WANG

Special Products

Model 9093
Dataproducts 1500
Band Printer Interface
Technical Manual

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PREFACE

The Special Products Model 9093 Dataproducts 1500 Band Printer
Interface Technical Manual provides information on how to install and
service the Model 9093 (part number 190-0333) in the field. This
manual deals primarily with the parallel-to-serial conversion kit that
provides an interface between a Dataproducts 1500 Band Printer and
Wang WPS/OIS and VS Systems.

Specifically, Chapter 1 contains an overview and specifications
for the Model 9093, and Chapter 2 gives a general description of the
product as well as descriptions of the PC boards. Chapter 3 describes
the appropriate switch, jumper, and lamp settings. The installation
procedure is outlined in Chapter 4, while Chapter 5 describes the
operation of the Model 9093. Chapter 6 deals with troubleshooting.

Additional information on the Dataproducts 1500 Band Printer can
be found in Product Definition DP 1500 Printer specifications.

CONTENTS

FIGURES

1.1 PRODUCT OVERVIEW

The Special Products Model 9093 (part number 190-0333), shown in Figure 1, serves as an interface between a Wang VS System or WPS/OIS to a Dataproducts 1500 Band Printer, which has a parallel interface. A 25-foot dual coaxial cable is provided that exits from the rear of the 9093 interface box and connects to any available slave channel on the rear of the VS or WPS/OIS. A 50-pin D-type connector links the printer to the interface box.

The 9093 interface box houses the memory, CPU, and printer interface circuits. Serial data is converted to parallel data through the interface box prior to being transferred to the printer.

NOTE: Wang does not sell or service the Dataproducts 1500 Band Printer, nor provide any applications software.
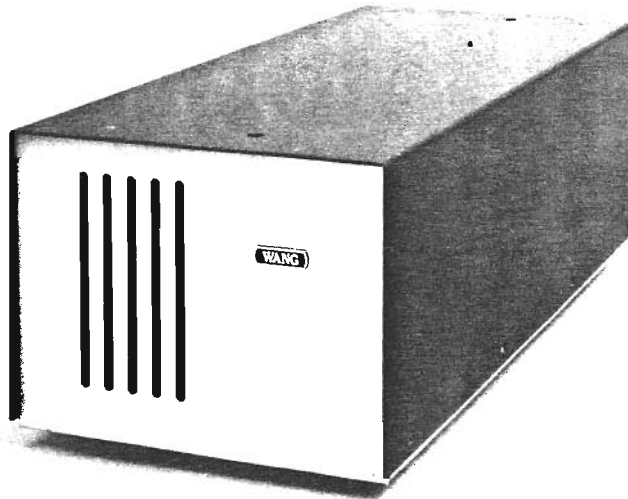
Figure 1. Model 9093

1.2 PHYSICAL SPECIFICATIONS

```
Height  .........  6.5 in. (16.5 cm)
Length  .........  19 in. (48.3 cm)
Width   ..........  9 in. (22.8 cm)
Weight  .........  25 lbs (11.3 kg)
```

1.3 CABLING

The following are cabling specifications:

- 25-foot dual coaxial cable (interface box to serial I/O port)
- 6-foot cable (part number 220-0438) terminated by a 50-pin D-type connector (interface box to printer)
- 9-foot power cord (interface box to 115 VAC power outlet)

1.4 REFERENCES

A detailed theory of operation of serial/parallel translators is contained in the WP 10/20/30 Maintenance Manual, Vol. III (part number 729-0652). Further information on the interface translator assemblies can be found in Word Processing Newsletter No. 30/30A (part number 729-0541-1).

CHAPTER 2
DESCRIPTION

2.1 GENERAL DESCRIPTION

     All printers used on Wang systems are parallel interface
machines. On WPS, OIS (130, 140), and VS Systems (with serial IOP),
the data is sent out in a serial format. The Dataproducts 1500 Band
Printer has a parallel interface. Therefore, a device is needed to
convert the serial data from the CPU into the parallel data required
by the printer. This conversion is accomplished by a
serial-to-parallel translator -- an 8080-controlled device that
converts serial data to parallel data and vice versa.

