

**LC8-E
DECwriter control
engineering drawings**

MASTER DRAWING LIST

[illegible]

USED ON OPTIONS							
PDP8-E							
PDP 8-L							
PDP8-F							
PDP8-M							
PDP8-I							
PDP12							

REV. / DATE		CHG. NO.	APP'D.	J.K. 10/71	
A	10/71	LC8-1			
B	4/72	LC8-2			
C	6/72	LC8-3			

DRN.	K. GULICK	DATE 7-26-71
CHK'D	K. GULICK	DATE 7-26-71
ENG.	John Thiel	DATE 7-30-71
PRGJ. ENG.	John Thiel	DATE 7-30-71
PROD.	R.S. Wilson	DATE 8-2-71

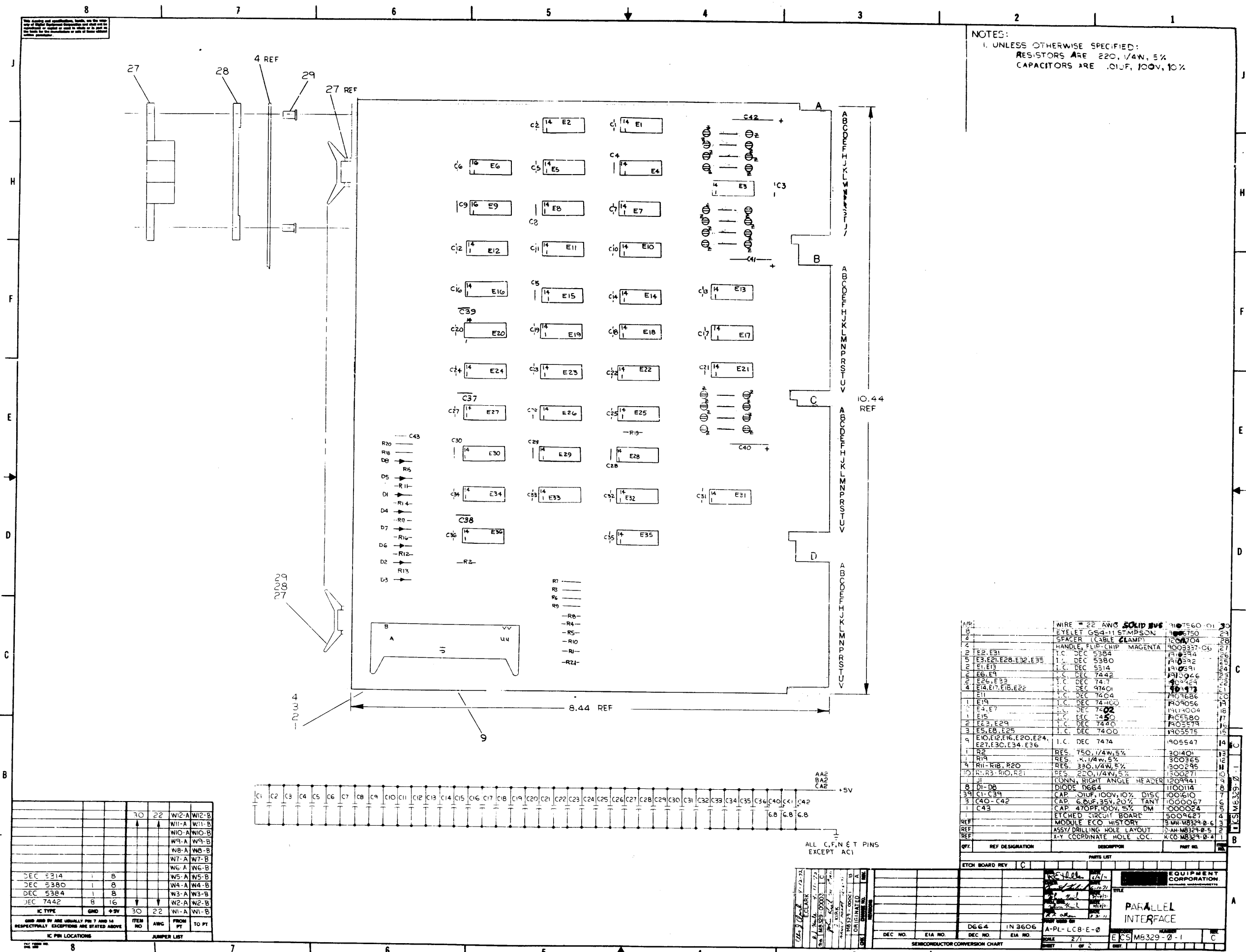
FIRST USED ON		PDP8-E
SCALE	NONE	
SHEET	1	OF 2

