

# **Model DPS- 3**

## **Dual Peripheral Switch**

### **Technical Manual**

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REVISION HISTORY

ECO No.	Date	Description	Pages
0667	9/17/86	Remove reference to Appendix A	Preface, Table/Cnt.



# Technical Manual for the Dual Peripheral Switch (DPS-3)

## PREFACE

This manual contains information regarding the installation and operation of the ZETACO Model DPS-3 Dual Peripheral Switch.

The technical contents of the manual have been written based on the assumptions that the reader 1) has a working knowledge of Data General's (DG) Nova and Eclipse class computer hardware and their associated operating systems; 2) is familiar with standard installation, power, grounding, and peripheral cabling procedures; and 3) has access to technical information describing the magnetic tape drive and printer to be used with this device.

The information in this manual is organized into three major sections:

- SECTION 1            PRODUCT OVERVIEW - Fully describes the DPS-3 features, capabilities, specifications, power and interface requirements.
  
- SECTION 2            INSTALLATION - Describes and illustrates the procedures required to install the DPS-3.  
WARNING: DO NOT ATTEMPT TO SLIDE THE DPS-3 LOGIC BOARD INTO A DATA GENERAL COMPUTER CHASSIS.
  
- SECTION 3            TROUBLE-SHOOTING AND CUSTOMER SERVICE - Contains information useful in analyzing faults and how to get help.



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## 1.0 PRODUCT OVERVIEW

### 1.1 GENERAL DESCRIPTION

#### 1.1.1 LOGIC

The Model DPS-3 Dual Peripheral Switch is a multiplexor that allows two CPUs to share a tape drive and/or a line printer. The logic for the tape and printer are completely separate from each other. The DPS-3 is designed to work with any tape drive with a standard Pertec interface and any line printer that uses the standard Data Products/Centronics interface.

Whichever CPU attempts to contact either peripheral first, gains control of the DPS-3 for that peripheral. In the case of the tape drive, the DPS-3 then makes the drive appear off-line to the other CPU until the tape side of the DPS-3 is released. In the case of the printer, the other CPU will be delayed in its use of the printer (no DEMAND signal will be sent) until the printer side of the DPS-3 is released. It is seen as a delay and not a disruption, even though the printer is made to appear off-line, because RDOS and most diagnostic software ignore the off-line status from the printer. After the "release", either CPU is free again to gain control of the DPS-3 for that peripheral.

#### 1.1.2 RACK-MOUNT ENCLOSURE

The DPS-3 rack-mount enclosure fits into a standard 19" rack with standard RETMA/EIA spacing on the mounting rails. The enclosure is 3.5" high and 23" deep. The DPS-3 logic board lies horizontally in the enclosure. A perforated metal cover is fitted on top of the enclosure. This permits air convection and provides protection to the board.

A vertically-mounted distribution printed circuit board at the rear of the enclosure brings the signals to the DPS-3 from the cables that go to the CPUs and the peripherals. The connection from the distribution panel to the logic board is done with two 100-pin board edge connectors. Cabling from the CPUs and peripherals attaches to the distribution board via nine 50-pin D connectors.

The front panel of the enclosure contains display LEDs, a power switch, and a Tape Select switch. The LEDs indicate which CPU has control over each peripheral.

## 1.2 OPERATION AND FEATURES

### 1.2.1 GENERAL OPERATION

The following discussion assumes that the Tape Select switch on the front panel is in the Auto Mode. Use of this switch is described in Section 1.2.5.

Upon power up, the DPS-3 is in a neutral state. When in the neutral state, either of the two CPUs (CPU A or CPU B) can gain access to either of the two peripherals (tape drive or line printer). Once access occurs, the DPS-3 leaves the neutral state for that peripheral. It then effectively blocks the other CPU from gaining access to the peripheral by making it appear off-line, in the case of the tape side, and by not releasing any DEMAND signals in the case of the printer side. It also logically blocks any signals coming from the CPU that does not have control so that the CPU cannot gain access to the DPS-3 or contact the peripheral.

When in the neutral state, the DPS-3 allows the following signals to pass from the peripherals to each of the CPUs:

TAPE DRIVE: ON LINE, READY, FORMATTER BUSY, HARD ERROR, FILE MARK, DATA BUSY, CORRECTED ERROR, REWINDING.

PRINTER: ON LINE, DEMAND, READY.

