

Bailey[®] network 90[®]

Module Power Panel NMPP02



A7628

Bailey Controls
Babcock & Wilcox, a McDermott company

Product Instruction

E93-909-2

WARNING notices as used in this manual apply to hazards or unsafe practices which could result in severe personal injury or death.

CAUTION notices apply to hazards or unsafe practices which could result in minor personal injury or property damage.

NOTES highlight procedures and contain information which assists the operator in understanding the information contained in this manual.

WARNING

INSTRUCTION MANUALS

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

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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.

AVERTISSEMENT

MANUELS D'OPERATION

NE PAS METTRE EN PLACE, REPARER OU FAIRE FONCTIONNER CE MATERIEL SANS AVOIR LU, COMPRIS ET SUIVI LES INSTRUCTIONS REGLIMENTAIRES DE **Babcock & Wilcox, Bailey Controls** TOUTE NEGLIGENCE A CET EGARD POURRAIT ETRE UNE CAUSE D'ACCIDENT OU DE DEFAILLANCE DU MATERIEL.

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LA PLUPART DES EQUIPEMENTS ELECTRONIQUES SONT SENSIBLES AUX PERTURBATIONS DE LA FREQUENCE RADIO. DES PRECAUTIONS DEVONT ETRE PRISES LORS DE L'UTILISATION DE MATERIEL DE COMMUNICATION PORTATIF. LA PRUDENCE EXIGE QUE LES PRECAUTIONS A PRENDRE DANS CE CAS SOIENT SIGNALEES AUX ENDROITS VOULOUS DANS VOTRE USAGE.

PERTES PROCEDE RENVERSEMENTS

L'ENTRETIEN DOIT ETRE ASSURE PAR UN PERSONNEL QUALIFIE ET EN CONSIDERATION DE L'ASPECT SECURITAIRE DES EQUIPEMENTS CONTROLES PAR CE PRODUIT. L'ADJUSTEMENT ET/OU L'EXTRACTION DE CE PRODUIT LORSQU'IL EST INSERE A UN SYSTEME ACTIF PEUT OCCASIONNER DES A-COUPS AU PROCEDE CONTROLE. SUR CERTAINS PROCEDES, CES A-COUPS PEUVENT EGALEMENT OCCASIONNER DES DOMMAGES OU BLESSURES.

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SAFETY SUMMARY

GENERAL WARNINGS

ELECTRICAL SHOCK HAZARD DURING MAINTENANCE

Disconnect power or take precautions to ensure that contact with energized parts is avoided when servicing.

RISQUES DE CHOCS ELECTRIQUES LORS DE L'ENTRETIEN

S'assurer de débrancher l'alimentation ou de prendre les précautions nécessaires à éviter tout contact avec des composants sous tension lors de l'entretien.

SECTION 1 – INTRODUCTION

PURPOSE

The Module Power Panel (MPP) design supports and interfaces with up to two Module Power Supplies (PSMs) providing multiple DC power outputs for the Module Mounting Units (MMUs). These outputs include +5 V, +15 V, -15 V, and -30 V. An MPP also provides alarm monitoring, auctioneering, and load balancing for redundant supplies.

WHO SHOULD READ THIS MANUAL

Anyone who must install or maintain the MPP should carefully read and understand the information in this manual.

RELATED DOCUMENTS

E93-909-1	Power Entry Panel
E93-909-3	I/O Power Panel
E93-909-4	Module Power Supplies
E93-909-5	I/O Power Supply
E93-909-6	Fan Assembly

RELATED HARDWARE

NFAN0X	Fan Assembly
NIOP0X	I/O Power Panel
NPSI0X	I/O Power Supply
NPSM0X	Module Power Supply
NPEP0X	Power Entry Panel

SPECIFICATIONS

Power Requirements				
Module Power Panel NMPP02		120/240 V ac with auctioneering		
Module Power Supply		Power Output	Input	Fusing
NPSM01		375 W	120 V ac	12 A
NPSM02		750 W	120 V ac	20 A
NPSM03		375 W	240 V ac	12 A
NPSM04		750 W	240 V ac	12 A
Physical Aspects				
		Inches	Centimeters	
Width		17.25	43.8	
Height		8.75	22.2	
Length		19.75	50.2	
Voltage Trip Level				
		Bus Voltage Set Point (at MPP jacks)	Alarm Trip Voltage Low Trip High Trip	
5 Volt Bus	{ +5 V	5.15 V	4.65 to 4.7 V > 5.35 V	
At Supply	{ +15 V -15 V 30 V	15.28 V	13.96 to 14.60 V	
Output		-15.28 V	-13.96 to -14.60 V	
TerminalBlock		-30.5 V	-27.8 to -29.3 V	
Alarm I/O				
Alarm Output		24 V dc at 0.12 Amps (maximum)		
External Alarm				
Power to Remote IOP		5 V dc at 25 mA (typical)		
Input		open - collector or contact		
CAS In/Out				
Source		4 V dc at 100 uA (typical)		
Sink		0.4V dc at 200 mA (maximum)		
Environmental				
Ambient Temperature		0° to 70° C (32° to 158°F)		
Relative Humidity		0 to 95% up to 55°C (131°F), noncondensing		
Atmospheric Pressure		Sea level to 3 km.		
Certification		CSA certified for use as process control equipment in an ordinary (nonhazardous) location.		