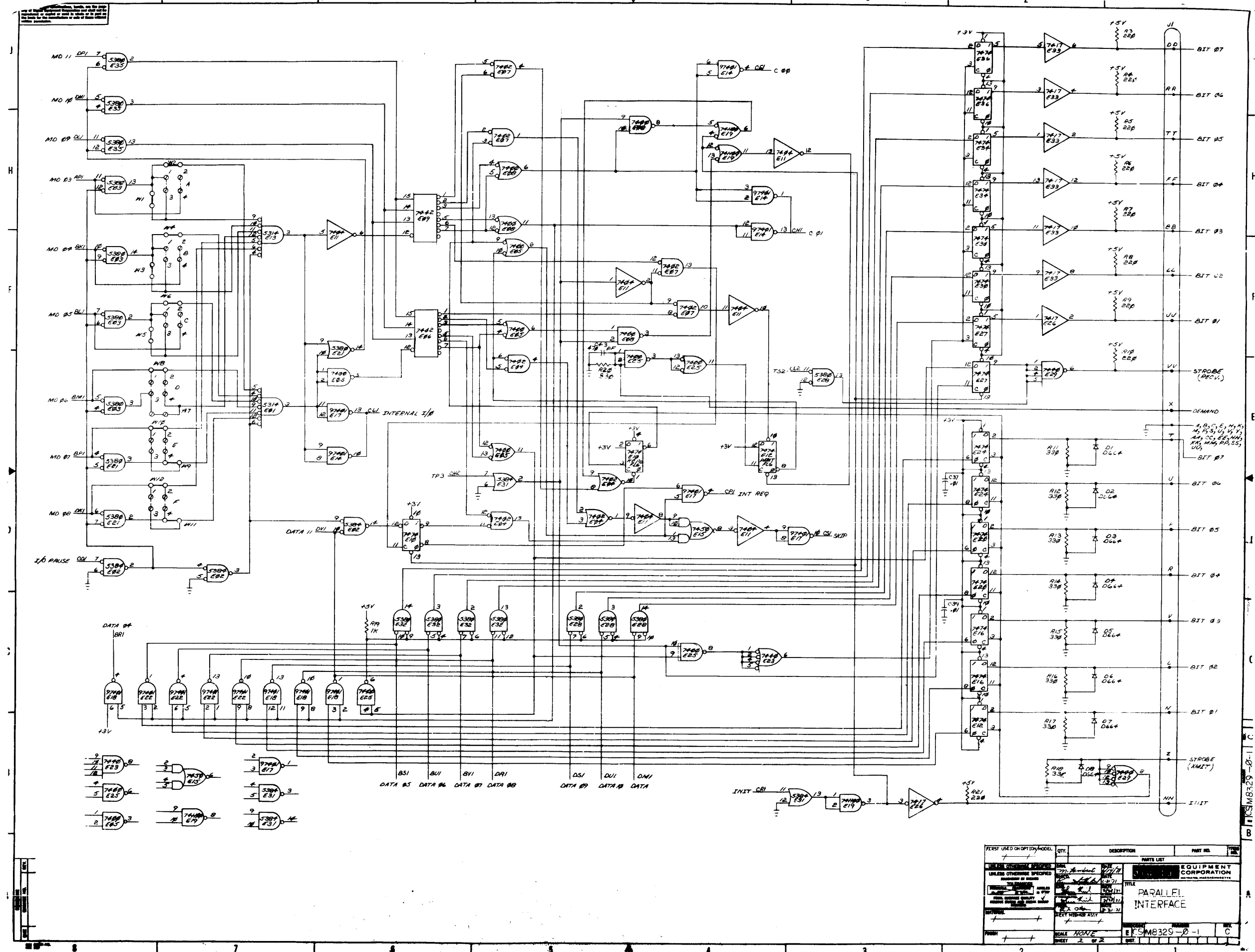
SIZE	CODE	NUMBER	REV.
A	ML	LC8-Ø	C

TITLE		PARALLEL CONTROL FOR LA3Ø-P	
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digital		EQUIPMENT CORPORATION	
MAYNARD, MASSACHUSETTS			

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CCD

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Abstract



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ENGINEERING SPECIFICATION		CONTINUATION SHEET	
TITLE		LC8-E (M8329)	
Abstract: The LC8-E is a parallel interface to the LA30 DECwriter for the PDP8/E. The LC8-E has split lugs provided to allow the device codes to be changed. I. General The LC8-E parallel interface is used with the LA30 DECwriter. Split lugs are provided to allow any device code between 00g and 77g to be assigned. In this manner multiple units can be installed to allow several LA30's on a single PDP8/E. The instruction set is identical to the teletype keyboard/teleprinter instruction set with the following exceptions: 1. There is no paper tape reader, hence no reader run. 2. There is no paper tape punch. 3. The maximum input/output rate is 30 characters/second. 4. Output to the printer is only 7 bits (AC5-11). Eight bits can be sent but bit 8 (AC4) is ignored. 5. If a non-printing character is sent to the printer, the printer does not go through a normal print cycle, but indicates that it is ready to print again in approximately 1 to 2 usec. 6. The LA30 has no hardware TAB, FORM FEED or VERTICAL TAB features. 7. Carriage return takes several character times but the printer ready flag is set again ~2 us after a CAR RET instruction. When the next character is sent, however, printer ready flag is not set again until the CAR RET has finished and this next character has been printed. 