     The serial interface requires microcode to perform and carry out
functions such as top of form, line feed, select, print, etc. The
printer will not operate unless this microcode has been loaded into
the memory in the translator. In WPS/OIS, the microcode is loaded
into the translator memory when the printer is powered on. In VS
Systems with serial IOP, the microcode is not loaded until a
document is queued to the printer.

NOTE: This product does not support the optional Printer Vertical
Format Unit (VFU).

2.2 PC BOARD DESCRIPTIONS

     Model 9093 is a standard interface box (part number 190-0314)
with the addition of Special Products Interface Board (210-8036). A
description of the CPU, I/O, interface, memory PC boards, and
210-8036 PC board used in the translator assembly follows.

2.2.1 210-7348 CPU Board

     This board contains the 8080 CPU with its associated data and
address busses. The board also contains the following:

     ● System timing circuits
     ● Status decoder
     ● Data and address buffers
     ● Refresh timing and parity generators and checker
     ● Part of the data link circuit including line drivers and
       receivers, data detection circuits and serial/parallel
       register

3

2.2.2 210-7446 I/O Board

This board contains portions of the data link logic including the following:

- Instruction register
- Byte timing register
- DMA timing circuits
- In and Out command decoders
- Printer control circuits
- External status gate
- Data out registers

2.2.3 210-7547-A or 210-7747-1A (16K and 32K Memory Boards)

These boards contain printer memory and memory control circuits. Included are the following:

- Bank select
- Address counter
- Refresh counter
- Address mux
- Data in and out buffers
- PROM memory with associated buffers
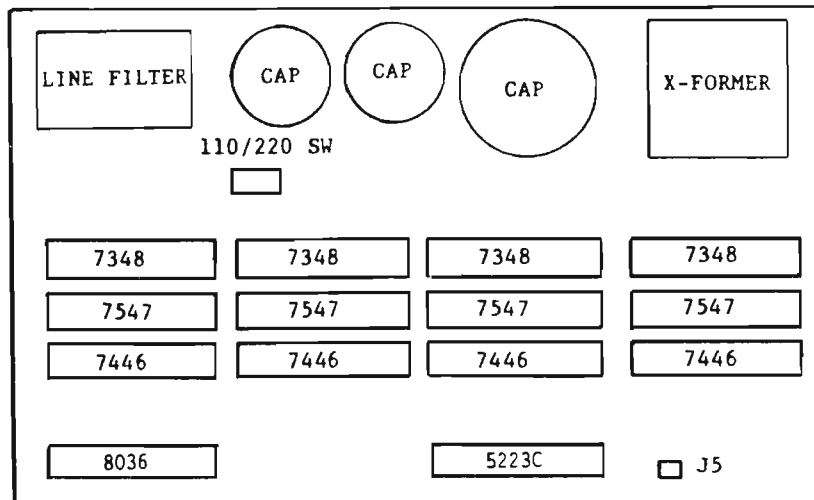
Figure 2. Interface Box Board Location

2.2.4 210-8036 Printer Interface Board

The 210-8036 board is a modified Special Products interface board that contains the SELECT circuitry used for selecting the interface box and other associated interface circuits.

