



ADDENDUM

HEWLETT-PACKARD I/O

for

1200 SERIES LINE PRINTERS

Revised June 1979

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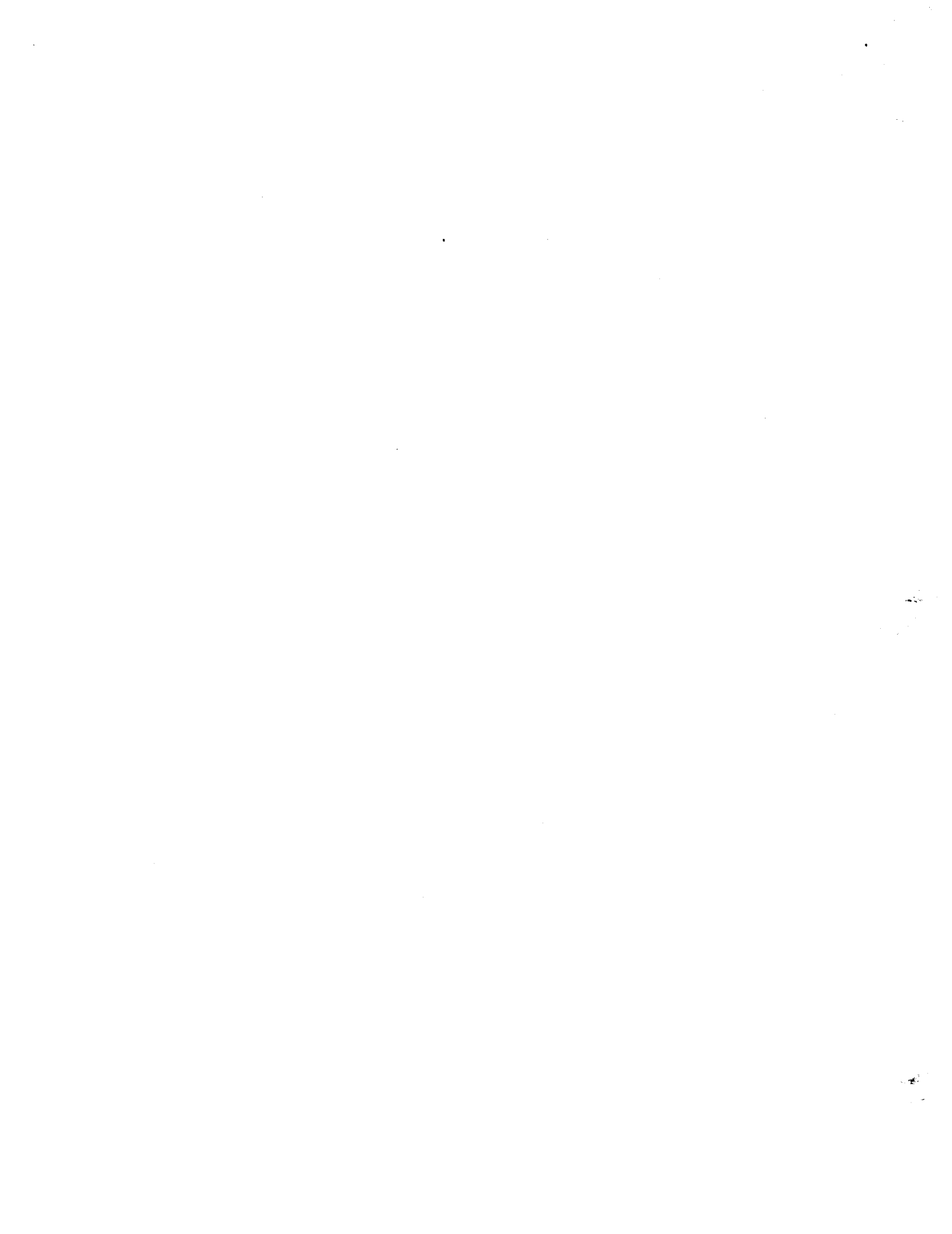


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ADDENDUM
Hewlett-Packard I/O
for
1200 Series Line Printers

1.0 INTRODUCTION

This addendum describes Data Printer Corp's Hewlett-Packard Interface. This interface consists of a printed circuit board, which replaces Data Printer Corp's Standard I/O board, and an I/O Adaptor Cable with a Hewlett-Packard - compatible connector. With this I/O installed, Data Printer's 1200 Series of line printers fully comply with Hewlett-Packard's E.R.S 2619A.

1.1 INTERFACE SUMMARY

A seven bit-parallel interface is provided with differential drivers and receivers. The demand/response timing allows the user system to control the data transfer rate up to a maximum of 5×10^5 characters per second. The interface consists of seven (7) data lines, a paper instruction control line, five status lines, a clear line, and demand and strobe lines. Details of the interface are provided in paragraph 2.0.

1.2 CHARACTER SET

The 64- and 96-character sets and coding are provided in Table 1.

1.3 VERTICAL FORMAT INSTRUCTIONS

Tables 2 and 3 provide the vertical format instruction codes which initiate print and paper advance of from either 0 to 15 lines or to a selected format channel.

2.0 PRINTER INTERFACE

The interface lines and I/O connector pin assignments are listed on the following page and defined in paragraph 2.1.

I/O Connector Characteristics
Connector Type: Winchester MRAC 50S-J

INPUT SIGNALS TO PRINTER

PIN	SIGNAL	GATE TYPE
p n	(-) MASTER CLEAR MASTER CLEAR (+)	DM 8820A or SN 75182
E F	DATA 1 (+) (-) DATA 1	
H J	DATA 2 (+) (-) DATA 2	
K L	DATA 3 (+) (-) DATA 3	
M N	DATA 4 (+) (-) DATA 4	
P R	DATA 5 (+) (-) DATA 5	
S T	DATA 6 (+) (-) DATA 6	
U V	DATA 7 (+) (-) DATA 7	
B A	STROBE (+) (-) STROBE	
a b	PAPER INSTRUCTION (+) (-) PAPER INSTRUCTION	
x HH	LOGIC COMMON (LOGIC GROUND) +5 VOLTS (LOGIC SUPPLY)	

OUTPUT SIGNALS FROM PRINTER

PIN	SIGNAL	GATE TYPE
C	DEMAND (+)	DM 8830A or SN 75183
D	(-) DEMAND	
r	READY (+)	
s	(-) READY	
j	ON LINE (+)	
h	(-) ON LINE	
m	BUFFER READY (+)	
k	(-) BUFFER READY	
v	CHANNEL 9 (+)	
w	(-) CHANNEL 9	
u	CHANNEL 12 (+)	
t	(-) CHANNEL 12	

The timing diagram in Figure 1 details the relationship of the interface lines. When the printer is ready to accept data, it will raise the demand line. The user can respond without time limits except, however, the data lines must have stabilized for at least 50 nanoseconds before raising the strobe line. The printer will accept the data and lower the demand line within 250 nanoseconds, after which the data strobe line should be lowered. The demand line will remain low for a minimum of 1.5 microseconds before going high again to accept more data. However, the demand line will not go high unless the strobe line is low.

2.1 INTERFACE SIGNAL DEFINITIONS

2.1.1 Input Signals to the Printer

2.1.1.1 Data Lines

Seven lines are used for the character transfer to the printer. Data Line 1 is the least significant bit of the ASCII character.

2.1.1.2 Master Clear

This line, when asserted, will cause the following action in the printer.

- A) Clear the input buffer.
- B) Finish printing the current line and perform any stored VFU instruction if the print cycle had been initiated prior to the assertion of the Master Clear.
- C) INHIBIT DEMAND until clear operation is complete (approximately 3 milliseconds).

2.1.1.3 Data Strobe

This line is used to define when the information on the data lines is to be accepted by the printer. Each time a Data Strobe occurs, the printer gates in the contents of the data lines and the Demand Line is made false while the character is stored. After the desired number of characters have been loaded, the vertical format code is loaded the same as a data character by the strobe, and the Demand line now remains false until the characters are printed.

2.1.1.4 Paper Instruction

This line is used to define when the information on the data lines is to be used as a vertical format or paper slew instruction. A vertical format or paper slew control code may be sent after any number of data characters have been loaded in the print buffer. Successive paper instructions may be issued to the printer.

2.1.2 Output Signals From Printer

2.1.2.1 Ready Line

This signal indicates when the printer is ready to be put "On-Line". When Ready is true, the following are true:

- A) Power is ON.
- B) An alarm condition does not exist.
- C) VFU had been initialized.

2.1.2.2 On-Line

This signal indicates when the printer has been put "ON-LINE". When On-Line is true, the Ready line is true.

2.1.2.3 Demand Line

This signal synchronizes the data transmission between the printer and the user system. The Demand line signal requests a character from the user. The Demand line remains true until a data strobe is received. It is disabled while the character is stored in the print buffer and during the print operation. The Demand line can be asserted only while the printer is On-Line.

2.1.2.4 Buffer Ready Line

This signal is true when the printer is On-Line and not printing or moving paper.

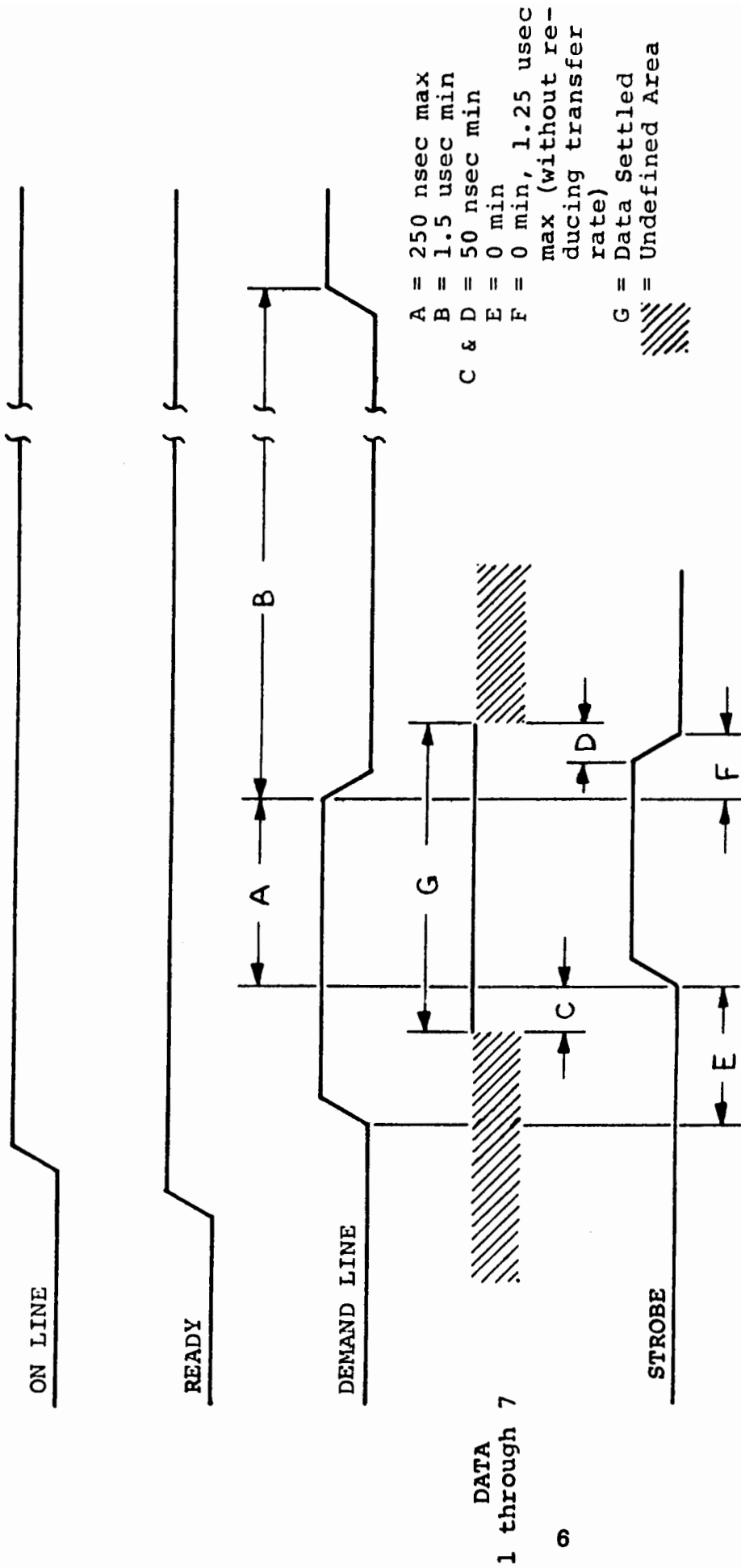
2.1.2.5 VFU Channel 9

This signal indicates when the current print line is the same as the pre-programmed position on the vertical format control tape's channel 9.

2.1.2.6 VFU Channel 12

This signal indicates when the current print line is the same as the pre-programmed position on the vertical format control tape's channel 12.





Note: If STOP is depressed after one or more data characters have been loaded into the printer's buffer, the printer will not go "OFF LINE" until a PAPERFEED instruction or a Master Clear is transmitted. The printer will complete the operation and drop the ON LINE signal.