8. It is possible, by changing an internal switch, for the keyboard to generate lower case characters. Normally this is set so that only upper case characters are generated whether the keyboard is in SHIFT or not.			
SIZE	CODE	NUMBER	REV
A	SP	LC8-E-1	

ENGINEERING SPECIFICATION

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CONTINUATION SHEET

TITLE LC8-E (M8329)

9. The printer cannot print lower case characters. These are interpreted as upper case.
10. There is no BELL; CNTRL G is treated as non-printing.
11. End of line (> 80 characters) is trapped and any subsequent characters sent before a CAR RET are not printed.

II. Physical

The LC8-E is built on a single quad size board which plugs directly into the OMNIBUS. The etched board number is M8329.

III. Specifications - Environment

Operating temperature: 0 to 55 degrees C
Operating humidity: 10 to 90% non-condensing
During storage, temperature extremes of -15 to +65 degrees C can be tolerated.

IV. Specifications - Operating

A. Type of transmission: Parallel
Type of Reception: Parallel

B. Control Signals:

1. Receiver Strobe: Sent to the LA30 teleprinter to enable the printing of a character. It is sent at Time State One (TS1) of the instruction following the Input/Output transfer instruction. See the timing diagram in part D of this section.
2. Demand: Received from the LA30 printer requesting the next character from the PDP8/E. See the timing diagram in part D of this section.
3. Transmitter Strobe: Received from the LA30 keyboard; used to clock the character into the input buffer.