NOTE: All components, whether in transportation, operation, or storage must be in a noncorrosive environment.

Specifications Subject To Change Without Notice.

SECTION 2 – DESCRIPTION

GENERAL

A Module Power Panel (MPP) can be equipped with Power Supplies for foreign and domestic power requirements and for varying sizes as shown in Table 2-1.

Table 2-1. Module Power Supply Types

Nomenclature	Input	Power Output
NPSM01	120 V ac	375 W
NPSM02	120 V ac	750 W
NPSM03	240 V ac	375 W
NPSM04	240 V ac	750 W

MPP FEATURES

1. Bus voltage test jacks.
2. Cascading of alarm monitor inputs.
3. Two external alarm inputs to bring remote termination unit cabinet cascade alarms into the main system.
4. A Power Fail Interrupt (PFI) signal to PCUs from supply PFI output(s) and from one or more bus voltage monitors.
5. Status LEDs for each operating power supply.
6. Alarmed monitoring of the power supply outputs.
7. An isolated DC contact output, customer alarms, on detection of a module power supply output failure.
8. Diode-auctioneering for auxiliary module power supply outputs.
9. Forced load sharing between the 5.1 V outputs, when operating with redundant module power supplies.

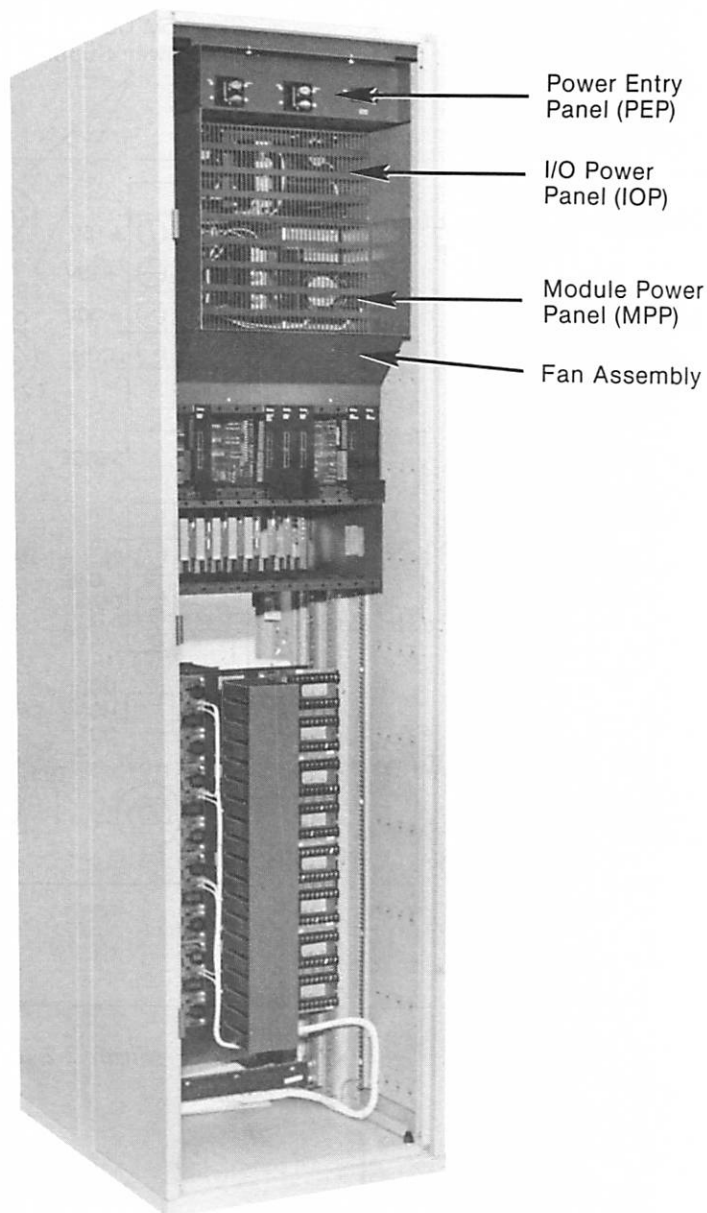


Figure 2-1. Location of Power System Components in PCU Cabinet

10. A shelf for mounting either one or two Module Power Supplies.

As shown in Figure 2-2, the power terminals for an auctioneered MPP are located at the rear. The +5 V terminal is a one quarter inch stud sized to carry currents in excess of 50 Amps. The +15, -15, and -30 V dc terminals (TB5) carry less than 8 Amps.

