

**digital**

**VT15**

**Engineering Drawings**

**Digital Equipment Corporation**

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 D-BS-VT15-0-14  
 D-BS-VT15-0-15  
 D-BS-VT15-0-16  
 D-BS-VT15-0-17  
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 D-BS-VT15-0-22  
 D-BS-VT15-0-23  
 D-BS-VT15-0-24  
 D-BS-VT15-0-25  
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 LIGHT CABLES  
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 CHARACTER GEN CONTROL  
 CHAR. GEN. READ-ONLY-MEMORY  
 ADR. & CHAR. GEN. CONTROL  
 INT. & STATUS  
 VECTOR GENERATOR  
 MODULE UTILIZATION  
 MODULE UTILIZATION (PL)  
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 H721 CIRCUIT SCHEMATIC  
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 32 TO 8 BIT MULTIPLEXER  
 ROM DIODE MATRIX RECEIVERS  
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 DRAWING DIRECTORY  
 ROM DIODE MATRIX DECODER  
 AWT REVISION STATUS  
 WIRE LIST  
 ENGINEERING SPEC.  
 ACCEPTANCE PROCEDURE  
 OPTION ACCEPTANCE  
 H963-L CAB ASSY  
 H963-L CAB ASSY (PL)

SEQUENCE  
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 D-BS-VT15-0-36  
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 D-IC-VT15-0-38  
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 D-BS-VT15-0-40  
 D-BS-VT15-0-41  
 D-BS-VT15-0-42  
 D-BS-VT15-0-43  
 D-BS-VT15-0-44  
 D-MU-VT15-0-45  
 A-PL-VT15-0-45  
 A-SP-VT15-0-51  
 D-CS-H721-0-1  
 C-CS-716-0-1  
 D-CS-A618-YA-1  
 B-CS-A622-0-1  
 C-CS-M761-0-1  
 C-CS-M762-0-1  
 C-CS-A140-0-1  
 B-DD-VV15-0  
 C-CS-G618-0-1  
 A-WT-7006551-0  
 K-WL-VT15-0-46  
 A-SP-VT15-0-47  
 A-SP-VT15-0-48  
 A-SP-VT15-0-49  
 D-UA-H963-L-0  
 A-PL-H963-L-0

VAR	TITLE	PRINT SET			
		VT15-0			
VT15-A	GRAPHIC DISPLAY	X			
VT15-B	GRAPHIC DISPLAY	X			

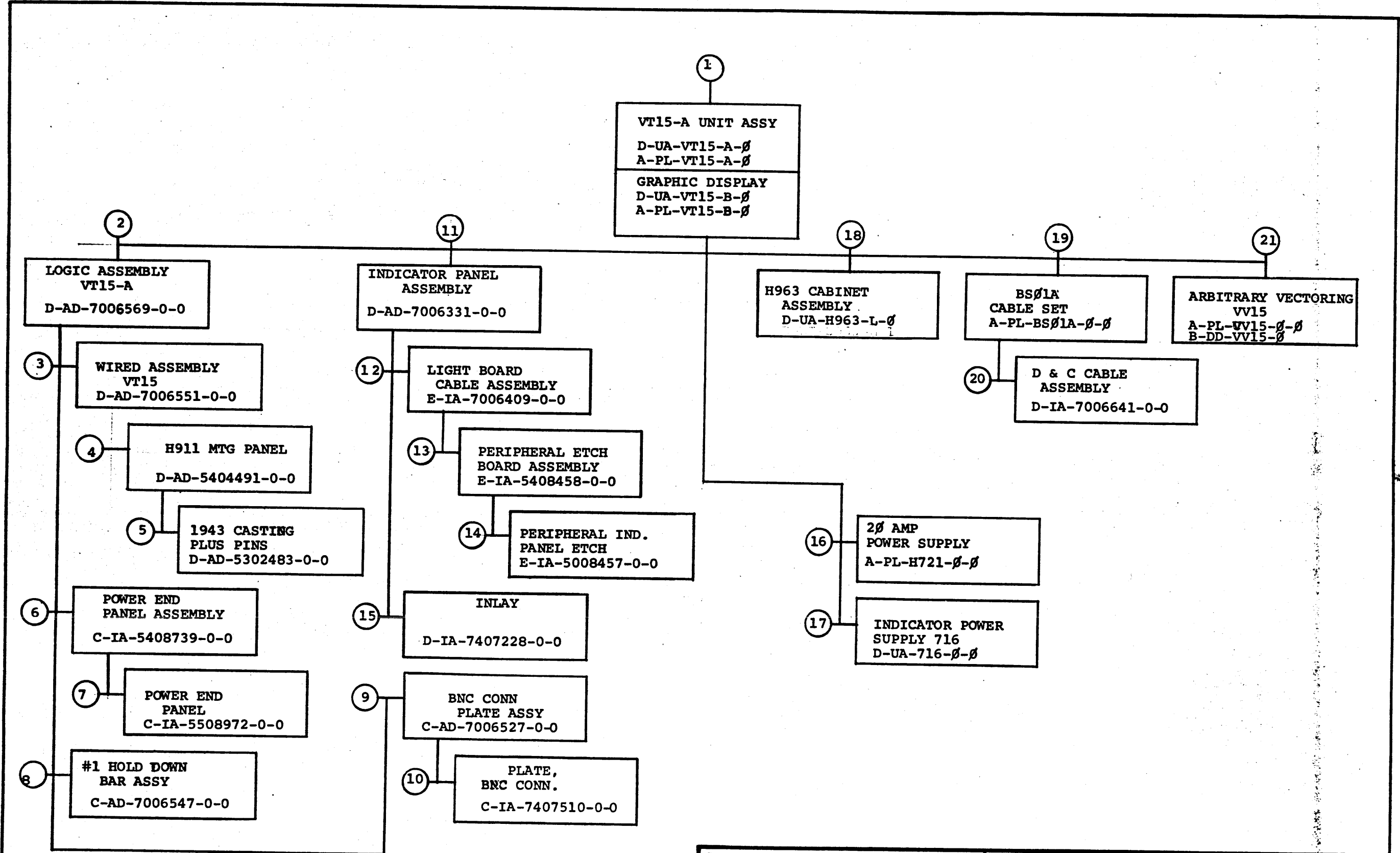
DEC 16-12321-1042-1A-M973

REVISIONS	REV	CHG. NO.	DATE
	AP	VT15-00055	12/73
	AR	VT15-00056	9/74
	AS	7006551-1	1/75
	AT	VT15-57	4/75
	AU	VT15-58	5-75
	AV	VT15-59	9-75
	AW	VT15-60	10-77