SIZE	CODE	NUMBER	REV
A	SP	LC8-E-1	

ENGINEERING SPECIFICATION

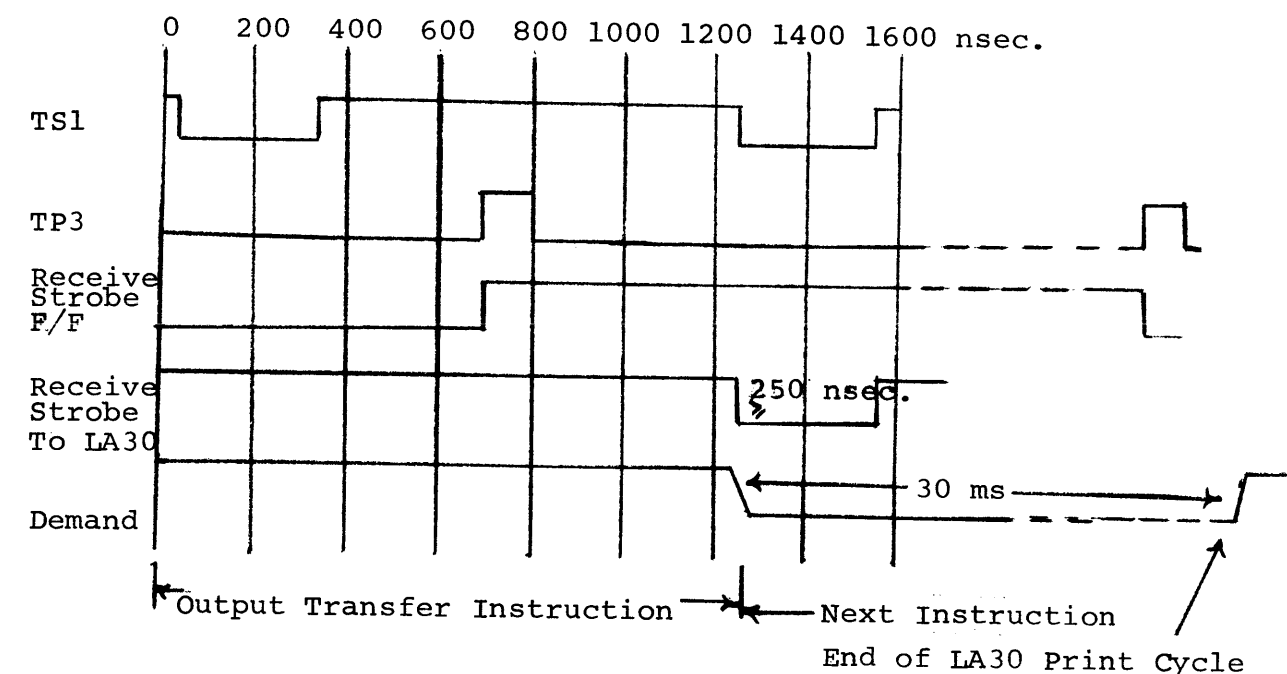
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CONTINUATION SHEET

TITLE LC8-E (M8329)

C. Number of Data Elements per character: Seven.

D. Timing Diagram:



E. Cable

The standard cable length is 25 feet. The cable used is a DEC #7008417.

V. Programming

The LC8-E uses the standard PDP8/E teletype keyboard/teletype teleprinter instruction set with the following changes:

LA30 Keyboard Instructions

*6XXØ	KCF	Clear Keyboard Flag Clears the keyboard flag only
6XX1	KSF	Skip on Keyboard Flag Skip next sequential instruction if keyboard flag is set.

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ENGINEERING SPECIFICATION

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CONTINUATION SHEET

TITLE LC8-E (M8329)

6XX2 KCC Clear Keyboard Flag
Clear the keyboard flag and the AC only.

6XX4 KRS Read Keyboard Buffer Static
OR's the contents of the input buffer with
AC5 through 11 and leaves the result in AC5-11.
AC4 is set. Neither the AC nor the keyboard
flag is cleared.

**6XX5 KIE Set/Clear Interrupt Enable
Set or clear the interrupt enable flip-flop
as determined by AC11.

6XX6 KRB Read Keyboard Buffer
Clear the keyboard flag and the AC. Transfer
the contents of the input buffer to AC5 through
AC11. Set AC4.