Figure 1. Timing Diagram at Printer Interface Connector

TABLE 1. 64- and 96-Character Set and ASCII Codes

b7 b6 b5	0 0 0	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1	
BIT 4 3 2 1								
0 0 0 0		space	0	@	P		R	
0 0 0 1		!	1	A	Q	a	q	
0 0 1 0		"	2	B	R	b	r	
0 0 1 1		#	3	C	S	c	s	
0 1 0 0		\$	4	D	T	d	t	
0 1 0 1		%	5	E	U	e	u	
0 1 1 0		&	6	F	V	f	v	
0 1 1 1		'	7	G	W	g	w	
1 0 0 0		(	8	H	X	h	x
1 0 0 1		)	9	I	Y	i	y
1 0 1 0	PF	*	:	J	Z	j	z	
1 0 1 1		+	;	K	[	k	{
1 1 0 0	FF	,	<	L	\	l	|	
1 1 0 1	CR	-	=	M	]	m	}
1 1 1 0		.	>	N	^	n	~	
1 1 1 1		/	?	O	_	o	space	
	|	⇐64 character set⇒				|		
	|	⇐96 character set⇒					|	

PAPER INSTRUCTION	DATA LINES												SELECTED TAPE CHANNEL	
	7	6	5	4	3	2	1						12 CHANNEL	
1	X	X	0	0	0	0	0						1	
1	X	X	0	0	0	0	1						2	
1	X	X	0	0	0	1	0						3	
1	X	X	0	0	0	1	1						4	
1	X	X	0	0	1	0	0						5	
1	X	X	0	0	1	0	1						6	
1	X	X	0	0	1	1	0						7	
1	X	X	0	0	1	1	1						8	
1	X	X	1	0	0	0	0						9	
1	X	X	1	0	0	0	1						10	
1	X	X	1	0	1	0	0						11	
1	X	X	1	0	1	0	1						12	

"X" UNDEFINED

Table 2. Vertical Format Instruction When Paper Tape Reader Is Used To Control Duration Of Slew

PAPER INSTRUCTION	NUMBER OF LINES SLEWED						
	7	6	5	4	3	2	1
1	0	X	X	0	0	0	0
1	0	X	X	0	0	0	1
1	0	X	X	0	0	1	0
1	0	X	X	0	0	1	1
1	0	X	X	0	1	0	0
1	0	X	X	0	1	0	1
1	0	X	X	0	1	1	0
1	0	X	X	0	1	1	1
1	0	X	X	1	0	0	0
1	0	X	X	1	0	0	1
1	0	X	X	1	0	1	0
1	0	X	X	1	0	1	1
1	0	X	X	1	1	0	0
1	0	X	X	1	1	0	1
1	0	X	X	1	1	1	0
1	0	X	X	1	1	1	1

"X" - Undefined

Table 3. Vertical Format Instruction When Data Code Is Used To Control Duration Of Slew

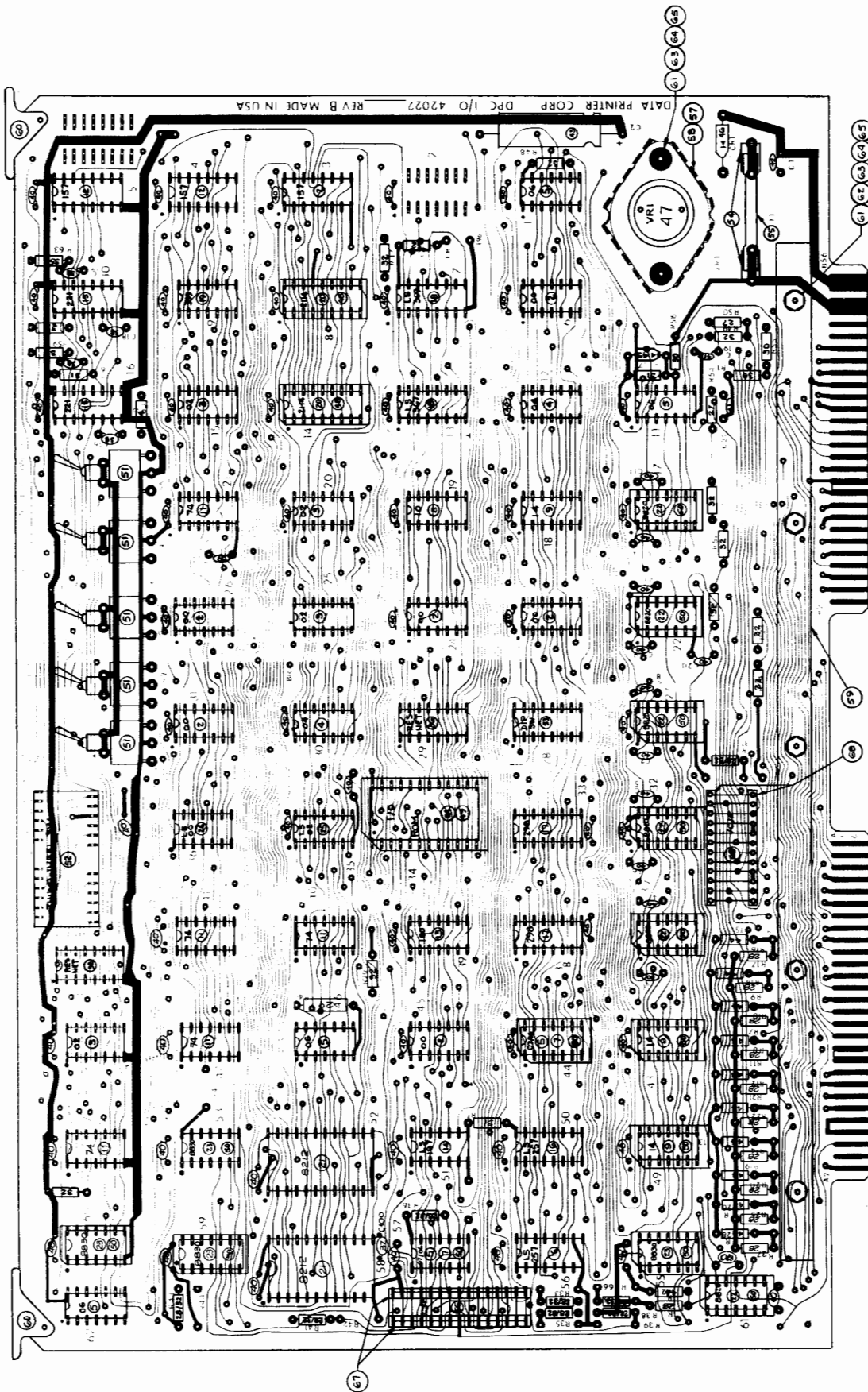


Figure 2. DPC I/O Assembly

Figure and Index No.	DPC/MFR Part Number	Description	Qty	Use
2 -	D42022G3	DPC I/O Assembly		
- 1	D42023	P.C. Board Blank	1	
- 2	A20300-001	Integrated Circuit 7400	6	
- 3	A20301-001	Integrated Circuit 7402	4	
- 4	A20302-001	Integrated Circuit 7404	2	
- 5	A20303-001	Integrated Circuit 7406	3	
- 7	A20325-001	Integrated Circuit 7407	2	
- 8	A20305-001	Integrated Circuit 7410	1	
- 9	A20306-001	Integrated Circuit 7414	1	
- 11	A20310-001	Integrated Circuit 7474	5	
- 12	A20343-001	Integrated Circuit 74157	3	
- 13	A20331-001	Integrated Circuit 74180	1	
- 14	A20348-001	Integrated Circuit 74LS197	1	
- 15	A20351-001	Integrated Circuit 74221	2	
- 16	A20376-001	Integrated Circuit 74LS257	2	
- 17	A20338-001	Integrated Circuit 74298	2	
- 18	A20364-001	Integrated Circuit 74LS367N	2	
- 19	A20344-001	Integrated Circuit 74393	1	
- 20	A20387-001	Integrated Circuit 2114	2	
- 21	A20342-001	Integrated Circuit 74S412N or 8212	2	
- 22	A20350-001	Integrated Circuit 8820	6	
- 23	A20349-001	Integrated Circuit 8830	4	
- 24	A20346-001	ROM D3624-4A	1	
- 25	A20366-001	Integrated Circuit 74LS02	1	
- 26	A20635-001	Integrated Circuit 74LS00	1	
- 27	A20004-024	Resistor, 100 ohm, 1/4W, 5%	2	
- 29	A20006-009	Resistor, 300 ohm, 1/2W, 5%	1	
- 30	A20004-025	Resistor, 470 ohm, 1/4W, 5%	3	
- 31	A20004-002	Resistor, 1K, 1/4W, 5%	2	
- 32	A20004-004	Resistor, 1.8K, 1/4W, 5%	10	
- 33	A20004-007	Resistor, 3.3K, 1/4W, 5%	3	
- 34	A20004-011	Resistor, 6.8K, 1/4W, 5%	1	
- 35	A20004-016	Resistor, 20K, 1/4W, 5%	1	
- 36	A20680-001	Resistor Network, 3.9K, 4116R002392	2	

Figure and Index No.	DPC/MFR Part Number	Description	Qty	Use
2 -	D42022G3			
- 37	A20102-008	Capacitor, 500 pf/1KV	1	
- 38	A20102-001	Capacitor, 100 pf	4	
- 39	A20101-001	Capacitor, .0047, 25V	1	
- 40	A20100-001	Capacitor, .01, 10-12V	69	
- 41	A20100-004	Capacitor, .1, 12V	2	
- 42	A20102-010	Capacitor, .33	1	
- 43	A20126-010	Capacitor, 330, 12V	1	
- 45	A20203-003	Diode 1N4732A	1	
- 46	A20206-001	Diode 1N5340B	1	
- 47	A20688	Voltage Regulator, LAS 1405	1	
- 48	A20689-004	Socket, Pin Dip 18	2	
- 49	A20689-003	Socket, Pin Dip 24	1	
- 50	A20689-006	Socket, Pin Dip 14	14	
- 51	A20804	Switch, Toggle	5	
- 52	A20675	Thumbwheel Switch	1	
- 53	A20803	Dip Switch (Low Profile) PIP8-L8	1	
- 54	A20805	Fuse Block (2 pieces)	2	
- 55	A20701-004	Fuse 3A, AGC-3	1	
- 57	A20692	Chotherm Insulator	1	
- 58	A20809-001	Heatsink 5013B	1	
- 59	B40521	Board Stiffener	1	
- 60	A20812	Card Ejector	2	
- 61		Screw, 4-40 x 3/8	7	
- 62		Washer, Fiber	5	
- 63		Washer, Plain, No. 4	7	
- 64		Washer, Splitlock, No. 4	7	
- 65		Nut, Hex No. 404, 4-40	7	
- 67		Jumper Socket, 15 ckt	2	
- 68		Jumper Socket, 12 ckt	2	

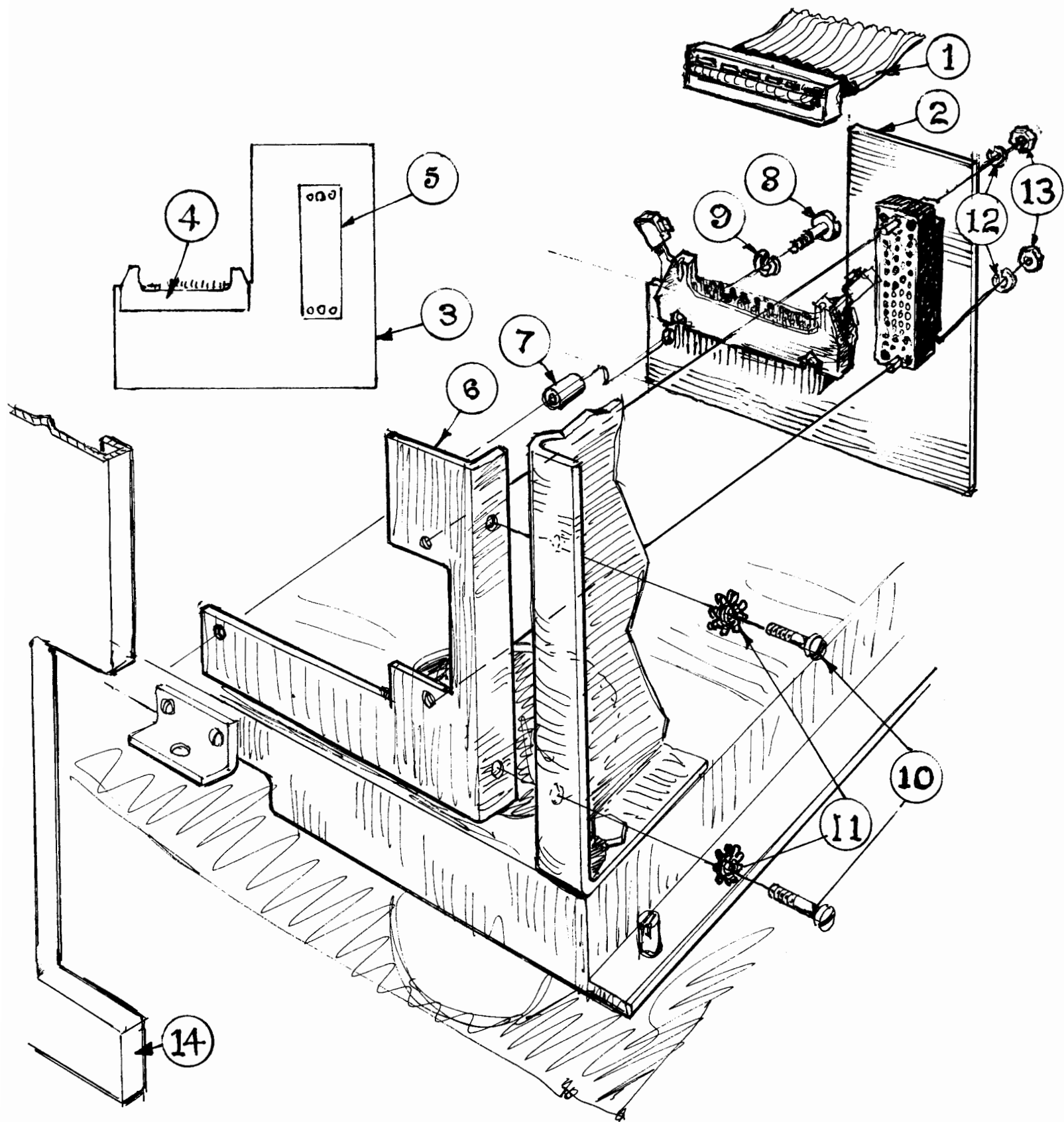


Figure 3. H-P/DPC I/O Cable Assembly

Figure and Index No.	DPC/MFR Part Number	Description	Qty	Use
3 -	B42352G1	H-P DPC I/O Cable Assembly		
- 1	C42350G1	I/O Cable Subassembly	1	
- 2	C42056G1	H-P Transition Board Assembly	1	
- 3	C42057	Printed Circuit Blank	1	
- 4	A20937-001	Right-Angle Socket Header	1	
- 5	A20939-001	Connector	1	
- 6	C42351	Mounting Bracket, I/O Connector	1	
- 7	A20941-001	Spacer	1	
- 8		Pan Hd. Screw, 6-32 x 5/8	1	
- 9		Split Lockwasher, No. 6	1	
- 10		Pan Hd. Screw, 10-32 x 3/8	2	
- 11		Lockwasher, External Tooth, No. 10	2	
- 12		Lockwasher, Split, No. 4	2	
- 13		Nut, Hex Plain 4-40	2	
- 14	D48019	Panel, Rear, Lower	1	