2.2.5 510-5223-C Fingerboard

The 510-5223-C board has jumper wires installed to provide +5V to the 210-8036 PC board.
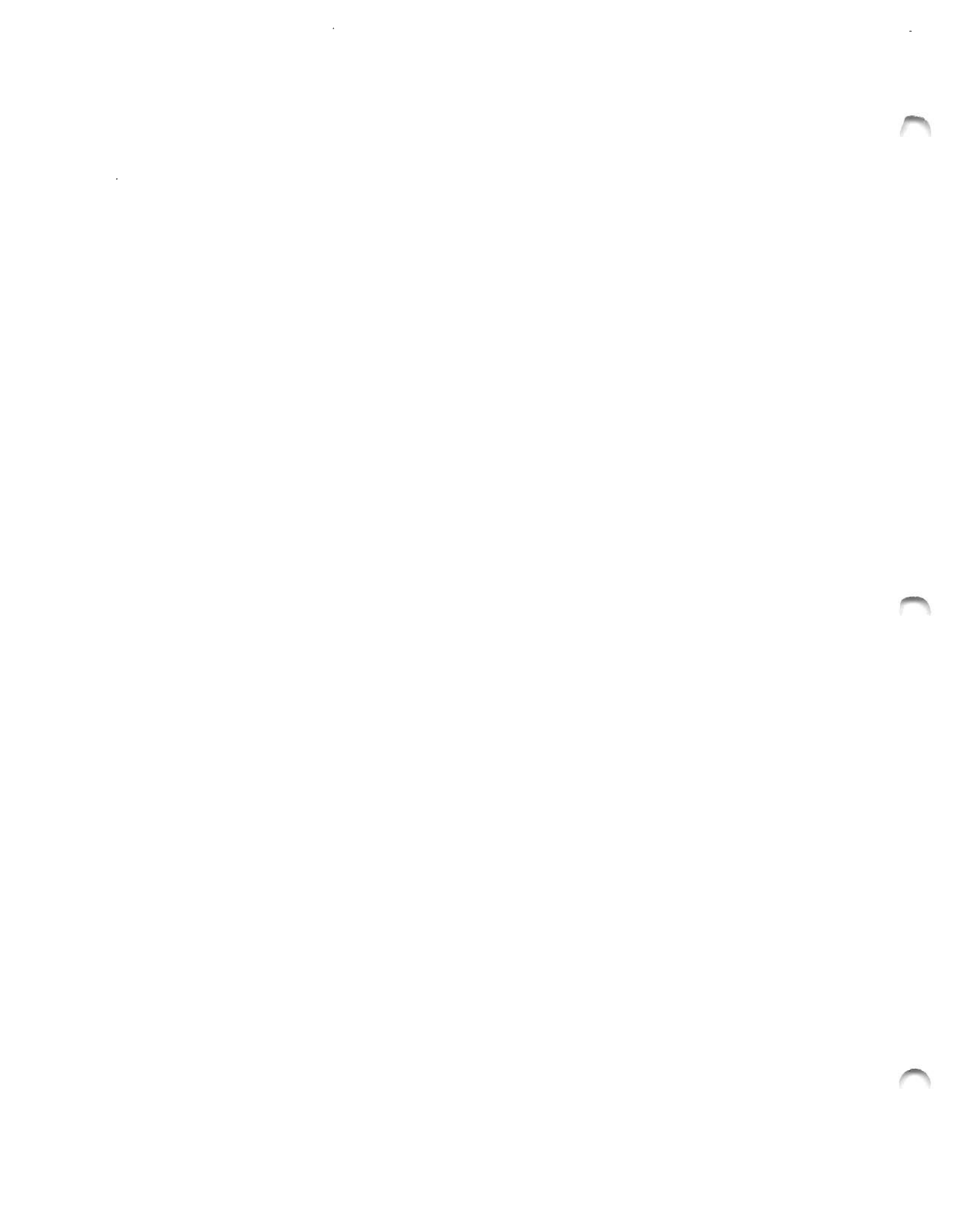
3.1 INTRODUCTION

Different printer models need different microcode to operate.
This is provided for by switch settings on the 210-7348 CPU board.
Also, the 210-7446 I/O board has switches that must be properly set
and some jumper connections that must be made. Also, for the DP
printer to be configured to the VS, switch settings must be made on
the DP 1500 parallel interface board (Interface CCA) as described in
Section 3.3. Perform the switch settings and jumper installations
as outlined in the following sections.

