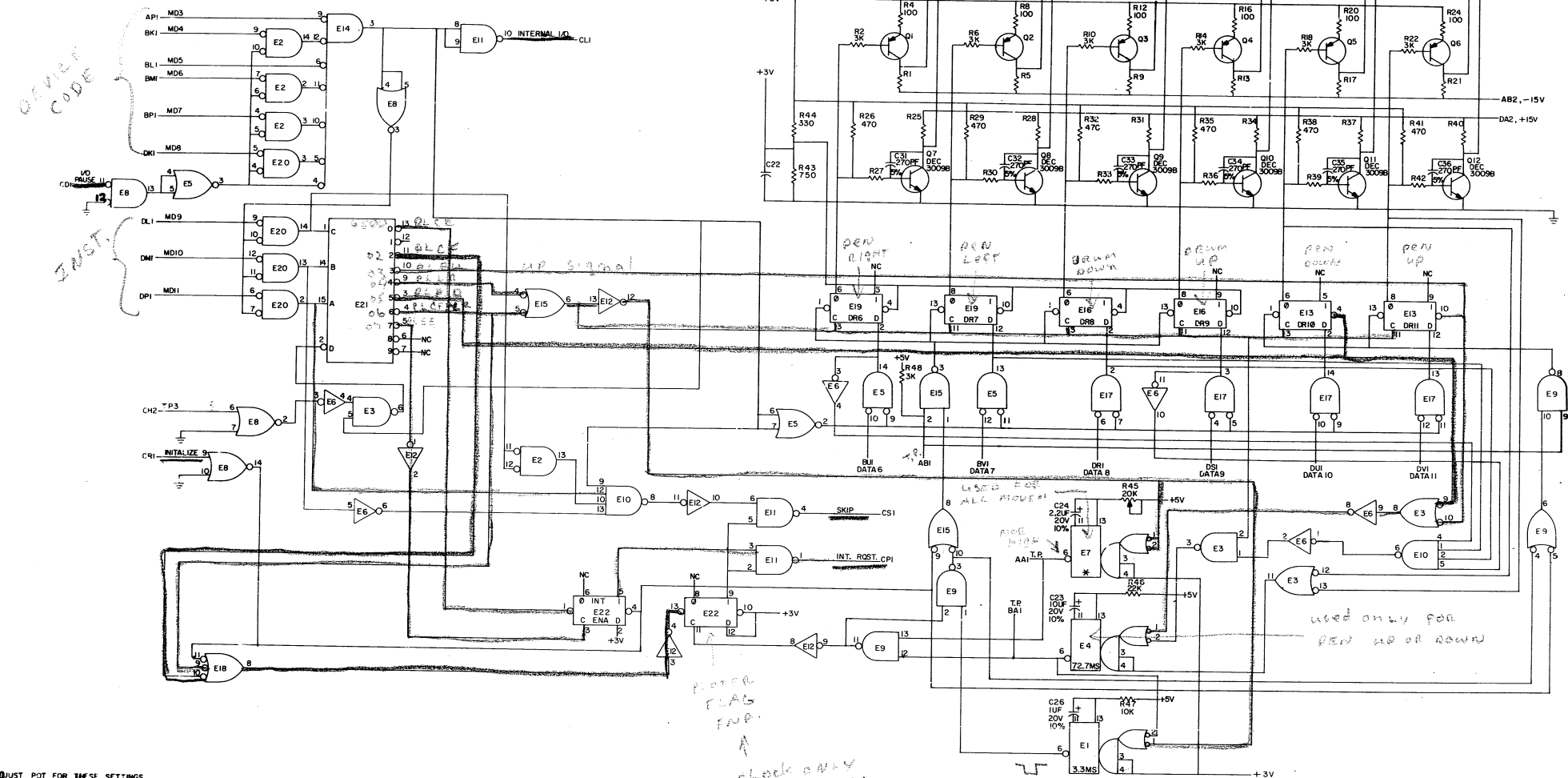


**XY8-E plotter control
engineering drawings**

M 8 4 2

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NOTE: * ADJUST POT FOR THESE SETTINGS ACCORDING TO PLOTTER MODEL.