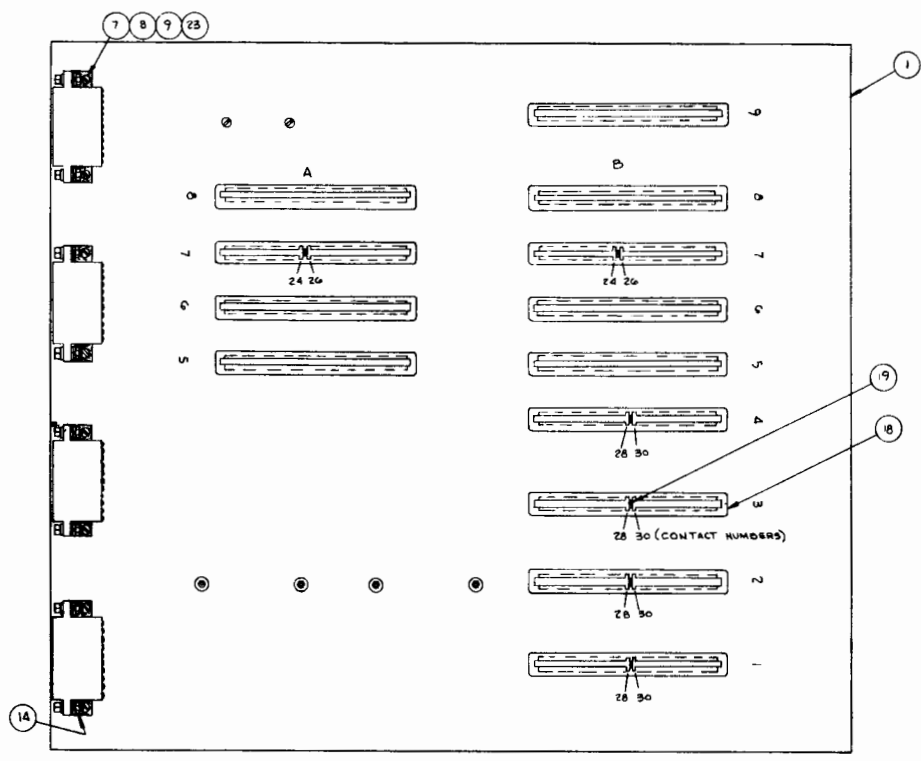
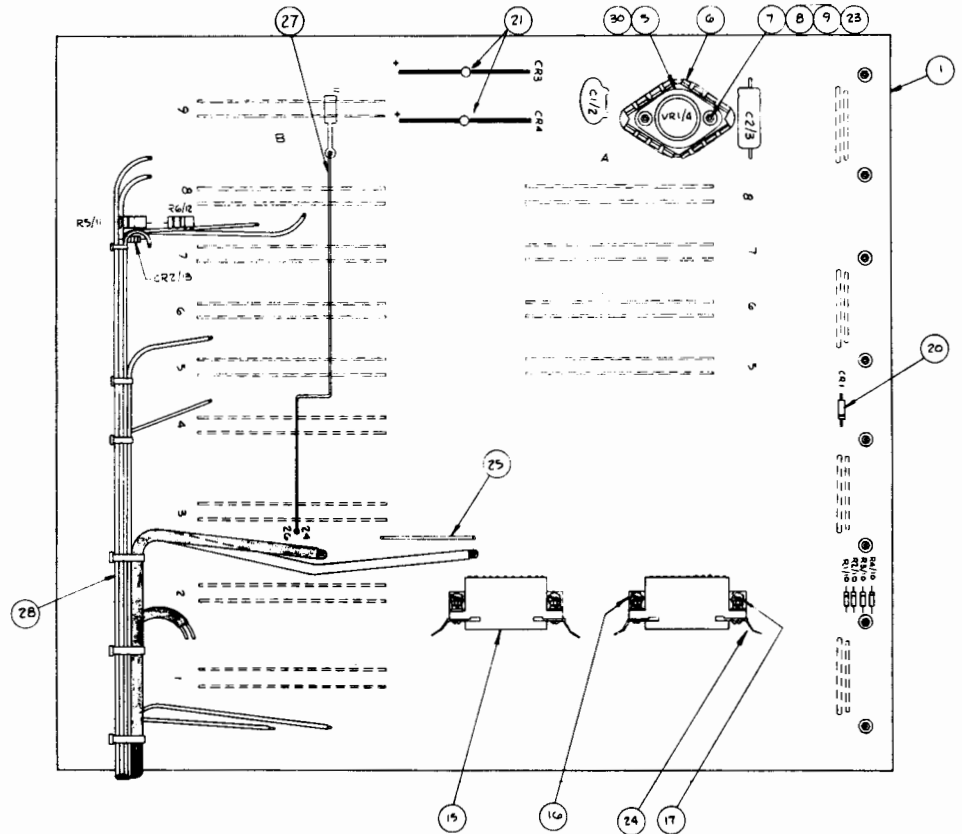
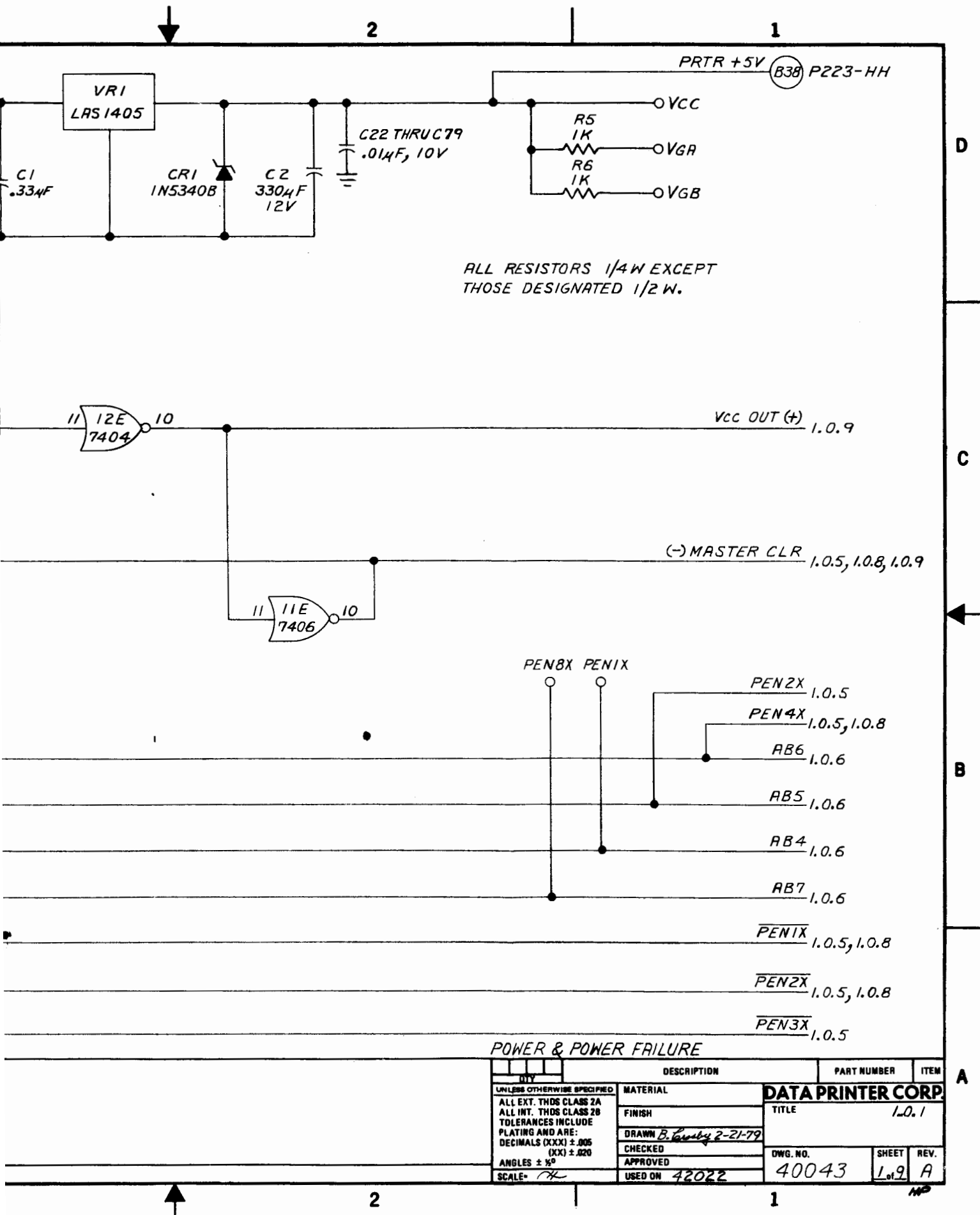


Figure 4. H-P Mother Board Assembly

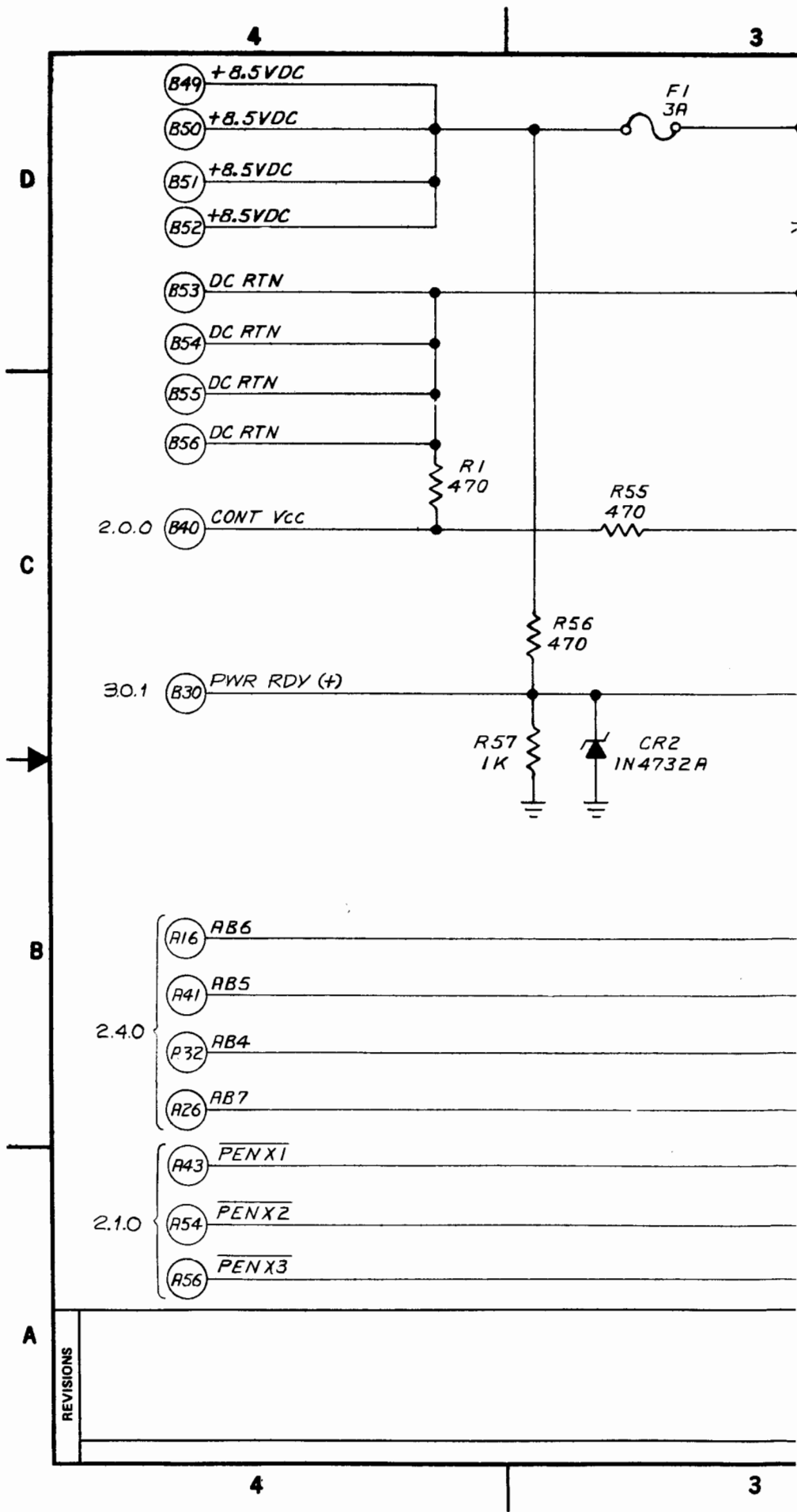
Figure and Index No.	DPC/MFR Part Number	Description	Qty	Use
4 -	C42054G1	H-P Mother Board Assembly		
- 1	R42055	P.C. Blank	1	
- 2	A20102-010	Capacitor, .33/12V	1	
- 3	A20126-009	Capacitor, 300/12V	1	
- 4	A20670	Voltage Regulator	1	
- 5	A20817-001	Heatsink Compound	A/R	
- 6	A20809-001	Heatsink	1	
- 7		Nut, Hex No. 4	14	
- 8		Washer, Splitlock No. 4	14	
- 9		Screw, Pan HD., 4-40 x 3/8	14	
- 10	A20004-032	Resistor, 200 Ω , 1/4 W, 5%	4	
- 11	A20007-003	Resistor, 1K, 1W, 5%	1	
- 12	A20006-006	Resistor, 1K, 1/2W, 5%	1	
- 13	A20205-001	Diode IN4752	1	
- 14	A20507	Screwlock Assembly	8	
- 15	A20517	Connector	6	
- 16	A20802	Standoff, 3/16 x 1/8 IO	4	
- 17		Screw, Pan Hd., 4-40 x 9/16	4	
- 18	A20909-001	Connector	13	
- 19	A20910-001	Keying Plug	6	
- 20	A20200-010	Diode, IN4728	1	
- 21	A20207-001	Diode, IN5059	2	
- 23		Washer, Plain No. 4	14	
- 24	A20855-001	Locking Assembly	2 PR.	
- 25		Wire, No. 18 STR, WHT Teflon INS, 2-1/2" LG	1	
- 27		Wire, No. 14 Black STD, 8" LG	1	
- 28	D42312	Mother Board Cable	1	
- 30	A20692	Chootherm Insulator	1	