USED ON OPTION/MODEL	DRN. D.K. CRABBE	DATE 12-10-73	TITLE VT15 GRAPHIC DISPLAY
	CHK'D <i>D.K. Crabbe</i>	DATE 12-10-73	
	PROJ. ENG. <i>Howard Lawrie</i>	DATE 12-10-73	
	PROD. <i>C. Walsh</i>	DATE 12/10/73	
	FIELD SERV. <i>H. Crues</i>	DATE 12/11/73	

SHEET 1 OF 5

SIZE	CODE	NUMBER	REV
B	DD	VT15-0	AW



TITLE	VT15 GRAPHIC DISPLAY	SHEET 2 OF 5	SIZE CODE	B DD	NUMBER	VT15-Ø	REV	AW
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CUSTOMER PRINT SET		MECHANICAL					CUSTOMER PRINT SET		MECHANICAL								
VT15-Ø		MFG. SET	FIND NO.	DRAWING NO.	REV	NO OF SHT	DESCRIPTION	OPTION NO./FILE DATE	VT15-Ø		MFG. SET	FIND NO.	DRAWING NO.	REV	NO OF SHT	DESCRIPTION	OPTION NO./FILE DATE
			13	E-IA-5408458-0-0			PERIPHERAL ETCH BD ASSY					20	D-IA-7006641-0-0			D&C CABLE ASSY	
													D-AH-M912-Ø-5			ETCH BD ASSY	
													B-MD-7408020-0-0			CABLE CLAMP VT15	
			14	D-IA-5008457-0-0			PERIPHERAL IND. PANEL ETCH					21	A-PL-VV15-Ø-Ø			ARBITRARY VECTORING	
				K-CO-5408458-0-4			X-Y COORDINATE HOLE LOC.						B-DD-VV15-Ø			DRAWING DIRECTORY VV15	
				C-AH-5408458-0-5			ASSY DRILLING HOLE LAYOUT										
			15	D-IA-7407228-0-0			INLAY										
				C-SS-7407228-0-2			REAR SCREEN										
				C-SS-7407228-0-3			FRONT SCREEN										
			16	D-UA-H721-Ø-Ø		3	2Ø AMP POWER SUPPLY										
				A-PL-H721-Ø-Ø		4	2Ø AMP POWER SUPPLY										
			17	D-UA-716-Ø-Ø		1	IND. POWER SUPPLY 716										
				A-PL-716-Ø-Ø		2	IND. POWER SUPPLY (PL)										
			X 18	D-UA-H963-L-Ø		#	H963-L CABINET ASSY										
			X	A-PL-H963-L-Ø		#	H963-L CABINET ASSY (PL)										
				A-PL-H963-L-1			ENG. DRAWING H963-L										
			19	A-PL-BSØ1A-Ø-Ø			BSØ1A CABLE SET										
				C-IA-7006577-0-0			COAX CABLE ASSY										

CUSTOMER PRINT SET CODES  
X = PRINT OF DOCUMENT INCLUDED IN PRINT SET  
C = INCLUDES ALL PRINTS INDICATED ON DOCUMENT  
S = CONFIDENTIAL AUTHORIZED SIGNATURE REQUIRED