3.2 SWITCH SETTINGS

Set the switch banks (SW1) on the 210-7348 CPU board and the
210-7446 I/O board as shown in Figure 3 (switches are set for device
code 300, 5521 matrix printer). The switch bank (SW1) on the
210-8036 Printer Interface board should be set as shown in Figure 4
(three options are available -- even, odd, and no parity).
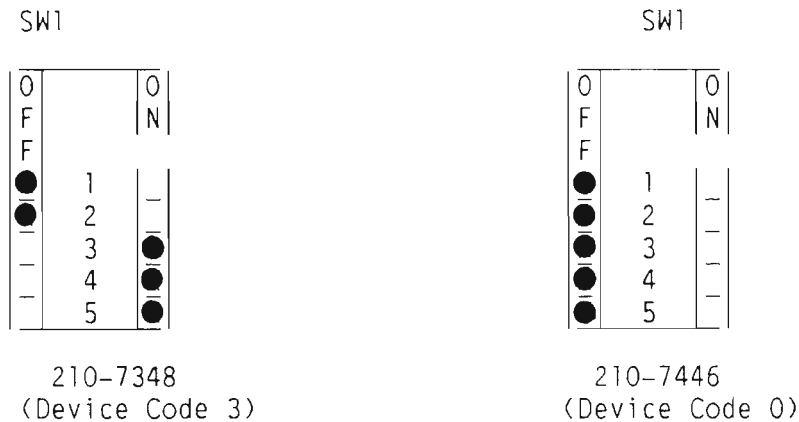
Figure 3. CPU and I/O Board Switch Settings

```
     SW1                      SW1                      SW1
  ┌─────────┐              ┌─────────┐              ┌─────────┐
  │O      O │              │O      O │              │O      O │
  │F      N │              │F      N │              │F      N │
  │F        │              │F        │              │F        │
  │   1  ● │              │●  1  ─ │              │   1  ● │
  │   2  ● │              │   2  ● │              │●  2  ─ │
  │   3  ● │              │   3  ● │              │   3  ● │
  │   4  ● │              │   4  ● │              │   4  ● │
  │   5  ● │              │   5  ● │              │   5  ● │
  └─────────┘              └─────────┘              └─────────┘
    210-8036                 210-8036                 210-8036
   (No Parity)             (Even Parity)            (Odd Parity)
```
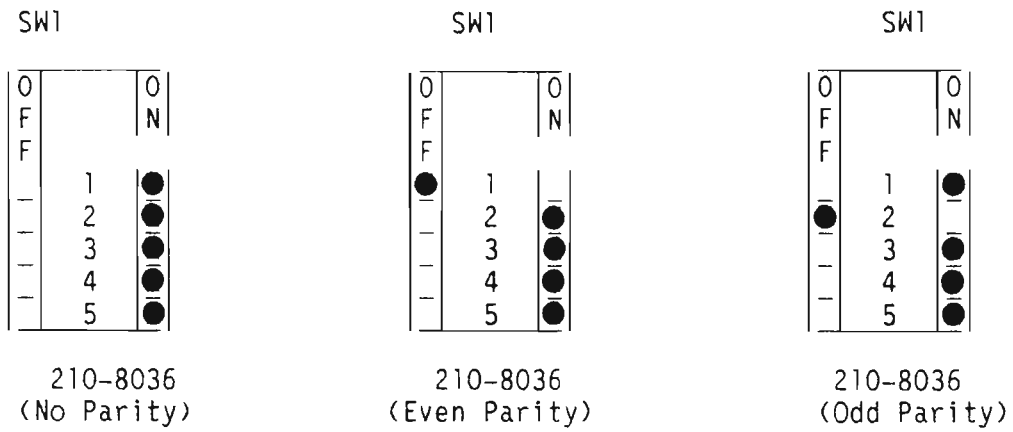
Figure 4.   Printer Interface Board Switch Settings

3.3   INTERFACE CCA SWITCH SETTINGS

The configuration switches S4 through S8, on the Interface CCA (parallel interface board), are used to configure the printer according to the Wang VS requirements. Set S4 through S8 on the Interface CCA to the positions illustrated in Figure 5. To locate S4 through S8 on the CCA PC board, see Figure 6. The switches and their functions are listed and described in Table 2-3 of the Dataproducts BP Series Line Printer Maintenance Guide.

INTERFACE CCA PC BOARD SWITCH SETTINGS FOR THE WANG VS				
S4	S5	S6	S7	S8
1 OFF	1 ON	1 OFF	1 OFF	1 ON
2 OFF	2 OFF	2 OFF	2 OFF	2 OFF
3 OFF	3 OFF	3 ON	3 OFF	3 OFF
4 OFF	4 OFF	4 ON	4 OFF	4 OFF
5 ON	5 OFF	5 OFF	5 OFF	5 ON
	6 OFF	6 OFF	6 ON	6
	7 OFF	7 OFF	7 OFF	7
	8 OFF	8 OFF	8 OFF	8