LA30 Teleprinter Instructions

6YY0 TFL Set Teleprinter Flag
Set the teleprinter flag

6YY1 TSF Skip on Teleprinter Flag
Skip the next sequential instruction if the
teleprinter flag is set.

*6YY2 TCF Clear Teleprinter Flag
Clears the teleprinter flag.

6YY4 TPC Load Teleprinter Buffer and Print
Transfer AC bits 5 through 11 to the output
buffer and set Receiver Strobe. At Time State
One (TS1) of the following instruction, the
character is transferred to the LA30 teleprinter.
The teleprinter flag is not cleared.

6YY5 SPI Skip if Teletype Interrupt
Skip next sequential instruction if keyboard or
teleprinter flag is set and Interrupt Enable
is set.

SIZE	CODE	NUMBER	REV
A	SP	LC8-E-1	

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CONTINUATION SHEET

TITLE LC8-E (M8329)

6YY6 TLS Load Teleprinter Sequence
The teleprinter flag is cleared and AC bits
5 through 11 are transferred to the output
buffer. Receiver Strobe is set. At Time State
One (TS1) of the following instruction, the
character is transferred to the LA30 teleprinter.

With the previous instruction the return of the
signal DEMAND from the LA30 sets the teleprinter
flag enabling the transfer of the next character.

In the instructions XX and YY are the device
code. The standard codes are 03g and 04g for
the LA30 keyboard/teleprinter respectively.
These can be changed to allow several LA30's
to be installed on one PDP8/E.

* Cleared by initialize or CAF
** Set by initialize or CAF

VI Device Codes

All input/output devices on the PDP8/E have device codes
which must be unique to that device. No two devices can have
the same device codes. An example is 6036 where 03 would be
the device code.

On the LC8-E, split lugs are provided so that any device codes
between 00g and 77g can be selected separately as the trans-
mitter and receiver device codes. Since some of these codes
may be pre-assigned to other devices, a careful check should
be made before any device codes are assigned.

Across the bottom edge of the M8329 are three groups of four
split lugs. These determine the device codes. Each group of
split lugs has an alphabetic designation (A-F), and each lug
within a group is numbered (1-4). A model layout is shown
below.

2		1
W2	A	W1
4		3

Machine inserted jumpers, W1 to W12, are the factory wired

SIZE	CODE	NUMBER	REV
A	SP	LC8-E-1	

ENGINEERING SPECIFICATION		CONTINUATION SHEET				
TITLE LC8-E (M8329)						
device codes 03 and 04 for the RECEIVER and TRANSMITTER respectively. REMEMBER to cut these jumpers before adding any jumpers to change device codes. The strappings for RECEIVER device codes are given in the following list.						
Code	Group A	Group B	Group C	Group D	Group E	Group F
00	1-3	1-3	1-3	3-4	4-2	4-2
01	1-3	1-3	1-3	3-4	4-2	1-2
02	1-3	1-3	1-3	3-4	1-2	4-2
03	1-3	1-3	1-3	3-4	1-2	1-2
04	1-3	1-3	1-3	1-4	4-2	4-2
05	1-3	1-3	1-3	1-4	4-2	1-2
06	1-3	1-3	1-3	1-4	1-2	4-2
07	1-3	1-3	1-3	1-4	1-2	1-2
10	1-3	1-3	4-3	3-4	4-2	4-2
11	1-3	1-3	4-3	3-4	4-2	1-2
12	1-3	1-3	4-3	3-4	1-2	4-2
13	1-3	1-3	4-3	3-4	1-2	1-2
14	1-3	1-3	4-3	1-4	4-2	4-2
15	1-3	1-3	4-3	1-4	4-2	1-2
16	1-3	1-3	4-3	1-4	1-2	4-2
17	1-3	1-3	4-3	1-4	1-2	1-2
20	1-3	4-3	1-3	3-4	4-2	4-2
21	1-3	4-3	1-3	3-4	4-2	1-2
22	1-3	4-3	1-3	3-4	1-2	4-2
23	1-3	4-3	1-3	3-4	1-2	1-2
24	1-3	4-3	1-3	1-4	4-2	4-2
25	1-3	4-3	1-3	1-4	4-2	1-2
26	1-3	4-3	1-3	1-4	1-2	4-2
27	1-3	4-3	1-3	1-4	1-2	1-2
30	1-3	4-3	4-3	3-4	4-2	4-2
31	1-3	4-3	4-3	3-4	4-2	1-2
32	1-3	4-3	4-3	3-4	1-2	4-2
33	1-3	4-3	4-3	3-4	1-2	1-2
34	1-3	4-3	4-3	1-4	4-2	4-2
35	1-3	4-3	4-3	1-4	4-2	1-2
SIZE A		CODE SP	NUMBER LC8-E-1		REV	