TITLE  
VT15  
GRAPHIC DISPLAY

SIZE CODE  
NUMBER  
SHEET 4 OF 5 B DD VT15-Ø

REV  
AW

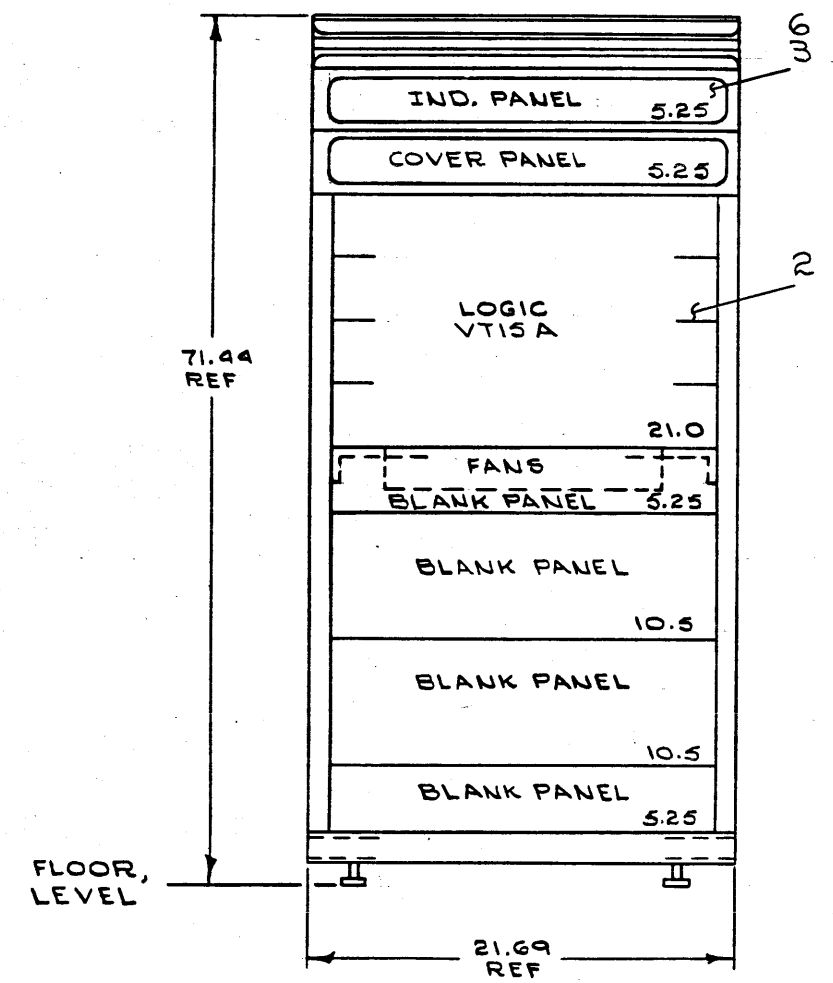
CUSTOMER PRINT SET		ELECTRICAL					CUSTOMER PRINT SET		ELECTRICAL						
VT15-0	MFG. SET	FIND NO.	DRAWING NO.	REV	NO OF SHT	DESCRIPTION	OPTION NO./FILE DATE	VT15-0	MFG. SET	FIND NO.	DRAWING NO.	REV	NO OF SHT	DESCRIPTION	OPTION NO./FILE DATE
X		1	D-UA-VT15-A-0	F	2	VT15-A UNIT ASSEMBLY		X			D-BS-VT15-0-36	H	1	PC 1,2,3,4,5, AND POINT	
X			A-PL-VT15-A-0	F	1	VT15-A UNIT ASSEMBLY (PL)		X			D-BS-VT15-0-37	F	1	DATA CHAN & API MULTIPLEX	
X			D-IC-VT15-A-2	B	2	CABLE CONFIGURATION		X			D-IC-VT15-0-38	A	1	LIGHT CABLES	
X			D-UA-VT15-B-0	B	2	GRAPHIC DISPLAY		X			D-BS-VT15-0-39	B	1	CHARACTER GEN INPUT MIXER	
X			A-PL-VT15-B-0	B	1	GRAPHIC DISPLAY (PL)		X			D-BS-VT15-0-40	F	1	CHARACTER GEN CONTROL	
X			D-IA-7006691-0-0	#		+15V PWR CABLE		X			D-BS-VT15-0-41	C	1	CHAR GEN READ-ONLY-MEMORY	
X			E-IA-7007120-0-0	#		DC PWR CABLE		X			D-BS-VT15-0-42	J	1	ADR & CHAR GEN CONTROL	
X			E-IA-7006692-0-0	#		DC PWR CABLE		X			D-BS-VT15-0-43	C	1	INT. & STATUS	
X			D-BS-VT15-0-01	A	1	UNIT BUFFER		X			D-BS-VT15-0-44	P	1	VECTOR GENERATOR	
X			D-BS-VT15-0-02	C	1	DATA BUFFER		X			D-MU-VT15-0-45	ACB	4	MODULE UTILIZATION	
X			D-BS-VT15-0-03	A	1	PARAMETER 1			X		A-PL-VT1500-45	ACB	3	MODULE UTILIZATION (PL)	
X			D-BS-VT15-0-04	E	1	PARAMETER 2			X		K-WL-VT15-0-46	AM	1	WIRE LIST	
X			D-BS-VT15-0-05	C	1	PARAMETER 3			X		A-SP-VT15-0-47	C	51	ENGINEERING SPECS.	
X			D-BS-VT15-0-06	-	1	INSTRUCTION DECODER			X		A-SP-VT15-0-48	B	12	ACCEPTANCE PROCEDURE	
X			D-BS-VT15-0-07	S	2	MAIN TIMING			X		A-SP-VT15-0-49	A	3	OPTION ACCEPTANCE	
X			D-BS-VT15-0-08	E	1	CONTROL TIMING 1		X			A-SP-VT15-0-50	-	23	ADJUSTMENT PROCEDURE	
X			D-BS-VT15-0-09	F	1	CONTROL TIMING 2		X			A-SP-VT15-0-51	*	47	ADJUSTMENT PROCEDURE	
X			D-BS-VT15-0-10	B	1	VT09 ADDRESS LINES		X			D-CS-A618-YA-1	#		DIGITAL TO ANALOG CONVERTER	
X			D-BS-VT15-0-11	R	1	GRAPHPLOT PT VECTOR INCREMENT		X			B-CS-A622-0-1	#		10 BIT SINGLE BUFFERED DAC 0-5 VOLT	
X			D-BS-VT15-0-12	K	1	INTENSITY & LIGHT PEN		X			C-CS-M761-0-1	#		32 TO 8 BIT MULTIPLEXER	
X			D-BS-VT15-0-13	B	1	D REGISTER		X			C-CS-M762-0-1	#		ROM DIODE MATRIX RECEIVERS	
X			D-BS-VT15-0-14	-	1	PC X&Y REGISTER 1		X			C-CS-A140-0-1	#		DUAL ANALOG SWITCH	
X			D-BS-VT15-0-15	-	1	PC X&Y REGISTER 2					C-CS-G618-0-1	#		ROM DIODE MATRIX DECODER	
X			D-BS-VT15-0-16	-	1	PC X&Y REGISTER 3		X		3	D-AD-7006551-0-0	#	3	WIRED ASSY (VT15)	
X			D-BS-VT15-0-17	F	2	MISC CONTROL		X			A-PL-7006551-0-0	#	1	WIRED ASSY (VT15) PL	
X			D-BS-VT15-0-18	A	1	BUS RECEIVERS		X			A-WT-7006551-0	#	1	AWT REVISION STATUS	
X			D-BS-VT15-0-19	A	2	ADDER GATING 6 & 7									
X			D-BS-VT15-0-20	-	1	ADDER GATING 8 & 9									
X			D-BS-VT15-0-21	A	1	ADDER GATING 10 & 11		X		16	D-CS-H721-0-1	#	1	H721 CIRCUIT SCHEMATIC	
X			D-BS-VT15-0-22	-	1	ADDER GATING 12 & 13									
X			D-BS-VT15-0-23	-	1	ADDER GATING 14 & 15									
X			D-BS-VT15-0-24	-	1	ADDER GATING 16 & 17		X		17	C-CS-716-0-1	#		CIRCUIT SCHEMATIC 716	
X			D-BS-VT15-0-25	E	1	DIRECTION & ROTATE 1									
X			D-BS-VT15-0-26	B	1	DIRECTION & ROTATE 2									
X			D-BS-VT15-0-27	E	1	SKIP 1 AND DATA & CONT. BUS									
X			D-BS-VT15-0-28	D	2	SKIP 2									
X			D-BS-VT15-0-29	C	1	SKIP REQUEST AND INC CT. REG.				21	A-PL-VV15-0-0		1	ARBITRARY VECTORING	
X			D-BS-VT15-0-30	C	1	DAC		C			B-DD-VV15-0	#	2	DRAWING DIRECTORY VV15	
X			D-BS-VT15-0-31	B	1	I/O DECODER									
X			D-BS-VT15-0-32	B	1	I/O BUS 0-5									
X			D-BS-VT15-0-33	A	1	I/O BUS 6-11									
X			D-BS-VT15-0-34	B	1	I/O BUS 12-17									
X			D-IC-VT15-0-35	A	1	CABLES									