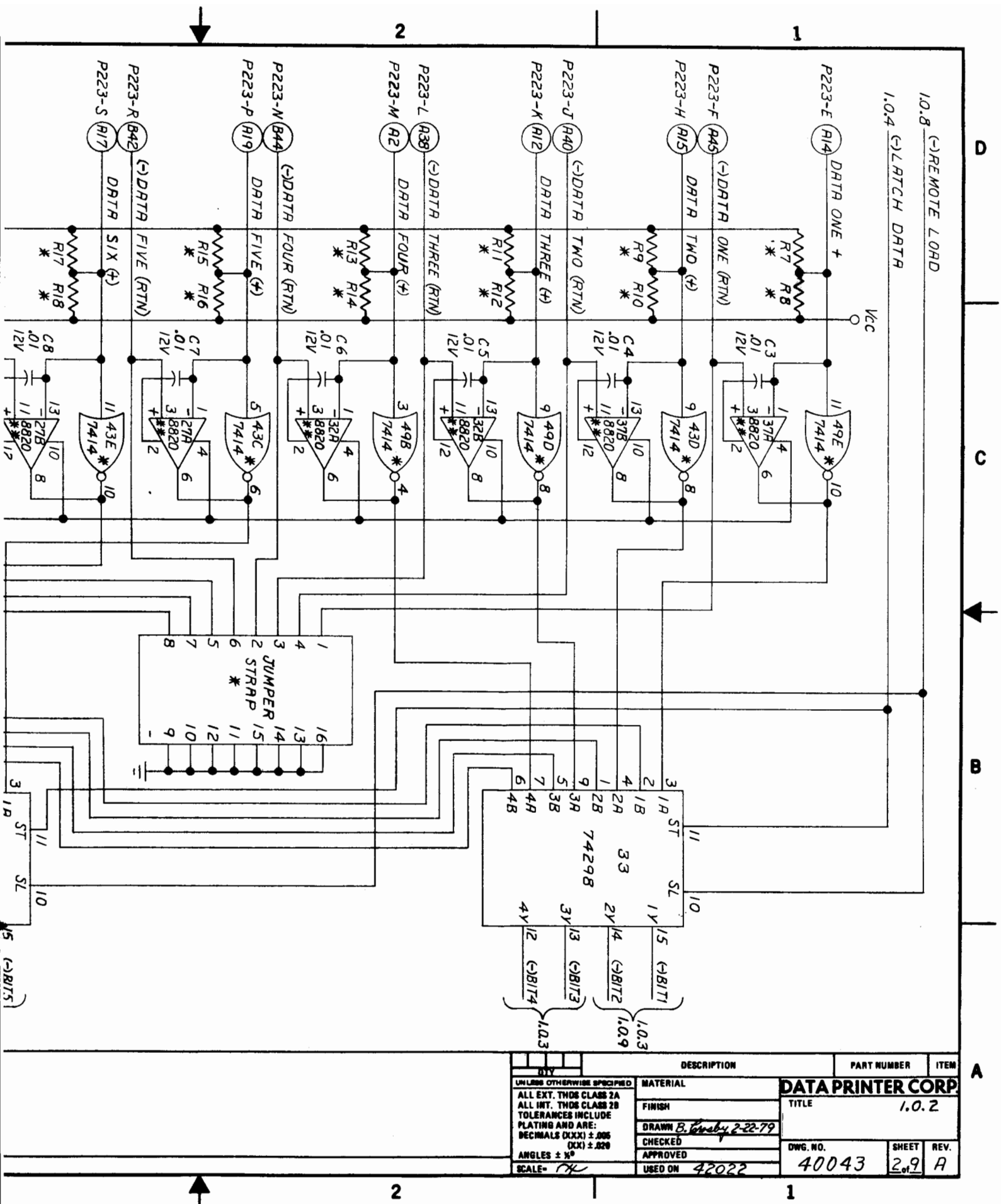


POWER & POWER FAILURE

QTY	DESCRIPTION	PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED:		DATA PRINTER CORP.	
ALL EXT. THOS CLASS 2A	MATERIAL	TITLE	1.0.1
ALL INT. THOS CLASS 2B	FINISH		
TOLERANCES INCLUDE	DRAWN <i>B. Luby 2-21-79</i>		
PLATING AND ARE:	CHECKED	DWG. NO.	SHEET
DECIMALS (XXX) ± .005	APPROVED	40043	1 of 9
(XX) ± .020	USED ON	42022	REV. A
ANGLES ± ½°			
SCALE= <i>1/8"</i>			

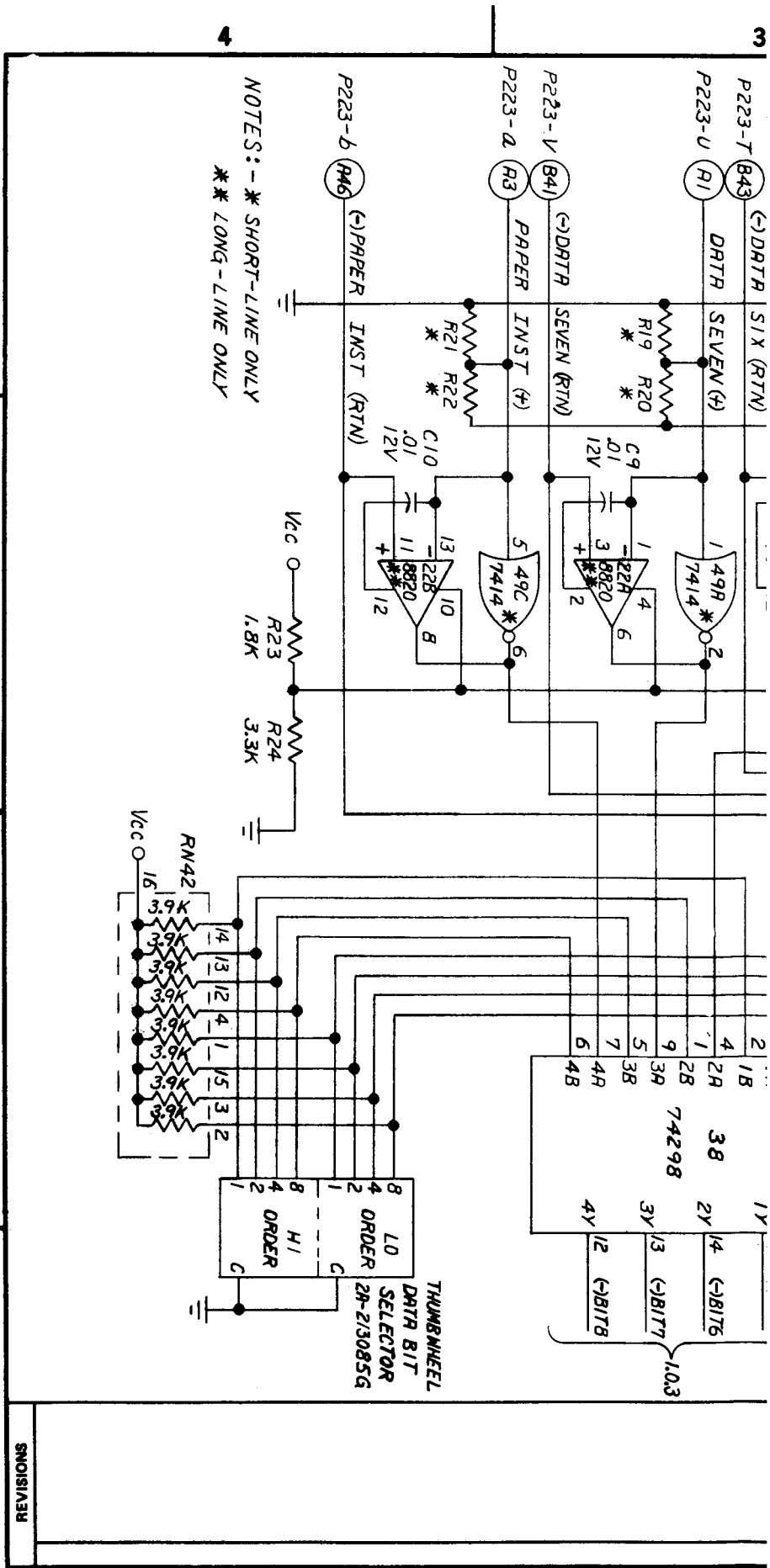
Figure 1.0.1 Hewlett-Packard I/O (Sheet 1 of 9)





DESCRIPTION		PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED		DATA PRINTER CORP.	
MATERIAL		TITLE	
FINISH		1.0.2	
DRAWN <i>B. Gandy</i> 2-22-79		DWG. NO.	SHEET
CHECKED		40043	2.9
APPROVED		REV.	A
USED ON 42022			

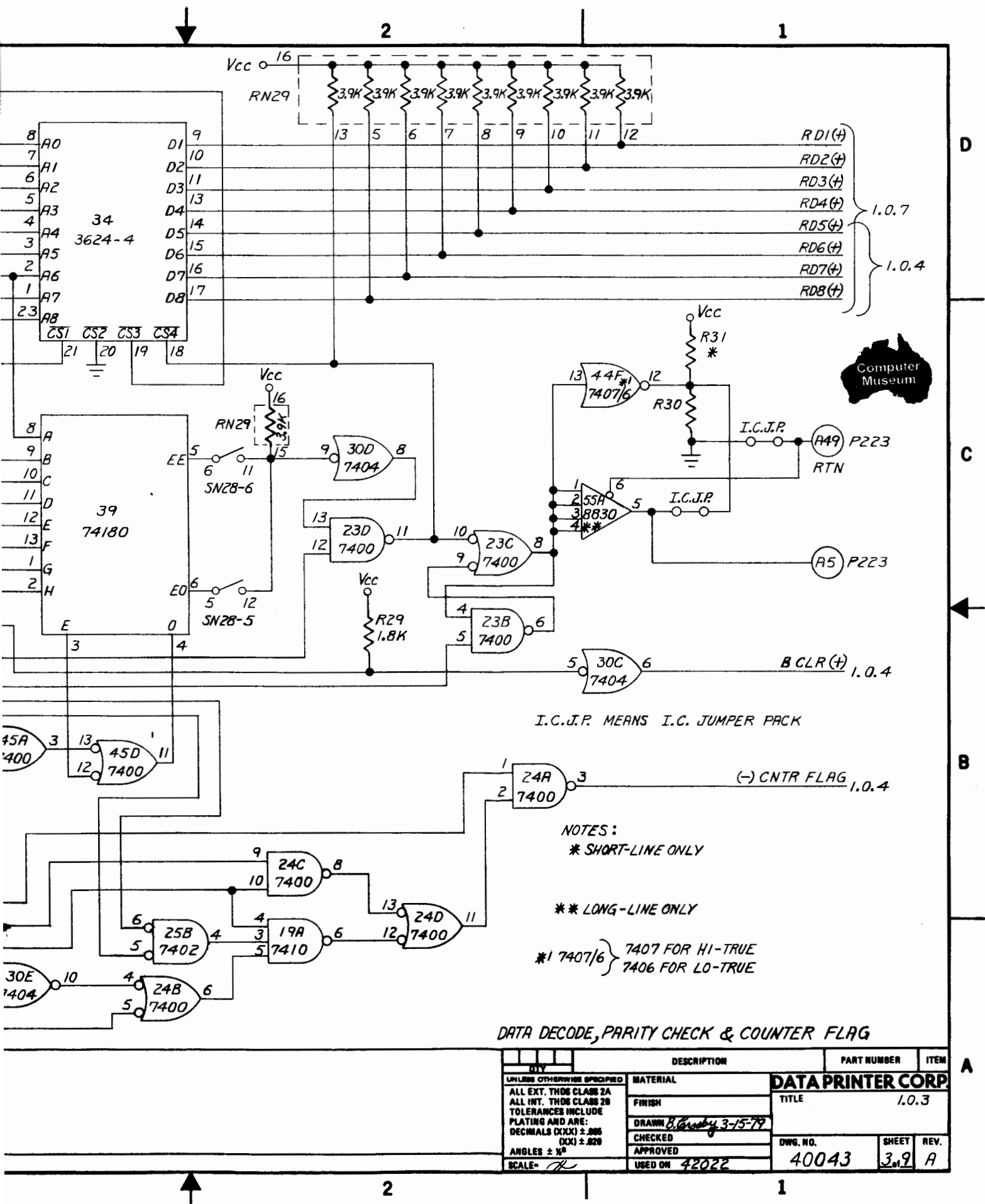
Figure 1.0.2 Hewlett-Packard I/O (Sheet 2 of 9)