PLOTTER MODEL	SET DELAY	STEP SPEED
CAL-COMP 563	5.5ms	(200 STEPS/SEC)
CAL-COMP 565	3.8ms	(300 STEPS/SEC)
CAL-COMP 600	1.5ms	(900 STEPS/SEC)
HOUSTON DP-10	3.8ms	(300 STEPS/SEC)
HOUSTON DP-11	3.0ms	(400 STEPS/SEC)
HOUSTON DP-3	3.0ms	(400 STEPS/SEC)

QTY.	DESCRIPTION	PART NO.	ITEM NO.
UNLESS OTHERWISE SPECIFIED: ORN WYATT DATE 10-27-70			
UNLESS OTHERWISE SPECIFIED: CHKD. WALDIE DATE 10-16-70			
UNLESS OTHERWISE SPECIFIED: TOLERANCES: ENG. DATE 10-16-70			
DECIMALS FRACTIONS ANGLES DATE 10-16-70			
FINISH SURFACE QUALITY: REMOVE BURRS AND BREAK SHARP CORNERS DATE 10-16-70			
MATERIAL:	FIRST USED ON:	SCALE:	NUMBER:
FINISH:	SCALE: NONE	SHEET 2 OF 2	REV. J
TITLE: PLOTTER CONTROL		PARTS LIST: EICSM842-0-1	

EICSM842-0-1

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0-0-9969002 2

LEGEND

PART NO.	DIM "X"
7006965-20	20 FT ± 3 IN

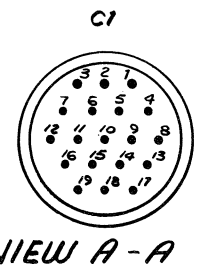
WIRE TABLE

ITEM NO	AWG	COLOR	FROM		TO	
			CONNECTION	WITH	CONNECTION	WITH
4	22	BLU	C1-1	SOLDER	C2-L	#3
		RED	C1-2		C2-J	
		BRN	C1-3		C2-F	
		WHT	C1-4		C2-D	
		GRN	C1-9		C2-E	
		BLK	C1-10		C2-N	
4	22	YEL	C1-15	SOLDER	C2-S	#3

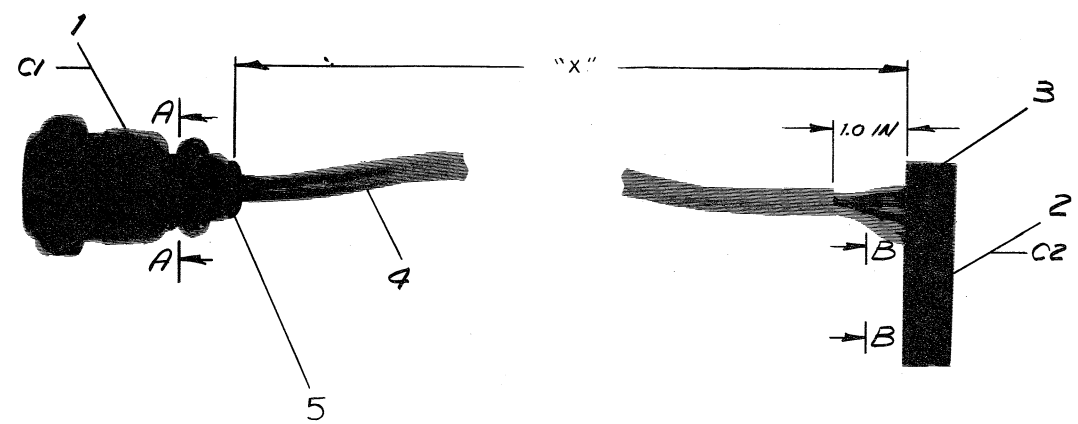
C2

A	B
C	D
E	F
H	J
K	L
M	N
P	R
S	T
U	V
W	X
Y	Z
AA	BB
CC	DD
EE	FF
HH	JJ
KK	LL
MM	NN
PP	RR
SS	TT
UU	VV

* NOT USED



VIEW B-B



PARTS LIST

QTY.	DESCRIPTION	PART NO.	ITEM NO.
1	GROMMET, #91117	90-07028	5
4	BELDON 10 CONDUCTOR CABLE	9107623	4
7	BERG PINS (47706)	12-10089-6	3
1	BERG 40 PIN HOUSING	12-10090-0	2
1	CANNON SK-19-21C-1/2	1205074	1