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C = INCLUDES ALL PRINTS INDICATED ON DOCUMENT  
S = CONFIDENTIAL AUTHORIZED SIGNATURE REQUIRED

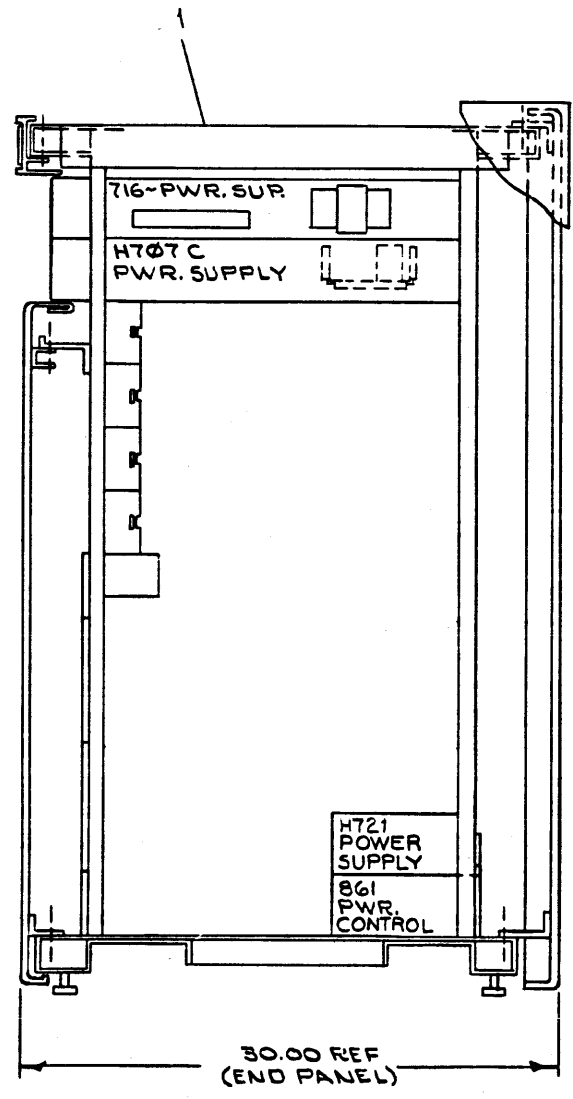
TITLE VT15 GRAPHIC DISPLAY  
SIZE CODE B DD  
NUMBER VT15-0  
REV AW  
SHEET 5 OF 5

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NOTES:  
 1. FOR DRAWING INDEX LIST REFER TO: B-DD-VT15-0  
 2. FOR CABLE CONFIGURATION OF VT15A/B, REFER TO D-IC-VT15-A-2



FRONT VIEW (WITHOUT DOOR)



REV.	CHANGE NO.	DATE
A	VT15-00004	4-8-70
B	VT15A-00004	4-8-70
C	MISC-00014	8-19-70
D	VT15-00014	10-14-70
E	VT15-00055	1-16-71
F	VT15-00058	1-16-71