NOTES: - * SHORT-LINE ONLY
 ** LONG-LINE ONLY

3 4 3 2 1 4 3

REVISIONS



I.C.J.P. MEANS I.C. JUMPER PACK

NOTES:
* SHORT-LINE ONLY

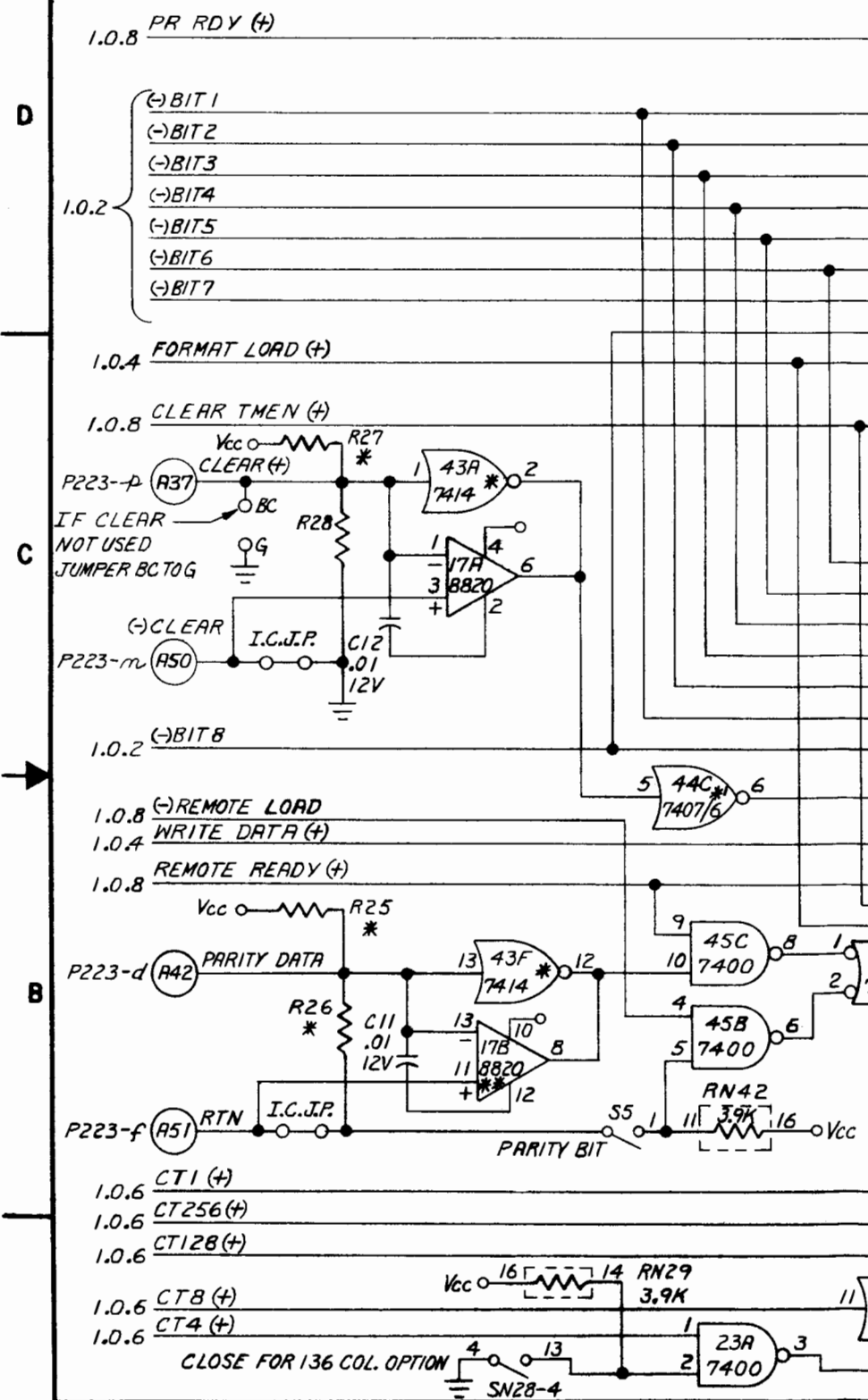
** LONG-LINE ONLY

*1 7407/6 } 7407 FOR HI-TRUE
7406 FOR LO-TRUE

DATA DECODE, PARITY CHECK & COUNTER FLAG

QTY	DESCRIPTION	PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED:		DATA PRINTER CORP.	
ALL EXT. THOS CLASS 2A			
ALL INT. THOS CLASS 2B		TITLE	1.0.3
TOLERANCES INCLUDE		DRAWN <i>B. Gandy</i> 3-15-79	
PLATING AND ARE:		CHECKED	
DECIMALS (XX) ± .005		APPROVED	
(XX) ± .020		USED ON 42022	
ANGLES ± 1°		DWG. NO.	40043
SCALE= <i>1/8"</i>		SHEET	3 of 9
		REV.	A

Figure 1.0.3 Hewlett-Packard I/O (Sheet 3 of 9)



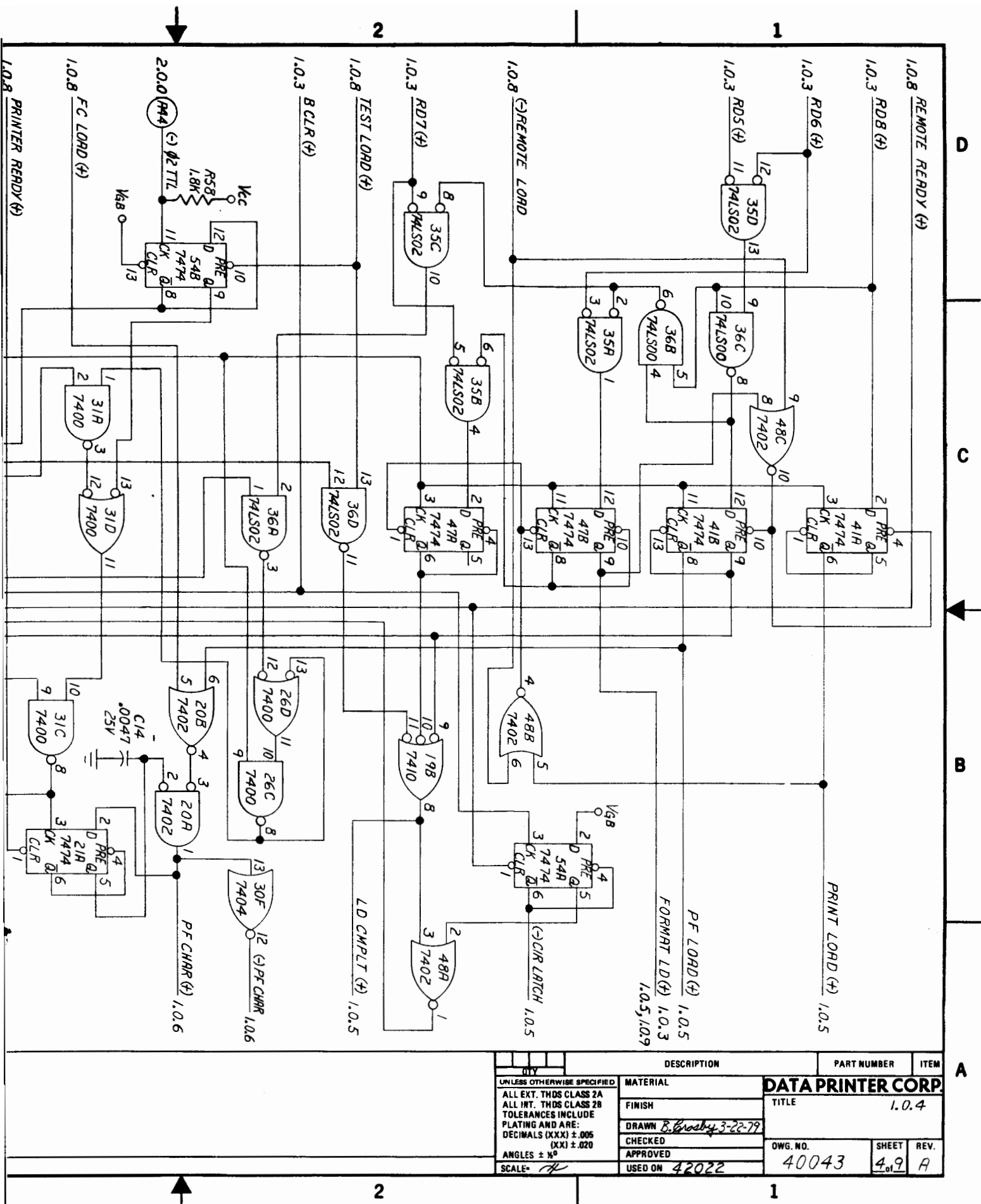
D

C

B

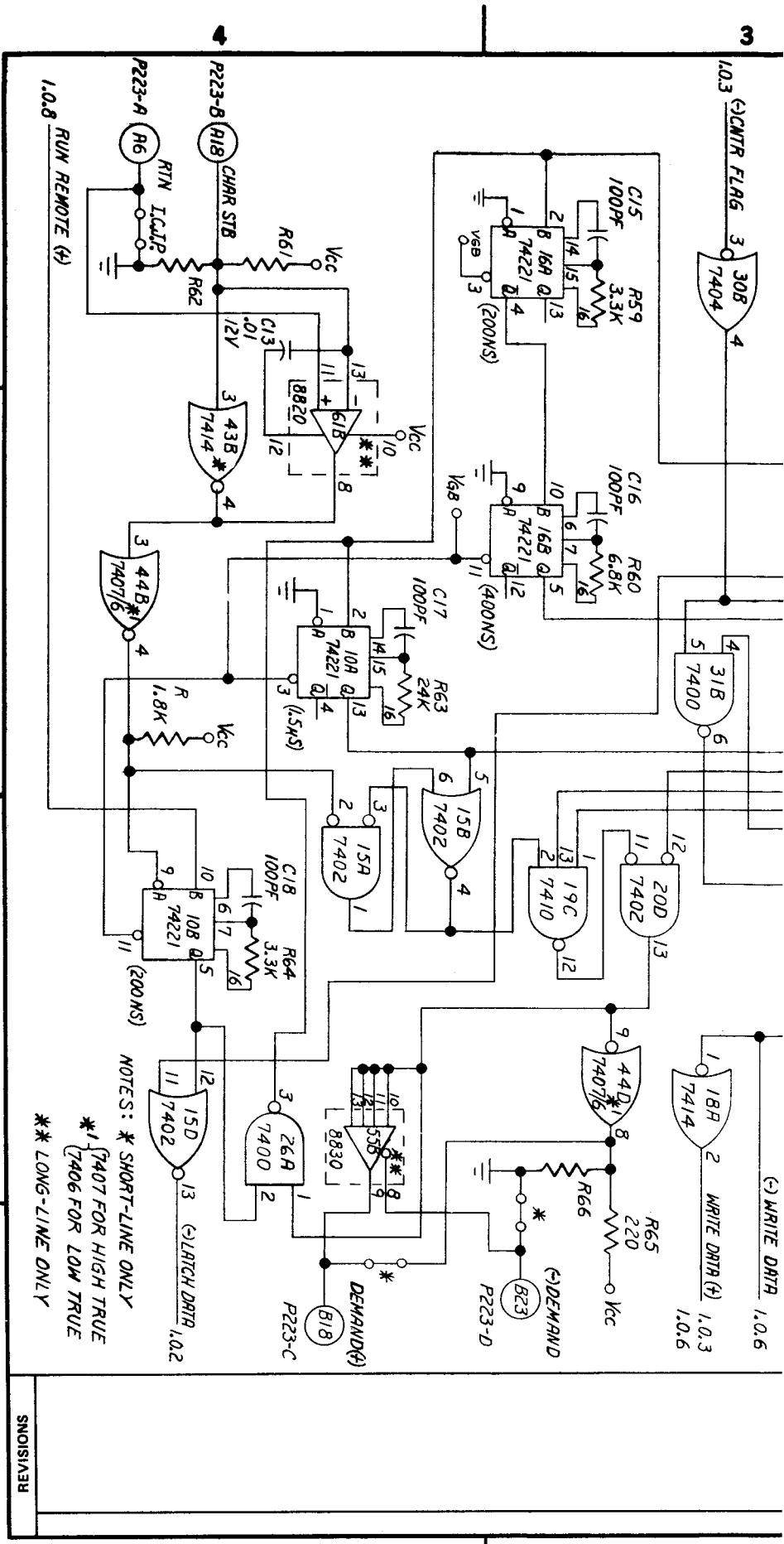
A

REVISIONS



DESCRIPTION		PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED		DATA PRINTER CORP.	
MATERIAL			
ALL EXT. THDS CLASS 2A ALL INT. THDS CLASS 2B TOLERANCES INCLUDE PLATING AND ARE: DECIMALS (XXX) ± .005 (XX) ± .020		TITLE 1.0.4	
DRAWN <i>B. Crosby 3-22-79</i>		OWG. NO. 40043	
CHECKED		SHEET 4 of 9	
APPROVED		REV. A	
USED ON 42022			

Figure 1.0.4 Hewlett-Packard I/O (Sheet 4 of 9)

