs to Terminal Block **TB3,** terminals **1, 2 (COM),** and **3 (STATUS IN).** Ensure that the inputs are low true, open collector or contact type referenced to DC common (terminal **COM)** The alarm inputs must have the current carrying capability to sink at least 1 mA

If the system uses Plant Loop, do Step 12 If not, go to Step 13

12 Connect cable 6634205 1 from **TB3** terminal **4 STATUS OUT** to the **P3** card edge connector of the Bus Interface Module (BIM) Doing so enables the BIM to send the status message to the Loop Interface Module (LIM) and to the Plant Loop

Go to Step 16

13 Connect an 18 AWG wire from **TB3** terminal **4 STATUS OUT** to **TB1** terminal **8** on the NTCL01 Termination Unit

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14 If redundant Network Interface Slave Modules are being used with the NTCL01 Termination Unit

a. Put two 18 AWG wires on a lug Attach the lug to TB3 terminal **4 STATUS OUT**

b Attach the primary wire to **TB1** terminal **8; the secondary to TB3** terminal **8.**

15 If redundant Network Interface Slave Modules are being used with the NICL01 Termination Module

a Put two 18 AWG wires on a lug Attach the lug to TB3 terminal **4 STATUS OUT**

b Attach the primary wire to **TB2** terminal **4; the secondary toTB2** terminal **5.**

16 Use TB3 terminals **5, 6, 7** and **8** for connecting the alarms Use 18 AWG wire Terminals **5(+)** and **6(-)** are labeled **PWR SYS.** These are the output connections for the Power System Alarm Terminals **7(+)** and **8( )** labeled **BUS VOLT** are the bus voltage alarm annunciators

NOTE: W re your system per the co or codes n the w r ng d a grams of Fo dout 1 at the end of th s manua

AC Transfer Module

Before installing the AC Transfer Module, set switch S1 to the rear for 120 VAC operation (silkscreened 110 on board), or to the front for 240 VAC operation (silkscreened 220 on board) See Figure 3 5 for switch location

NOTES:

1 Both the AC Transfer and Bus Monitor Modules mount from the rear of the system cabinet The AC Transfer Module mounts in the leftmost slot the Bus Monitor Module mounts in the rightmost slot The board edge connectors are keyed to prevent mounting in correct slots

2 Be careful not to bump switch S1 when installing the AC Transfer Module Accidentally moving the switch to the 240 position will cause the module to go into error mode

To mount the module

1 Grasp the sides of the faceplate

2 Line up circuit board edges with card guides in Power Entry Panel opening

3 Gently slide the module in until it locks in place

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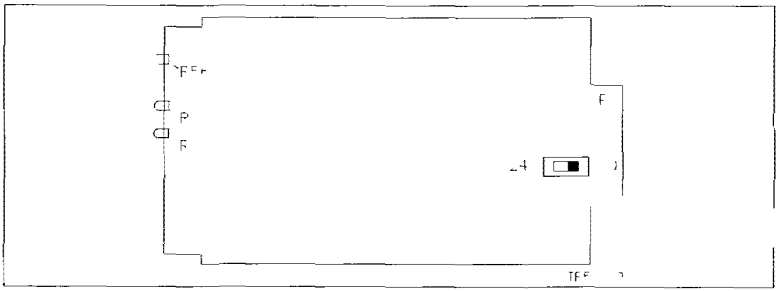


Figure 3 3 AC Transfer Module Switch S1

Bus Monitor Module

Before mounting the Bus Monitor Module, set switch S1 and jumpers J1/J2 Refer to Tables 3 1 and 3 2 for recommended settings see Figure 3 4 for locations

Table 3 1 Bus Monitor Module Switch Settings

Switch S1	Factory Setting	Function
1	0	Mon tor +5 +15 and 15 VDC enab ed
2	0	Mon tor system 24 VDC enabled
3	1	Mon tor externa power CH1 supp y d sabled
4	1	Mon tor externa power CH2 supp y d sab ed

Notes
1 0 Enab e (C osed or ON) 1 D sab e (Open or OFF)
2 Unused mon tor nputs must be put n D sab e posit on
3 Do not enab e a sw tches at once Do ng so w cause a Bad Status s gna

Table 3 2 Bus Monitor Module Jumper Settings

Jumper		Setting	Function
Channel 1	J1	1 2	Se ects 24 VDC leve for external power
	J1	2 4	Selects 48 VDC eve for externa power
	J1	2 3*	Se ects 125 VDC evel for externa power
Channe 2	J2	1 2	Se ects 24 VDC eve for externa power
	J2	2 4	Se ects 48 VDC leve for external power
	J2	2 3*	Se ects 125 VDC leve for external power

* Factory sett ng

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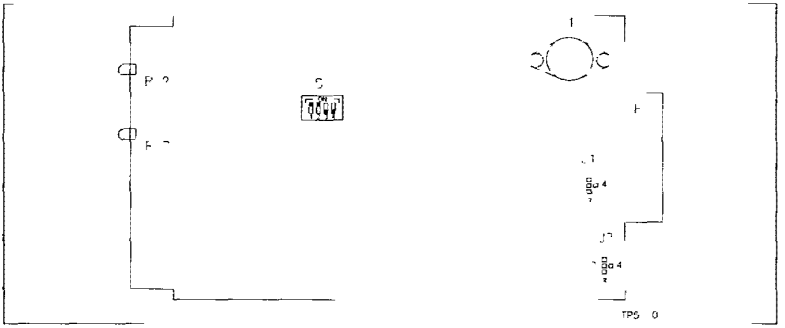


Figure 3 4 Bus Monitor Module

Fan Assembly

The Fan Assembly (Figure 3 5) mounts directly beneath the Power Entry Panel and above the first Module Mounting Unit Attach the fan power cable to the J4 connector on the Power Entry Panel

