

Bailey network 90™

I/O Power Panel NIOP0□

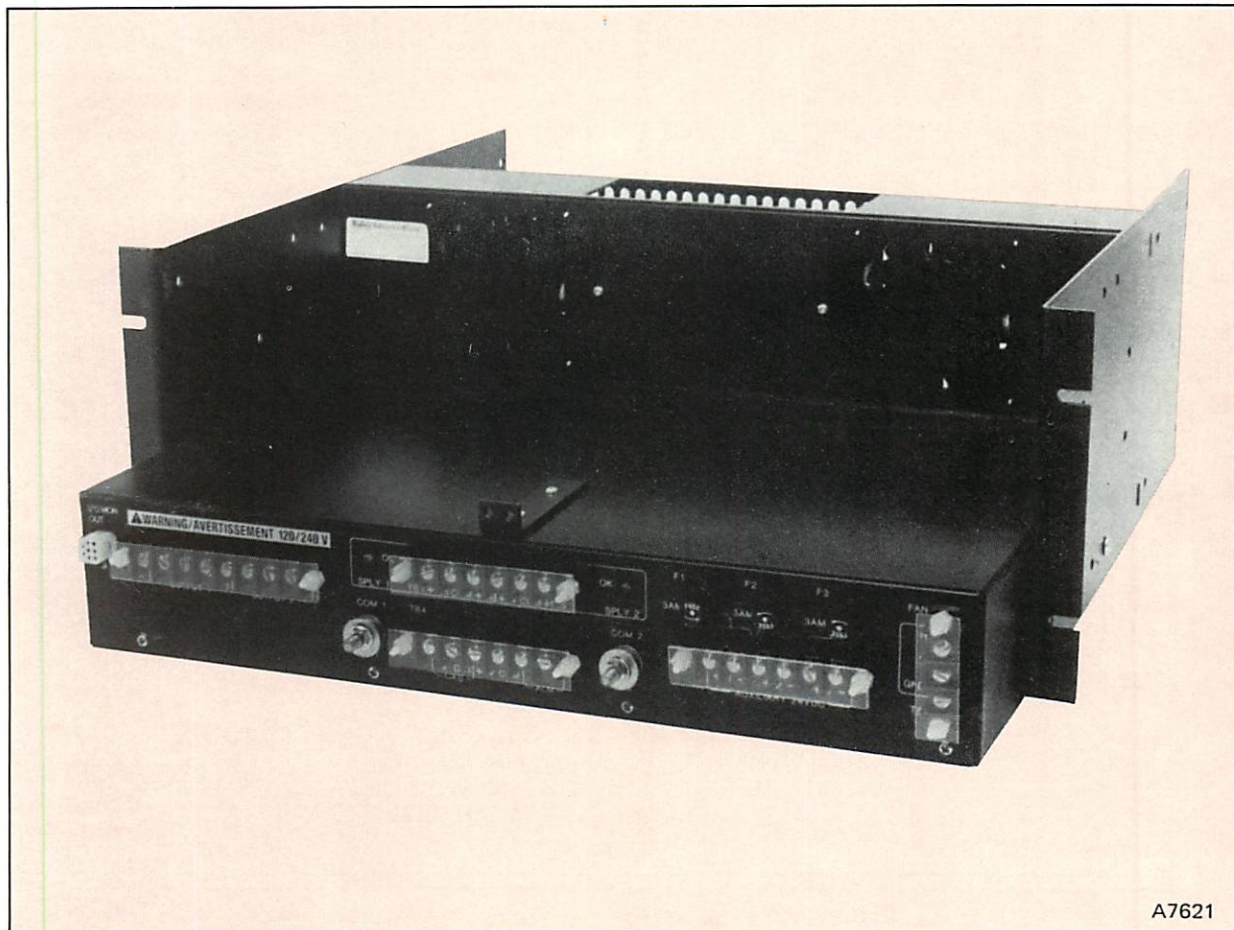


FIGURE 1 — I/O Power Panel (rear view)

Product Instruction

E93-909-3

Bailey® Controls
Babcock & Wilcox, a McDermott company

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.

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Foreword

The Power System for NETWORK 90™ is made up of standard components which include the Power Entry Panel (PEP), the I/O Power Panel (IOP) and I/O Power Supplies, the Module Power Panel (MPP) and Module Power Supplies, and a Fan Assembly for cooling, as shown in Figure 3.

The PEP provides circuit breakers and filtering for the source line voltage and routes this power to the individual d.c. supplies and Fan Assembly. The PEP also monitors the outputs of these supplies and provides alarm indication for any out of tolerance conditions. Product Instruction E93-909-1 describes the PEP.

I/O Power Supplies mount in the IOP which monitors the output voltage and provides auctioneering when redundant supplies are used. I/O power is 24 V or 125 V dc and is used to power controller outputs, two-wire transmitters, field contacts and NETWORK 90 Digital Control Stations. This product instruction provides description, installation and operation information for the IOP.

Module Power Supplies mount in the MPP which monitors the output voltages and provides auctioneering when redundant supplies are used. Module power is +5, ± 15 and -30 V dc and is used to power system components such as the Controller Module and Logic Master Module. Product Instruction E93-909-2 describes the MPP.

The Fan Assembly mounts below the Power Panels in a NETWORK 90 cabinet and provides cooling air for the power system. Product Instruction E93-909-6 describes the Fan Assembly.

Section 1 - Introduction

The NETWORK 90 I/O Power Panel (IOP) provides process I/O power for NETWORK 90 and field-mounted equipment. There are four basic functions performed by the IOP:

- 1) Provides a mounting shelf and cooling for the I/O Supplies and associated hardware
- 2) Distributes I/O power to the Termination Units
- 3) Auctioneers I/O power
- 4) Monitors I/O Power Supplies

The IOP is designed to interface with one or two I/O Power Supplies to provide 24 V dc and/or 125 V dc power outputs to Termination Units. The IOP contains circuitry for single or dual Power Supply operation. With dual (auctioneered) operation, the IOP can

operate with two 24 V dc or two 125 V dc Power Supplies and can draw total power from either supply, in the event one fails.

The IOP monitors the status of each Power Supply and the output voltages. Power Supply failures are indicated in the following ways:

- 1) Green LED's on the IOP's rear panel (one LED for each Power Supply)
- 2) Alarm contact outputs (24 V dc @ 120 mA) from the IOP for wiring to a separate annunciator panel
- 3) Internal system alarm for indication at an Operator Interface Unit or a computer if they are used

A voltage output that is out of tolerance is indicated in the following ways:

- 1) Alarm contact output from the Power Entry Panel (24 V dc @ 120 mA) for wiring to a separate annunciator panel
- 2) Internal system alarm for indication at an Operator Interface Unit or a computer, if they are used

There is a status LED on the Power Entry Panel front panel. If the power system associated with this Power Entry Panel is operating correctly, this status LED is green. When a failure in the power system is detected (at least one monitored voltage is out of tolerance), this LED turns RED. Failures are communicated from the IOP to the Power Entry Panel via the cascade line (CAS).

Section 2 - Description

The I/O Power Panel (IOP) contains two cooling fans, space for two Power Supplies, Power Supply monitoring assemblies, auctioneering assemblies (on types IOP02 and IOP04 only), and connections to Termination Units and other field devices.

Four types of IOP's are available to satisfy source voltage and the auctioneering options. These four types are:

<u>Nomenclature</u>	<u>V ac (In)</u>	<u>Auction- eering</u>	<u>V dc (out)</u>
NIOP01	120	No	(1) 24 V or (1) 125 V
NIOP02	120	Yes	(2) 24 V or (2) 125 V
NIOP03	240*	No	same as 01
NIOP04	240*	Yes	same as 02

*NOTE: This 240 V ac service is a 2-wire (240 V to ground) system found in some foreign countries, not the standard U.S. 240 V ac, 3-wire service which is 120 V to Ground.

The I/O Power Supplies are installed in the IOP from the rear. The cooling fans, auctioneering diodes, and monitor board are located in front of the Power Supplies. The green LED's located on the rear

of the panel indicate that the Power Supply status is good. Refer to Figure 2 for a view of the rear of the IOP.

The AC power for the Power Supplies and fans is supplied from the Power Entry Panel (PEP). (Refer to Product Instruction E93-909-1 for a description of the PEP.) There is a terminal block on the rear of the IOP (Figure 2) where fan AC power is connected. The AC power for the supplies is connected directly from the PEP to the supplies. The rear of the IOP also holds the terminal blocks for dc power distribution to the Termination Units and connections to the I/O Monitor.