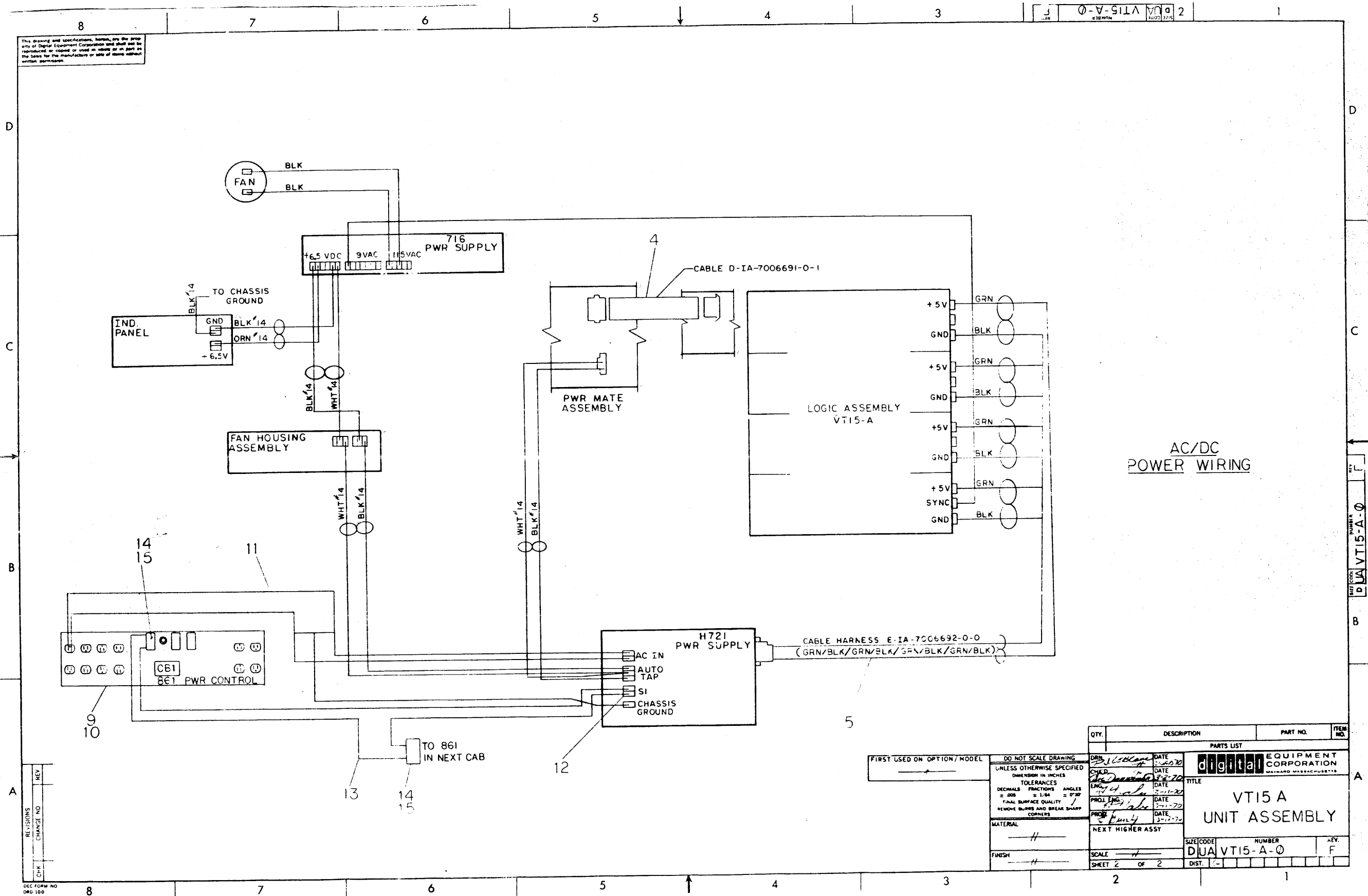
FIRST USED ON OPTION/MODEL  
 #

DO NOT SCALE DRAWING UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES	DRN: <i>[Signature]</i> DATE: 2/6/70 CHKD: <i>[Signature]</i> DATE: 3-2-70 ENG: <i>[Signature]</i> DATE: 3-7-70 PROL ENG: <i>[Signature]</i> DATE: 5-3-70 PROD: <i>[Signature]</i> DATE: 2-3-71
TOLERANCES DECIMALS FRACTIONS ANGLES ± .005 ± 1/64 ± 0°30'	FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS
MATERIAL #	NEXT HIGHER ASSY #
FINISH #	SCALE #

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
digital EQUIPMENT CORPORATION MAYFIELD, MASSACHUSETTS			
TITLE VT15 A UNIT ASSEMBLY			
SIZE/ CODE	NUMBER	REV.	
DUA VT15-A-0		F	
SHEET 1 OF 2	DIST. C		

DEC FORM NO. 000 000

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AC/DC  
POWER WIRING

VT15-A-0  
REV. CODE  
DUA

REV	NO
CHG	NO
CHG	NO

FIRST USED ON OPTION/ MODEL

DO NOT SCALE DRAWING  
UNLESS OTHERWISE SPECIFIED  
DIMENSION IN INCHES  
TOLERANCES  
DECIMALS FRACTIONS ANGLES  
± .005 ± 1/64 ± 0°30'  
FINAL SURFACE QUALITY  
REMOVE BURRS AND BREAK SHARP CORNERS  
MATERIAL  
FINISH

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
<b>digital</b> EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS			
TITLE <b>VT15 A UNIT ASSEMBLY</b>			
SCALE		SHEET	OF
DIST.		NO.	REV.
DUA		VT15-A-0	F