ENGINEERING SPECIFICATION		CONTINUATION SHEET				
TITLE LC8-E (M8329)						
Code	Group A	Group B	Group C	Group D	Group E	Group F
36	1-3	4-3	4-3	1-4	1-2	4-2
37	1-3	4-3	4-3	1-4	1-2	1-2
40	4-3	1-3	1-3	3-4	4-2	4-2
41	4-3	1-3	1-3	3-4	4-2	1-2
42	4-3	1-3	1-3	3-4	1-2	4-2
43	4-3	1-3	1-3	3-4	1-2	1-2
44	4-3	1-3	1-3	1-4	4-2	4-2
45	4-3	1-3	1-3	1-4	4-2	1-2
46	4-3	1-3	1-3	1-4	1-2	4-2
47	4-3	1-3	1-3	1-4	1-2	1-2
50	4-3	1-3	4-3	3-4	4-2	4-2
51	4-3	1-3	4-3	3-4	4-2	1-2
52	4-3	1-3	4-3	3-4	1-2	4-2
53	4-3	1-3	4-3	3-4	1-2	1-2
54	4-3	1-3	4-3	1-4	4-2	4-2
55	4-3	1-3	4-3	1-4	4-2	1-2
56	4-3	1-3	4-3	1-4	1-2	4-2
57	4-3	1-3	4-3	1-4	1-2	1-2
60	4-3	4-3	1-3	3-4	4-2	4-2
61	4-3	4-3	1-3	3-4	4-2	1-2
62	4-3	4-3	1-3	3-4	1-2	4-2
63	4-3	4-3	1-3	3-4	1-2	1-2
64	4-3	4-3	1-3	1-4	4-2	4-2
65	4-3	4-3	1-3	1-4	4-2	1-2
66	4-3	4-3	1-3	1-4	1-2	4-2
67	4-3	4-3	1-3	1-4	1-2	1-2
70	4-3	4-3	4-3	3-4	4-2	4-2
71	4-3	4-3	4-3	3-4	4-2	1-2
72	4-3	4-3	4-3	3-4	1-2	4-2
73	4-3	4-3	4-3	3-4	1-2	1-2
74	4-3	4-3	4-3	1-4	4-2	4-2
75	4-3	4-3	4-3	1-4	4-2	1-2
76	4-3	4-3	4-3	1-4	1-2	4-2
77	4-3	4-3	4-3	1-4	1-2	1-2
SIZE A		CODE SP	NUMBER LC8-E-1		REV	

ENGINEERING SPECIFICATION

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CONTINUATION SHEET

TITLE LC8-E (M8329)

The strappings for TRANSMITTER device codes are given in the following list.