As soon as a CPU tries to strobe a command or data to one of the peripherals, it gains control of the DPS-3 for that peripheral by setting a flip-flop. The signals shown above are then made to appear inactive to the CPU that does not have control of the peripheral in question. Note that all other signals passing from the tape drive to the CPUs are allowed through at all times.

Once a CPU has gained control of the DPS-3, it may be returned to its neutral state by the various means listed on the following page.

TAPE DRIVE: 1. The DPS-3 is powered down and then up.  
2. The CPU in control is powered down.  
3. The tape drive is taken off-line.

PRINTER: 1. The DPS-3 is powered down and then up.  
2. The CPU in control is powered down.  
3. Approximately 30 seconds elapse from the last time data was strobed by the CPU in control.  
4. A 27 (octal) code is transmitted on the data lines. This code is not passed to the printer; however, it is acknowledged by a toggling of the DEMAND signal to the CPU that originated it.

### 1.2.2 POWER

Power for the DPS-3 is obtained through three 28-gauge wires in each printer cable from the +12 volt pins on each of the CPU backplanes. The +12 volts is then fed through diodes to a +5 volt, 3A voltage regulator. If one of the CPUs is arbitrarily shut down, the diode will cut off that 12 volt supply line and the DPS-3 can continue uninterrupted operation by automatically deriving power from the other CPU.

### 1.2.3 SINGLE CPU POWER-DOWN

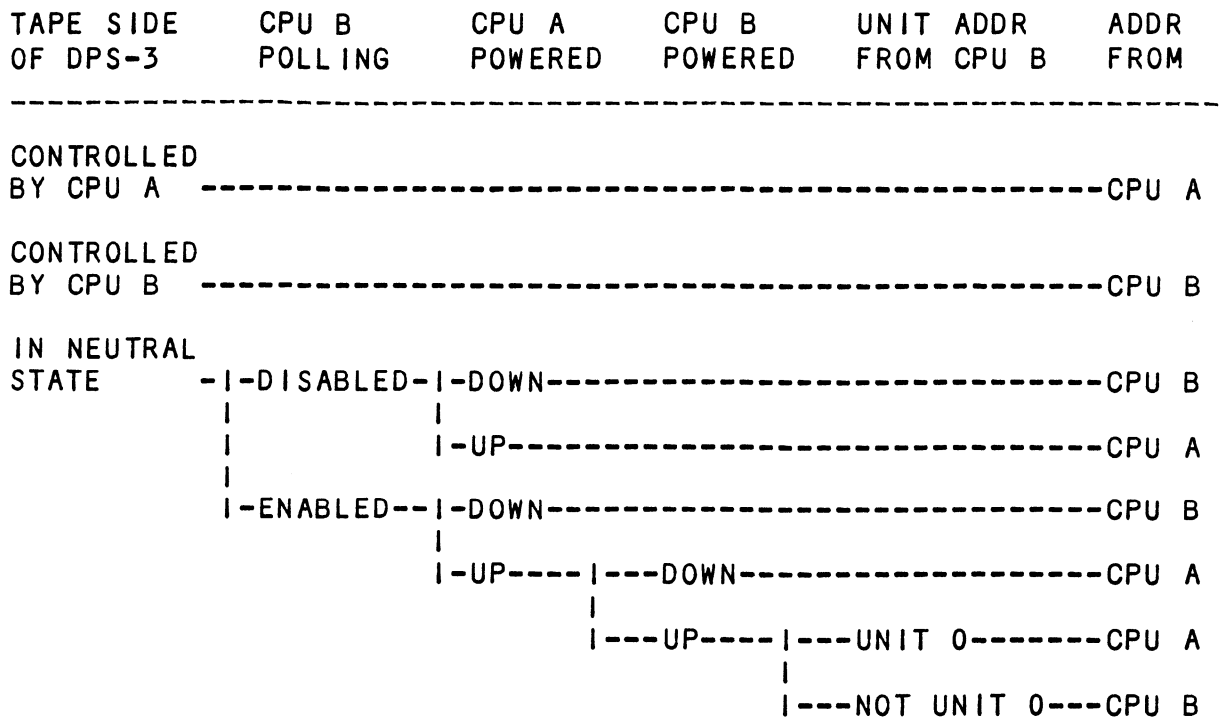
The DPS-3 monitors the +5 volt power supply pins from each of the CPU backplanes via a line in the printer cable in order to determine if one of the CPUs is being powered down. If a CPU has control of either the tape or printer side of the DPS-3 when it is powered down, the DPS-3 will automatically return to the neutral state for that particular peripheral. It will then automatically lock out the signals from that CPU so that any errant signals coming from it can not gain control of either the tape or printer side of the DPS-3. If, however, the CPU that was not powered down had control of the tape or printer side of the DPS-3 at the time of the power-down of the other CPU, it will continue operation as normal.