The MPP consists of a panel subassembly, base plate, and side piece. The base plate is a formed sheet metal grill which is bent to extend up the front plate. This provides protection and allows the discharge of cooling air.

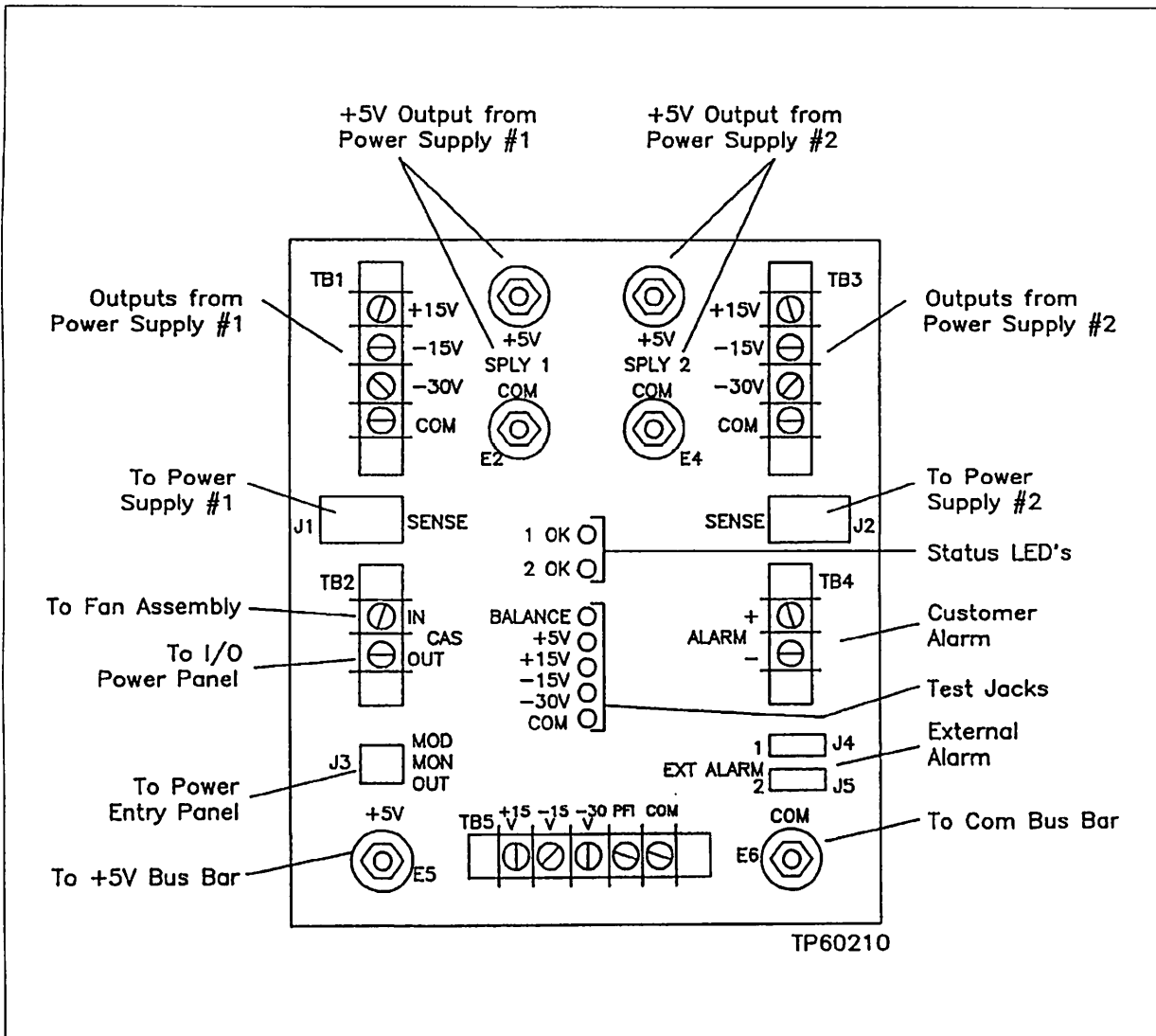


Figure 2-2. NMPP02 Panel (Rear View)

SECTION 3 – INSTALLATION

RECEIVING AND HANDLING

Upon receipt, examine the unit for possible damage in transit. If damage is found or if there is any evidence of rough handling, a damage claim should be filed and the nearest Bailey Sales/Service Office should be notified.

Storage should make use of original packing material and container. The storage environment should be protected and free of all environmental extremes, including temperature, moisture, and air quality conditions.