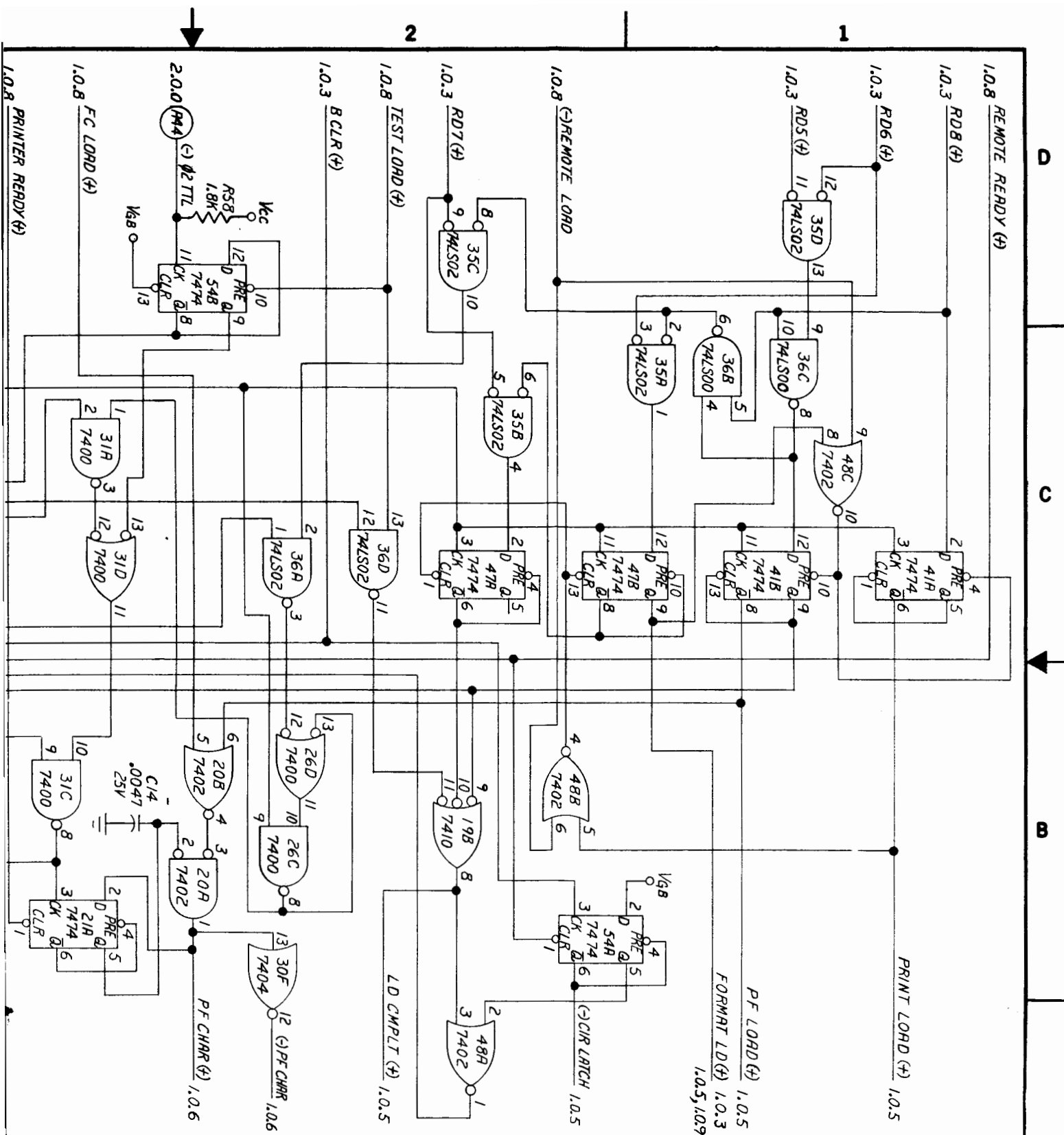


NOTES: * SHORT-LINE ONLY
 *1 [7407 FOR HIGH TRUE
 [7406 FOR LOW TRUE
 ** LONG-LINE ONLY

REVISIONS

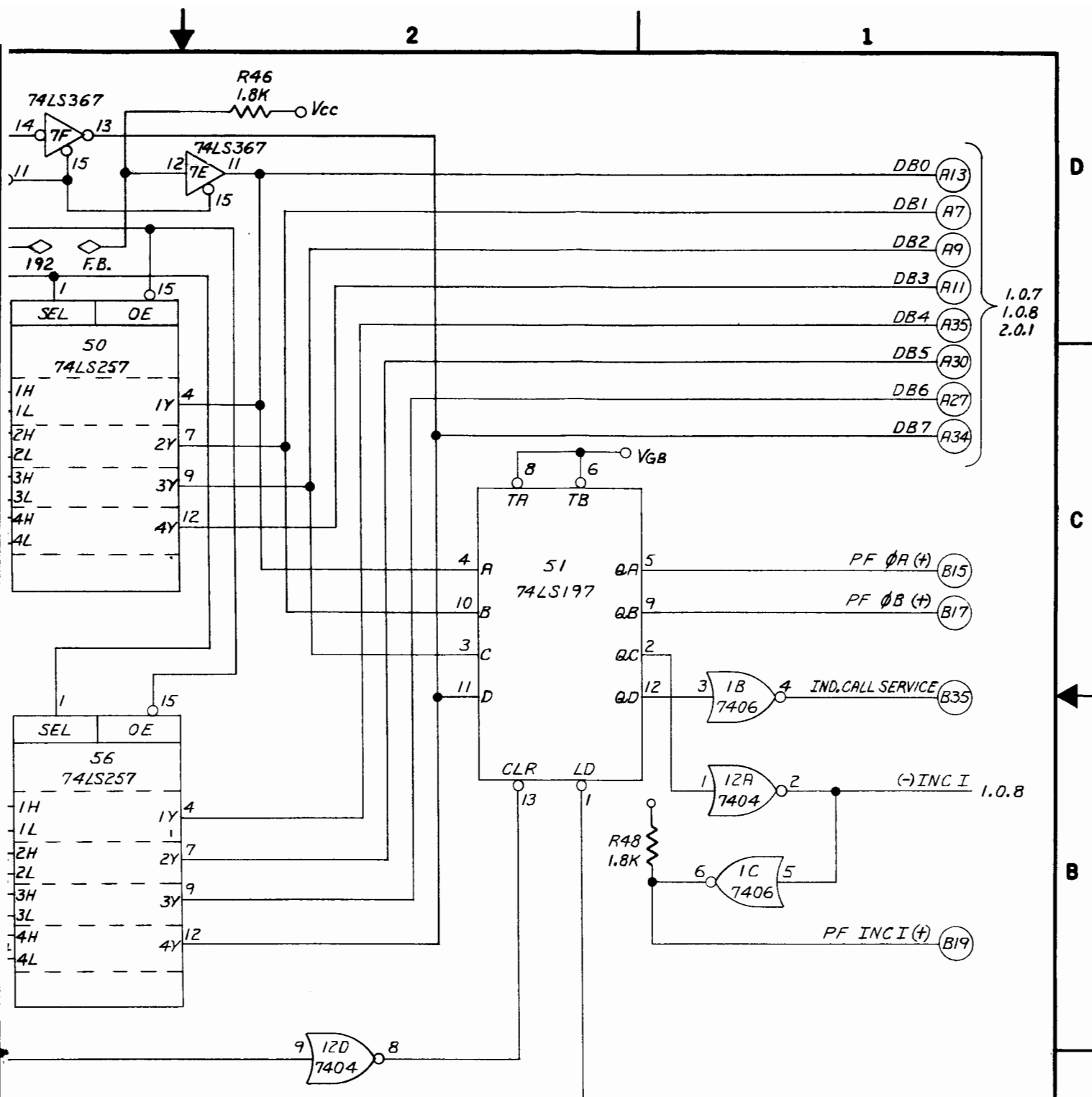
10.3 (C) CNTN FLAG 3 7404 4
 1.0.6 (C) WRITE DATA 1.0.6
 1.0.3 WRITE DATA (C) 1.0.3
 1.0.2 LATCH DATA (C) 1.0.2
 1.0.8 RUN REMOTE (C) 1.0.8

3 3 4 4



DESCRIPTION		PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED		DATA PRINTER CORP	
ALL EXT. THDS CLASS 2A		TITLE 1.0.4	
ALL INT. THDS CLASS 2B		DRAWN <i>B. Brody</i> 3-22-79	
TOLERANCES INCLUDE		CHECKED	
PLATING AND ARE:		APPROVED	
DECIMALS (XXX) ± .005		USED ON 42022	
(XX) ± .020		DWG. NO. 40043	SHEET 4 of 9
ANGLES ± 1/2°		REV. A	
SCALE= <i>H</i>			

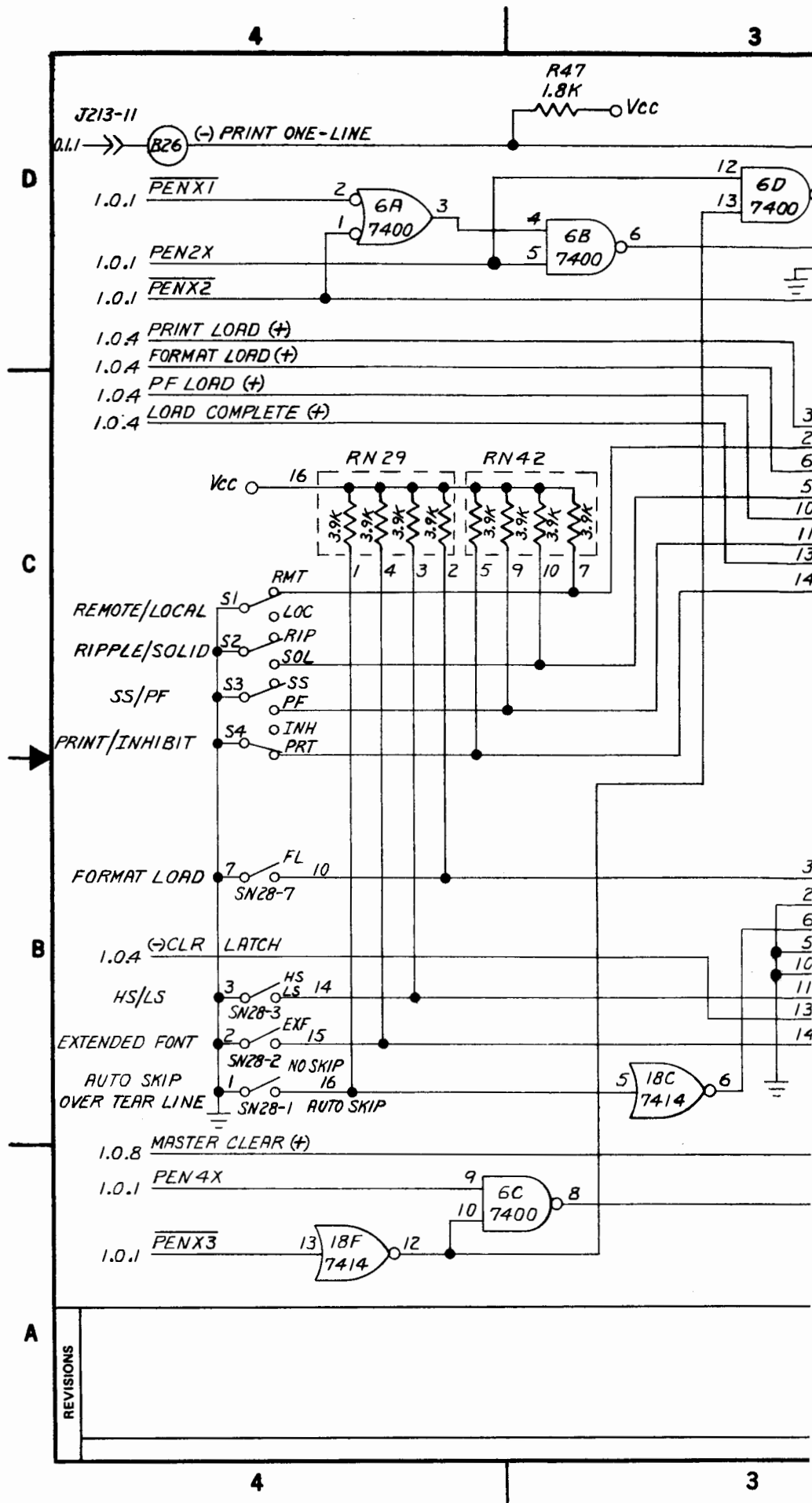
Figure 1.0.4 Hewlett-Packard I/O (Sheet 4 of 9)

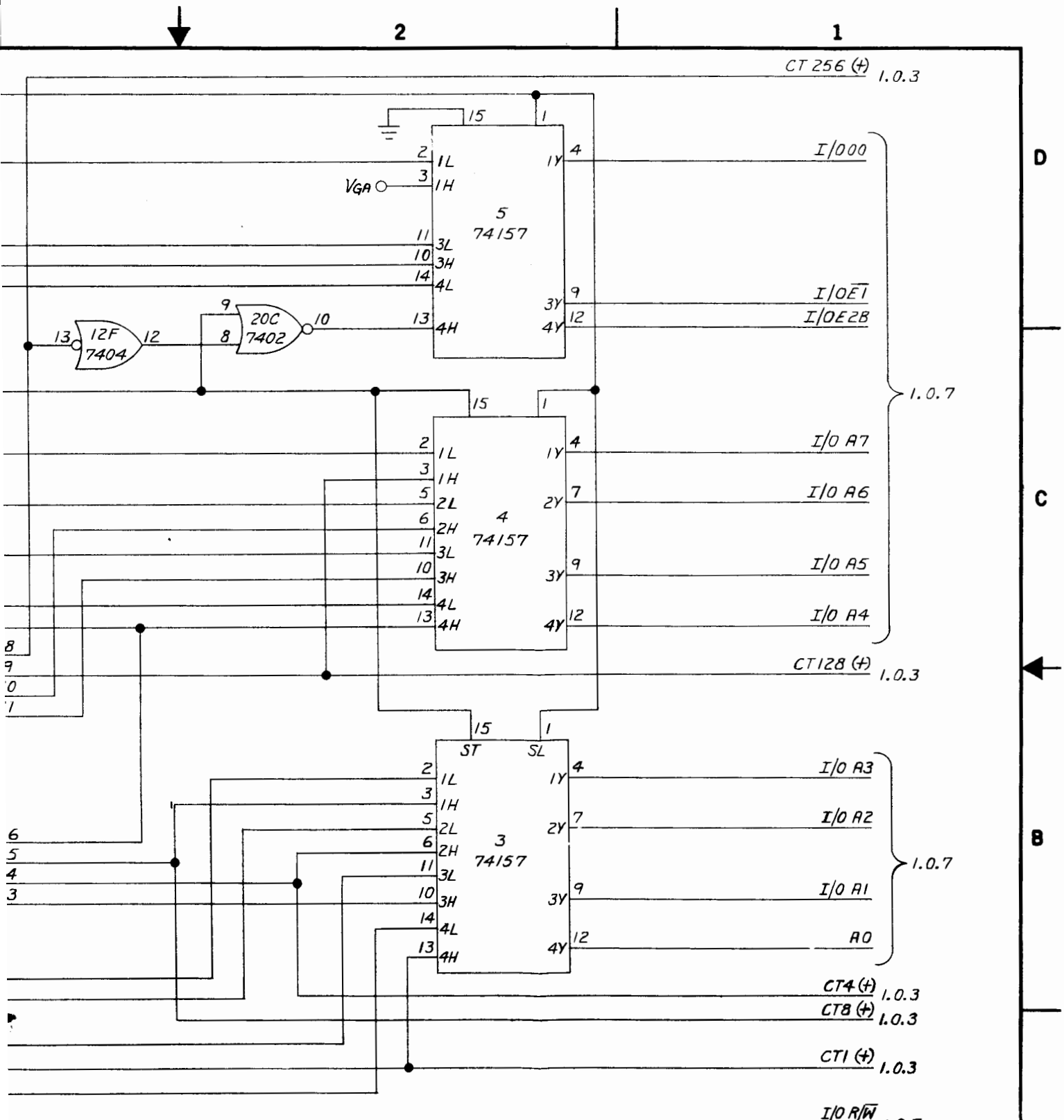


CONTROL SWITCH & I/O PORTS 1.0.5

DESCRIPTION		PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED:		DATA PRINTER CORP	
MATERIAL		TITLE	
FINISH		1.0.5	
DRAWN <i>B. Brody</i> 3-16-79		DWG. NO.	SHEET
CHECKED		40043	5 of 9
APPROVED			REV. A
SCALE = <i>7/8</i>		USED ON	42022