#### 1.2.4 TAPE DRIVE UNIT ADDRESS SELECT

Three signals from the CPU (TRANSPORT ADDRESS 0 [TAD 0], TRANSPORT ADDRESS 1 [TAD 1], and FORMATTER ADDRESS [FAD]) are used to select one of up to eight daisy-chained tape drives. These signals must be stable before any commands or data can be strobed over.

Some programs (e.g. ZETACO's Universal Mag Tape Reli - not supplied) poll to determine which drives are ON-LINE (unit 0-7) before actually strobing over any commands. Since these lines are static and are not strobed, the DPS-3, while in its neutral state, cannot be sure which computer's address lines to pass through. To get around this problem, the assumption is made that when CPU B is powered up and its tape coupler is not in use, it outputs the address for unit 0. Therefore, if CPU B is powered up while the DPS-3 is in the neutral state, it is assumed that any address other than unit 0 coming from CPU B means it is polling the units on the tape drive daisy-chain.

CPU's B tape address signals are then allowed through. Otherwise, when the DPS-3 is in the neutral state only CPU A's tape address signals are allowed through. This feature can be disabled via the configuration switches. The following graph shows which CPU's tape unit addresses are allowed through depending on the various conditions present. As the graph is followed from left to right, additional conditions are added. The right most column indicates which CPU has control of the three address lines for the various conditions present.



### 1.2.5 MANUAL CPU SELECT FOR TAPE SIDE

Manual selection of a particular CPU to have access to the tape drive can be done by flipping the Tape Select switch on the front panel to either CPU A or CPU B. The appropriate LED on the front panel will then light up. If the switch is in the Auto Mode and it is desired to manually select one CPU when the other one has control (its LED is lit), do the following:

- A. Flip the switch to the desired CPU.
- B. Flip the switch back to the Auto Mode which should then clear out the other CPU's LED.
- C. Flip the switch back to the desired CPU.

Do not alter the switch setting during interaction of one of the CPUs with the tape drive or errors may occur.

### 1.2.6 PRINTER STROBE CAPTURE

The DPS-3 logic is set up so that if one of the CPUs is using the printer and the other CPU attempts to send a character, the strobe for that character will be "captured". When the first CPU is done using the printer and the DPS-3 returns to the neutral state, the DPS-3 will automatically send the "captured" strobe over for the second CPU. Since the data on the printer controller's data lines remains valid, the "lost" character will now be sent over. The second CPU will then have control of the printer side of the DPS-3, and will have 30 seconds to start sending out the remainder of the information it previously attempted to print.

### 1.2.7 INHIBIT OF 27 (OCTAL) CODE TO PRINTER

Whenever a 27 (octal) code is sent by the CPU in control of the printer side of the DPS-3, it is prevented from going to the printer. The printer side of the DPS-3 will then revert to the neutral state, and there will be no characters in the printer's line buffer (provided the 27 code was preceded by a paper movement code). Upon reception of the 27 code, a DEMAND signal is generated by the DPS-3 and sent to the CPU that sent the 27 code. This allows the CPU to send out more data if required.

## 1.3 SPECIFICATIONS

### 1.3.1 TAPE DRIVE INTERFACE

Tape Format:	Specified by Drive Formatter; PE or NRZI
Interface	
Standard:	Standard Pertec, Embedded Formatter
Electrical:	Open Collector, Active Low, Standard TTL
Driver:	Standard Open Collector TTL: Logic Low = 0.4V Maximum Logic High = 2.4V Minimum
Receiver:	Schmitt Trigger: 220/330 ohm voltage divider network; VIH=3V



### 1.3.2 PRINTER INTERFACE

Interface  
Standard: Standard Data Products/Centronics Interface

Electrical: Open Collector and Totem Pole, Active High and Low, Standard TTL

Driver: Standard TTL with 22 ohms in Series:  
Logic Low = 0.4V Maximum  
Logic High = 2.4V Minimum

Receiver: Schmitt Trigger: 330/390 ohm voltage divider network from printer;  $V_{IH}=2.7V$

### 1.3.3 CABLING

There are nine 50-pin, round, twisted pair, shielded FCC cables that connect to the distribution panel at the rear of the DPS-3 enclosure. All connectors on the distribution panel are 50-pin D connectors. Descriptions of the cables follow:

1. Six tape cables (two to CPU A, two to CPU B and two to the tape drive).
2. Three printer cables (one to CPU A, one to CPU B and one to the printer).