Figure 5. Interface CCA Switch Settings
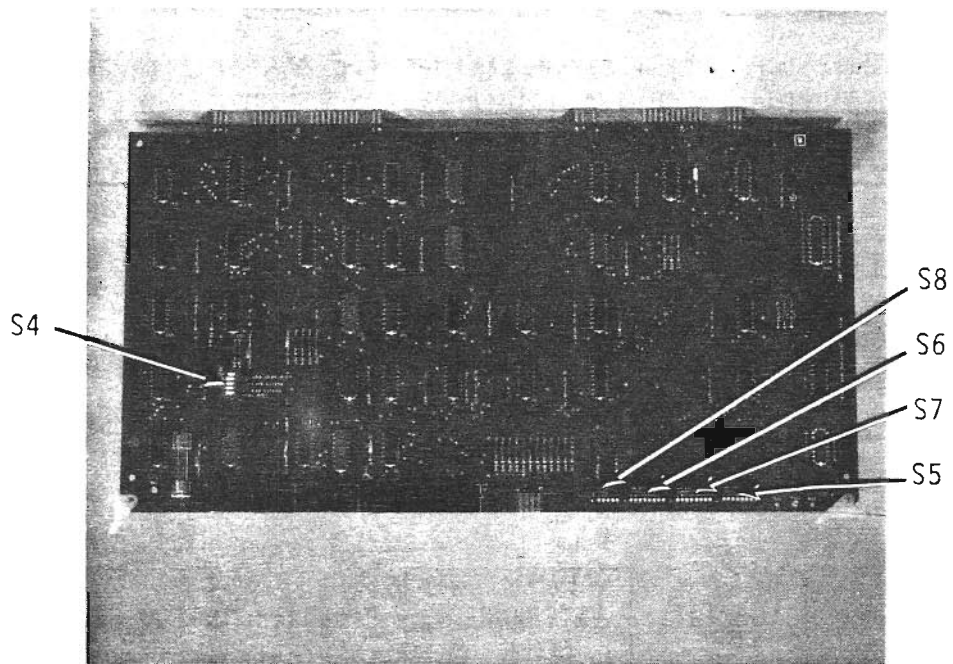
Figure 6. Interface CCA Switch Location

3.4 JUMPER SETTINGS

For the Model 9093 to interface the DP 1500 Printer to a Wang VS or WPS/OIS, you must install the following jumpers on the 7446 and the 7348 boards.

1. On the 7446 board, install jumpers as follows (See Figure 7):

    a. A to B (L28-10 to L42-10)
        D to E (L13-2 to L17-14)
        H to J (L42-3 to L32-14)
    b. Install jumper wire from L16 to Pin 12 to ground.

2. Install the fingerboard jumper (510-5223-C) as follows:

    B to M
    2 to 11

Figure 8 shows the cable for the printer to the interface box.

3.5 INDICATOR LAMP

The indicator lamp located at the rear of the interface box has two designations: when the interface box is powered on, the lamp is dimly illuminated; when the interface box is selected (by turning on the printer), the lamp is brightly illuminated.