Figure 1.0.5 Hewlett-Packard I/O (Sheet 5 of 9)





CT 256 (+) 1.0.3

I/O 00

I/O E1
I/O E2B

I/O A7

I/O A6

I/O A5

I/O A4

CT 128 (+) 1.0.3

I/O A3

I/O A2

I/O A1

A0

CT 4 (+) 1.0.3

CT 8 (+) 1.0.3

CT 1 (+) 1.0.3

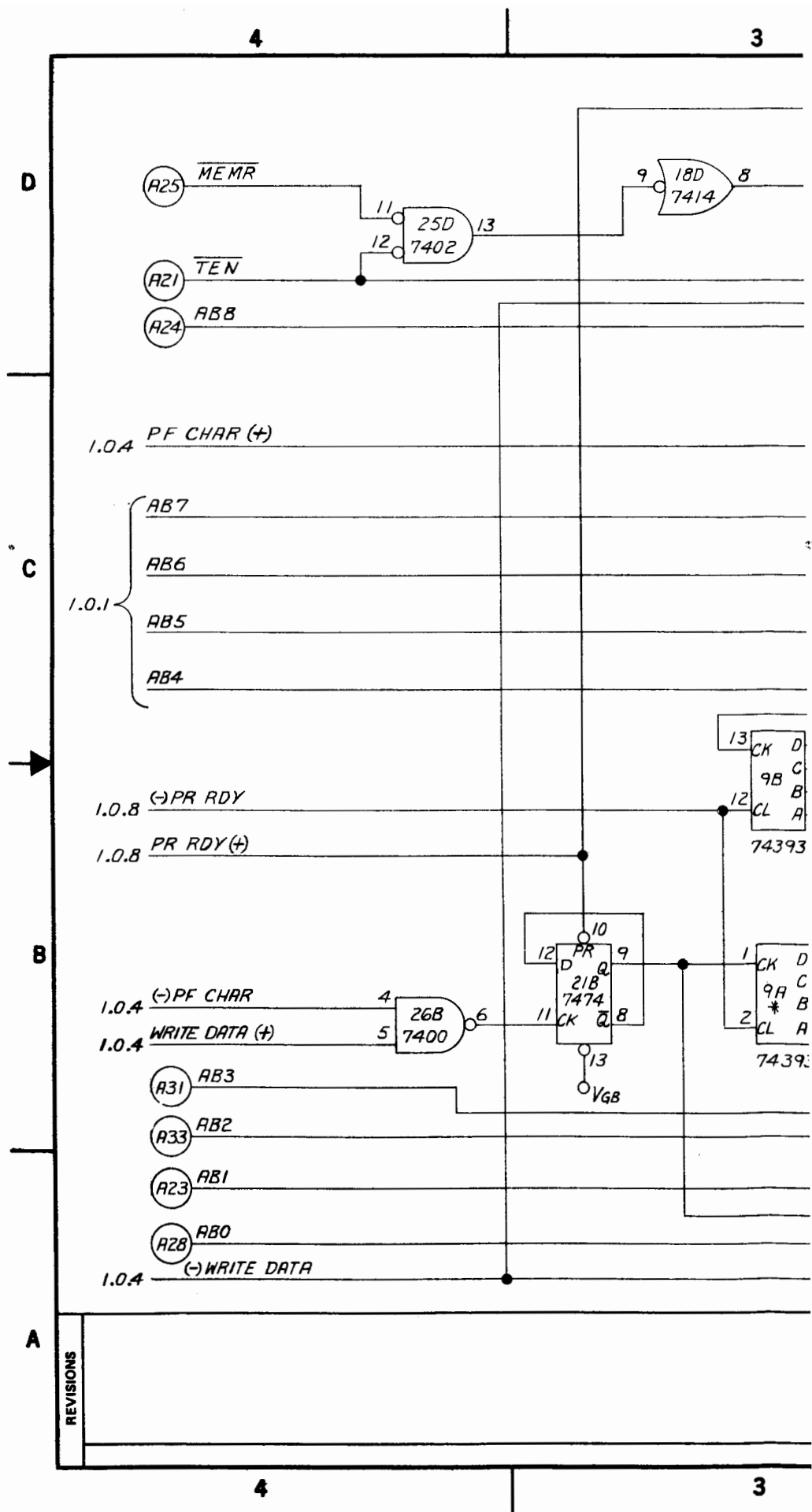
I/O R/W 1.0.7

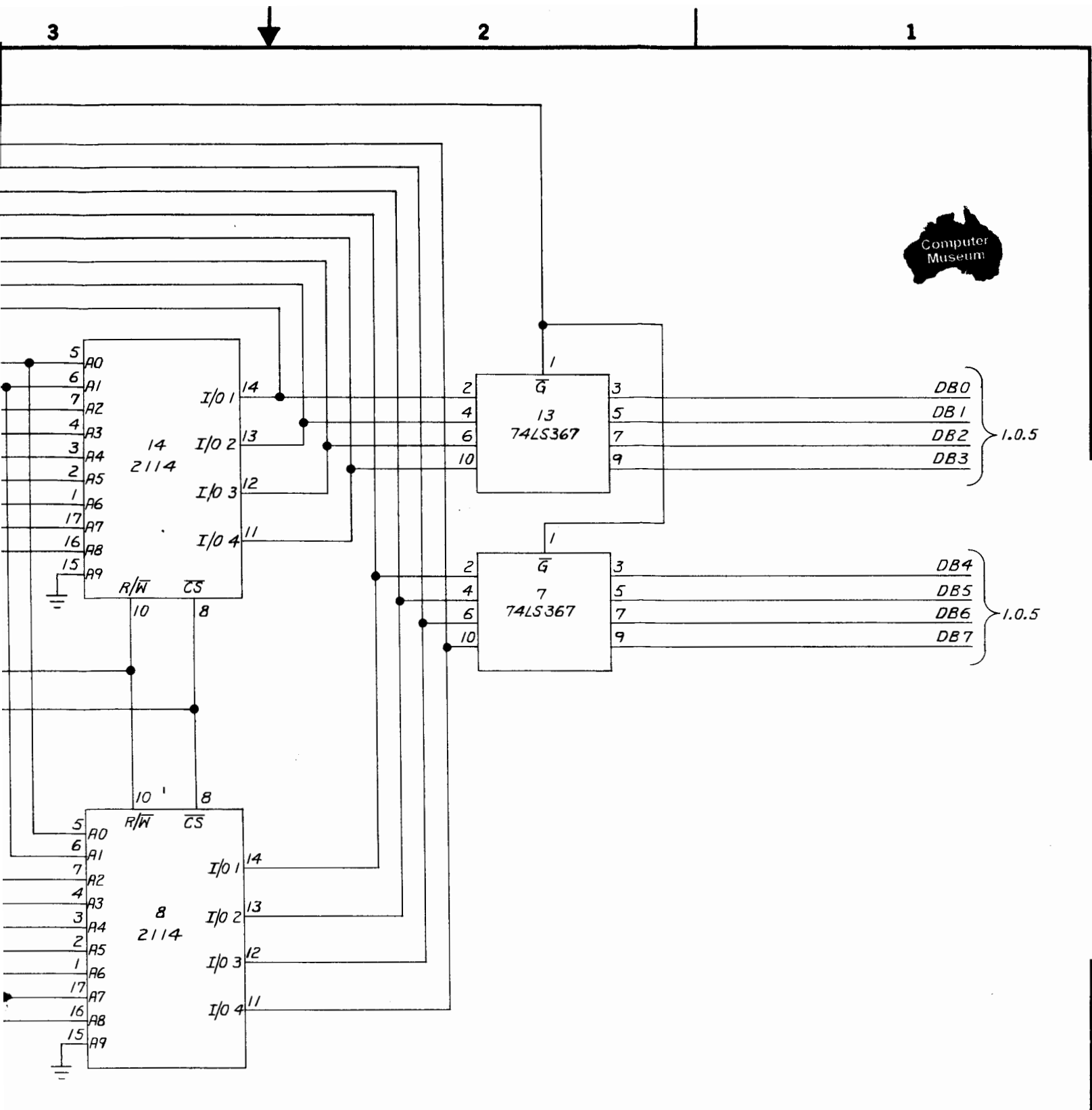
I/O MEMORY ADDRESS DEMULTIPLEXER 1.0.6

* NOTE POSITION 2A ON REV. Ø PCB

DESCRIPTION		PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED		DATA PRINTER CORP	
MATERIAL		TITLE 1.0.6	
FINISH		DRAWN <i>B. L...</i> 3-19-79	
CHECKED		DWG. NO.	SHEET REV.
APPROVED		40043	6 of 9 A
SCALE <i>1X</i>		USED ON 42022	

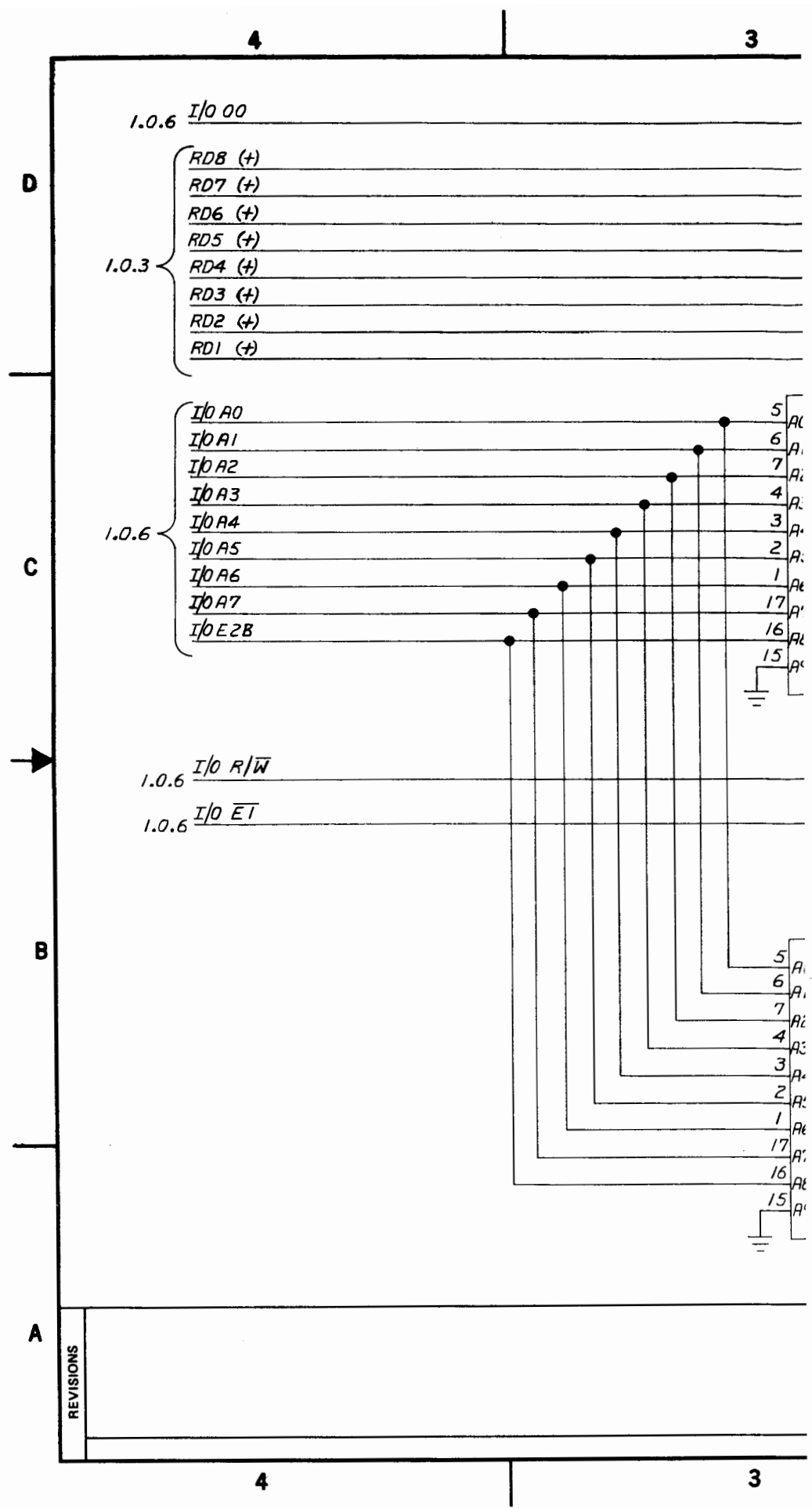
Figure 1.0.6 Hewlett-Packard I/O (Sheet 6 of 9)