### 1.3.4 MECHANICAL

Dimensions:

DPS-3 Logic Board: 1/2" x 15" x 17" (H x W x D)  
(1.3 cm x 38.1 cm x 43.2 cm)

DPS-3 Enclosure: 3.5" x 17" x 23" (H x W x D)  
(8.9 cm x 43.2 cm x 58.4 cm)  
(rack-mount tabs extend an additional 1" (2.5 cm) beyond the 17" width)

Shipping Weight: 14 pounds

### 1.3.5 POWER REQUIREMENTS

Typically 1.5 Amps at 12 VDC (18 watts).

1.3.6 ENVIRONMENTAL REQUIREMENTS

Operating Temperature: 0 to 55 C

Relative Humidity: 10% to 90% (non-condensing)

## 2.0            INSTALLATION

### 2.1            UNPACKING AND INSPECTION

Upon receipt of the DPS-3 from the carrier, inspect the shipping carton immediately for any evidence of damage or mishandling in transit.

If the shipping carton is water stained or damaged, contact the carrier and shipper immediately, specify the nature and extent of the damage and request that the carrier's agent be present when the carton is opened.

ZETACO'S warranty does not cover shipping damage.

Check the contents of the container against the packing list to ensure that all items to be shipped were received.

For repair or replacement of any ZETACO product damaged in shipment, call ZETACO to obtain return authorization instructions.

### 2.2            CONFIGURATION OF DIP SWITCHES

There are four 8 switch DIP packs on the DPS-3 which are used to configure the board. The switch packs are labeled SW1, SW2, SW3, and SW4. Numbers 1-8 are assigned to the 8 switches in each pack. A description of the various configuration options is given below. All switches must be set up according to the configurations that follow. If settings other than those shown are used, the DPS-3 will not operate properly. The underlined configurations are the way the units will be shipped.

1. Use of the REWIND signal to obtain control of the tape side of the DPS-3. Note that this is in addition to the GO pulse which is always used for this purpose. SEE LOGIC SHEET 3.

ENABLED:    SW1 - Switch 1 closed  
              SW1 - Switch 2 open  
              SW1 - Switch 3 closed  
              SW1 - Switch 4 open

DISABLED:    SW1 - Switch 1 open  
              SW1 - Switch 2 closed  
              SW1 - Switch 3 open  
              SW1 - Switch 4 closed

2. Select polarity of data to printer. This is active high for Dataproducts and Centronics interfaced models. SEE LOGIC SHEET 6.

ACTIVE\_HIGH: SW1 - Switch 6 open

ACTIVE LOW: SW1 - Switch 6 closed

3. Examine the VFU bit in addition to the 7 data bits when determining if a return to neutral code (27 octal) for the printer side of the DPS-3 has been transmitted. This should be enabled if the system is using a VFU and disabled otherwise. SEE LOGIC SHEET 6.

ENABLED: SW1 - Switch 7 closed  
SW1 - Switch 8 open

DISABLED: SW1 - Switch 7 open  
SW1 - Switch 8 closed

4. Select polarity of STROBE signal to printer. This is active high if it is a Data Products interfaced model and active low if it is a Centronics interfaced model. SEE LOGIC SHEET 6.

ACTIVE\_HIGH: SW2 - Switch 1 open  
SW2 - Switch 2 closed  
SW2 - Switch 3 open  
SW2 - Switch 4 closed  
SW2 - Switch 5 open  
SW2 - Switch 6 closed

ACTIVE LOW: SW2 - Switch 1 closed  
SW2 - Switch 2 open  
SW2 - Switch 3 closed  
SW2 - Switch 4 open  
SW2 - Switch 5 closed  
SW2 - Switch 6 open

5. Select polarity of READY signal from the printer. This signal is active high for Data Products and Centronics interfaced models. SEE LOGIC SHEET 7.