MOUNTING LOCATION

The Module Power Panel (MPP) mounts from the rear in a NETWORK 90 Cabinet or into standard 19 in. (48.3 cm.) EIA mounting rails. It should be mounted directly under an I/O Power Panel (IOP), if used. If no IOP is used, the MPP is moved up against the Power Entry Panel (PEP).

External wiring is shown in the wiring section of this manual. When using two supplies, each must have a current rating capable of handling the load requirement.

Before installing a Power Supply into the MPP, its mounting plate is fastened to the bottom of the supply using four 10-32 by 3/8 inch flathead screws.

POWER AND GROUNDING

Power is delivered from the Power Entry Panel (PEP) to each supply. Input power of 120 V ac, 50/60 Hz, and 240 V ac, 50/60 Hz is accommodated with Power Supply options (refer to the Description section of this manual). A weldnut is provided on the PEP rear surface for grounding, if necessary. Mounting rail attachment screws ground the MPP to the cabinet.

INPUT/OUTPUT CONNECTIONS

Tables 3-1 and 3-2 list detailed input/output connections for the MPP.

Table 3-1. Input Connections

Designation	Function	Termination
CAS IN	Support Equip Fail	TB2-1
COM	Return	TB1-4, TB3-4, E6
+ 5 V	Sense, Monitor	E1, E3
+ 15 V	Sense, Monitor	TB1-1, TB3-1
-15 V	Sense, Monitor	TB1-2, TB3-2
-30 V	Sense, Monitor	TB1-3, TB3-3
POWER FAIL	Alarm	J1-8, J2-8
COM	Auctioneer	E2, E4
FAULT	Ext Alarm 1 Ext Alarm 2	J4-2 J5-2

Table 3-2. Output Connections

Designation	Function	Termination
CAS OUT	Support Equip Fail ¹	TB2-2
COM	Return	TB5-5, J12
+5 V	Supply Sense	J1-9, J2-9
+15 V	Supply Sense	J1-1, J2-1
-15 V	Supply Sense	J1-5, J2-5
-30 V	Supply Sense	J1-6, J2-6
+5 V	Ext Alarm 1	J4-1
COM	Ext Alarm 1	J4-3
+5 V	Ext Alarm 2	J5-1
COM	Ext Alarm 2	J5-3
PFI	Pwr Fail Inter. Sig.	TB5-4
(+)	Isol. Alarm ²	TB4-1
(-)	Isol. Alarm ²	TB4-2
+5 V	Mon. Out, Test Pt.	J3-1, J8
+15 V	Mon. Out, Test Pt.	J3-2, J9
-15 V	Mon. Out, Test Pt.	J3-3, J10
-30 V	Mon. Out, Test Pt.	J3-4, J11
COM	Mon. Out, Test Pt.	J3-5, J12
BALANCE	Test Pt.	J7

1 - Indicates power supply status and fan failure.
2 - Indicates power supply status.

USER CONFIGURATION - CIRCUIT BOARD JUMPERS

Table 3-3 gives the jumper configurations on the Module Monitor Board assembly, located in the MPP. The

jumpers (JP1, JP2, and JP3) are located in the lower center area of the board (see Figure 3-1). Table 3-3 applies only to Board Assembly number 6632100-1, Revision L or later.

Table 3-3. Jumper Positions

Supply Configuration	Jumper Positions		
	JP1	JP2	JP3
Two supplies (auctioneered) with -30 V Output monitoring	IN	IN	IN
Two supplies (auctioneered) without -30 V Output monitoring	OUT	OUT	IN
One supply with -30 V Output monitoring (Mounted in Supply number 1 position, only)	IN	OUT	OUT
One supply without -30 V output monitoring (Mounted in Supply number 1 position, only)	OUT	OUT	OUT

FIELD SETUP OF NON-AUCTIONEERED MPP

Initial Setup

1. Check input wiring to ensure it is correct.
2. Remove all modules from Module Mounting Units (MMUs).
3. Since monitor logic remains powered, set the voltage adjustment for each channel to minimum (counterclockwise).

Voltage Adjustment

1. Turn on the Module Power Supply using breaker CB3 on the Power Entry Panel (PEP).
2. Using a digital voltmeter to measure voltages, set the output voltages with potentiometers labeled 1 through 4 as shown in Table 3-4.