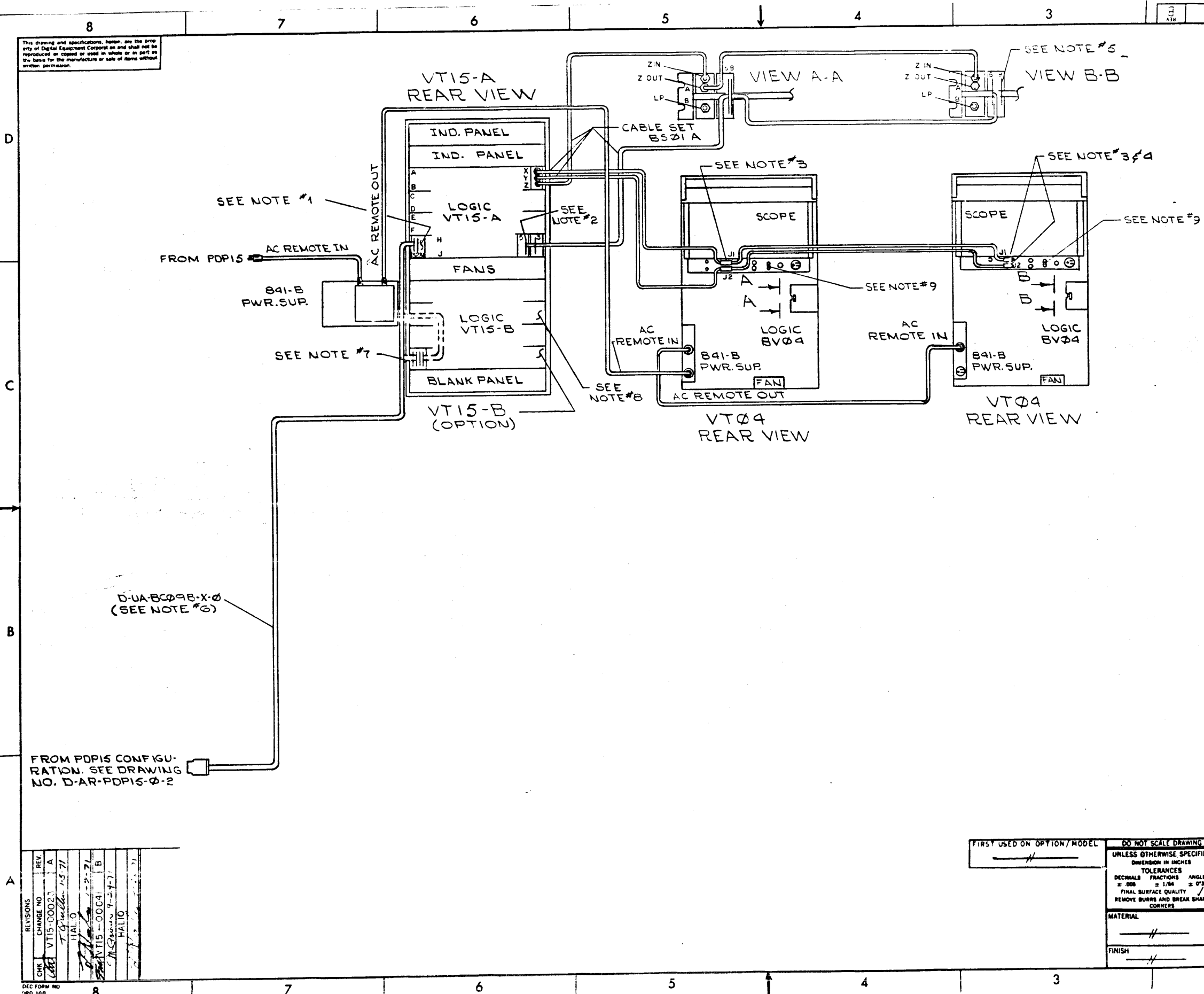
**DIGITAL EQUIPMENT CORPORATION**  
MAYNARD, MASSACHUSETTS  
**PARTS LIST**

MADE BY P. LE BLANC	CHECKED <i>De D...</i>	SECTION
DATE 11/5/69	DATE 3-2-70	1
ENG <i>Lra mms</i>	PROD <i>J Bandy</i>	ISSUED SECT.
DATE 3-3-70	DATE 3-3-70	1

		QUANTITY/VARIATION									
ITEM NO.	DWG NO./PART NO.	DESCRIPTION	VT15-AA	VT15-AB							
1	D-UA-H963-LA-0	H963-LA CAB ASSEMBLY	1	-							
2	D-AD-7006569-0-0	LOGIC ASSY VT15-A	1	1							
3	D-AD-7006331-2-0	INDICATOR PANEL ASSY	1	1							
4	D-IA-7006691-1-0	+ 15V PWR CABLE (VT15)	1	1							
5	E-IA-7006692-0-0	DC POWER CABLE	1	1							
6	A-PL-BS01A-0-0	CABLE SET (NOT SHOWN)	1	1							
7	9006074-2	SCR PHL FLT HD #10-32 X 5/8	4	4							
8	D-UA-H963-LB-0	H963-LB CAB ASSEMBLY	-	1							
9	E-UA-861-C-0	PWR CONTROL	REF	-							
10	E-UA-861-B-0	PWR CONTROL	-	REF							
11	9107673-3	EXT CORD 3 FT	REF	REF							
12	9007970	CONNECTOR, QUICK CONN	REF	REF							
13	9107430-29	WIRE 18 AWG TWP RED/WHT	REF	REF							
14	1209378-00	PIN MALE	REF	REF							
15	1209351-03	PIN HOUSING	REF	REF							

TITLE	ASSY NO.	SIZE	CODE	NUMBER	REV.	ECO NO.
VT15-A UNIT ASSEMBLY	D-UA-VT15-A-0	A	PL	VT15-A-0	F	VT15-100058
	SHEET 1 OF 1	DIST.				

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- NOTES**
1. TERMINATE SLOTS HJ-29 & 30 WITH M909.
  2. TERMINATE SLOT HJ-5 WITH M910.
  3. USE BNC (TEE) CONNECTOR NUMBER 1209746 IN J1 AND J2.
  4. WHEN USING LAST VT04 IN SEQUENCE, TERMINATE J1 & J2 WITH ONE BNC TERMINATOR B-1A-5308706-0 AND ONE VARIABLE BNC TERMINATOR (Φ-200 CHMS) B-1A-7409303-0-0. FOR APPROPRIATE INSTALLATION REFER TO THE VT15 SYSTEM ADJUSTMENT PROCEDURE (SP-VT15-Φ-49).
  5. IN LAST VT04, TERMINATE AT END OF BUS WITH AN M909 IF VM15 IS NOT USED.
  6. LENGTH OF CABLE (BC09B-Y-Φ) WILL VARY TO SPECIFICATIONS OF CUSTOMER.
  7. I/O CABLE WILL RUN TO VT15B (HJ-32 & 31) THEN TO VT15A (HJ-32 & 31) IF OPTION DESIGNATED IS USED.
  8. ALL WIRING ON VT15B IS IDENTICAL TO WIRING ON VT15A.
  9. REMOVE GROUND STRAP IN VT04 AND REPLACE WITH A 100 OHM, 1/4 WATT, 5% RESISTOR (PART #1300229) IN PARALLEL WITH A .01μF CAPACITOR.

FROM PDP15 CONFIGURATION. SEE DRAWING NO. D-AR-PDP15-Φ-2

REV	CHANGE NO.	DATE	BY	CHKD
A	VT15-00023	1-5-71	J. G. ...	
B	VT15-00041	9-2-71	M. ...	
C	VT15-00041	9-2-71	M. ...	