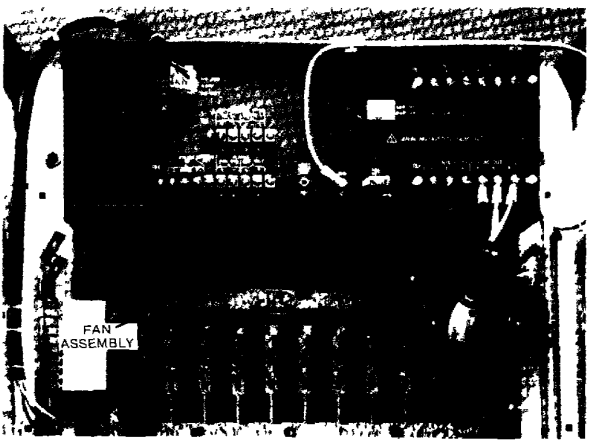


Figure 3 5 Fan Assembly

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Power Supply Modules

Power Supply Modules (Figure 3 6) mount directly in the Module Mounting Unit (MMU) Any slot except the rightmost (slot 12) can be used Install the modules per Steps 1 through 5 and as shown in Figure 3 7 This installation scheme provides the best heat dissipation and power distribution

NOTES:
1 For optimum heat dissipation and power distribution do not exceed more than two EPAS01 modules in any Module Mounting Unit

2 Install at least one EPAS01 module in the Module Mounting Unit with the largest load (e g an MMU containing several Multi Function Processor Modules)

WARNING	**The plastic covers on the module mounting unit backplane protect against accidental contact with ac Do not remove these covers.**
AVERTISSEMENT	**Les couvercles de plastique de la plaque arriere du chassis de montage des modules (mmu) assurent une protection contre l'exposition au courant alternatif. Ne pas retirer ces couvercles.**

Before handling the Power Supply Modules

- Verify that all devices connected to the module are properly grounded before using them
- Avoid touching the circuitry when handling the module
- Always use grounding straps (field static kits) when working with the modules

1 Set Jumper J1 for 120 or 240 VAC operation Jumper pins 1 and 2 (position B) for 240 VAC; pins 2 and 3 (position A) for 120 VAC See Figure 3 6

2 Set Jumper J2 for bus voltage monitoring Jumper pins 1 and 2 (position A) for +24 VDC monitoring only, pins 2 and 3 (position B) for +5, +15, 15 and +24 VDC monitoring NOTE: When using the IEPAF01, use position A

Trim potentiometers R5 and R6 are factory set and locked into position **Do not attempt to re-adjust them.**

3 Grasp the module faceplate handle

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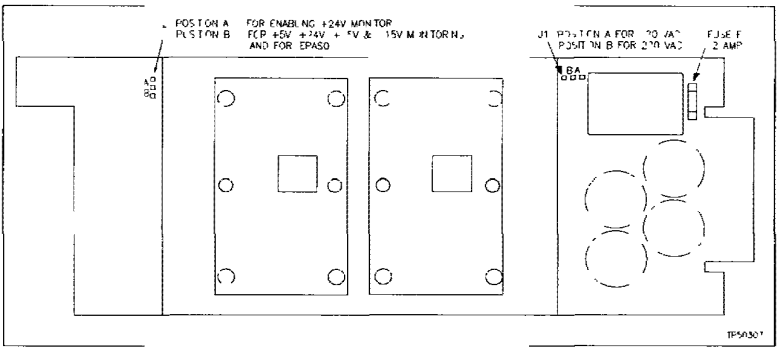


Figure 3 6 Power Supply Module (1EPAS01 shown)

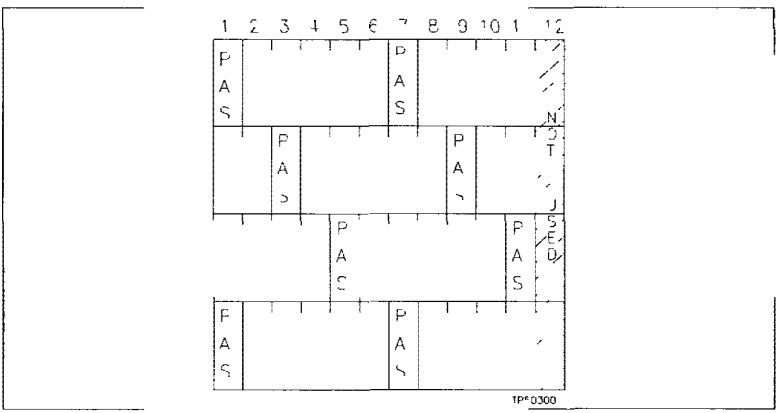


Figure 3 7 Recommended Power Supply Module Layout

4 Align the top and bottom edges of the circuit board with the guides in the Module Mounting Unit

5 Hold the module by the faceplate handle and slide it into the slot, push until the rear edges are firmly seated in the backplane connectors

6 Firmly press the module handle as you use a blade screw driver to push and turn the two concentric screws one half turn clockwise to lock the module in place

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To remove the module, push and turn the two concentric screws one half turn in either direction Slide the module part way out

WARNING	**To prevent shock when removing the Power Supply Module, wait 5 seconds to allow line filter capacitors to discharge before handling the module. Then, slide the module the rest of the way out. Do not grab the module by the heat sink (it may be hot), support it by the bottom edge of the circuit board.**
AVERTISSEMENT	**Pour eviter les chocs electriques, attendre 5 secondes avant de toucher au module afin de permettre la dissipation de l'energie emmagasinee dans les condensateurs de filtration. On peut ensuite retirer le module completement en le tirant vers soi Ne pas tenir le module au niveau du dissipateur thermique, mais plutot au niveau de la partie inferieure de la carte de circuits imprimes.**