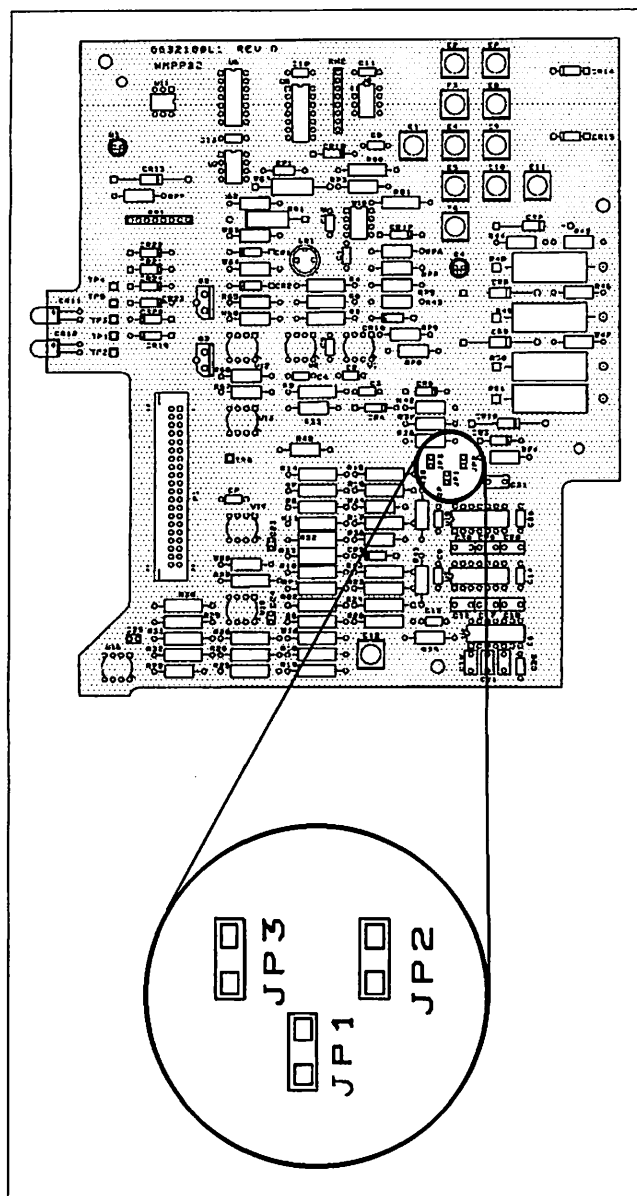


Figure 3-1. Jumper Locations

Final Adjustment

1. With supply off, insert the full complement of system modules for full load.
2. Apply power to the supply (CB3).
3. Measure all system voltages. Do not readjust unless voltages are outside the $\pm 5\%$ tolerance or system status indicator is red.

FIELD SETUP OF AUCTIONEERED MPP

Initial Setup

1. Check input wiring to ensure it is correct.

2. Remove all modules from Module Mounting Units (MMUs).

3. Set the voltage adjustment for each channel to minimum (counterclockwise).

Voltage Adjustment

1. Turn on the left supply, CB3, on the PEP rear.
2. Set output voltages using potentiometers labeled channels 1 through 4. Use a digital voltmeter to measure the voltages. Refer to voltage values in Table 3-4.

Table 3-4. MPP Voltage Adjustments

Channel Number	Setting
1	+5.15 V dc
2	+15.28 V dc
3	-15.28 V dc
4	-30.50 V dc

3. Turn off the left supply, CB3, on the PEP rear.
4. Turn on the right supply, CB5, on the PEP rear.
5. Repeat Step 2 for the right supply.
6. Turn off the right supply, CB5, on the PEP rear.

Final Adjustment

1. With power off (both CB3 and CB5 in the OFF position) install the full complement of system modules for the full load.
2. Apply system power to both supplies by turning on CB3 and CB5.
3. Measure all system voltages, including the balance voltage at the test jack marked **BALANCE**. (Balance voltage should be between ± 3 V dc and -3 V dc. A $+$ indication shows the left supply is handling the greater load; a $-$ indication shows the greater load on right supply.
4. If all voltages are within $\pm 5\%$ of the values in Step 2 under "Voltage Adjustment", record them in the system diary and do not adjust.
5. If any values are out of the $\pm 5\%$ tolerance, or balance is greater than ± 3 V, turn off the other supply, readjust the output, and repeat Steps 1 through 3.

SECTION 4 – OPERATION

GENERAL

The Module Power Panel (MPP) supports either a single Module Power Supply or two supplies, in an auctioneered configuration. When operating with just one supply (non-auctioneered configuration), jumpers on the module monitor board are configured to disable monitoring circuitry normally used for a second supply.¹ Jumpers are also available to disable monitoring of the -30 volt outputs if these outputs are not required for the system. When operating with two supplies, the MPP performs load sharing on the +5 volt outputs and auctioneering on the auxiliary channel outputs. AC power is wired directly from the PEP to each power supply. The outputs from Supply number 1 (via E1, E2 and TB1) and Supply number 2 (via E3, E4 and TB3) pass through auctioneering diodes and appear at the output bus terminals E5, E6 and TB5.

Other MPP functions involve the monitor board. It accepts supply output voltages and load bus voltages for monitoring, provides remote sense connections via J1 and J2, and includes the load sharing control circuit. A test jack, labeled **BALANCE**, allows you to monitor the +5 V load sharing balance.