Code	Group A	Group B	Group C	Group D	Group E	Group F
00	1-2	1-2	1-2	3-2	4-3	4-3
01	1-2	1-2	1-2	3-2	4-3	1-3
02	1-2	1-2	1-2	3-2	1-3	4-3
03	1-2	1-2	1-2	3-2	1-3	1-3
04	1-2	1-2	1-2	1-2	4-3	4-3
05	1-2	1-2	1-2	1-2	4-3	1-3
06	1-2	1-2	1-2	1-2	1-3	4-3
07	1-2	1-2	1-2	1-2	1-3	1-3
10	1-2	1-2	4-2	3-2	4-3	4-3
11	1-2	1-2	4-2	3-2	4-3	1-3
12	1-2	1-2	4-2	3-2	1-3	4-3
13	1-2	1-2	4-2	3-2	1-3	1-3
14	1-2	1-2	4-2	1-2	4-3	4-3
15	1-2	1-2	4-2	1-2	4-3	1-3
16	1-2	1-2	4-2	1-2	1-3	4-3
17	1-2	1-2	4-2	1-2	1-3	1-3
20	1-2	4-2	1-2	3-2	4-3	4-3
21	1-2	4-2	1-2	3-2	4-3	1-3
22	1-2	4-2	1-2	3-2	1-3	4-3
23	1-2	4-2	1-2	3-2	1-3	1-3
24	1-2	4-2	1-2	1-2	4-3	4-3
25	1-2	4-2	1-2	1-2	4-3	1-3
26	1-2	4-2	1-2	1-2	1-3	4-3
27	1-2	4-2	1-2	1-2	1-3	1-3
30	1-2	4-2	4-2	3-2	4-3	4-3
31	1-2	4-2	4-2	3-2	4-3	1-3
32	1-2	4-2	4-2	3-2	1-3	4-3
33	1-2	4-2	4-2	3-2	1-3	1-3
34	1-2	4-2	4-2	1-2	4-3	4-3
35	1-2	4-2	4-2	1-2	4-3	1-3
36	1-2	4-2	4-2	1-2	1-3	4-3
37	1-2	4-2	4-2	1-2	1-3	1-3

SIZE
ACODE
SPNUMBER
LC8-E-1

REV

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CONTINUATION SHEET

TITLE LC8-E (M8329)

Code	Group A	Group B	Group C	Group D	Group E	Group F
40	4-2	1-2	1-2	3-2	4-3	4-3
41	4-2	1-2	1-2	3-2	4-3	1-3
42	4-2	1-2	1-2	3-2	1-3	4-3
43	4-2	1-2	1-2	3-2	1-3	1-3
44	4-2	1-2	1-2	1-2	4-3	4-3
45	4-2	1-2	1-2	1-2	4-3	1-3
46	4-2	1-2	1-2	1-2	1-3	4-3
47	4-2	1-2	1-2	1-2	1-3	1-3
50	4-2	1-2	4-2	3-2	4-3	4-3
51	4-2	1-2	4-2	3-2	4-3	1-3
52	4-2	1-2	4-2	3-2	1-3	4-3
53	4-2	1-2	4-2	3-2	1-3	1-3
54	4-2	1-2	4-2	1-2	4-3	4-3
55	4-2	1-2	4-2	1-2	4-3	1-3
56	4-2	1-2	4-2	1-2	1-3	4-3
57	4-2	1-2	4-2	1-2	1-3	1-3
60	4-2	4-2	1-2	3-2	4-3	4-3
61	4-2	4-2	1-2	3-2	4-3	1-3
62	4-2	4-2	1-2	3-2	1-3	4-3
63	4-2	4-2	1-2	3-2	1-3	1-2
64	4-2	4-2	1-2	1-2	4-3	4-3
65	4-2	4-2	1-2	1-2	4-3	1-3
66	4-2	4-2	1-2	1-2	1-3	4-3
67	4-2	4-2	1-2	1-2	1-3	1-3
70	4-2	4-2	4-2	3-2	4-3	4-3
71	4-2	4-2	4-2	3-2	4-3	1-3
72	4-2	4-2	4-2	3-2	1-3	4-3
73	4-2	4-2	4-2	3-2	1-3	1-3
74	4-2	4-2	4-2	1-2	4-3	4-3
75	4-2	4-2	4-2	1-2	4-3	1-3
76	4-2	4-2	4-2	1-2	1-3	4-3
77	4-2	4-2	4-2	1-2	1-3	1-3

SIZE
ACODE
SPNUMBER
LC8-E-1

REV