WARNING	**Disconnect power before installing dipshunts for slave modules on the MMU backplane (slave expander bus). Failure to do so could result in severe or fatal shock.**
AVERTISSEMENT	**Couper l'alimentation avant d'installer les dipshunts sur la plaque arriere du chassis de montage de modules (MMU). Toute negligence a cet egard constitue un risque de choc pouvant entrainer des blessures graves, voire mortelles.**

POWER ENTRY PANEL (IEPEP01)

NOTE Th s Power Entry Pane requ res you to supp y an externa c rcu t breaker or fuse The breaker or fuse must be ab e to hand e the current and vo tage sted n **Spec f cat ons** n **Section 1**

1 Set the slide switch (accessible through the chassis) to either 120 V or 240 V depending on your line voltage This is used for the Power Fail Interrupt (PFI) detection circuit for determining low level or loss of input See Figure 3 8

CAUTION	**Improper switch setting can cause permanent damage to the PFI Board if exposed to the higher input voltage.**
ATTENTION	**Un reglage inadequat des interrupteurs peut entrainer des dommages permanents a la carte PFI (interruption due a une panne d'alimentation) si elle est soumise a la tension d'entree elevee.**

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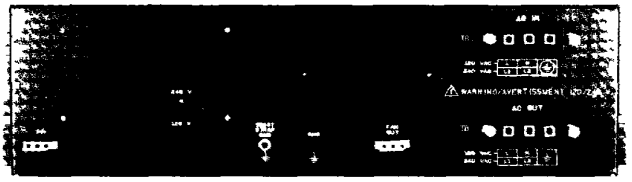


Figure 3 8 IEPEP01 Rear View

2 Connect cable 6638084 1 from connector **PFI** on the rear of the panel to the **DC Bus Bar** for distribution to the process control modules in the cabinet

3 Connect cable 6637814 1 from **TB2** on the rear of the panel to the **AC Bus Bar** for distribution to the Module Mount ing Unit backplanes This supplies the power to the Power Modules

4 Plug the Fan Assembly power cable into the **FAN OUT** connector on the rear of the panel

5 Connect a wire equivalent to the power wiring but not less than 10 AWG from the **GND** stud of the panel to the cabinet frame for AC safety grounding (see Foldout 2, Wir ing Diagram for wire color)

6 Apply power by connecting the 120/240 VAC, 50/60 Hz power input to terminal block **TB1** on the rear of the panel

NOTE: W re your system per the co or codes n the w r ng d agram of Fo dout 2

CONNECTING MULTIPLE MODULE MOUNTING UNITS

Most system cabinet configurations have multiple Module Mounting Units There must be continuity between each of the MMU busses This requires two cable assemblies the three wire, twisted cable for Mcdule Bus, and the flat, 40 conductor ribbon cable for Slave Expander Bus

NOTE. For proper operat on and max mum no se reduct on con nect the cab es so that the bus s n a serpent ne arrangement Th s e m nates the dead end stubs wh ch cause ref ect ons and over/un dershoot See F gure 3 9

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Module Bus Cable (Three Wire, Twisted pair)

1 Attach one end of the cable to the second column of three tabs on the lower left of the MMU backplane (facing from behind)

2 Attach the other end of the cable to the first column of three tabs on the lower left of the next MMU backplane

Slave Expander Bus Cable (Ribbon)

1 Attach the cables as shown in Figure 3 9.

2 Insert the ribbon connector in the hole in the upper MMU backplane (bottom position) Slide the latch to the left to lock into place Insert the bottom ribbon connector in the lower MMU holes (top position) Slide the latch to the right to lock into place Repeat this until all MMUs are tied together

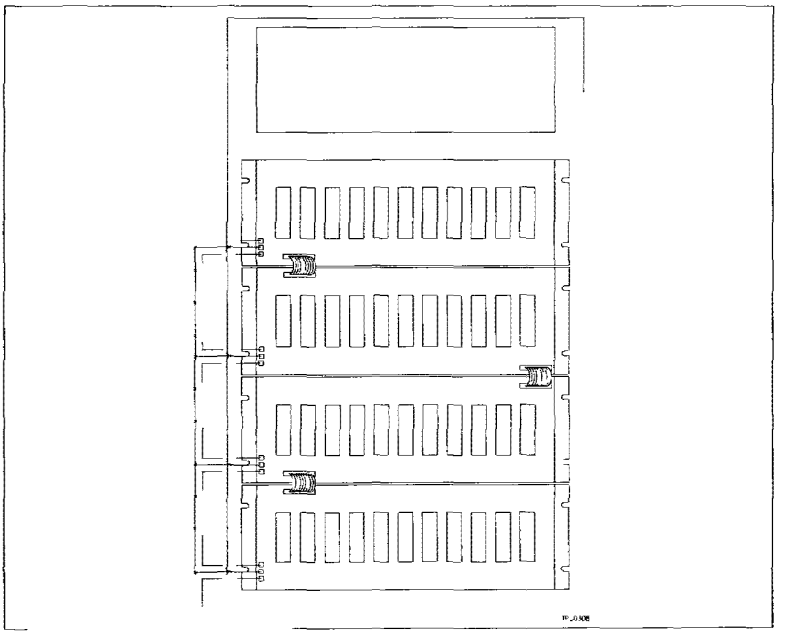


Figure 3 9 Connecting Cables to Multiple Module Mounting Units

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SECTION 4 – OPERATION

INTRODUCTION

This section covers what must be known to operate the Modular Power System The first part of this section pro vides a step by step approach to start up The remainder of this section explains the LED indicators on the AC Transfer, Bus Monitor and Power Supply Modules, and other general operating information

NOTE: The Modu ar Power System requ res no user ca brat on a components are factory ca brated