DISABLED: SW1 - Switch 5 closed  
SW2 - Switch 7 closed  
SW3 - Switch 2 closed  
SW3 - Switch 3 open  
SW4 - Switch 1 closed  
SW4 - Switch 2 open

ACTIVE\_HIGH: SW1 - Switch 5 open  
SW2 - Switch 7 open  
SW3 - Switch 2 closed  
SW3 - Switch 3 open  
SW4 - Switch 1 closed  
SW4 - Switch 2 open

ACTIVE LOW: SW1 - Switch 5 open  
SW2 - Switch 7 closed  
SW3 - Switch 2 open  
SW3 - Switch 3 closed  
SW4 - Switch 1 open  
SW4 - Switch 2 closed

6. Select polarity of the ON LINE signal from the printer. This signal is active high for Data Products and Centronics interfaced models. SEE LOGIC SHEET 7.

ACTIVE\_HIGH: SW2 - Switch 8 open  
SW3 - Switch 4 closed  
SW3 - Switch 5 open  
SW4 - Switch 3 closed  
SW4 - Switch 4 open

ACTIVE LOW: SW2 - Switch 8 closed  
SW3 - Switch 4 open  
SW3 - Switch 5 closed  
SW4 - Switch 3 open  
SW4 - Switch 4 closed

7. Select polarity of the DEMAND signal from the printer. This signal is active low for Data Products and Centronics interfaced models. SEE LOGIC SHEET 7.

ACTIVE HIGH: SW3, switch 1 open  
SW3, switch 6 closed  
SW3, switch 7 open  
SW4, switch 5 closed  
SW4, switch 6 open

ACTIVE\_LOW: SW3, switch 1 closed  
SW3, switch 6 open  
SW3, switch 7 closed  
SW4, switch 5 open  
SW4, switch 6 closed

8. Allow polling of the tape unit address lines by CPU B while the DPS-3 is in the neutral state. This feature should be enabled if either the tape drives are daisy-chained or if a program is used that polls the unit address lines before strobing over any commands to the drive. It should be disabled otherwise. SEE LOGIC SHEET 4.

ENABLED: SW4, switch 7 closed  
SW4, switch 8 open

DISABLED: SW4, switch 7 open  
SW4, switch 8 closed

### 2.3 INSTALLATION OF THE RACK-MOUNT ENCLOSURE

The main body of the enclosure attaches to the standard 19" rack mount via slotted tabs in the front and slotted adjustable "L" brackets in the rear. Mounting hardware (e.g., bolts, nut plates, washers, etc.) must be supplied by the customer. Slide the enclosure body into its designated space on the rack. Then bolt on the front of the enclosure using the two slots on each tab (note that the tabs should be on the outside of the rail, i.e., the cabinet door side). Adjust the fore-aft position of the slotted "L" brackets at the rear of the enclosure. When they are in the proper position, tighten them down to the enclosure and then bolt them to the rack-mount rails.

## 2.4      INSTALLATION OF THE LOGIC BOARD INTO THE ENCLOSURE

**WARNING: DO NOT ATTEMPT TO SLIDE THE LOGIC BOARD INTO A DG COMPUTER CHASSIS.**

If the cable connections to the CPUs have been made, make sure they are powered down. Slide the logic board into the nylon rails. Use the lock tabs on the two outside corners to provide leverage when the board meets the connector. Apply equal pressure on both lock tabs until the board seats firmly into the backplane connectors.

Attach the internal cable on the front panel to the connector on the logic board. Make sure the polarity is correct (the "teeth" face upwards on the connector which is on the cable). Bolt the front panel onto the cabinet's mounting rails.

## 2.5      CONNECTING OF CABLES

There are nine cables that attach to the DPS-3. Three of them go to CPU A, three to CPU B, two to the tape drive and one to the line printer.