The DC bus voltages can be measured at test jacks labeled +15 V, -15 V, -30 V, and COM. These voltages are also supplied through connector J3 to support the PEP Module Bus Monitor. External alarm inputs J4 and J5 enable monitoring of up to two remote I/O Power panels. TB2 provides termination for cascading the alarm signal (Cascade) to the PEP. The Power Fail Interrupt (PFI) signal, generated when a PFI signal is received from the module power supply (from both module power supplies, for two supply operation) and one of the output voltages

is bad, is provided for distribution to the MMU card cage assemblies via TB5-4. The following subsections describe the functions of Alarm Monitoring, Forced Load Sharing and Auctioneering in detail.

MONITORING AND ALARMING

The MPP has two **EXTERNAL ALARM** connectors J4 and J5 to provide power for and accept CAS internal system alarm signals from up to two remote cabinet I/O Power panels. Pin 1 of J4 or J5 provides +5 V power, at up to 25 mA, to provide pull-up voltage for contact or open collector inputs. Pin 2 of J4 or J5 is the CAS input from a remote cabinet. Pin 3 of J4 or J5 is connected to DC common through fuse resistors.

The **CAS OUT** and **ALARM** open-collector outputs are asserted (low true) when either the ± 15 V or -30 V output from either supply is too low, or the +5 V bus voltage is either too low or high, or one of the ± 5 V outputs from the supply fails causing a load sharing imbalance.² The **ALARM** output is an isolated output.

The Power Fail Interrupt (PFI) open-collector is asserted (low true) when a PFI is received from the power supply to warn modules of a pending loss of DC power. When operating with two supplies, the PFI is asserted when PFIs are received from both supplies, or if a PFI is received from one supply and a low voltage is detected at the output(s) of the other supply.

The Status LEDs (1-OK or 2-OK) are turned off when one of the outputs of the respective supply is too low.

1 Early revision circuit board assemblies (pre-revision L) in the MPP do not contain jumpers to disable monitoring of Supply number 2 when operating with only one supply, or to disable -30 volt output monitoring. If the circuit board does not contain jumpers and the MPP is being operated with one power supply; you must add wires from TB1-1 to TB3-1, TB1-2 to TB3-2, and TB1-3 to TB3-3. Addition of these wires avoids incorrect supply status and alarm conditions.

2 Early revision circuit board assemblies (pre-revision L) do not monitor the +5 V bus voltage or load sharing imbalance on +5 V outputs.

FORCED LOAD SHARING

Load sharing between 5 V outputs assures minimum load for each switching supply and minimizes transients during supply switchover.

Current shunts are present in the 5 V common feed line of each supply. The voltage across each is amplified and applied to a differential integrator.

This responds to a load imbalance by slewing positive when the current of channel 1 exceeds that of channel 2, and negative for the reverse. A positive slew drives the negative sense input of power supply 2 positive in proportion to the extent of the slew. This completes the closed-loop correction.

The supply having the higher set point is the master. The (-) sense input of the other supply is made sufficiently positive to raise its output level to balance the master supply.

AUCTIONEERING

Each supply output is coupled to the combined outputs of the panel by silicon junction blocking diodes. The +5V dc outputs are wired to the +5 V output terminal, and auctioneering diodes and shunts placed in the common (-) lines. (This reduces common mode voltage levels for load balancing circuitry.)

Auctioneering diode pairs for +15 V and -15 V outputs utilize bridge rectifier packages. The -30.5 V outputs utilize diodes mounted on the Module Monitor board.

SECTION 5 – MAINTENANCE

Maintenance of the Module Power Panel (MPP) is not normally required. Be certain the proper circuit breakers are switched off when removing a power supply. Special precautions must be taken while power is applied to avoid harmful shocks.

SPARE PARTS LIST

Table 5-1 is a list of recommended spare parts for the MPP.

Table 5-1. MPP Recommended Spare Parts

Part Number	Description
1946945-1	Power Diode
1947191-1	Bridge Rectifier Diode Assembly, 35A
1947312-100100	Current Shunt
6632100-1	Module Monitor PC Board Assembly
6633439-1	Cable Assembly
6633554-1	Alarm Sense PC Board Assembly
6633644-1	Bus Monitor Cable
6633645-1	Sense Cable
6633649-1	Strap Assembly

FIELD REPLACEMENT OF A MODULE POWER SUPPLY (PSM)

If one PSM in an auctioneered MPP should fail during system operation (in a case where the entire system cannot be turned off to replace the supply), the new supply can be installed without shutting down the system. Follow these steps.

Removing a Failed Supply

1. Turn off AC power going to the supply which has failed. Use the circuit breaker on the rear of the Power Entry Panel (PEP) corresponding to the failed supply (CB3 for left supply, CB5 for right supply).
2. Tag all wires which terminate on the failed supply. Use masking tape or other suitable labeling to mark the wire destination on the supply.
3. Remove all wires from the failed supply. GENTLY fold them out of the way of the supply.
4. Remove the two screws on the mounting bracket directly under the rear of the supply.
5. Slide the supply out of the MPP.