| VS | Serial
IOP | INTERFACE
BOX | Parallel
Interface | 1500 PRINTER |

VS CONFIGURATION

| OIS | Serial | INTERFACE
BOX | Parallel
Interface | 1500 PRINTER |

OIS CONFIGURATION
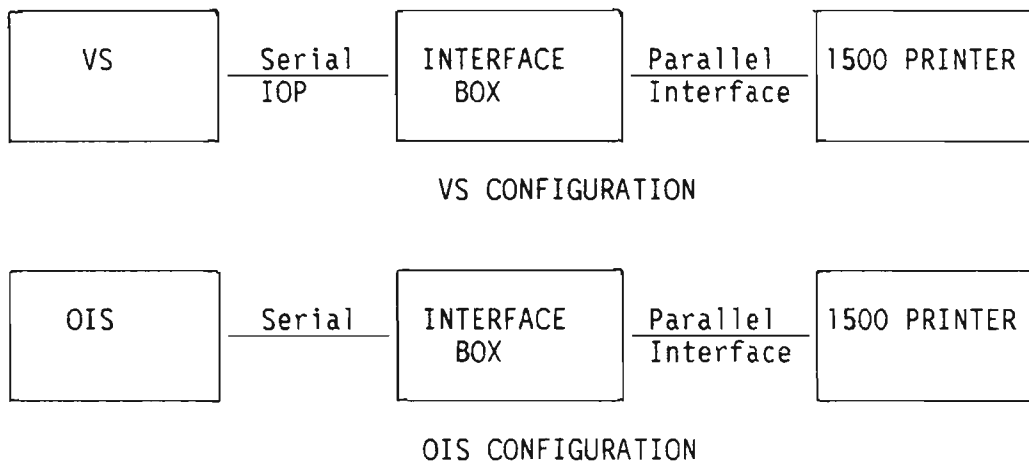
Figure 7. Connection Diagrams

```
-----------------------------------------------------------------------
50-Pin D-Type                          Signal              44 Position
Connector                              Name                Finger Board
19 ------------------------------ D1 ------------------------ A
3  ------------------------------ RET ----------------------- 1
20 ----------------------------- D2 ------------------------ B
4  ------------------------------ RET ----------------------- 2
1  ------------------------------ D3 ------------------------ C
2  ------------------------------ RET ----------------------- 3
41 ------------------------------ D4 ------------------------ D
40 ------------------------------ RET ----------------------- 4
34 ------------------------------ D5 ------------------------ E
18 ------------------------------ RET ----------------------- 5
43 ------------------------------ D6 ------------------------ F
42 ------------------------------ RET ----------------------- 6
36 ------------------------------ D7 ------------------------ H
35 ------------------------------ RET ----------------------- 7
28 ------------------------------ D8 ------------------------ J
48 ------------------------------ RET ----------------------- 8
29 ------------------------------ PAR ----------------------- L
13 ------------------------------ RET ----------------------- 10
30 ------------------------------ PI ------------------------ M
14 ------------------------------ RET ----------------------- 11
38 ------------------------------ STB ----------------------- P
37 ------------------------------ RET ----------------------- 13
23 --------------------------- DEMAND --------------------- R
7  ----------------------------- RET ----------------------- 14
21 -------------------------- ON LINE -------------------- T
5  ---------------------------- RET ----------------------- 16
22 -------------------------- READY --------------------- V
6  ---------------------------- RET ----------------------- 18
```

Figure 8.   Cable (Part Number 220-0438) for 1500 Printer to Interface Box

CHAPTER 4
INSTALLATION

4.1 INTRODUCTION

Replace or install equipment in accordance with the procedures
and illustrations contained in this chapter. The following sections
describe the installation of the interface box, along with cable
connections and microcode installation.

4.2 INTERFACE BOX INSTALLATION

You can place the interface box on any level surface. Once you
have properly positioned the interface box, perform the steps
outlined in Section 4.3.

4.3 CABLE CONNECTIONS

Make the following cable connections:

1. Connect a 25-foot dual coaxial cable between the Model 9093
    and any available slave channel on the WPS/OIS or VS System.

2. Connect the I/O cable from the Model 9093 to the connector,
    located at the rear left side of printer.

4.4 VS MICROCODE INSTALLATION

Update the "@MC2221S" file by mounting the diskette (part number
706-0010) labelled "DSK: SP9088/9093 Microcode" (the volume is
"PRINT", the library is "SPECIAL", and the file is "@MC2221S") onto
the VS disk drive and copying the file onto the system fixed and
removable disk.