LED INDICATORS

When the Modular Power System is operating, observe the Status LEDs The following paragraphs explain how to interpret these LEDs Also, refer to Table 4 1

AC Transfer Module

The AC Transfer Module has three LEDs Module Status, Line 1 and Line 2 All LEDs are red/green When the system is receiving power and operating normally, the **Module Sta tus LED** is green, as are the Line 1 and 2 Status LEDs The only time the **Module Status LED** turns red is if the module fails A failure means that the nternally generated supply voltages or references have fallen below the minimum ac ceptable level In a redundant supply line configuration, a failure in the primary input turns **Line 1 LED** red, a failure in the secondary input turns **Line 2 LED** red

Bus Monitor Module

The Bus Monitor Module has two LEDs Module Status and System Status The **Module Status LED** is green when the module is operating properly It turns red if the module fails A failure means that the internally generated supply voltages or references have fallen below the minimum acceptable level The **System Status LED** is green when everything in the system is satisfactory If for some reason a bus voltage fails or falls out of tolerance, one of the AC inputs fails, external status, auxiliary power supply inputs are low, or the ATM fails, the LED turns red

Power Supply Module

The Power Supply Module has one LED Module Status This LED is green when the module is operating normally It turns red if an overload occurs, if one or more outputs fail, or if temperature goes beyond acceptable levels

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Table 4 1 LED Conditions

Module	LED/Color		Condition
ATM	Status	Green Red	Normal Modu e has fa ed
	L ne #1	Green Red	L ne #1 nput s good L ne #1 nput has fa ed
	L ne #2	Green Red	L ne #2 nput s good L ne #2 nput has fa ed
BMM	Status	Green Red	Norma Modu e has fa ed
	System Status	Green Red	Norma Bad Power System Status
PAS/PAF	Status	Green Red	Norma Over oad fa ure or overtemperature

AC TRANSFER MODULE/BUS MONITOR MODULE REMOVAL DURING OPERATION

While the Power System is in operation, **do not** remove the AC Transfer Module without first verifying that line 1 is operational When the ATM is removed, it causes the system to transfer to line 1 If the ATM had already transferred from line 1 to line 2 because of a problem, the whole system will go down when the ATM is removed Before removing the ATM, line 1 **must be** operational Additionally, removal of the ATM takes the Bus Monitor Module off line as it is powered by the AC Transfer Module

To avoid unintentional triggering of the PFI signal when handling the Bus Monitor Module or the AC Transfer module insert or remove the Bus Monitor Module only when the AC Transfer Module remains in its designated slot

RECOMMENDED START UP PROCEDURES

Follow the procedures in Steps 1 through 7 before applying power to the system

1 Verify that all connections are secure

2 Ensure that all unused AC Bus Bar receptacles are covered with insulated receptacles

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3 Install the Power Modules only (refer to Installation section for details)

4 Turn power on

5 Measure the bus voltages at the test jacks of the Bus Monitor Module (+5, +15 and 15 VDC are with respect to MOD COM, +24 VDC with respect to I/O COM)

Acceptable levels are

+4 75 VDC	to	+5 25 VDC	for	+5 VDC
+14 65 VDC	to	+15 75 VDC	for	+15 VDC
14 65 VDC	to	15 75 VDC	for	15 VDC
+1 5 VDC	for	+24 VDC		

6 When the bus voltages are at acceptable levels, start adding process control modules

NOTE. A red status ght at th s po nt may nd cate an over oad cond t on or defect ve modu e f th s happens rep ace the suspect power modu e f the cond t on st ex sts add power modu es per the formu a n Sect on 1

7 Continue adding process control modules until the system cabinet is filled

8 For optimum cooling, put blank faceplate (Bailey P/N 6636586 A1) in any unused slots

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SECTION 5 – TROUBLESHOOTING

INTRODUCTION

The flowcharts in Figures 5-1, -2 and 3 represent basic troubleshooting procedures. They are not intended to be all encompassing For step-by step details, refer to the supportive text following these charts