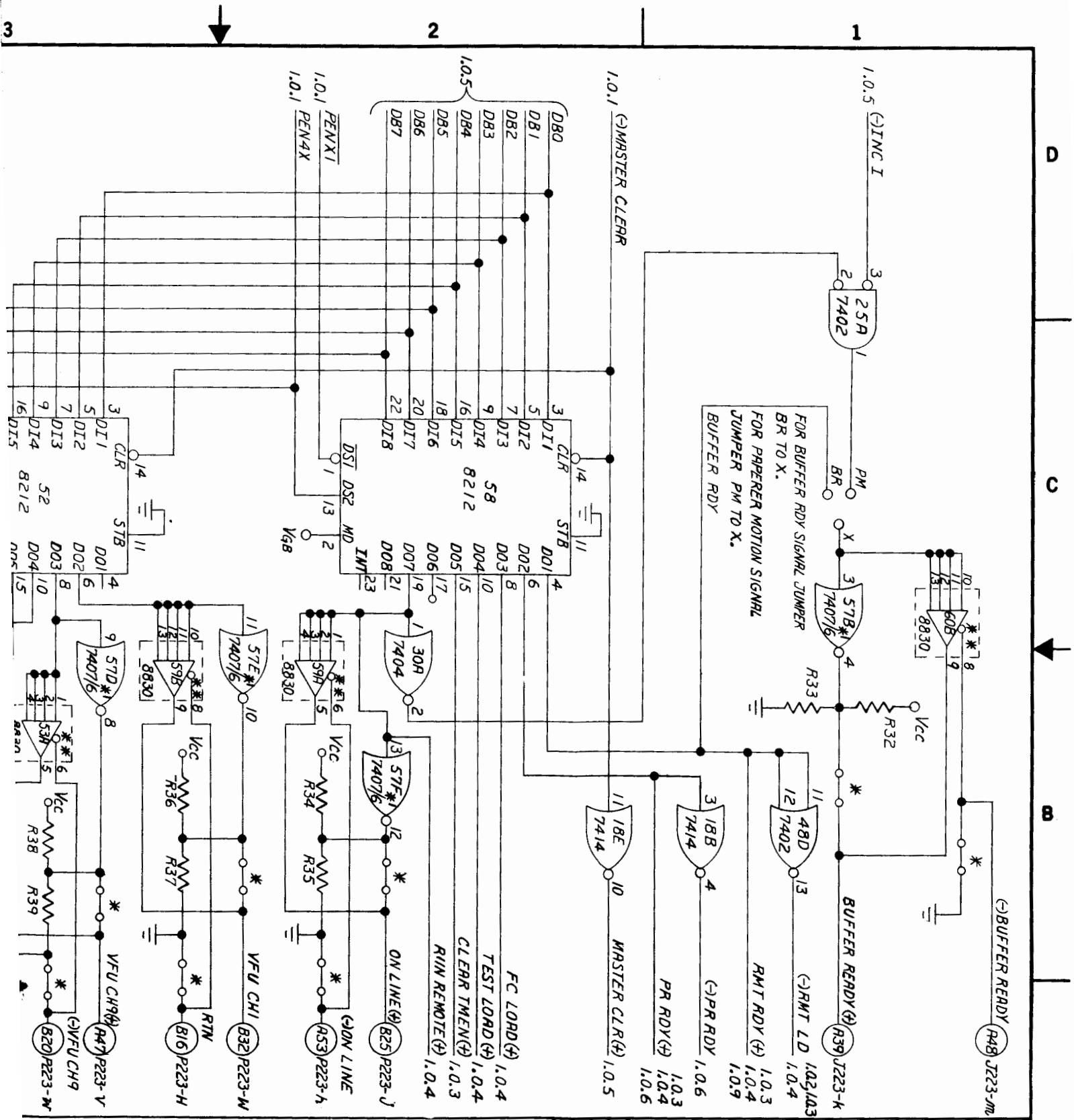




DESCRIPTION		PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED		DATA PRINTER CORP.	
ALL EXT. THDS CLASS 2A		TITLE 1.0.7	
ALL INT. THDS CLASS 2B		DWG. NO. 40043	
TOLERANCES INCLUDE		SHEET 7 of 9	
PLATING AND ARE:		REV. A	
DECIMALS (XXX) ± .005			
(XX) ± .020			
ANGLES ± 30°			
SCALE: <i>TK</i>	CHECKED		
	APPROVED		
	USED ON 42022		

Figure 1.0.7 Hewlett-Packard I/O (Sheet 7)



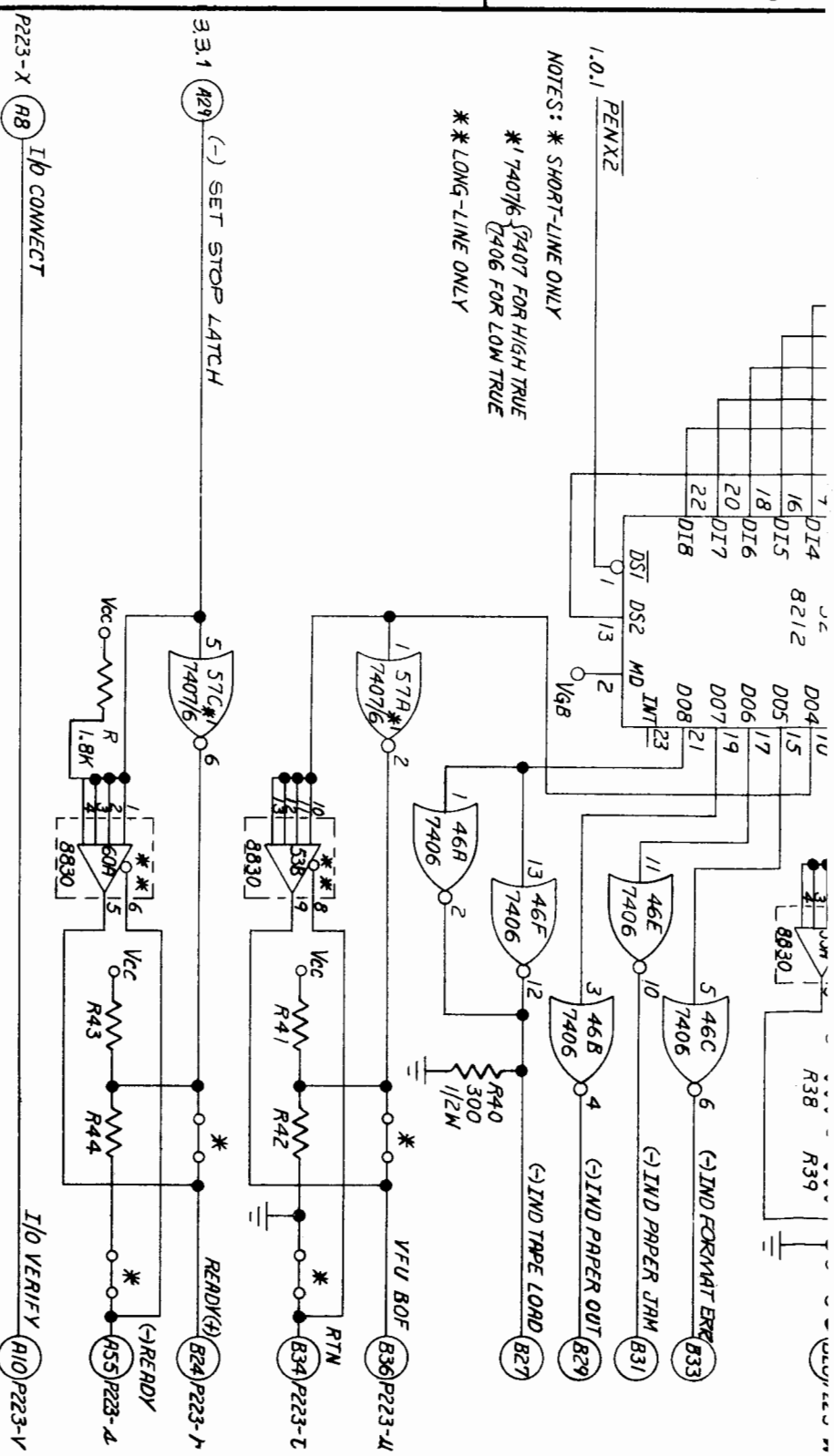


DESCRIPTION		PART NUMBER	ITEM
UNLESS OTHERWISE SPECIFIED		DATA PRINTER CORP.	
ALL EXT. THIS CLASS 2A		TITLE 1.0.8	
ALL INT. THIS CLASS 2B		DRAWN <i>B. Gandy 3-23-79</i>	
TOLERANCES INCLUDE		CHECKED	
PLATING AND ARE:		APPROVED	
DECIMALS (XXX) ± .005		DWG. NO. 40043	
(XX) ± .020		SHEET 8 of 9	
ANGLES ± 30°		REV. A	
SCALE = <i>7/8</i>		USED ON 42022	

Figure 1.0.8 Hewlett-Packard I/O (Sheet 8 of 9)

1.0.1 PENX2

NOTES: * SHORT-LINE ONLY
 * 7407/6 (7407 FOR HIGH TRUE
 7406 FOR LOW TRUE)
 ** LONG-LINE ONLY



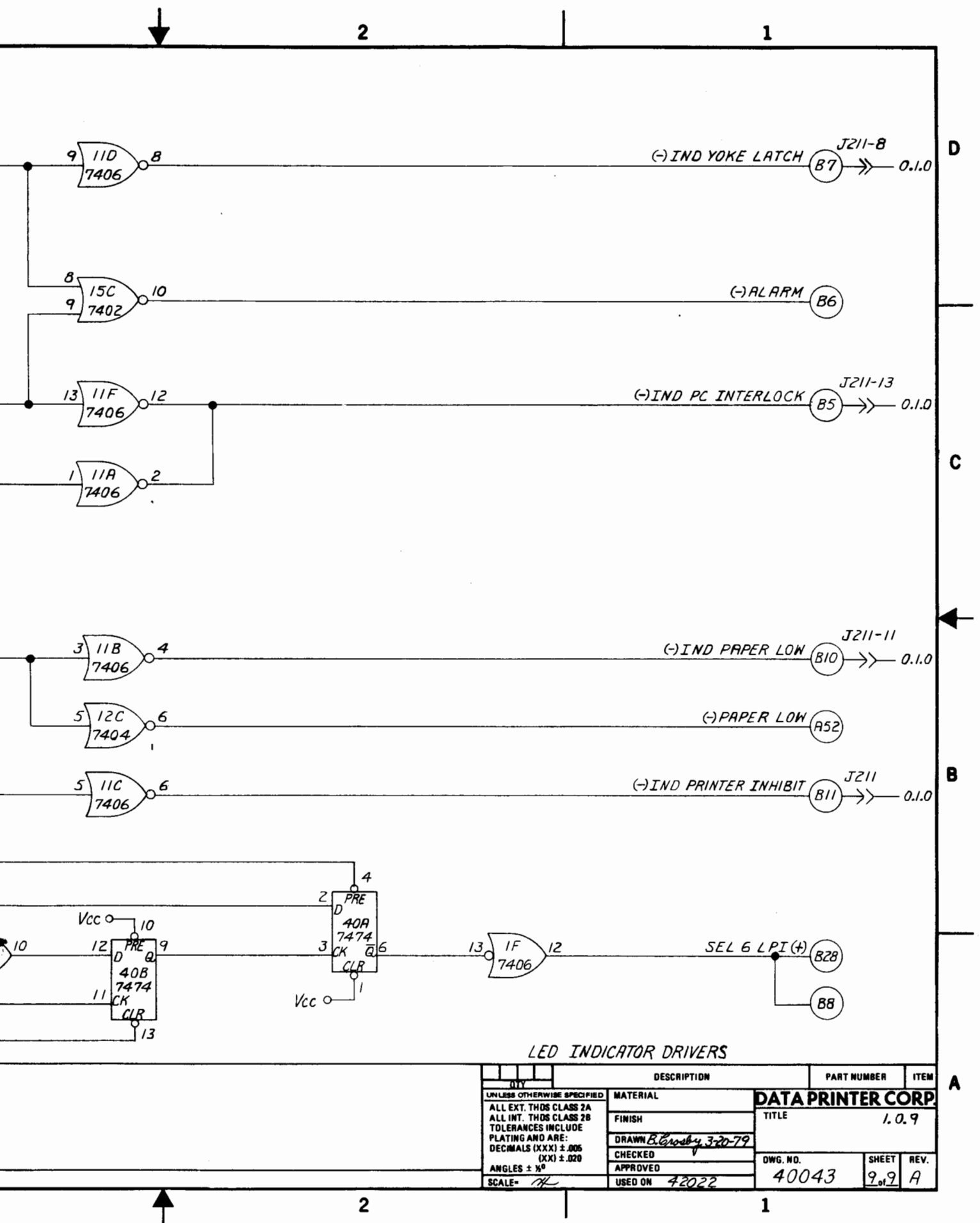
D

C

B

A

REVISIONS



LED INDICATOR DRIVERS

QUANTITY	DESCRIPTION	PART NUMBER	ITEM
		DATA PRINTER CORP.	
UNLESS OTHERWISE SPECIFIED		MATERIAL	TITLE 1.0.9
ALL EXT. THDS CLASS 2A		FINISH	
ALL INT. THDS CLASS 2B		DRAWN <i>B. Crosby</i> 3-20-79	
TOLERANCES INCLUDE		CHECKED	
PLATING AND ARE:		APPROVED	DWG. NO. 40043
DECIMALS (XX) ± .005		USED ON 42022	SHEET 9 of 9
ANGLES ± 30°			REV. A
SCALE = <i>H</i>			

Figure 1.0.9 Hewlett-Packard I/O (Sheet 9 of 9)