REVISIONS

CHK	CHANGE NO.	REV.
	XY8E-0001	A
	XY8E-0005	B
	XY8E-0007	C

FIRST USED ON OPTION / MODEL
XY8E

TOLERANCES
 DECIMALS
 .XXX = ±.005
 .XX = ±.02
 .X = ±.1

DO NOT SCALE DRAWING
 UNLESS OTHERWISE SPECIFIED
 DIMENSION IN INCHES

TOLERANCES
 ANGLES = 0°30'
 FINAL SURFACE QUALITY = 1
 REMOVE BURRS AND BREAK SHARP CORNERS

MATERIAL: —
 FINISH: —

DRN: [Signature]
 DATE: 7-30-70
 ENGR: [Signature]
 DATE: 8-12-70
 PROJ. ENG: [Signature]
 DATE: 8-12-70
 PROD: [Signature]
 DATE: 8-12-70

NEXT HIGHER ASSY
D-UA-XY8E-0-0

SCALE: NONE
 SHEET: 1 OF 1

digital EQUIPMENT CORPORATION
 MAYNARD, MASSACHUSETTS

TITLE: **XY8E PLOTTER CONTROL CABLE**

SIZE CODE: DIA
 NUMBER: 7006965-0-C
 REV. C

REV. C
 NUMBER DIA7006965-0-0

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DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 8/14/70

TITLE XY8-E PLOTTER INTERFACE FOR THE PDP-8/E

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE
A	 	XY8E-00003	LARRY NARHI	1/72	<i>Larry Narhi</i>	1/4/72
B	 	XY8E-00006	LARRY NARHI	4/72	<i>L. Narhi</i>	4/28/72

digital

CONTINUATION SHEET

TITLE XY8-E PLOTTER INTERFACE FOR THE PDP-8/E

1. OVERALL DESCRIPTION

The XY8-E Plotter Interface is a complete interface to Houston and Calcomp Plotters to the PDP-8/E computer. It is designed entirely with TTL type logic for speed and low cost.

2. GENERAL SPECIFICATIONS

2.1 The entire interface is contained on one "QUAD" module that conforms to the 8/E bus structure.

2.2 The included options are:

- XY8-E - Plotter Interface only
- XY8-EA- Interface and 565 Calcomp Plotter
- XY8-EB- Interface and 563 Calcomp Plotter
- XY8-EH- Interface and Houston DP-10 Plotter

2.3 The entire interface is contained on one 8½ x 11" Quad board. All pins on the board are defined by the 8/E bus.

2.4 Temperature limits are:

32F to 155F

Relative Humidity: 0 to 95%, non-condensing

Power Required: +15 volts - 30 Ma.
+ 5 volts - .5 Amps
-15 volts - 60 Ma

3. SPECIFICATION OF VENDOR SUPPLIED EQUIPMENT

The following is a brief description of each of the Calcomp Plotter series:

500 Series:

The Calcomp 500 Series includes two drum types and one flatbed type, each available with a choice of increment sizes; and a remote drum type capable of recording computer output at distant locations over land lines. Calcomp's low-cost line for medium speed plotting, the 500 Series operates at maximum speeds up to 300 increments per-second.

ENG Larry Narhi	APPD <i>Larry Narhi</i>	SIZE A	CODE SP	NUMBER XY8-E-1	REV B
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SIZE A	CODE SP	NUMBER XY8-E-1	REV B
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TITLE XY8-E PLOTTER INTERFACE FOR THE PDP-8/E

3. Continued

600 Series:

The Calcomp 600 Series includes two drum and two flatbed types with optional incremental sizes. Operating with either 8-vector or 24-vector incremental input command formats, the 600 Series is capable of recording with two different increment sizes which provides for controlled intermix of increment sizes for smoother, more accurate plotting. Operating speeds up to 900 increments-per-second, depending upon plotter model, input command format and increment size.

700 Series:

The Calcomp 700 Series includes two drum and two flatbed types - and is capable of operating either in the incremental or ZIP MODE. In the incremental mode, the 700 Series operates in a manner similar to the 600 Series, providing for controlled intermix of increment sizes. Calcomp's exclusive ZIP MODE drives the plotter at several times the maximum incremental speed, operating at a maximum rate of 1687 increments per second.