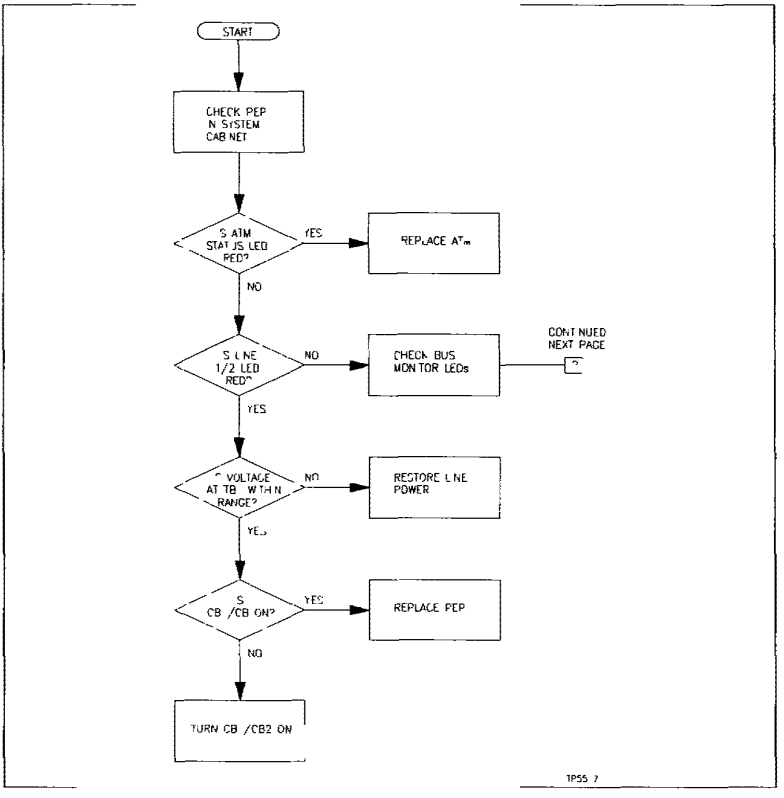


Figure 5 1 Power Entry Panel (IEPEP03) Troubleshooting Flowchart

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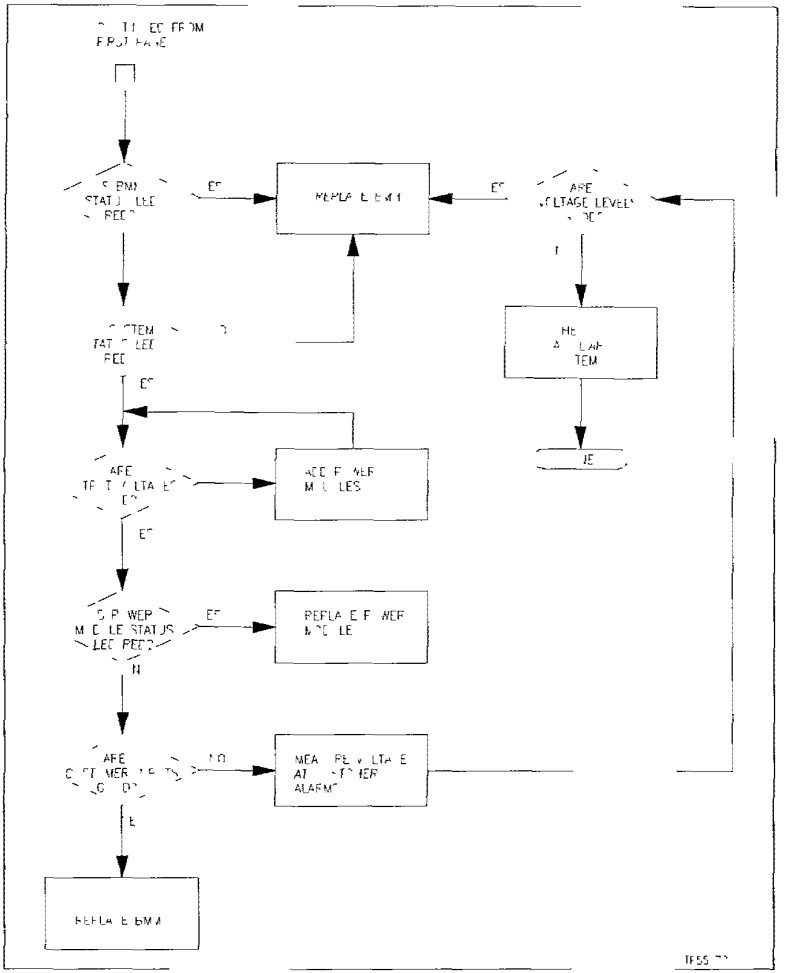


Figure 5 2 Bus Monitor/Power Supply Module Troubleshooting Flowchart

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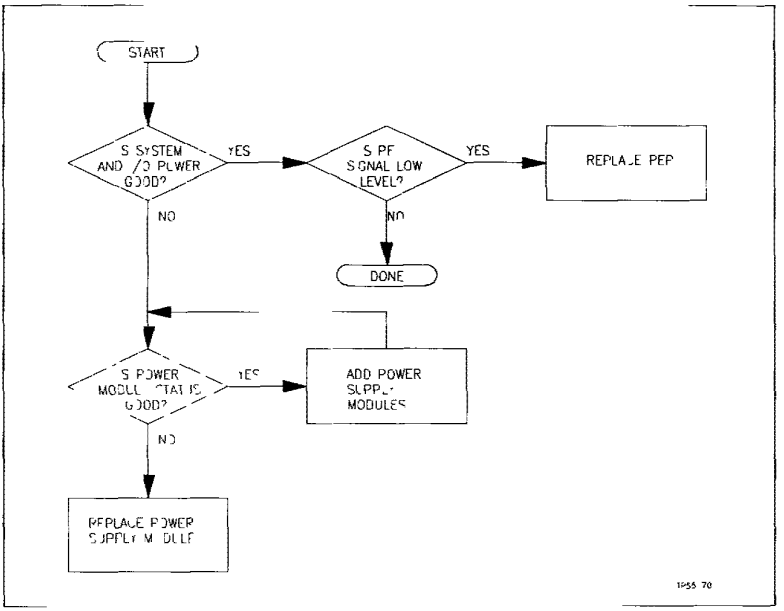


Figure 5 3 Power Entry Panel (IEPEP01) Troubleshooting Flowchart

Troubleshooting IEPEP03 Systems

Any power system problem causes a bad status flag at the operator interface This appears as an S on the System Status Display of an Operator Interface Unit or Management Command System Additionally, LED indicators on the Power Supply, Bus Monitor and/or AC Transfer Modules to go red Additionally, customer alarm outputs are activated to indicate a low bus voltage or other power system problems

Follow the steps below if bad status is detected

1 Check the LED indicators on the AC Transfer and Bus Monitor Modules

2 If the AC Transfer Module Status LED is red, the module has failed and must be replaced Note that a defective AC

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Transfer Module may cause the Bus Monitor Module to show bad status

NOTE: Before you remove the ATM measure ne 1 to ver fy that t s operat ona and w th n to erance (+102 to +132 VAC for 120 VAC nput +204 to +264 VAC for 240 VAC nput)

3 If the Bus Monitor Module Status LED is red, the module has fai ed and must be replaced

NOTE: Refer to the **Repair/Replacement** sect on for deta s on odu e e ova and ep ace ent