2.1 Status LED's

The two LED's at the rear of the IOP (Figure 2) are used to indicate the status of Power Supply #1 and Power Supply #2. When the output of the supply is within tolerance, the green LED will be illuminated "OK". If the output of a Power Supply drops below the preset trip point or fails, the LED will turn off and the system status alarm will be activated, at which time appropriate corrective action should be taken.

2.2 Protection/Isolation

Protection for the IOP is provided by circuit breakers CB1 and CB4 (Supply#1) or CB2 and CB6 (Supply #2) on Power Entry Panel types PEP01/03. A second IOP in a Termination Cabinet with PEP02/04 is switched with CB1 and CB3 (Supply#1) or CB2 and CB5 (Supply #2). Be certain that the proper circuit breakers in the PEP are switched off when servicing the power panel or fans.

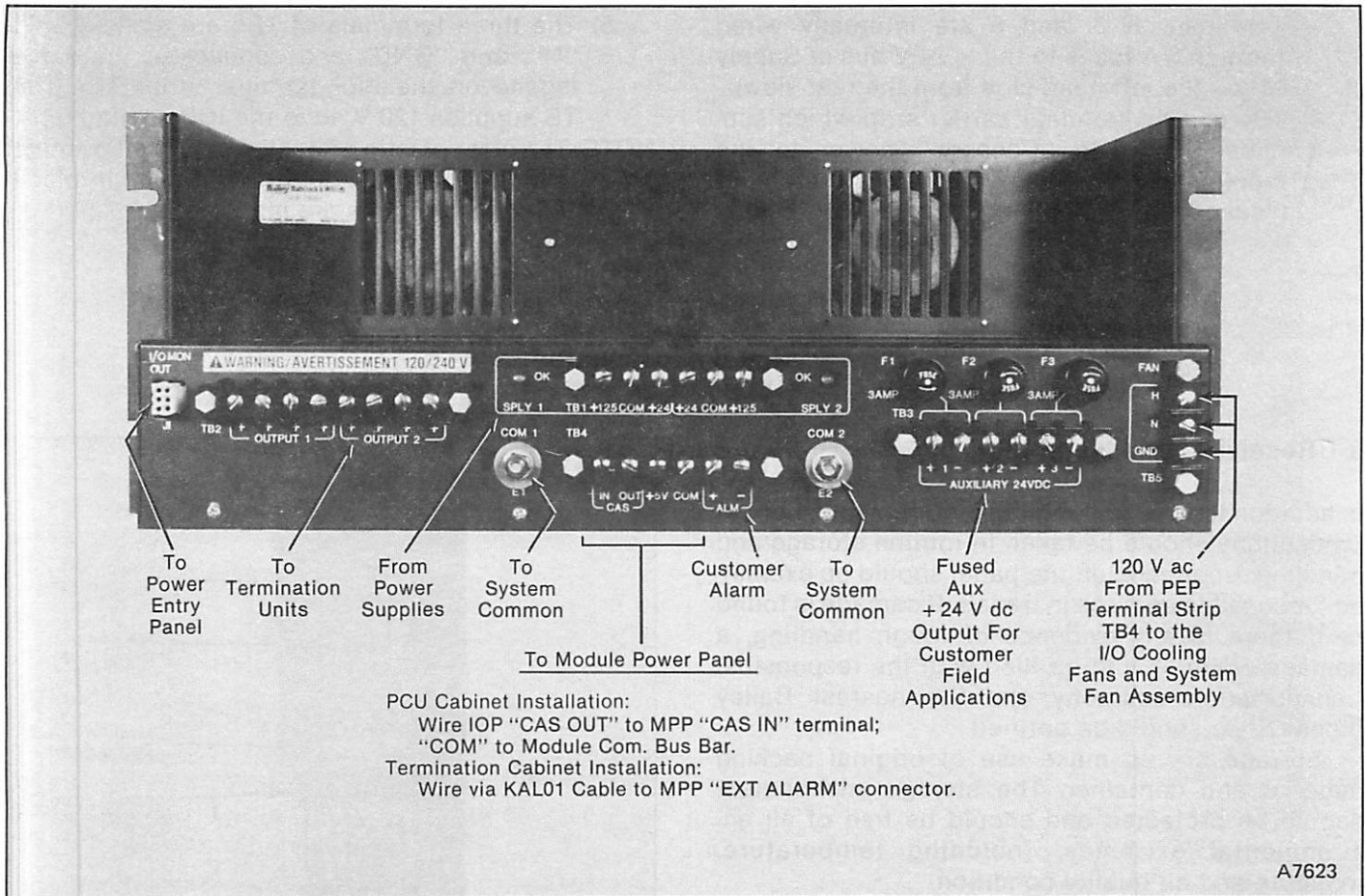


FIGURE 2 — Back View of the I/O Power Panel

There are three 250 V, 3 A fuses (Bailey P/N 194776-13001) on the right rear of the IOP panel for auxiliary +24 V outputs (refer to Figure 2). These fused outputs are connected to the left-hand "Power Supply #1" +24 V dc only.

2.3 Grounding

The IOP chassis is grounded to the cabinet chassis when it is screw mounted to the frame.

The IOP contains two I/O "common" connections (E1 and E2, Figure 2), one for each Power Supply. Each of these connections is electrically isolated from the panel chassis in order to minimize the possibility of ground loops in the I/O power system. The connections should be electrically connected to the isolated system common bus located on the floor of the cabinet.

2.4 Interface Connections

All connections are made at the rear of all units. Connections are shown in Figure 2 and include:

1. A 6-pin connector for I/O bus voltage connections to the bus monitor.
2. Two 1/4" bolts for I/O Common-Ground.
3. Terminal strips
 - 1) TB1 is a six-terminal barrier strip and is connected to the output terminals of the Power Supplies.
 - 2) TB2 is an eight-terminal barrier strip for the two auctioneered outputs. TB2-1 through TB2-4 are +24 V dc outputs and TB2-5 thru TB2-8 are +125 V dc outputs.
 - 3) TB3 is a six-terminal barrier strip with terminals 2, 4, and 6 being common (-) E1 Ground.

Terminals 1, 3, and 5 are internally wired through 3 A fuses to the +24 V bus of Supply #1 (on the left-hand side from the rear view).

- 4) TB4 is a six-terminal barrier strip which supplies +5 V dc "Cascade" power to the monitor board which accepts a status input ("cascade") and provides an alarm output.

- 5) The three terminals of TB5 are marked "H", "N", and "GND" and connect to the same legend on the PEP terminal strip- TB4. The TB supplies 120 V ac to the IOP cooling fans.

NOTE: The clear plastic protectors which fit over the terminal strips should be put back in place after connections are made.

Section 3 - Installation

3.1 Receiving and Handling

In addition to special handling requirements, normal precautions should be taken in routine storage and handling. Upon receipt, the panel should be examined for possible damage in transit. If damage is found or if there is any evidence of rough handling, a damage claim should be filed with the responsible transportation company and the nearest Bailey Sales Office should be notified.

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

3.2 Mounting Location

The IOP rear mounts in a NETWORK 90 cabinet or onto any standard 19" (48.3 cm) EIA mounting rails. The top position of a cabinet always contains a Power Entry Panel (PEP). The next position may contain none, one or two IOP's depending on the application. The next position contains the Module Power Panel (MPP) and a Fan Panel (FAN). If the cabinet contains only Terminal units there can be no power system panels below the second IOP. Refer to Figure 3 for a sample configuration.

An I/O Power Supply can be inserted and secured to the back of the IOP before or after panel mounting. If only one 24 V dc I/O Power Supply is used, it must be installed in the Power Supply #1 position on the left-hand side of the panel to provide AUX 24 V dc I/O power. If only one 125 V dc I/O Power Supply is used, the Power Supply #2 position on the right-hand side of the panel should be used.