1. Connect the internal FCC tape coupler cables (or paddleboards) for CPU A and CPU B as per the instructions in the coupler manual.
2. Locate the pins on the CPU backplane that correspond to the slot which the printer controller board has been inserted into. Ensure that +12V is on pins B87, B88 and B90. Carefully slide the connector block of the DPS-3 internal printer cable onto the "B" side of the backplane pins corresponding to the slot with the printer controller. Ensure that the connector is lined up properly with the backplane pins by using the alignment marks on the connector for pins 1 and 99. This must be done for both CPU A and CPU B.
3. Connect the external tape and printer cables between the CPU bulkheads and the DPS-3 for both CPU A and CPU B. Text on the backpanel of the DPS-3 indicates which cables go to which CPU (see Figure 2.1).
4. Connect the external tape cables from the DPS-3 to the tape drive unit. The appropriate connectors on the DPS-3 are the ones labeled TAPE(P1) and TAPE(P2) that have the word "peripheral" underneath them (see Figure 2.1).

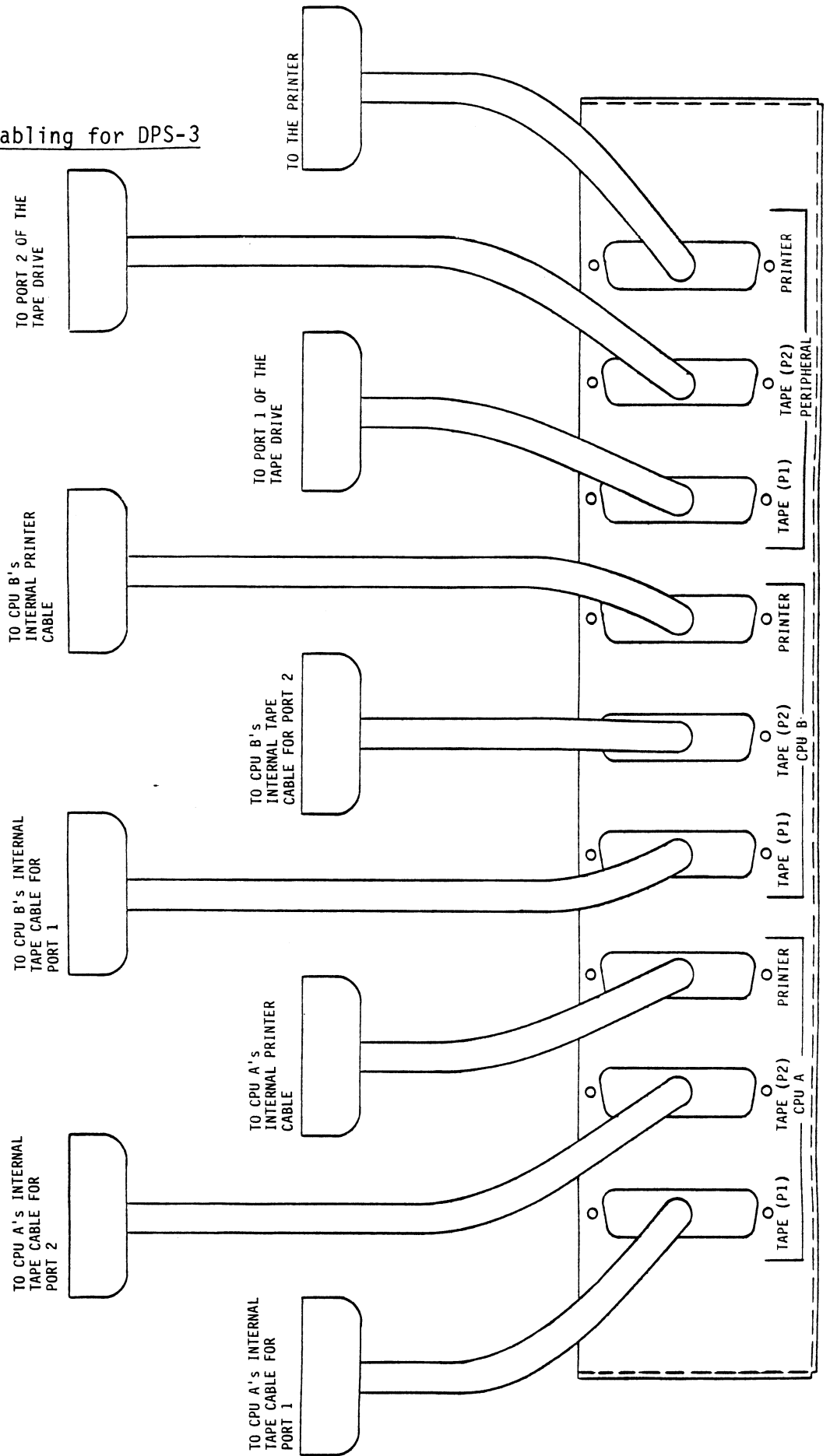
5. Connect the external printer cable between the DPS-3 and the printer. The appropriate connector on the DPS-3 is the one labeled PRINTER that has the word "peripheral" underneath it (see Figure 2.1).