Installing a New Supply

1. Install mounting bracket from the old supply onto the new supply.
2. Slide new supply into the MPP. Ensure all wires are out of the mounting slot.
3. Replace mounting screws.
4. Wire new supply according to marked wires.

Voltage Adjustment

1. Turn all four channel adjustment potentiometers fully counterclockwise.
2. Turn on AC power from the PEP.
3. Measure test point marked **BALANCE** with a digital voltmeter.
4. Using the potentiometer marked **Ch. 1 volt** slowly turn clockwise (CW) until balance voltage is between +3 V and -3 V. This adjusts the +5 V channel.
5. Insert test probe into test point marked +15 V.
6. Note the value that the +15 V line reads. It should be about +15.30 V. SLOWLY increase the +15 V channel by turning the potentiometer marked **Ch. 2 volt** CW until the voltage is "bumped" up one or two one-hundredths of a volt (0.01 V to 0.02 V).
7. SLOWLY decrease the voltage until it is at its original value.
8. Repeat Steps 5 through 7 for the -15 V channel (potentiometer - Channel 3 volt) and the -30V channel (potentiometer - Channel 4 volt).
9. Both LEDs on the MPP should now be green. Turn off the AC power going to the other PSM.
10. Adjust the four channels of the new supply to the following values.

Channel 1 = +5.15 V
Channel 2 = +15.28 V
Channel 3 = -15.28 V
Channel 4 = -30.50 V
11. Turn on the AC power to the other supply. Measure and record levels in the system diary. (All should be $\pm 5\%$ of the values listed in Step 10.)

APPENDIX A - WIRING DIAGRAMS

Figures A-1 and A-2 illustrate wiring diagrams for different configurations of the power system. Figure A-1 shows a Power Entry Panel (PEP), a Module Power Panel (MPP) with two Module Power Supplies (PSMs), and a Module Fan Assembly (FAN). Figure A-2 presents a PEP, an Input/Output Power Panel (IOP) with two I/O Power Supplies (PSIs), and an MPP with two PSMs.

CUSTOMER ALTERNATE
GROUNDING CONDUCTOR
GREEN

#8 AWG MIN. FOR
SINGLE SOURCE

#6 AWG MIN. FOR
TWO POWER SOURCES

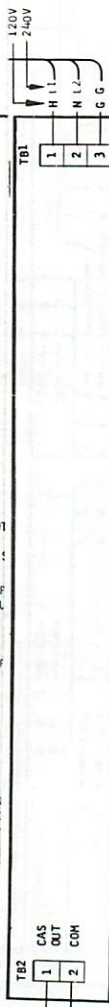
NOTES:

- 1) 120V
H = HOT (BLK),
N = NEUT (WHT),
G = GND (GRN)
- 2) USE #10 AWG UNLESS OT
- 3) ∇ = CONNECT TO 1:
- 4) ALL WIRING TO BE COPP
SPECIFIED, TO BE INSL
150V MIN. (300V MIN.

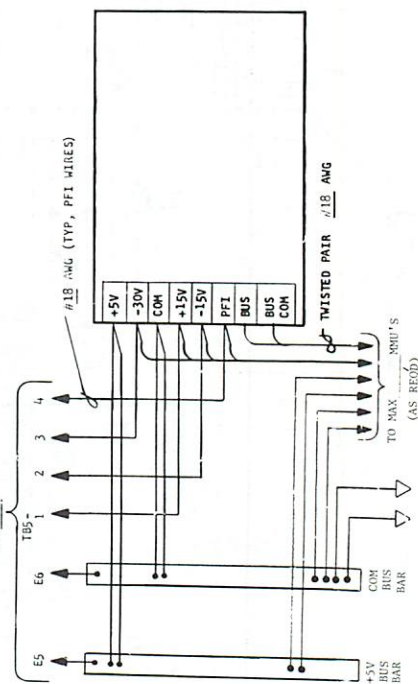
*** SEPARATELY ORDEF

TABLE OF CONN
BUS AND BUS C

PCU NO.	FROM
1	CAS
2	OUT
3	COM



TO MODULE POWER PANEL
ROW 1



Reference Drawing: D1113412G

Figure A-1. Wiring Diagram for an Auctioneered System
and Auctioneered Module Power Cabinet

H6 AND MIN. FOR
TWO POWER SOURCES.