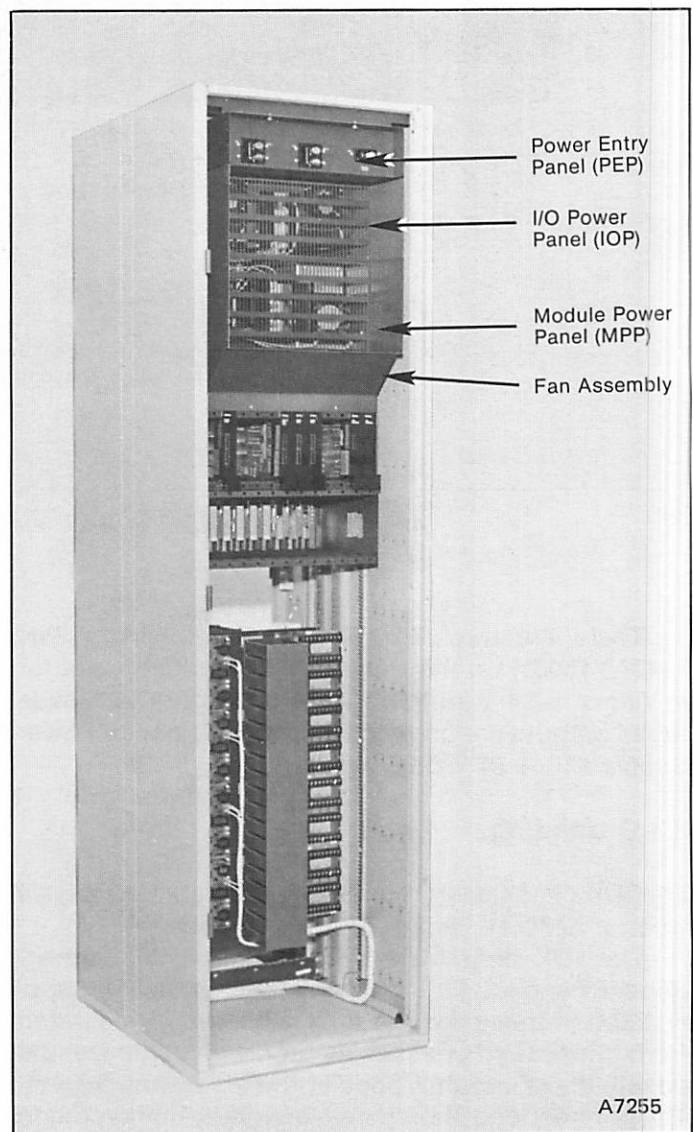


FIGURE 3 — Typical Configuration of Process Control Unit Cabinet with Power System Components in the Top Three Positions

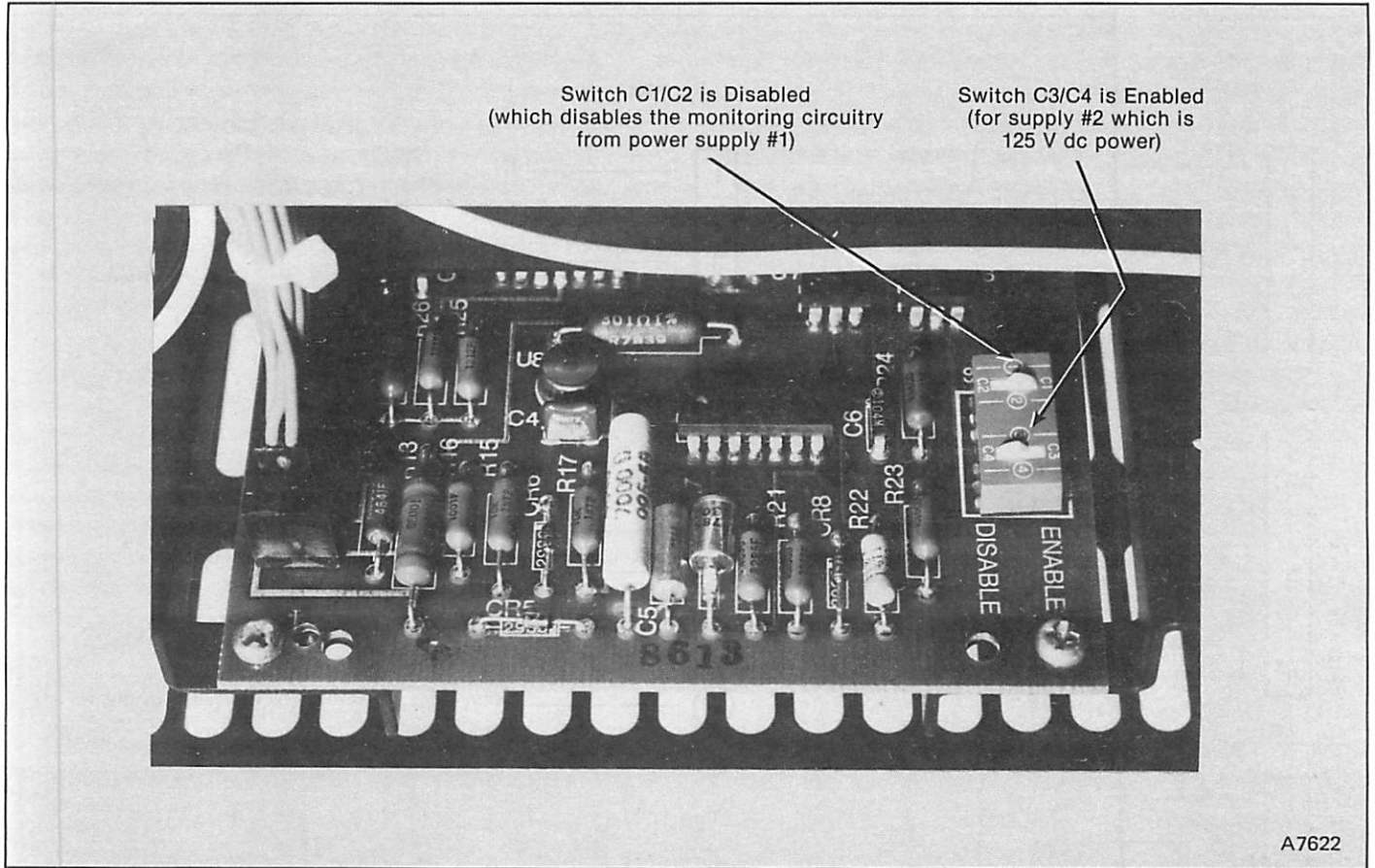


FIGURE 4 — Location of Switches Used to Enable/Disable Monitoring Circuitry

3.3 Source Voltage

Versions of I/O Power Panels and Supplies are available for 120 V ac or 240 V ac, 50/60 Hz. The ac input to the IOP is solely for operating the fans. AC for the I/O Power Supplies comes from the Power Entry Panel.

NOTE: This 240 V ac service is a 2-wire (240 V to ground) system found in some foreign countries, not the standard U.S. 240 V ac, 3-wire service which is 120 V to ground.

3.4 Dip Switches on the Monitor PC Board

If only one I/O Power Supply is monitored, the dip switch located on the lower portion of the monitor printed circuit board (Figure 4) must be set to disable the unused monitoring circuitry. The switch

labeled C1/C2 will disable I/O #1 for non-redundant 125 V dc I/O power. Switch C3/C4 will disable I/O #2 for non-redundant 24 V dc I/O power. If two I/O Power Supplies are used, place both C1/C2 and C3/C4 in the "enable" position. Refer to Table A.

I/O#1	I/O#2	Use	C1	C2	C3	C4
ENABLE	ENABLE	Redundant 125 V or 24 V	X		X	
DISABLE	ENABLE	125 V Supply only, Position 2		X	X	
ENABLE	DISABLE	24 V Supply only, Position 1	X			X
DISABLE	DISABLE	Both alarms are disabled*		X		X

X indicates depressed edge of switch
 * Position of C1/C2 and C3/C4 does not affect "Supply OK" indicator operation