DEC FORM NO. 500 100

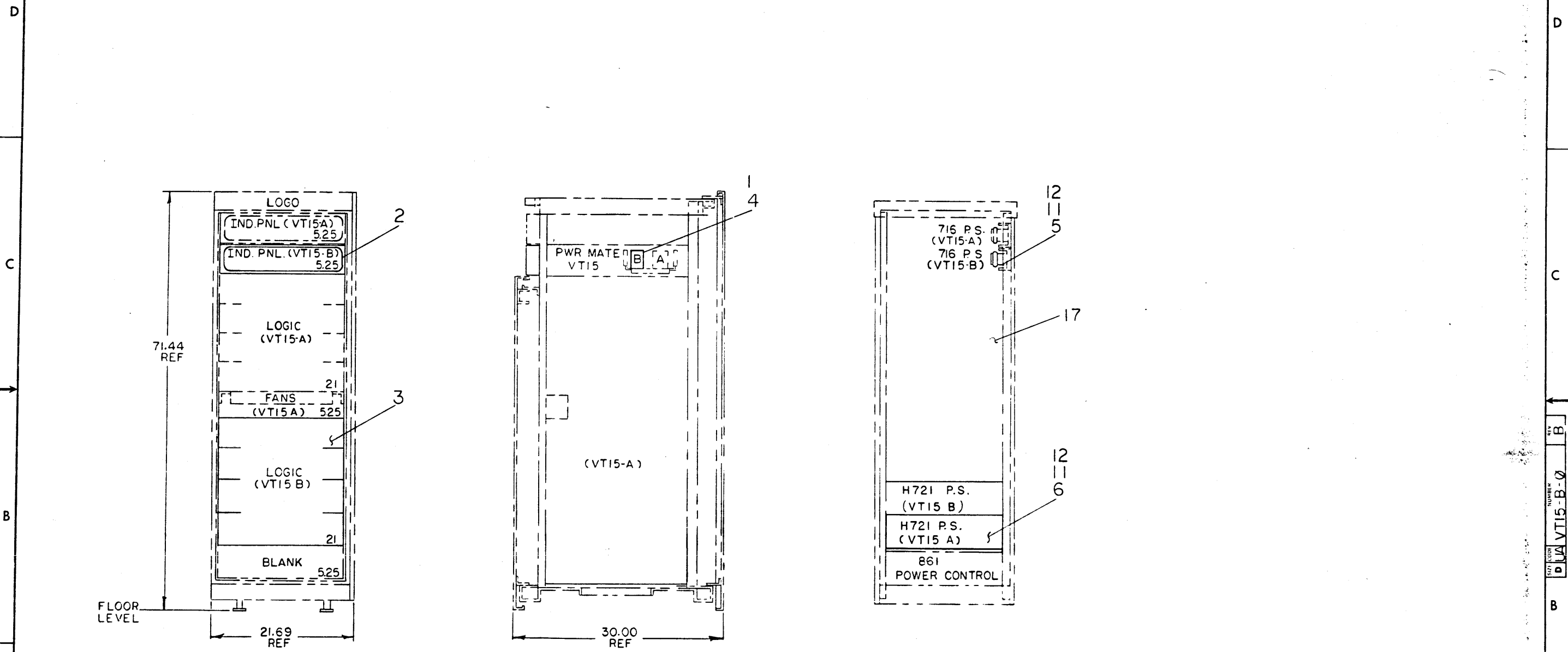
QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
<b>CABLE CONFIGURATION VT15A/B</b>			
FIRST USED ON OPTION/ MODEL		DATE	
/		3-1-70	
DO NOT SCALE DRAWING		DATE	
UNLESS OTHERWISE SPECIFIED		3-1-70	
DIMENSION IN INCHES		DATE	
TOLERANCES		3-1-70	
DECIMALS	FRACTIONS	ANGLES	DATE
± .001	± 1/64	± 0°30'	3-1-70
FINAL SURFACE QUALITY		DATE	
REMOVE BURRS AND BREAK SHARP CORNERS		3-1-70	
MATERIAL		DATE	
/		3-1-70	
FINISH		DATE	
/		3-1-70	
NEXT HIGHER ASSY		DATE	
D-UA-VT15-A-Φ		3-1-70	
SCALE		DATE	
/		3-1-70	
SHEET		DATE	
/		3-1-70	

DUA-VT15-A-2

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**NOTES:**  
 1. FOR DRAWING INDEX LIST REFER TO: B-DD-VT15-Ø.  
 2. PUT BOTH H721 PWR SUPPLY ON REAR DOOR.