NOTE: The "@MC2221S" file consists of a translation table that is
loaded into the interface box when it is turned on.
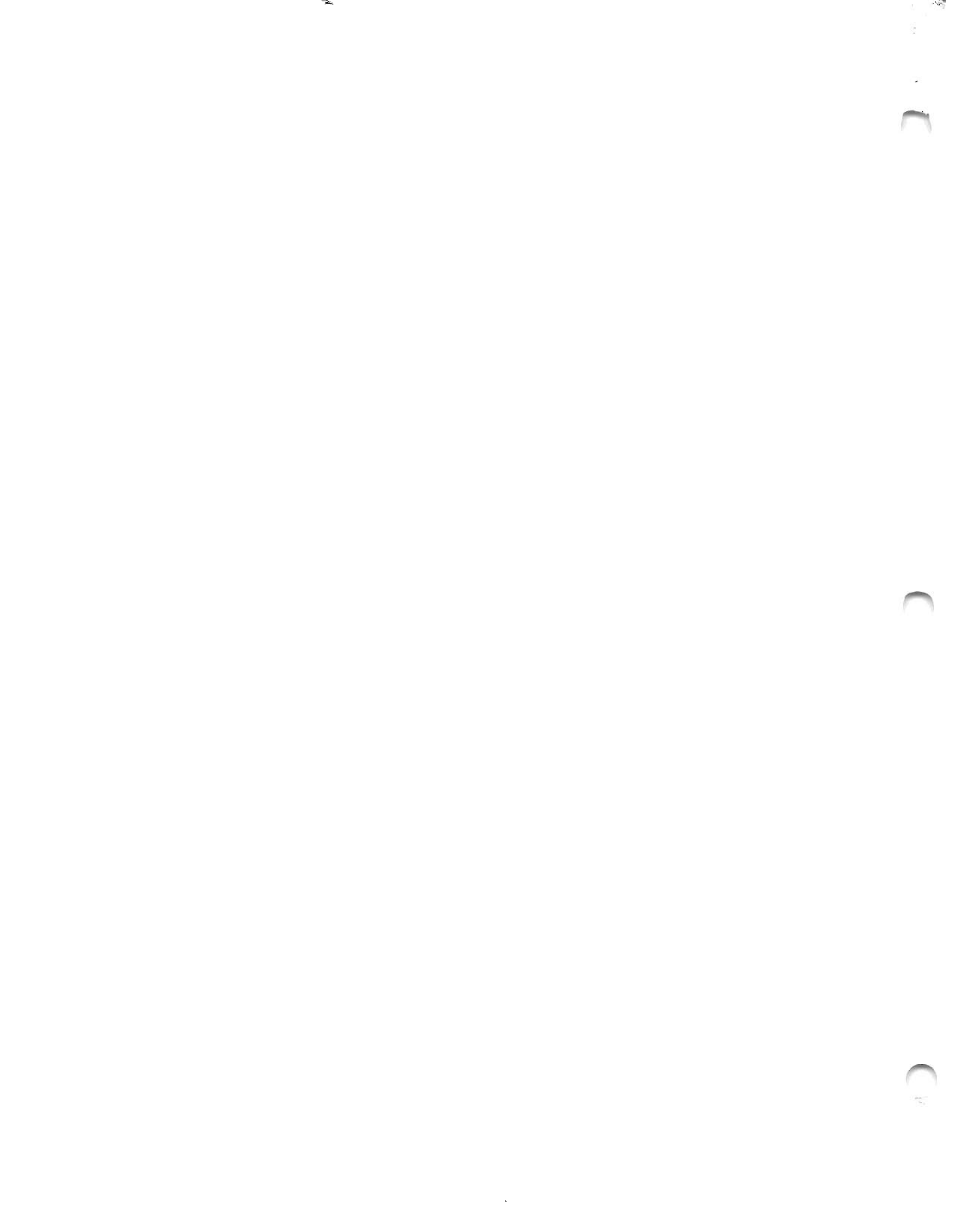
5.1 WPS/OIS

Follow these steps to operate the printer with WPS or OIS:

1. Turn on the 9093 interface box and the printer.

2. From the workstation, select "Control Functions". Then select "Device Control" from the Control Functions menu. The Device Control table should show that the 9093 is a Matrix Printer device, with a device type 300. If the table does not show this, check the switch setting on the 7446 and 7348 PC boards.

3. The printer is now ready to print. Select "Print Document" from the Word Processing main menu. Select "Line Printer" as the device type, and character set "2". Figure 9 shows the printable characters using character set 2.

```
 !  "  #  $  %  &  '  (  )  *  +  ,  -  .  /

 0  1  2  3  4  5  6  7  8  9  :  ;  <  =  >  ?

@  A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P  Q  R  S  T  U  V  W  X  Y  Z  [     ]  ^  _

`  a  b  c  d  e  f  g  h  i  j  k  l  m  n  o  p  q  r  s  t  u  v  w  x  y  z  {  |  }  ~  \
```

Figure 9. Printable Characters on WPS/OIS, Character Set 2

5.2 VS SYSTEMS

For VS Systems, you must install the microcode software (refer to Section 4.4).
Note: The modified @MC2221S file has to be loaded from the diskette supplied by Special Products.
Printing in the DP and WP modes is described in the following subsections.

NOTE: This product does not support the optional Printer Vertical Format Unit (VFU).