TABLE A — IOP Monitor Switch Settings

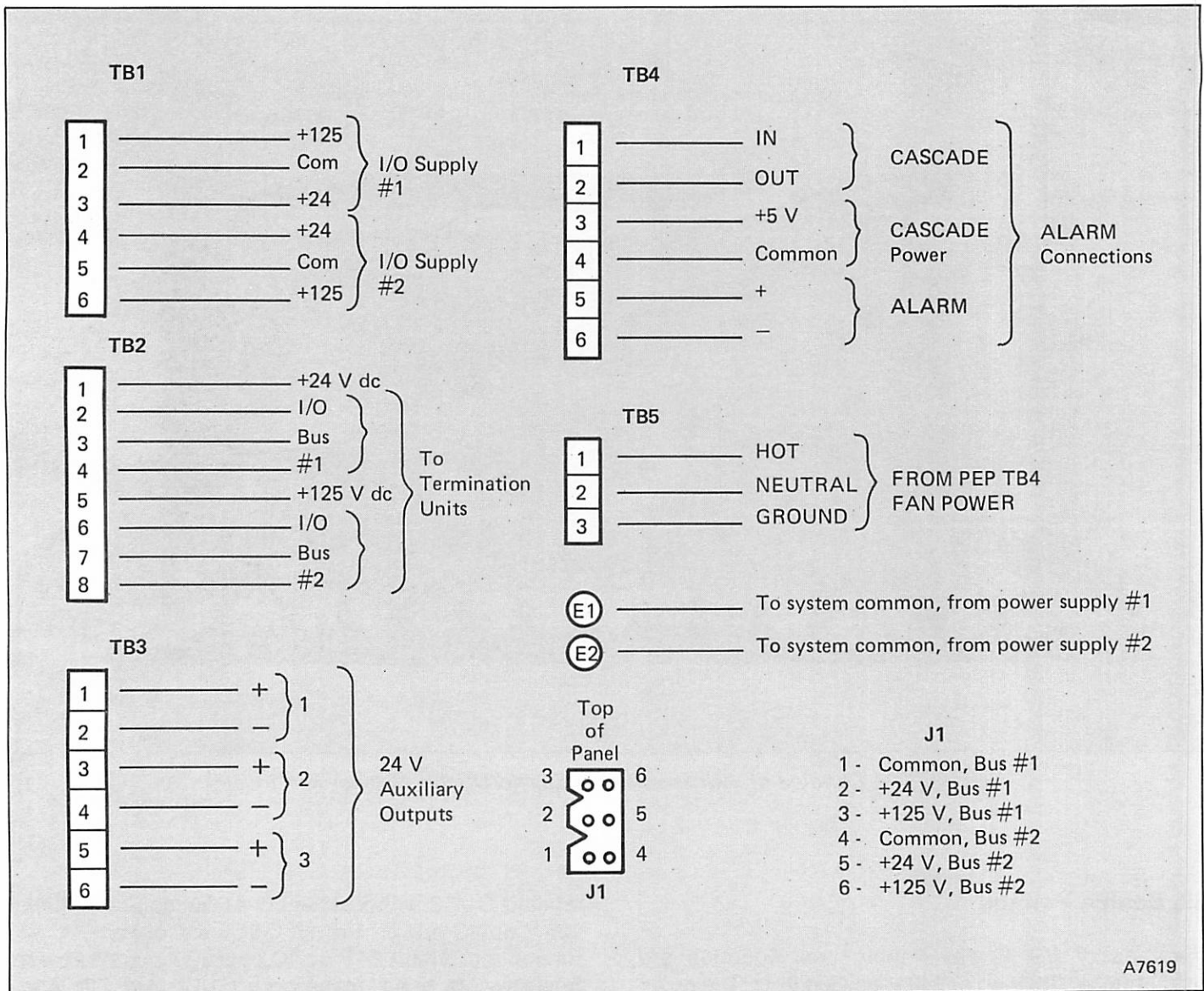


FIGURE 5 — Input/Output Connections for I/O Power Panel

Example: If only one + 24 V dc I/O Power Supply is installed, it must be connected to TB1-SPLY 1 to provide AUX 24 V dc; switch C1/C2 on the monitor circuit board must be in the "enable" position and switch C3/C4 must be in the "disable" position.

3.5 Ground Bus

Power Supply commons are internally connected to studs E1 and E2. These should be electrically con-

nected to the system common bus located at the bottom of the cabinet. (Refer to Figure 2 for location of E1 and E2.)

3.6 External Connections

Refer to Figure 2 which shows the IOP rear view and Figure 5 which is a list of all the I/O connections.

Inputs - Fan ac power is connected to barrier strip TB5 located on the right rear of the IOP. The

output from each I/O Power Supply is connected to barrier strip TB1 located on the IOP center rear.

Outputs - I/O Power is available for the Termination Units at barrier strip TB2 located on the left rear of the IOP. The I/O output to a PEP bus monitor (connector J1) is also located on the left rear of the IOP. Located at the center rear of the IOP on TB4 is the alarm output connection. The auxiliary +24 V dc output for customer field applications and associated fusing is located on the IOP right rear.

3.7 Wiring Diagrams

Wiring diagrams for various power system configurations are shown in Figures 6 through 9.

Wiring for ac and dc power distribution only is shown in Figures 6 and 7. A non-auctioneered system with one +24 V dc Power Supply is shown in Figure 6. An auctioneered power system with two +24 V dc Power Supplies is shown in Figure 7.

Wiring for the internal system "CAS" alarm monitor and the I/O power monitor connections is shown in Figures 8 and 9. The "Cascade" line sends an alarm signal to the PEP. The chaining of alarms uses the CAS IN and CAS OUT terminals on barrier

strips of each power system assembly as described below.

Two auctioneered IOP's in a Termination Cabinet are shown in Figure 8. The "Cascade" alarm line is wired from one IOP to the other IOP and is then cabled to an "External Alarm" connector on the Module Power Panel of the main PCU cabinet. This application requires no connection of the bus monitor J1 along the left-hand side of the PEP and the two IOP's.

Figure 9 shows a power system with an auctioneered I/O Power Panel and an auctioneered Module Power Panel in a PCU. The "cascade" alarm connection starts at CAS OUT of the Module Fan Assembly and goes to the CAS IN of the Module Power Panel. The MPP CAS OUT goes to the IOP CAS IN. The IOP CAS OUT goes to the PEP CAS IN. The bus monitor cable along the left-hand side is also shown: the I/O MON OUT J1 connection on the IOP goes to the MOD IN J1 connection on the PEP.

NOTE: The clear plastic protectors supplied to fit over the terminal strips should be put back in place after wiring is completed.

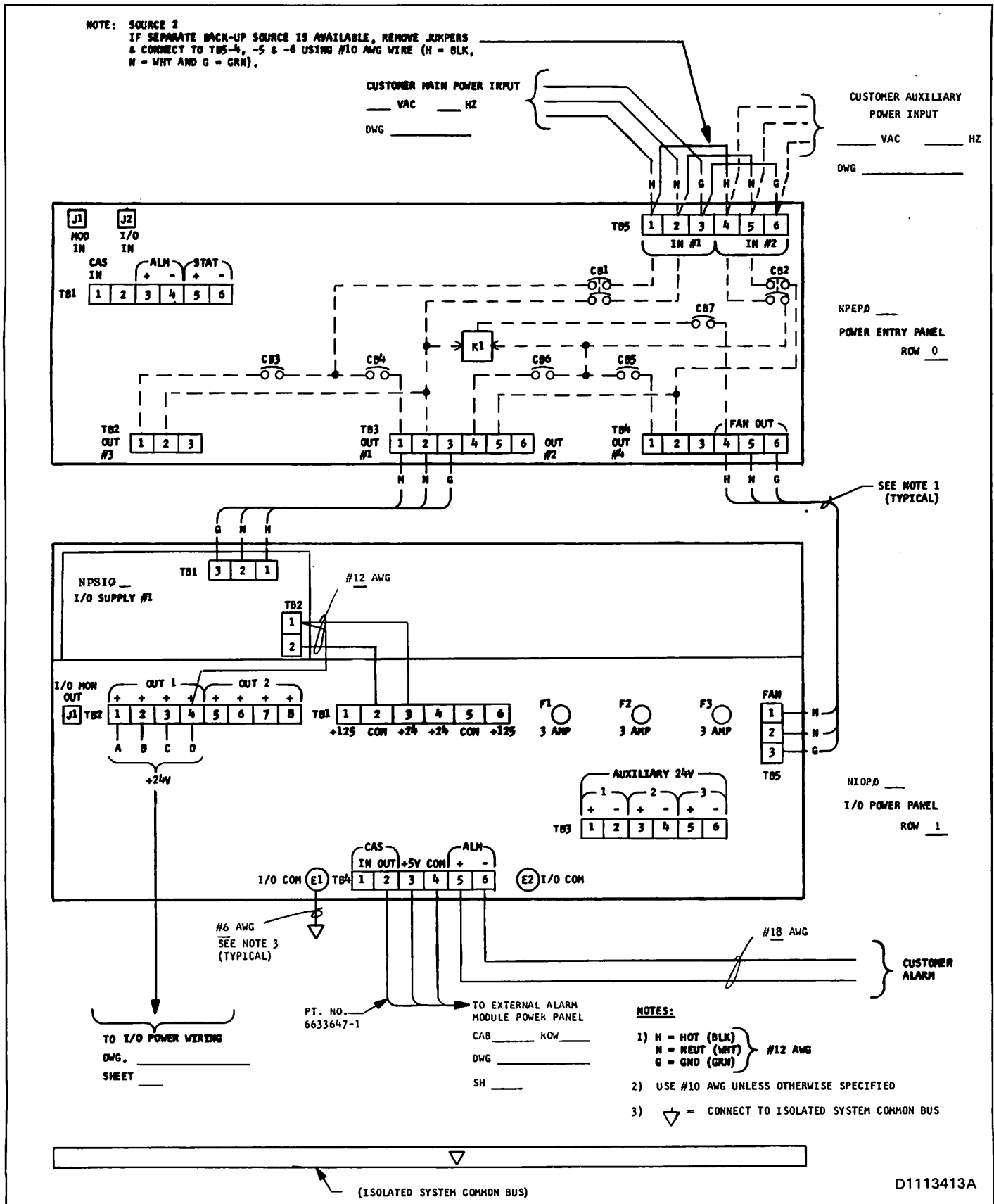


FIGURE 6 — Wiring Diagram for Non-Auctioneered Power System with One +24 V dc I/O Power Supply

NOTE: SOURCE 2
 IF SEPARATE BACK-UP SOURCE IS AVAILABLE, REMOVE JUMPERS
 & CONNECT TO TB5-4, -5 & -6 USING #10 AWG WIRE (H = BLK,
 N = WHT AND G = GRN).