DRUM TYPE:

Calcomp drum type plotters are available in two sizes: a 12-inch drum and a 30-inch drum. The plot is produced by rotary motion of the drum (X-axis) and lateral motion of the pen carriage (Y-axis). Either ballpoint or liquid ink pens may be used. The drum type plotter uses special chart paper rolls and can produce continuous plots up to 120 feet in length. A wide selection of paper is available.

FLATBED TYPE:

Calcomp flatbed plotters are also available in two sizes: 31 by 34 inches, and 54 by 72 inches (plot area). The plot is produced by lateral motion of the beam and vertical motion of the pen carriage. Either ballpoint or liquid ink pens may be used. The flatbed plotter provides continuous display during plotting. It does not require special paper, and can handle a large variety of preprinted forms and special materials.

SIZE A	CODE SP	NUMBER XY8-E-1	REV B
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TITLE XY8-E PLOTTER INTERFACE FOR THE PDP-8/E

MODEL 835:

The model 835 is a microfilm plotter with these features:

- 16MM or 35MM microfilm output
- 16MM or 35MM animation
- Line drawing speed to 1400 inches per second
- Printing speed to 1000 lines per minute
- All solid-state, drift free
- Adjacent frame exposure

The interface can also control Houston Instruments plotters Type 6400, DP-1 and DP-1Ø.

4. PROGRAMMING

4.1 The IOT coding is as follows:

<u>Mnemonic</u>	<u>IOT</u>	<u>Function</u>
PLCE	6500	Clear Interrupt Enable
PLSF	6501	Skip if Flag = 1
PLCF	6502	Clear Flag
PLPU	6503	Pen Up (UNENCODED PLOTTERS ONLY)
PLLR	6504	Load Direction Register, Set Flag
PLPD	6505	Pen Down
PLCF, PLLR	6506	Clear Flag, Load Direction Reg., Set Flag
PLSE	6507	Set Interrupt Enable

The Direction Register is loaded from AC bits 6 thru 11. The following is the coding for the AC bits:

For 500 Series Plotters and Houston Instruments Plotters:

- AC bit 6 - Pen Right
- 7 - Pen Left
- 8 - Drum Down
- 9 - Drum Up
- 10 - Used for 600, 700 & 800 Series
- 11 - Used for 600, 700 & 800 Series

ONLY ENCODED FOR PLOTTERS

(For 600, 700, & 800 Series Plotters: See following page.)

SIZE A	CODE SP	NUMBER XY8-E-1	REV B
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TITLE XY8-E PLOTTER INTERFACE FOR THE PDP-8/E

OCTAL COMMAND CODES FOR 600, 700 & 800 SERIES PLOTTERS

CODE (OCTAL) (in AC)	600-SERIES Plotters (Using Encoded Input)	700-SERIES Plotters	800-SERIES Plotters
10		+Y	
11		+X +Y	
12		+X	
13		+X -Y	Same as 700
14		-Y	
15		-X -Y	
16		-X	
17	Same as 700	-X +Y	
30		Spare	Crt. Shift
31		Pen Up	Beam Off
32		Pen Down	Beam On
33	Not Used	Start Zip	Not Used
34	Same	Block Code	-Z (+Aux. 1)
35	Same	Plot Code	+Z (+Aux. 2)
36	Not Used	Start Incr.	Not Used
37	Sync.	Sync.	Sync.
50		+Y/2	
51		+X/2 +Y/2	
52		+X/2	
53		+X/2 -Y/2	
54		-Y/2	
55		-X/2 -Y/2	
56		-X/2	
57		-X/2	Not Used (2 ⁵ line is not required except for operation of optional attached 700-Series or 600-Series Plotter).
70	Same as 700	+X +Y/2	
71		-X +Y/2	
72		+X/2 +Y	
73		-X/2 +Y	
74		+X -Y/2	
75		-X -Y/2	
76		+X/2 -Y	
77		-X/2 -Y	

SIZE A	CODE SP	NUMBER XY8-E-1	REV B
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ENGINEERING SPECIFICATION



TITLE XY8-E PLOTTER INTERFACE FOR THE PDP-8/E

- 4.2 There are no maintenance instructions.
- 4.3 Data flow is from Data Bus (AC) to Direction Register in 6 parallel bits that cause plotter movement.
- 4.4 Timing is variable from 1.5ms to 10ms for all functions except Pen Up, Pen Down, which takes 70 milliseconds.
- 4.5 There are no controls on the interface board (M842). There are manual controls on the Plotter, however.