## 2.6 POWERING UP

Power up one or both CPUs. Then press the power switch on the front panel of the DPS-3. The LED, which is built into the switch, should now be lit. All four front panel indicator LEDs should be out and should remain out until one of the CPUs tries to strobe over a command or data to one of the peripherals. The appropriate LED will remain lit while one of the CPUs has control of the DPS-3 for either of the peripherals.



FIGURE 2.1 Cabling for DPS-3



## 3.0 TROUBLE-SHOOTING, AND CUSTOMER SERVICE

### 3.1 FRONT PANEL INDICATORS

Upon power up of the DPS-3, all four indicator LEDs on the front panel should be out, (provided a CPU does not immediately strobe a command or data over to one of the peripherals). A feedback loop in the logic prevents both CPUs from having access to the same peripheral. If such an error did occur, it would be indicated by both the CPU A and CPU B LEDs for a single peripheral being lit simultaneously.

If one of the indicator LEDs lights up when it shouldn't have, try the following sequence of steps to correct it:

1. Power the DPS-3 down and up.
2. Double check that the proper DIP switch settings have been used (see Section 2.2).
3. Check the signal(s) coming off of the tape and/or printer controller boards which are used to gain control of the DPS-3. These are the GO pulse and possibly the REWIND signal for the tape drive, and the STROBE signal for the printer. Make sure that these signals are in their non-active state.

### 3.2 CUSTOMER SUPPORT HOTLINE

ZETACO, Inc. provides a Customer Support Hotline (612-890-5138) to answer technical questions and to assist with installation and trouble-shooting problems.

The Hotline is manned by a technical team from 8:00 a.m. to 5:00 p.m. (Central Time) Monday through Friday.

### 3.3 WARRANTY INFORMATION

The DPS-3 is warranted free from manufacturing and material defects for up to two years from date of shipment when used in a normal and proper manner. Except for the express warranties stated above, ZETACO disclaims all warranties including all implied warranties of merchantability and fitness. The stated express warranties are in lieu of all obligations of liabilities on the part of ZETACO for damages, including but not limited to, special, indirect or consequential damages arising out of or in connection with the use or performance of ZETACO's products.



# MATERIAL RETURN INFORMATION

All possible effort to test a suspected malfunctioning DPS-3 should be made before returning the DPS-3 to ZETACO for repair. This will: 1) determine if the board is actually defective, and 2) increase the speed and accuracy of a product's repair, which is often dependent upon a complete understanding of the user's checkout test results, problem characteristics, and the user system configuration.

Please allow our service department to do the best job possible by answering the following questions thoroughly and returning this information with the malfunctioning board.

1. Does the problem appear to be intermittent or heat sensitive? (If yes, explain.)
2. Under which operating system are you running? (RDOS, AOS, AOS/VS) Include Revision number.
3. Describe the system configuration, (i.e., peripherals, controllers, model of computer, etc.)
4. Has the unit been returned before? Same problem?

To be filled out by CUSTOMER:

Model #: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
RMA #: \_\_\_\_\_ (Call ZETACO to obtain an RMA number.)

Returned by:

Your name: \_\_\_\_\_  
Firm: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone: \_\_\_\_\_





**Please give us your comments.**

Please use this form to send us your comments regarding this Technical Manual. Your input is greatly appreciated! Problems will be promptly addressed and action taken as necessary. If you wish a written reply, please furnish your name and mailing address. Thank you.

Date \_\_\_\_\_

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ERRORS IN MANUAL:

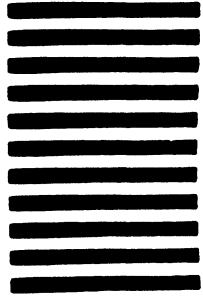
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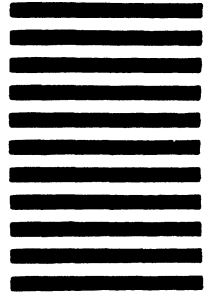
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