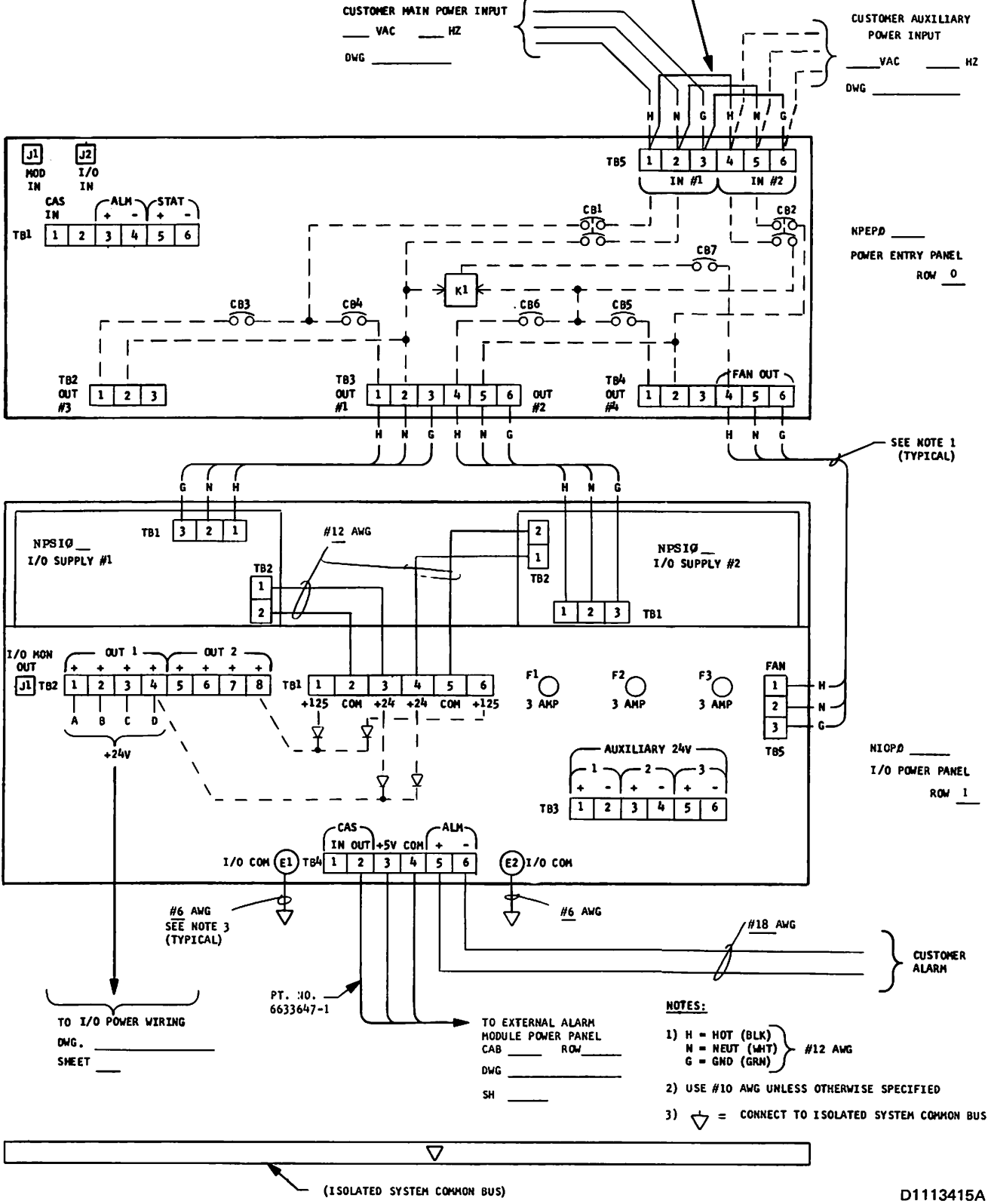


FIGURE 7 — Wiring Diagram for Power System with Auctioneered I/O Power Supplies

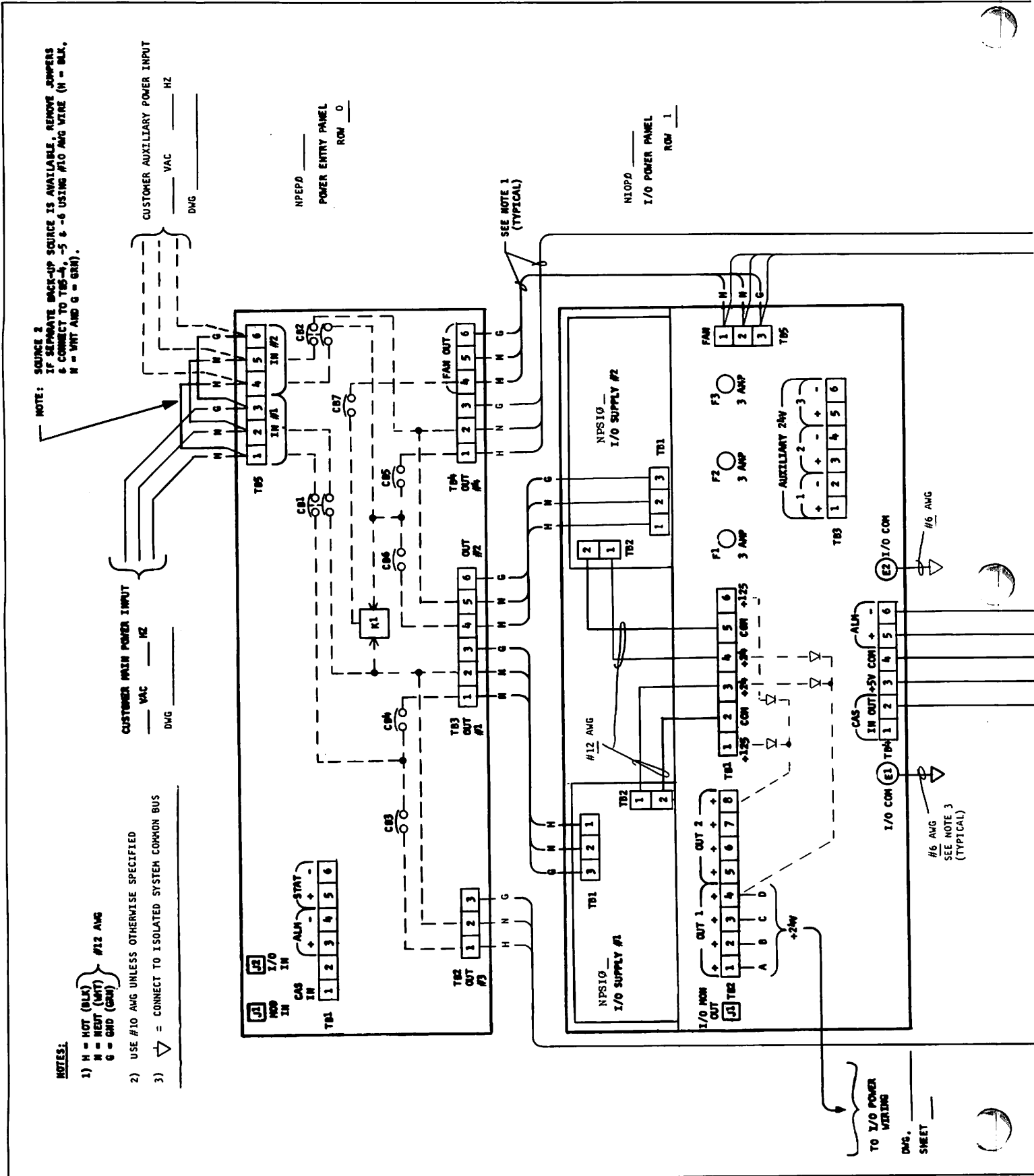
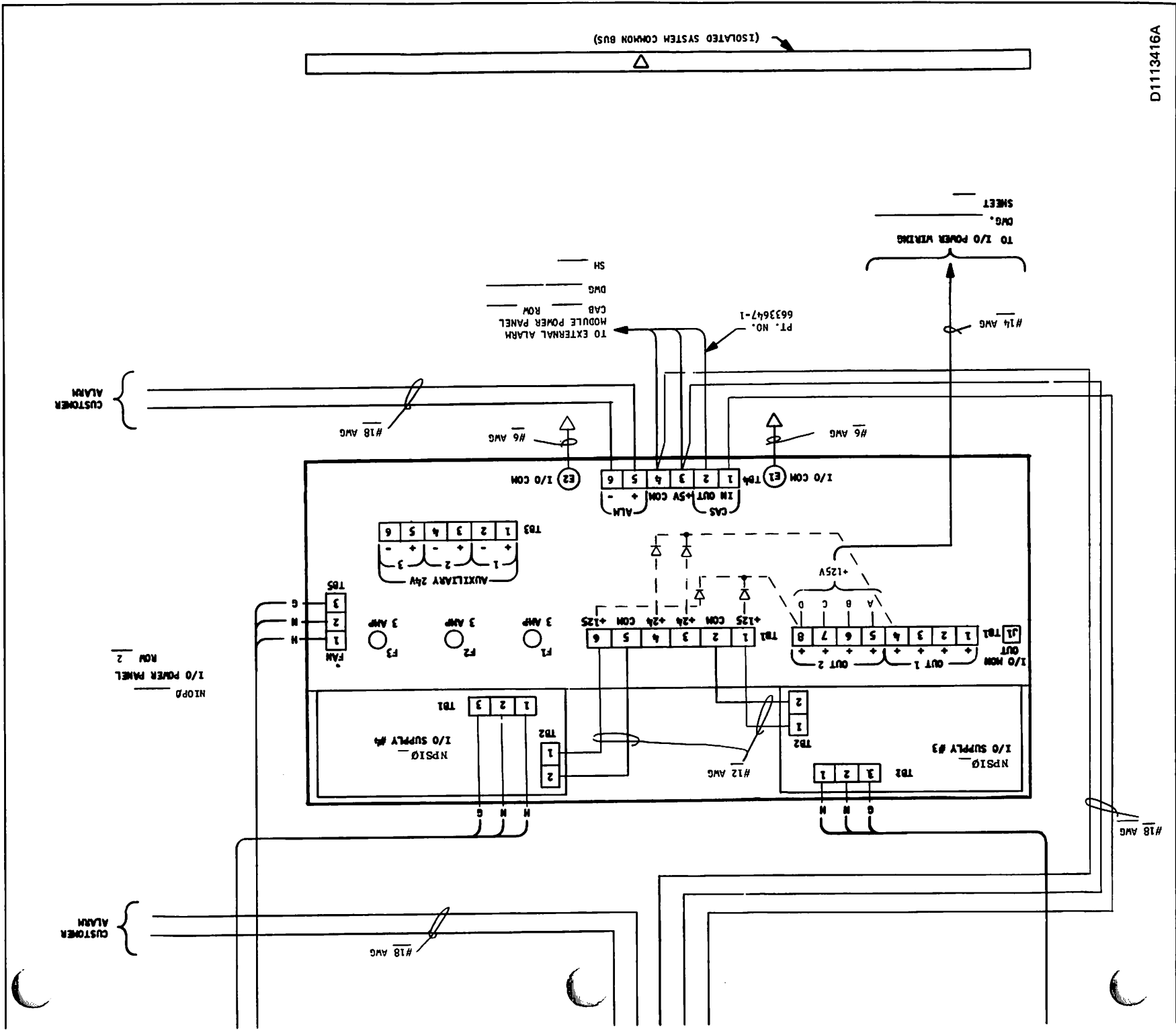