4 If both modules' LEDs are green, check the LINE 1 and LINE 2 LEDs on the AC Transfer Module

5 If either of these LEDs is red, this means a loss of AC input power, or bad quality If both LEDs are red switch S1 may have been moved when the ATM was insta led Check switch setting for 120

6 Verify that the circuit breakers are in the ON position

7 If circuit breakers are on and the LINE LEDs are still red, the Power Entry Panel has failed Call Bailey Service

8 If all AC Transfer Module LEDs are green, look at the Bus Monitor Module's LEDs

9 If Bus Monitor Module Status LED is red, the module has failed and must be replaced If it is green, proceed

10 If the SYSTEM STATUS LED is red, measure the bus voltages at the test jacks (on the module's front panel)

11 If the measurements made in Step 10 are good, look at the Power Supply Modules' Status LEDs If one or more are red, an overload condition may exist

12 Install additional Power Supply Modules

13 Check Power Supply Modules that had red LEDs If they are still red, they have failed Put a good module in the MMU, then remove the red lighted module

14 If the SYSTEM STATUS LED is red, bus voltages are good and there are no red LEDs on the Power Supply Mod ules, the problem is in the external inputs being monitored by the Bus Monitor Module

15 If customer external power supply voltages are being monitored at the AUX BUS MONITOR inputs to the Power Entry Panel, verify the jumper settings on the Bus Monitor

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Module are correctly set for the voltage levels being moni tored (refer to Table 3 2 for jumper settings)

16 If switch settings are okay, measure the voltages be tween terminals 1 and 2 and/or terminals 3 and 4 of TB4 on the PEP Voltages should be

greater than 22 VDC if set for 24 VDC
greater than 44 VDC if set for 48 VDC
greater than 115 VDC if set for 125 VDC

If the voltages are correct, there is a problem in one of the auxiliary status inputs (STATUS IN) at terminal block TB3 on the PEP.

17 Measure the voltage from terminal 1 and/or terminal 3 with respect to terminal 2 of TB3 If either voltage measures less than 2 5 VDC, the input status is bad To verify the external device causing the bad status, remove the suspect input wire The SYSTEM STATUS LED should turn green if the external device was pulling the input low

Troubleshooting IEPEP01 Systems

With IEPEP01 Systems, only the AC power input is moni-tored There are no bus voltage or other power system status indicators on the Power Entry Panel If AC input power is lost or goes low, a Power Fail Interrupt (PFI) signal is sent to the process control modules

Follow Steps 1 through 5 to troubleshoot the system

1 Check System and I/O power If System and I/O power are good, an overload condition may exist in the Power Sup-ply Modules

2 Check for red Status LEDs on Power Supply Modules

3 Install additional Power Supply Modules.

4 Check Power Supply Modules that had red LEDs If they are still green, they have failed Remove and replace them

5 Check PFI signal If it is good the Power Entry Panel has failed and must be replaced This should be done by a quali fied technician or serviceman

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SECTION 6 – MAINTENANCE

INTRODUCTION

While the Modular Power System requires minimal maintenance, it is very important for long, troublefree service Please note that only qualified personnel should perform maintenance

MAINTENANCE SCHEDULE

Table 6 1 is the maintenance schedule These tasks are to be performed at the specified intervals.

Table 6 1 Maintenance Schedule

Task	Interval
C ean and t ghten a l power and grounding connect ons Verify a 6 fans are operat onal	Every 6 months or dur ng plant shutdown, wh chever comes f rst
Use a stat c safe vacuum cleaner to remove dust from Modu es Modu e Mount ng Un t Fans Power Entry Pane	Every 6 months or during p ant shutdown, whichever comes f rst

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SECTION 7 – REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

Although the Modular Power System is designed to give long, troublefree service, some components may need to be replaced periodically This section explains the procedures for replacement and lists recommended spare parts

SPARE PARTS

The parts in Table 7 1 are Bailey recommended spare parts Bailey suggests having at least one of each on hand to minimize system downtime

NOTE. Use a Bailey Field Static Kit when working with the modules

AC TRANSFER MODULE REPLACEMENT

NOTES:

1 The AC Transfer Module can be removed under power if line 1 is good

2 The Bus Monitor Module goes off line when the AC Transfer Module is removed The Bus Monitor Module **MUST BE** removed **FIRST** Then remove the AC Transfer Module

3 Measure line 1 to verify that it is operational and within tolerance (+102 to +132 VAC for 120 VAC input +204 to +264 for 240 VAC input) If line 1 is good you can remove the AC Transfer Module without losing power to the cabinet If line 1 is not good turn off the Power Entry Panel circuit breaker for line 1 before you remove the module

To replace the AC Transfer Module

1 Grasp the Bus Monitor Module's lower faceplate, push the latch up and slide the module out

2 Grasp the lower faceplate, push the latch up and slide the module out

3 Set switch S1 on the replacement to match the setting of the ATM just removed

4 Insert the replacement AC Transfer Module. Grasp it by the faceplate Align the top and bottom edges of the circuit board with the guides in the panel

5 Hold the module by the faceplate and slide it into the slot, push until the rear edges are firmly seated in the backplane connectors

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6 Reinsert the Bus Monitor Module Grasp it by the face plate Align the top and bottom edges of the circuit board with the guides in the panel

7 Hold the module by the faceplate and slide it into the slot, push until the rear edges are firmly seated in the backplane connectors

BUS MONITOR MODULE REPLACEMENT

NOTE: The Bus Monitor Module can be removed under power Replace with another Bus Monitor Module as soon as possible

To replace the Bus Monitor Module

1 Grasp the lower faceplate, push the latch up and slide the module out

2 Set switch S1 and jumpers J1/J2 on the replacement to match the settings of the BMM you have just removed

3 Grasp the replacement module by the faceplate

4 Align the top and bottom edges of the circuit board with the guides in the panel

5 Hold the module by the faceplate and slide it into the slot, push until the rear edges are firmly seated in the backplane connectors