5. INTERFACE SPECIFICATIONS

The control board (M842) has two outputs. One that transitions from +5 volts to -15 volts for 7 or 70 milliseconds for unencoded, and one that transitions from +15 volts to ground for the same amount of time for encoded plotters.

SIZE A	CODE SP	NUMBER XY8-E-1	REV B
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MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 1/22/71

TITLE XY8-E PLOTTER TEST PROCEDURE

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE
A	/ / /	XY8E - 00003	LARRY NARHI	1/72	L. Narhi	1/19/72
B	/ / /	XY8E - 00006	LARRY NARHI	4/72	L. Narhi	4/28/72

ENGINEERING SPECIFICATION



CONTINUATION SHEET

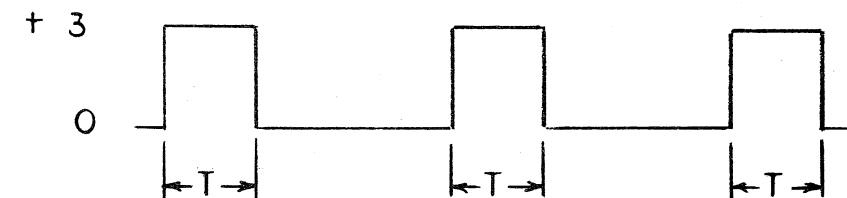
TITLE XY8-E PLOTTER TEST PROCEDURE

1.0 EQUIPMENT

- 1.1 PDP8/E standard
- 1.2 Heat box
- 1.3 453 scope and voltage probes
- 1.4 Teletype
- 1.5 PR8/E paper tape reader
- 1.6 Binary loader tape
- 1.7 Plotter control module M842 and 7006965 cable
- 1.8 Calcomp plotter model 563 or 565 or Houston DP-10 or EDP-10

2.0 TEST STATION SET UP

- 2.1 Check paperwork in the envelope making sure it is complete as required by DEC standard #101.
 - 2.1.1 Test and inspection record
 - 2.1.2 Key sheet and ECO status sheet will contain both CS and etch revision.
 - 2.1.3 Quality Control inspection report.
 - 2.1.4 PDP8/E progress report (inserted at this time).
- 2.2 Plug plotter AC cord into bench outlet.
- 2.3 Insert the M842 module in the Omnibus per "Recommended Module Assignment List" (ASP-PDP8-E-0-4).
- 2.4 Adjustment Procedure for 20K POT
 - 2.4.1 Deposit the following program in Memory starting at Location $\emptyset 2\emptyset\emptyset$.
 - $\emptyset 2\emptyset\emptyset/65\emptyset 6$
 - $\emptyset 2\emptyset 1/2300$
 - $\emptyset 2\emptyset 2/52\emptyset 1$
 - $\emptyset 2\emptyset 3/5200$
 - 2.4.2 With Channel A scope probe attached to Pin 8 of E7 observe the following waveform:



ENG <i>Larry Narhi</i>	APPD <i>B. Liff</i>	SIZE A	CODE SP	NUMBER XY8-E-2	REV B
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DEC FORM NO. DRA 107

SHEET 1 OF 5

SIZE A	CODE SP	NUMBER XY8-E-2	REV B
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DEC FORM NO. DEC 16-(381)-1022-N370
DRA 108

SHEET 2 OF 5

ENGINEERING SPECIFICATION

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CONTINUATION SHEET

TITLE

XY8-E PLOTTER TEST PROCEDURE

Adjust R45, the 20K POT, for the duration "T" as noted in the chart below.

PLOTTER MODEL/ MANUFACTURER	SET POT FOR "T"	STEP SPEED
CAL-COMP 563	5.5ms	200 steps/sec
CAL-COMP 565	3.8ms	300 steps/sec
HOUSTON DP-10	3.8ms	300 steps/sec

2.5 Connect the 7006965 cable between the unencoded connector on the M842 module and the plotter.

3.0 LOADING PROCEDURE

- 3.1 Deposit Rim Loader (High Speed) in PDP8E per PDP8-E instruction card.
- 3.2 Load Binary Loader using starting address of 7756.
- 3.3 Load diagnostic MAINDEC-8E-D6AB-D using starting address of 7777.