FIGURE 8 — Wiring Diagram for Power System with Two Auctioneered IOP's in a Termination Unit Only Cabinet



D1113416A

TO I/O POWER WINDING
 DWG. SHEET

PT. NO. 6633647-1
 TO EXTERNAL ALARM
 MODULE POWER PANEL
 CAB ROM
 DWG
 SH

CUSTOMER ALARM

I/O POWER PANEL
 ROW 2

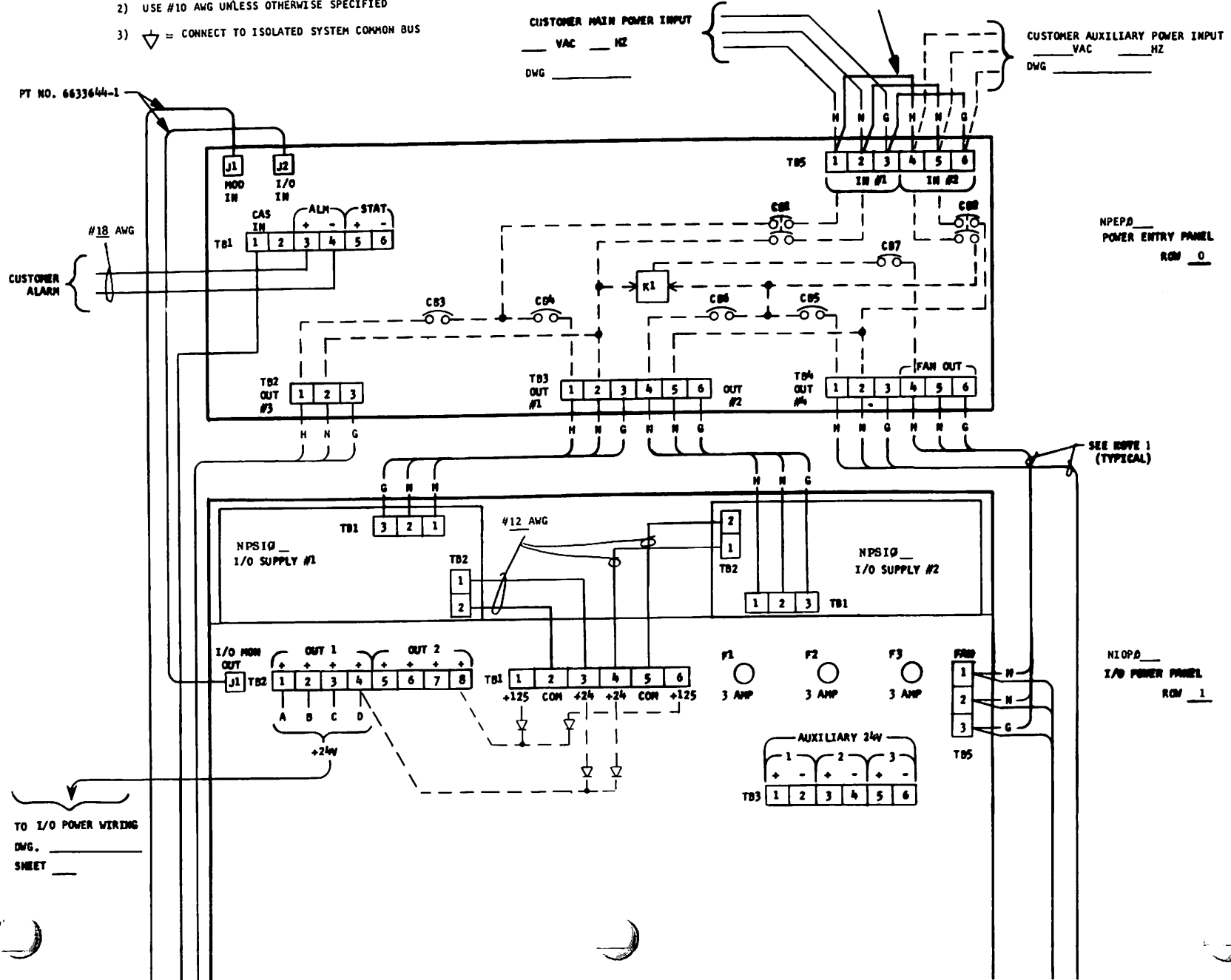
CUSTOMER ALARM

FIGURE 9 — Wiring Diagram for Power System with an Auctioneered IOP and an Auctioneered Module Power Panel in a PCU Cabinet

NOTES:

- 1) H = HOT (BLK)
N = NEUT (WHT) } #12 AWG
G = GND (GRN)
- 2) USE #10 AWG UNLESS OTHERWISE SPECIFIED
- 3) ▽ = CONNECT TO ISOLATED SYSTEM COMMON BUS

NOTE: SOURCE 2
IF SEPARATE BACK-UP SOURCE IS AVAILABLE, REMOVE JUMPERS
& CONNECT TO TB5-4, -5 & -6 USING #10 AWG WIRE (H = BLK,
N = WHT AND G = GRN).