FAN ASSEMBLY

Fuse Replacement

To replace a fuse

1 Unplug Fan Assembly

2 Remove fuseholder cover

3 Remove fuse from fuseholder

4 Replace with identically rated fuse (e g , AGC2 for IEFAN01 (120 VAC), AGC1 for IEFAN02 (240 VAC))

Fan Assembly Replacement

1 Unplug Fan Assembly.

2 Remove the four screws that attach the assembly to the cabinet frame

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3 Gently slide the assembly out Be careful not to disturb other cabinet wiring

4 Verify that replacement assembly is the same rating as the one just removed

5 Slide replacement assembly in

6 Secure with the four screws removed in Step 2

7 Plug power cord into Power Entry Panel

8 Listen for fan rotation

POWER SUPPLY MODULE

NOTE: Power Supply modules can be removed under power

Fuse Replacement

1 Use a flat blade screwdriver to turn the two concentric screws one half turn in either direction Slide the module part way out

WARNING	**To prevent shock when removing the Power Supply Module, wait 5 seconds to allow line filter capacitors to discharge before handling the module. Then, slide the module the rest of the way out. Do not grab the module by the heat sink (it may be hot); support it by the bottom edge of the circuit board**
AVERTISSEMENT	**Pour eviter les chocs electriques, attendre 5 secondes avant de toucher au module afin de permettre la dissipation de l'energie emmagasinee dans les condensateurs de filtration. On peut ensuite retirer le module completement en le tirant vers soi. Ne pas tenir le module au niveau du dissipateur thermique, mais plutot au niveau de la partie inferieure de la carte de circuits imprimes.**

2 Grasp the faceplate handle and slide the module out

3 Once the module has cooled, lay it on the anti static mat

4 Locate fuse F1 (at the rear of the module by the P1 edge connector See Figure 3 6

5 Use a fuse removal tool to extract fuse F1

6 Insert a new 2 amp slow blow fuse

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Module Replacement

Follow Steps 1 through 3 for Fuse Replacement

1 Set the jumper settings on the replacement module to match those of the one just removed

2 Grasp the replacement module by the faceplate

3 Align the top and bottom edges of the circuit board with the guides in the panel

4 Hold the module by the faceplate and slide it into the slot push until the rear edges are firmly seated in the backplane connectors

5 Firmly press the module handle while using a flat blade screwdriver to push and turn the two concentric screws one half turn clockwise to lock the module in place

6 Verify the Status LED turns green

Table 7 1 Recommended Spare Parts List

Description	Part Number	Remarks
AC System Power Modu e	E PAS01	
AC F e d Power Modu e	E PAF01	
AC Transfer Modu e	6637827 1	Used n EPEP03
Bus Mon tor Modu e	6637830 1	Used n EPEP03
Cab e	1948502A0340	Connects S ave Expander Bus from MMU to MMU
Fan 120 VAC Fan 240 VAC	1947419A1 1947419A2	
Fuse 2 Amp	Bussman® AGC2 or equ va ent 194776A12001	Used n EFAN01 (120 VAC)
Fuse 2 amp	L tt efuse® S oB o 218002 or equ va ent 1948182A32001	Used n EPAS01 EPAF01
Fuse 1 Amp	Bussman AGC1 or equ va ent 194776A11001	Used n EFAN02 (240 VAC)
nsu ated Qu ck Connect Receptac e	1948529A1	

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SECTION 8 – SUPPORT SERVICES

GENERAL INFORMATION

Bailey Controls is ready to assist in the use and repair of its products Requests for sales and/or applications services along with installation, repair, overhaul and/or maintenance contract services should be made to the nearest sales office

REPLACEMENT PARTS AND ORDERING INFORMATION

When making repairs at your facility, order replacement parts through a Bailey sales office Provide the following information to expedite the handling of parts orders

1 Part description, part number and quantity

2 Model and serial numbers (if applicable) of the assembly for which the part has been ordered

3 Bailey publication number, page number and reference figure used in identifying the part

When ordering standard parts from Bailey Controls, use part numbers and descriptions from respective Renewal Parts sections of applicable equipment manuals Parts which do not have a commercial description provided in the description column of the Renewal Parts sections must be ordered from the nearest Bailey Controls sales office

TRAINING

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TECHNICAL DOCUMENTATION

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APPENDIX A – QUICK REFERENCE MATERIAL