4.0 XY8-E CHECKOUT

- 4.1 Manual checkout of plotter mechanism.
 - 4.1.1 Turn on plotter power
 - 4.1.2 Check the operation of the following switches:
 - "Carriage Fast Run" moves carriage to right and left.
 - "Carriage Single Step" moves carriage to right and left in single step increments.
 - "Drum Single Step" rotates drum up and down in single step increments.
 - "Drum Fast Run" rotates drum up and down.
 - "Up, Down Pen" moves pen up and down.
 - "Chart Drive On, Off" enables chart drive feed and take up motors.
- 4.2 XY8-E Control Test
 - 4.2.1 Turn off plotter power. Turn on PDP8-E power.
 - 4.2.2 Read "Caution Notes" contained on page 2 of the diagnostic write-up, before continuing.

SIZE A	CODE SP	NUMBER XY8-E-2	REV
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ENGINEERING SPECIFICATION

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CONTINUATION SHEET

TITLE

XY8-E PLOTTER TEST PROCEDURE

4.2.3 Run the following diagnostic test:

Program	Run Time	No. of Passes
XY8-E Control Test	2.5 minutes	10

Definition of plotter specifications - teletype will request following information concerning plotter test:

- 4.2.3.1 "Plotter series (1-3):" *Reply with a 1
- 4.2.3.2 "Plotter type (1-4):" *Reply with a 1 for 11" drum.
Reply with a 2 for 28.55" drum.
- 4.2.3.3 "Vector type (1-2)" *Reply with a 1
- 4.2.3.4 "Increment type (1-5):" *Reply with a 1 for 0.1 mim.
Reply with a 4 for .005 mim.
Reply with a 5 for .01 mim.

4.2.3.5 After answering last request, depressing return key will cause teletype to print plotter specifications as requested by operator followed by "Correct (Y or N)?*" Reply with a "Y" for yes if specifications are correct or a "N" if specifications are not correct. Replying with an "N" will return program to the beginning of the plotter spec. routine so errors can be corrected.

4.2.4 At the end of the 10th pass "Control test complete" is displayed. Control is then passed to display test monitor.

4.3 XY8-E Display Test

- 4.3.1 Turn on the plotter power
- 4.3.2 To run complete display test, position pen at least 2" from any physical stop and type "Alt Mode D".
Note: Denotes return key
- 4.3.3 Execution time for 11" Drum is approximately 10 minutes.
Execution time for 28.55" Drum is approximately 20 minutes.
- 4.3.4 Plotter printouts are to be evaluated based on the diagrams and instructions supplied in the diagnostic write up.
- 4.3.5 Acceptable plotter accuracy is ± 1 increment or ± 1 line thickness, whichever is greater, for +X, -X, +Y or -Y vectors. For +X/2, -X/2, +Y/2, -Y/2 vectors accuracy is ± 2 increments.
- 4.3.6 Upon completion of the display test turn plotter power off.
- 4.3.7 In pattern P05, ignore line segment 43, 44.

5.0 HEAT TEST

- 5.1 Heat test is to be run after successful completion of all previously indicated tests.
- 5.2 Run the XY8-E control test for 5 minutes with the heat box down, ports closed and heat off. Load per loading procedure step 3.0.
- 5.3 Raise the heat switch on the test station panel and once the indicator light goes off, run the combined XY8-E control and display tests for 10 minutes.
- 5.4 Turn the heat switch off and open the two ports on the left side of the heat box.
- 5.5 Allow 15 minutes for the machine to cool before removing the heat box.
- 5.6 Terminate the test once the machine has run, display pattern 6 for 5 minutes at room temperature.

SIZE A	CODE SP	NUMBER XY8-E-2	REV B
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TITLE XY8-E PLOTTER TEST PROCEDURE

6.0 FINAL OPERATION AND INSPECTION

- 6.1 Disconnect the M842 module from the 8/E and the cable from the plotter.
- 6.2 Check that the following paperwork has been completed:
 - Envelope
 - ECO Status Sheet
 - QC Sheet
 - 8/E Progress Report

	SIZE A	CODE SP	NUMBER XY8-E-2	REV B
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