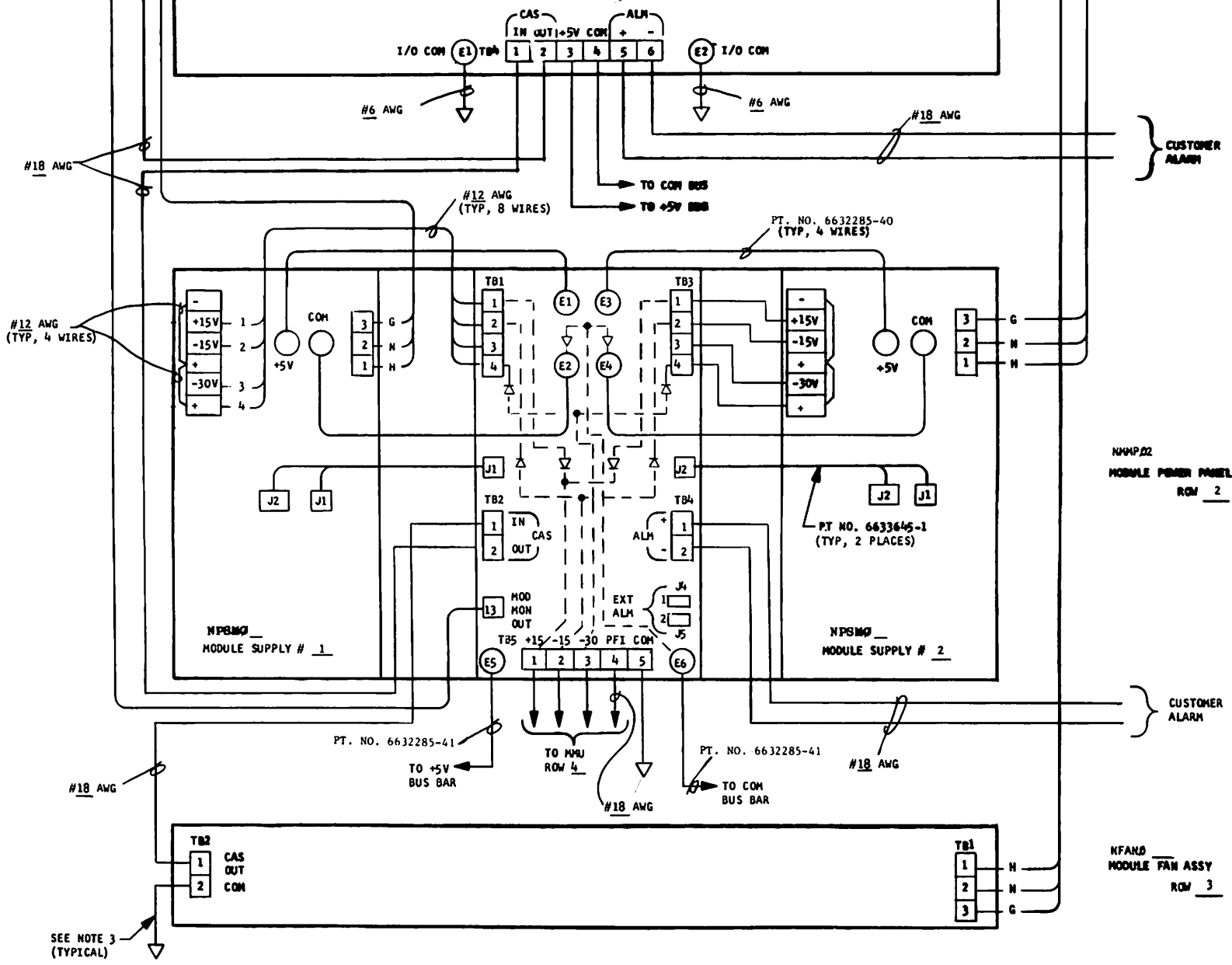


TO I/O POWER WIRING
DWG. _____
SHEET _____

NPEP/D _____
POWER ENTRY PANEL
ROW _____

SEE NOTE 1
(TYPICAL)

NIOP/D _____
I/O POWER PANEL
ROW _____



CUSTOMER ALARM

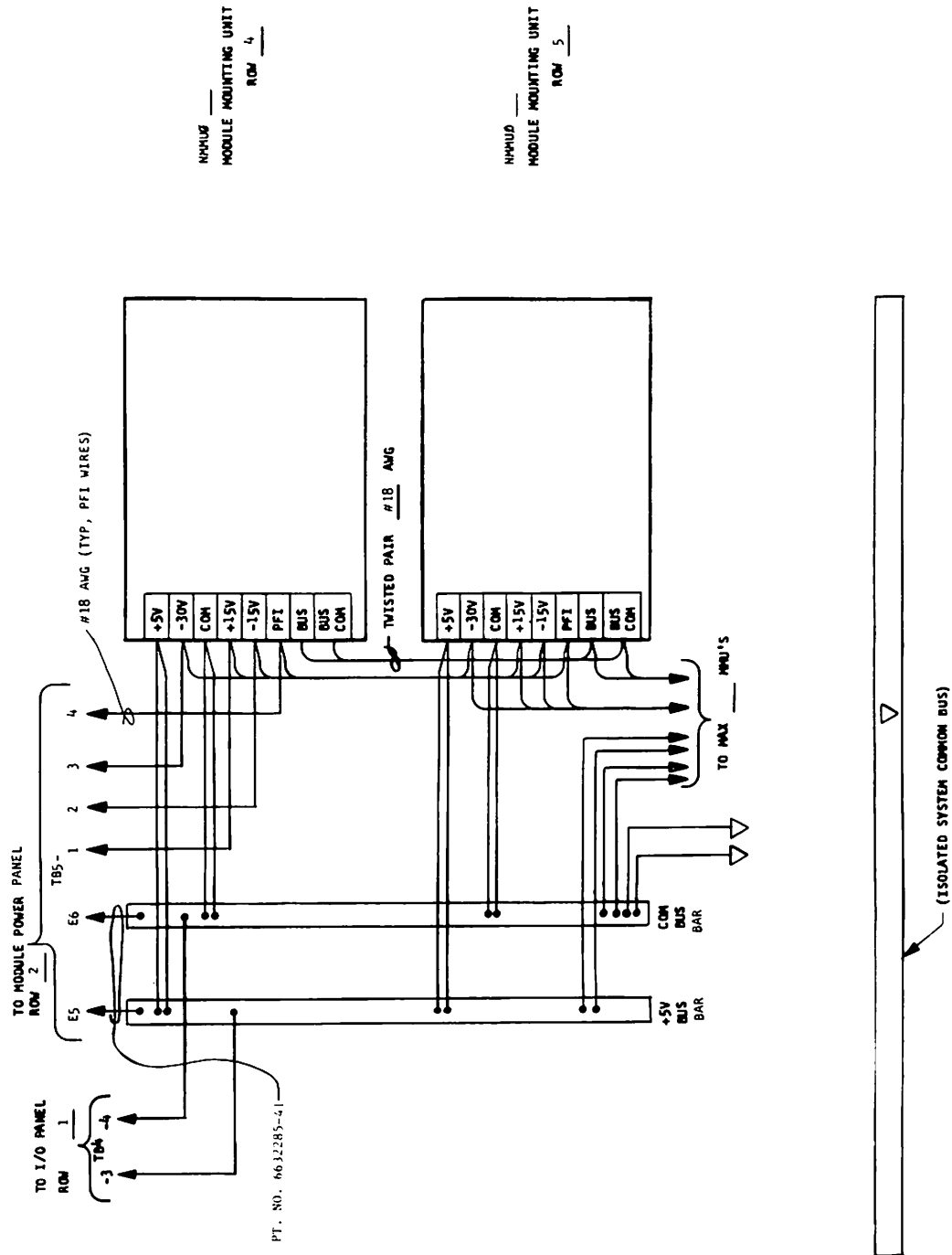
NPSMP
MODULE POWER PANEL
ROW 2

CUSTOMER ALARM

NFWND
MODULE FAN ASSY
ROW 3

SEE NOTE 3
(TYPICAL)

D1113420B



D1113420B

FIGURE 9 — Wiring Diagram for Power System with an Auctioneered IOP and an Auctioneered Module Power Panel in a PCU Cabinet (Continued)

Section 4 - Operation

Figure 10 is a block diagram of the IOP. The IOP is used to monitor, auctioneer and distribute +24 or +125 V dc to power various process inputs and outputs. AC power from the PEP is connected to the Power Supplies mounted on the IOP shelf. The output of each I/O Supply is connected to TB1.