Use Table A 1 as a quick reference to check jumper and switch settings

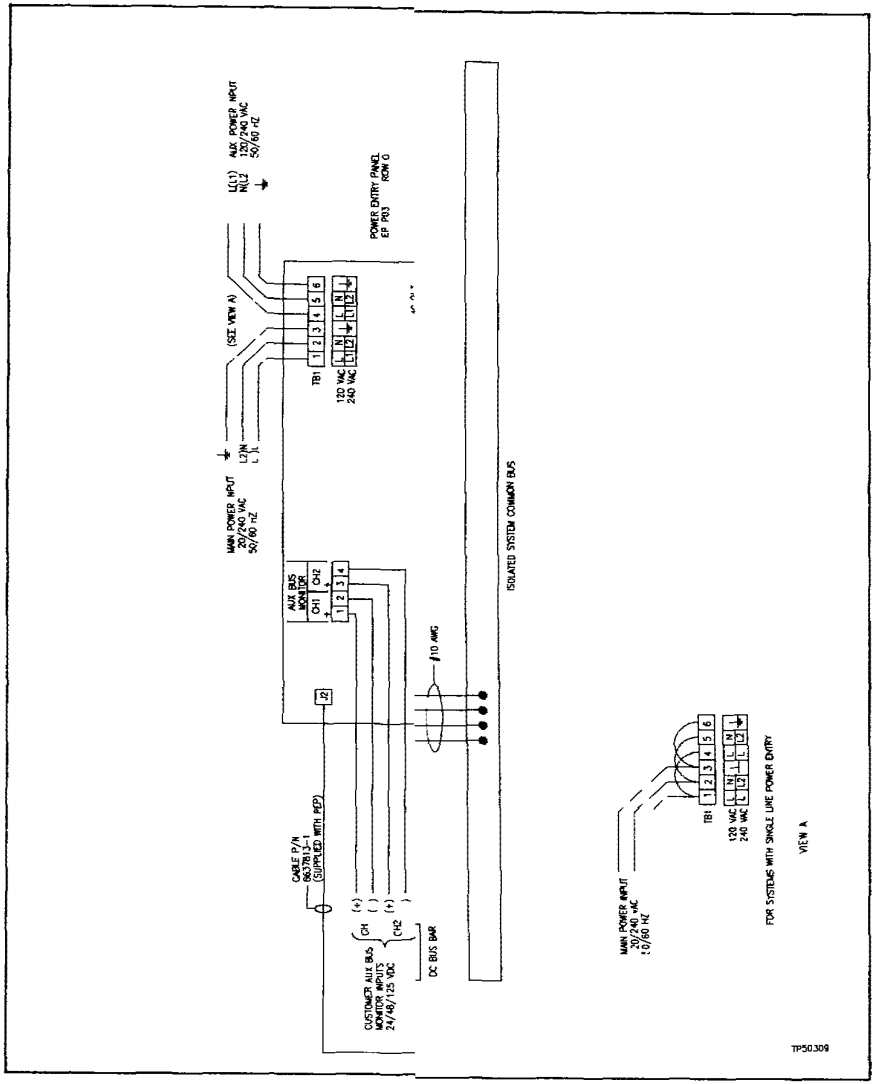
Table A 1 Switch and Jumper Setting Reference

Voltage	Fan	Device	Switch/Position	Jumper/Position
120 VAC	IEFAN01	ATM	S1 to the rear	
		BMM	S1 - 0011	J1 pins 2 and 3 J2 pins 2 and 3
		PAS		J1 position A J2 position B
		PAF		J1 position A J2 position A
240 VAC	EFAN02	ATM	S1 to the front	
		BMM	S1 0011	J1 pins 2 and 3 J2 pins 2 and 3
		PAS		J1 position B J2 position B
		PAF		J1 position B J2 position A

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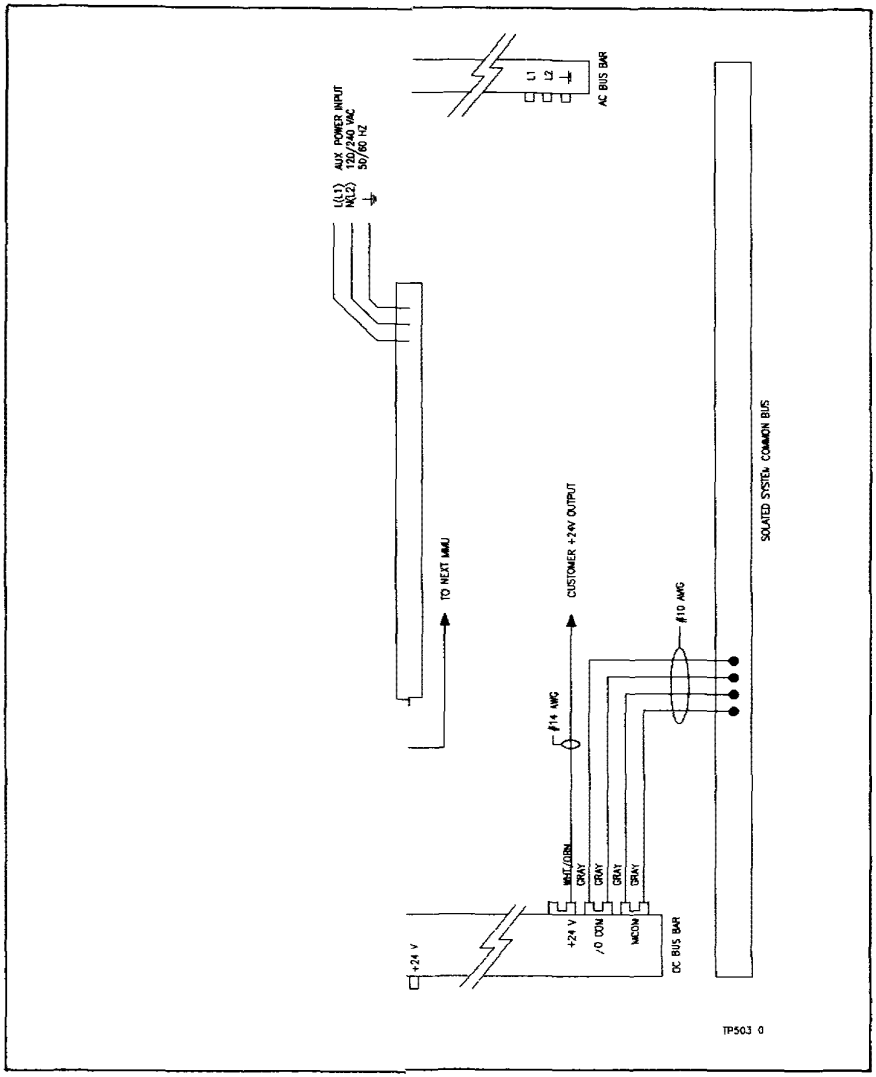


oldout 1 IEPEP03 System Cabinet Wiring Diagram

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Foldout 2 IEPEP01 System Cabinet Wiring Diagram

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