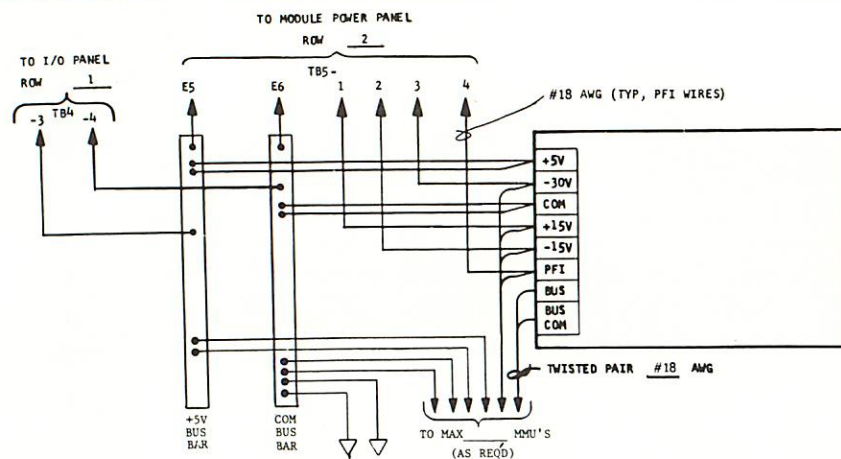
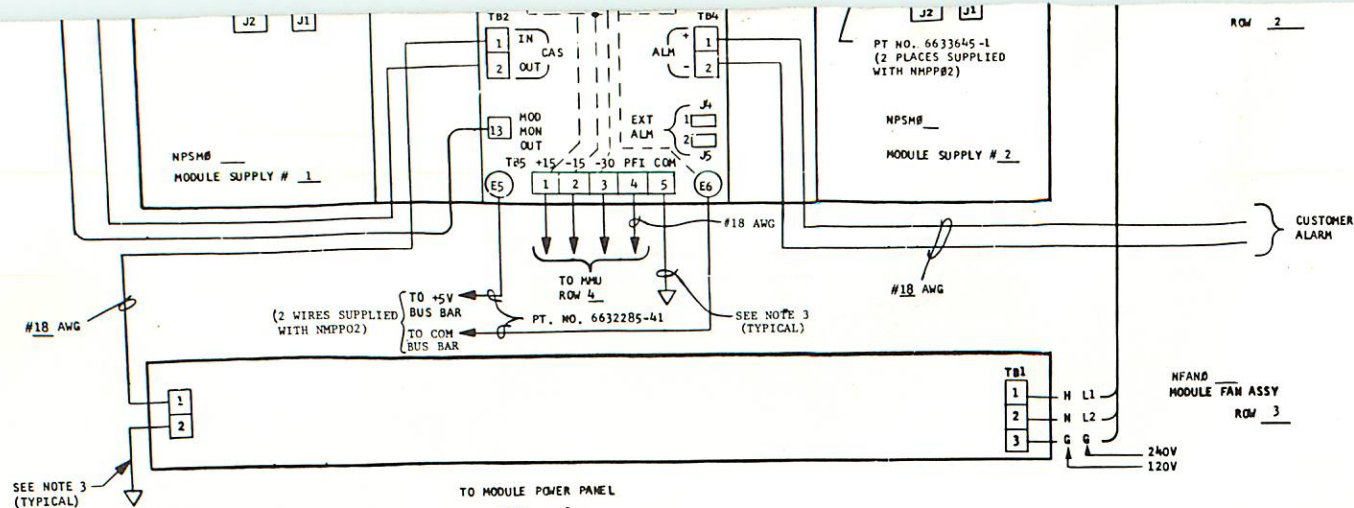
H8 AND MIN. FOR
SINGLE SOURCE

H9 AND MIN. FOR
SINGLE SOURCE

CUSTOMER ALTERNATE
GROUNDING CONDUCTOR
GREEN

TO .250-20 X .500
GREEN HEADED .028 IN.
AT TOP LEFT REAR RAIL

SEE NOTE 3
(TYPICAL)



PCU NO.	FROM MOD ROW	TO MOD ROW

TABLE OF CONNECTIONS FOR MODULE
BUS AND BUS COMMON PAIR

- NOTES:
- 1) 120 { L1 = LINE 1 (BLK)
L2 = LINE 2 (RED)
N = NEUT (WHT)
G = GND (GRN) } #12 AWG { L1 = LINE 1 (BLK)
L2 = LINE 2 (RED)
N = NEUT (WHT)
G = GND (GRN) }
 - 2) USE #10 AWG UNLESS OTHERWISE SPECIFIED
 - 3) ∇ = CONNECT TO ISOLATED SYSTEM COMMON BUS
 - 4) ALL WIRING TO BE COPPER AND, UNLESS OTHERWISE SPECIFIED, TO BE INSULATED FOR 75°C MIN. AND 150V MIN. (300V MIN. FOR 240V POWER CONDUCTORS)

MMU'S
MODULE MOUNTING UNIT
ROW 4

HFAND
MODULE FAN ASSY
ROW 3

240V
120V