5.2.1 DP Mode

Follow these steps for printing in the DP mode:

1. The Model 9093 uses one of the channels of the Serial IOP (22V17), and it is emulated to use the software of a matrix printer (5521). Therefore, device 5521 should be included in the Serial IOP configuration. If 5521 is not shown under the 22V17 IOP, you have to run the "GENEDIT" program and include the 5521 in the configuration.

2. To test the 9093, run the "PRTEST" program, or simply enter SF key 15 for the Print Command screen. The printer should print after you select it.

5.2.2 WP Mode

For printing in the WP mode, the printer works using WP software on the VS System. To print a document, select "Print Document". Then select "Line Printer" as the device type, and character set "2".

When a printer fails to operate, the problem could lie in the
master CPU or IOP, in the cables connecting the serial/parallel
translator to the CPU or to the printer, in the translator itself,
or in the printer itself. A failure of the printer to IPL generally
indicates that no code is being loaded into it. This condition
could be caused by a problem in the master controller, in the
translator or in the cabling between the two.

If the problem appears to be on the translator, there is no easy
way to troubleshoot this unit in the field, except by substituting
suspected bad modules with known good ones. In the case of a
WPS/OIS, run the "Slave Channel Diagnostic" to check the interface
box. In the case of a VS System, run the "Printer Test Diagnostic"
to check the interface box. Check all cabling and internal voltages
before you replace a board. Check the switches and jumpers on a
replacement board for correct configuration before you insert it.

NOTE: Wang does not sell or service the Dataproducts 1500 Band
Printer.

APPENDIX A
BILL OF MATERIALS

    The following constitutes a copy of the Bill of Materials for the Model 9093 Dataproducts 1500 Band Printer Interface.

A20112221-08 DATA DATE 06/29/84 LOWELL R&D WANG AMAPS   06/29/84 PAGE 100

REQUESTOR ID ***   SINGLE LEVEL BILL OF MATERIAL   190-0333   PAGE 100

OPTIONS- EFFECTIVITY & DATE   ITEM TYPE 1

PARENT ITEM NUMBER	ITEM DESCRIPTION	ITM TYP	ITM CLS	ITEM STAT UM	ENG REV	MFG REV	OEM CTL	ISS CTL	DSGN SRCE	DWG NUMBER
190-0333	9093 INTRF PSC-BP1500 PTR	1	2	EA	AA	1	1			DWG SIZE

FIND COMPONENT NO ITEM NUMBER	ITEM DESCRIPTION	ITM CLS T	QTY UM	COMP TYP/J	-PCT- OP SC	L/T OFF	WORK CNTR	OPER CTL	OEM CTL	ISS CTL	EFFECT	REV LVL	ECO NUMBER	ISS DATE
000 289-0360	SP9093 VS TO PSC-BP-1500	1	1.0000 EA	1	00	00	000		1	1	IN07/05/84	AA	N/A	06/27/84
000 291-0203	AUTO ENCL: SP9093 DP 1500	1	1.0000 EA	1	00	00	000		1	1	IN07/05/84	AA	N/3	06/23/84

A20112221-08 DATA DATE 12/05/83 LOWELL R&D AANS AMAPS   12/05/83 PAGE 195

REQUESTOR ID ***   SINGLE LEVEL BILL OF MATERIAL   291-0203   PAGE 195

OPTIONS- EFFECTIVITY & DATE   ITEM TYPE 1

PARENT ITEM NUMBER	ITEM DESCRIPTION	ITM TYP	ITM CLS	ITEM STAT UM	ENG REV	MFG REV	OEM CTL	ISS CTL	DSGN SRCE	DWG NUMBER
291-0203	AUTO ENCL: SP9093 DP 1500 PTR INTF	1	2	EA	AA	1	1			DWG SIZE

FIND COMPONENT NO ITEM NUMBER	ITEM DESCRIPTION	ITM CLS T	QTY UM	COMP TYP/U	-PCT- OP SC	L/T OFF	WORK CNTR	OPER CTL	OEM CTL	ISS CTL	EFFECT	REV LVL	ECO NUMBER	SMS DATE
000 804-C006	SP9093 DP 1500 PTR INTF	1	1.0000 EA	1	00	00	000		1	1	IN12/12/83	AA	N/8	12/05/83

20