When the output of a Power Supply is within tolerance, a green LED, CR1 for Power Supply #1 and CR2 for Power Supply #2, is illuminated by the monitor. When the output of a single supply drifts low or fails, the LED corresponding to that supply turns off, the "cascade out" alarm is activated and the customer alarm turns on. The "cascade" line sends an alarm signal to the PEP. The chaining of alarms uses the CAS IN and CAS OUT terminals on barrier strips of each power system assembly. This open collector logic level line is driven low to indicate an alarm. The "customer alarm" is an optically isolated 2-wire alarm output. When all operating alarms are operating properly, the "alarm" + and - outputs are "shorted" together (like a relay contact closing). Should any monitored supply fall out of

tolerance, the "alarm" outputs will "open" (like a relay contact opening). TB4 is used for alarm connections. Socket J1 at the left rear is used to connect the I/O bus voltage(s) to the bus monitor in a PEP 01/03.

I/O power is distributed thru TB2 to the Termination Units which have provisions for daisy-chaining to the next lower unit.

There are three +24 V dc fused (3A) outputs for customer field applications located at TB3. When customer field power is desired, the +24 V dc Power Supply is placed in the Power Supply #1 position on the left-hand side of the panel and connected to TB1, pins two and three. If the Power Supply at the Supply #1 position is a 125 V dc supply, the output at TB3 will be zero.

The I/O Power Supply auctioneering diodes CR4 and CR5 mount on a heatsink near the front of the power panel. When auctioneering, each I/O Supply must be capable of handling the entire load.

The AC power for the I/O Power Supply fans is connected to TB5, on the rear of the I/O Power Panel.

Section 5 - Application

The IOP interfaces with the I/O Power Supply and loads. The voltages (+24 V or +125 V dc) are supplied to the Termination Units to power controller

outputs, two-wire transmitters, field contacts NETWORK 90 Digital Control Stations, and other devices.

Section 6 - Service and Replacement

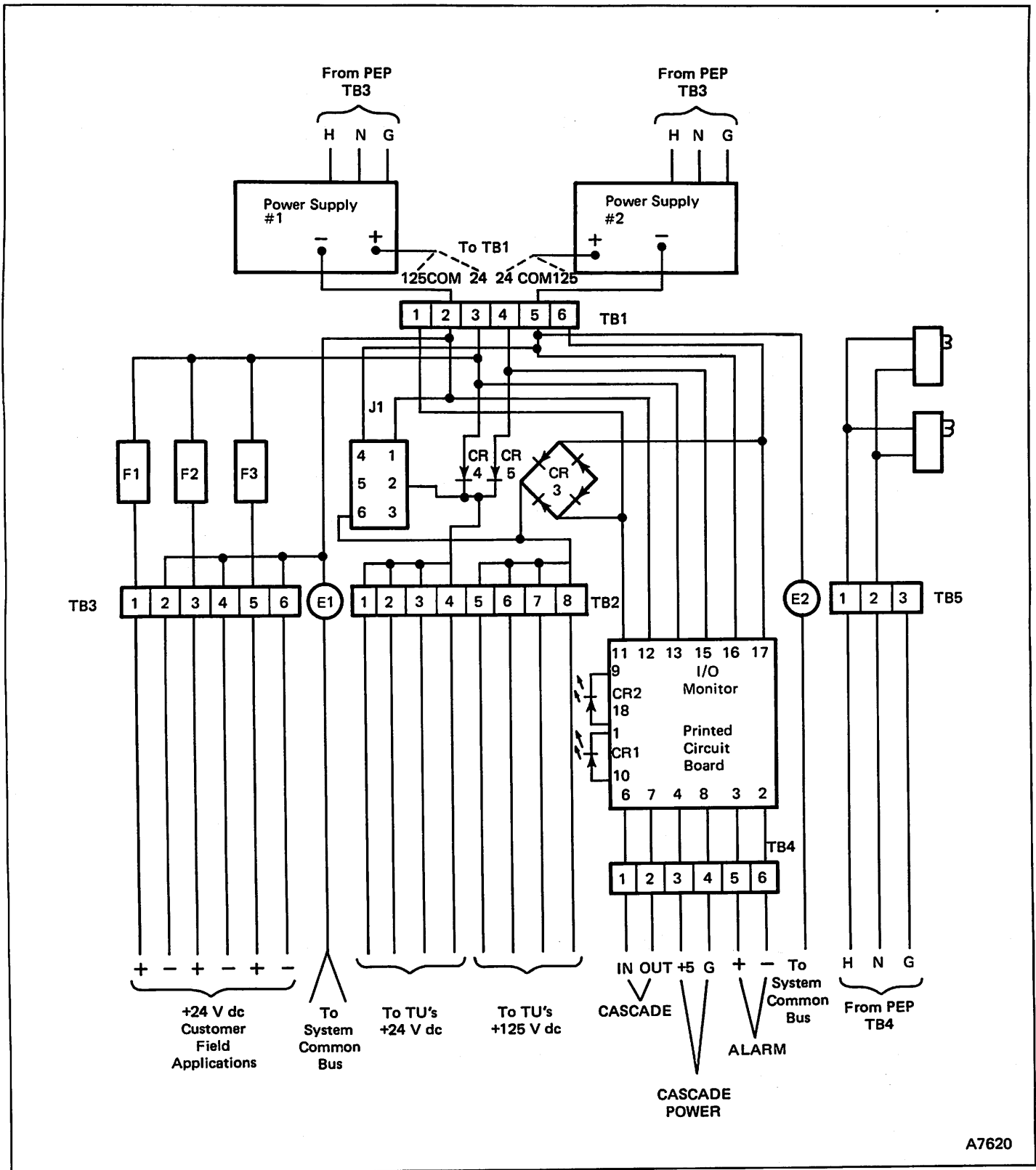
Maintenance of the IOP is not normally required. Be certain the proper circuit breakers in the PEP are switched off when servicing the power panels or fans. Precautions must be taken during maintenance while power is applied to avoid hazardous electrical shocks.

Recommended spare parts are listed below.

Part Number

6633411-1	Cable Assembly
1946933-3	Connector, Cable
1946934-1	Contact, Connector

194776-13001	Fuse, 3 Amp
1946455-2	Lamp (LED)
1947238-1	Fan, AC Axial (for NIOP01 and NIOP02/120 V ac units only)
1947238-2	Fan, AC Axial (for NIOP03 and NIOP04/240 V ac units only)
6632097-1	Monitor PC Board Assembly
1946743-1	Diode, Schottky
1947191-1	Diode Assembly (Bridge Rectifier), 35 Amps (for NIOP02 and NIOP04 auctioneered units only)



A7620

FIGURE 10 — Block Diagram for I/O Power Panel

Section 7 - Specifications

I/O Power Panel Types:	NIOP01 120 V ac 10 without auctioneering NIOP02 120 V ac 10 with auctioneering NIOP03 240 V ac 10 without auctioneering NIOP04 240 V ac 10 with auctioneering
Electrical Ratings:	NIOP01 120 V ac, 50/60 Hz, 16 VA NIOP02 NIOP03 240 V ac, 50/60 Hz, 18 VA NIOP04
I/O Power Supply Types:	NPSI01 24 V dc 120 V ac source NPSI02 125 V dc 120 V ac source NPSI03 24 V dc 120/240 V ac source NPSI04 125 V dc 120/240 V ac source
Physical Aspects:	Width: 19.0" (48.3 cm) Height: 6.97" (17.7 cm) Depth: 19.9" (50.5 cm)

Environmental Constraints:	Standard environmental specifications for the system are applicable (reference Product Specification E93-900).						
Performance: I/O Monitor Trip Points	Under standard conditions, the following trip points indicating low supply voltage should be observed: <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Supply Voltage V dc</th> <th style="text-align: center;">Trip Point V dc</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">+24</td> <td style="text-align: center;">21.00 ± .37</td> </tr> <tr> <td style="text-align: center;">+125</td> <td style="text-align: center;">110.8 ± 1.7V</td> </tr> </tbody> </table>	Supply Voltage V dc	Trip Point V dc	+24	21.00 ± .37	+125	110.8 ± 1.7V
Supply Voltage V dc	Trip Point V dc						
+24	21.00 ± .37						
+125	110.8 ± 1.7V						
Safe Operating Voltage (AC Input)	NIOP01 & NIOP02: 102 to 132 V ac NIOP03 & NIOP04: 204 to 264 V ac						
Alarm Output	Maximum current that the alarm can sink is 120 mA at 24 V dc max.						
Product Certification	CSA (Canadian Standards Association) certified for use in ordinary (non-hazardous) locations.						

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