8 7 6 5 4 3 2 1



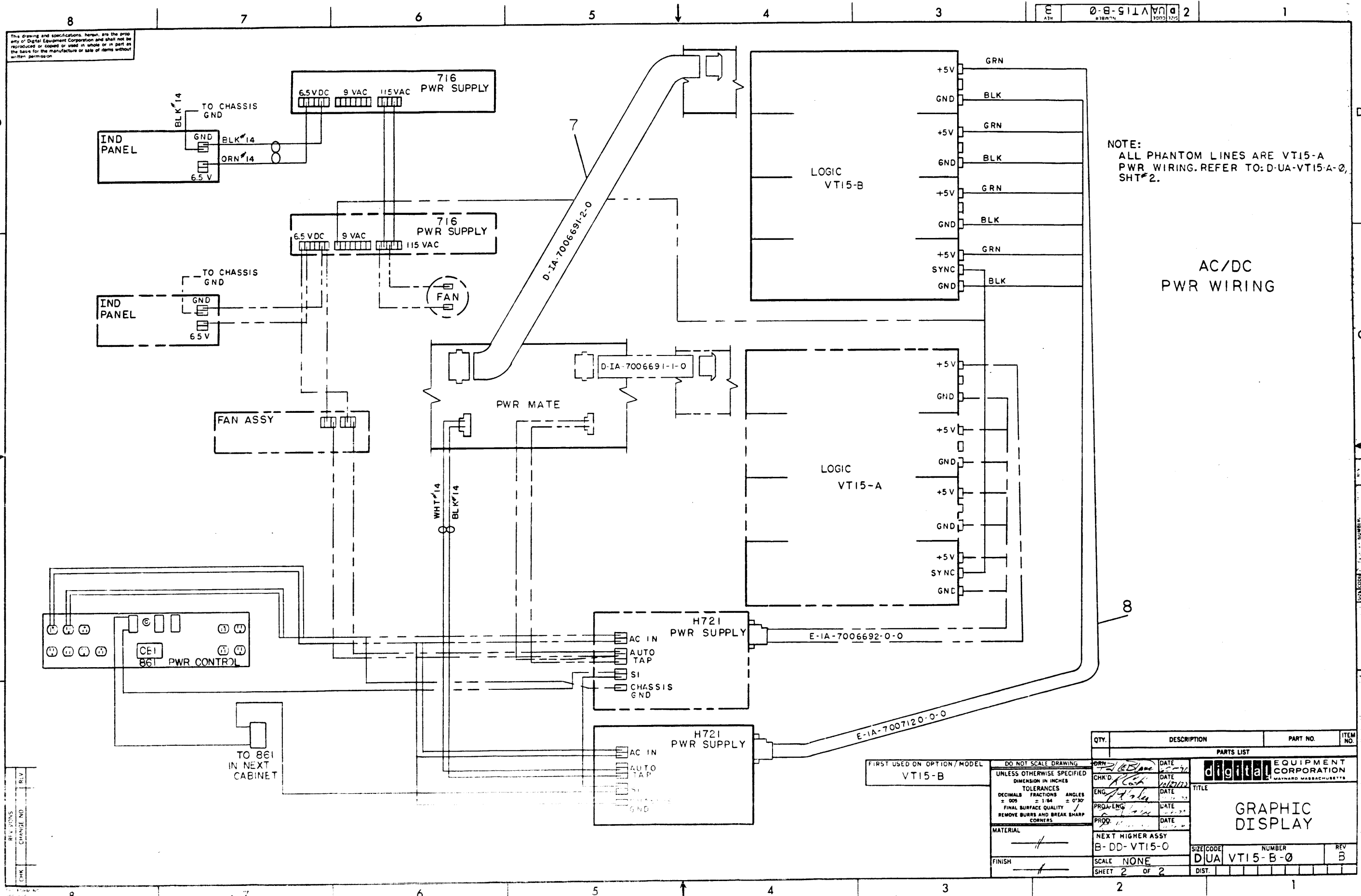
REV	CHG	NO	DATE	BY	APP
1		VT15-00055	1-29-74	HALIO	
2		VT15-00018	5-14-74	F. REMOND	
3		VT15-00018	5-14-74	F. DOLI	

FIRST USED ON OPTION MODEL  
VT15-B

DO NOT SCALE DRAWING  
 UNLESS OTHERWISE SPECIFIED  
 DIMENSION IN INCHES  
 TOLERANCES  
 DECIMALS FRACTIONS ANGLES  
 ±.009 ±.009 ±.009 ±.009 ±.009 ±.009  
 FINAL SURFACE QUALITY  
 REMOVE BURRS AND BREAK SHARP CORNERS

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
		<b>digital</b> EQUIPMENT CORPORATION MAYNARD MASSACHUSETTS	
		TITLE <b>GRAPHIC DISPLAY</b>	
		SIZE CODE <b>DUA</b>	NUMBER <b>VT15-B-Ø</b>
		SCALE <b>NONE</b>	REV <b>B</b>
		SHEET <b>2</b>	OF <b>2</b>
		DIST.	

8 7 6 5 4 3 2 1



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NOTE:  
ALL PHANTOM LINES ARE VT15-A  
PWR WIRING. REFER TO: D-UA-VT15-A-0,  
SHT#2.

AC/DC  
PWR WIRING

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
ORN CHK'D ENG PROJ-ENG PROD		DATE DATE DATE DATE DATE	
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES TOLERANCES DECIMALS FRACTIONS ANGLES ± .005 ± 1/64 ± 0°30' FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS		<b>digital</b> EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
MATERIAL FINISH		TITLE <b>GRAPHIC DISPLAY</b>	
FIRST USED ON OPTION / MODEL VT15-B		NEXT HIGHER ASSY B-DD-VT15-0	
DO NOT SCALE DRAWING		SIZE CODE DUA VT15-B-0	
SCALE NONE		NUMBER 2 OF 2	
SHEET 2 OF 2		REV B	

REV	NO	DATE	BY
CHK	NO		

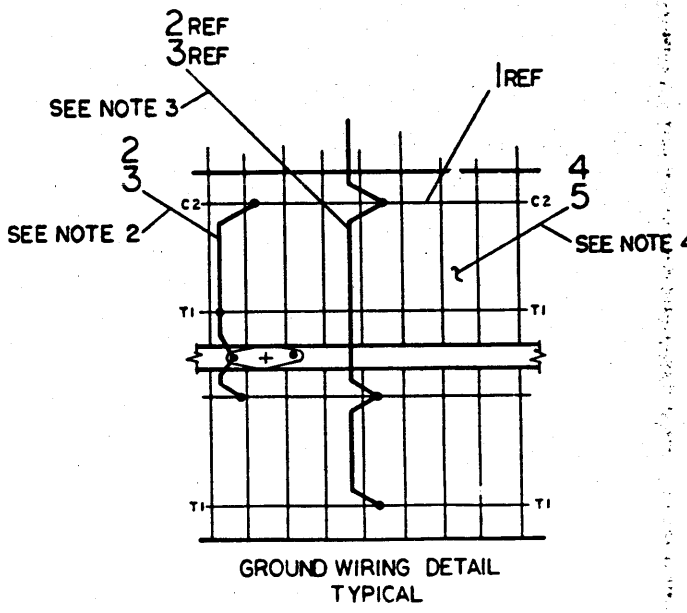
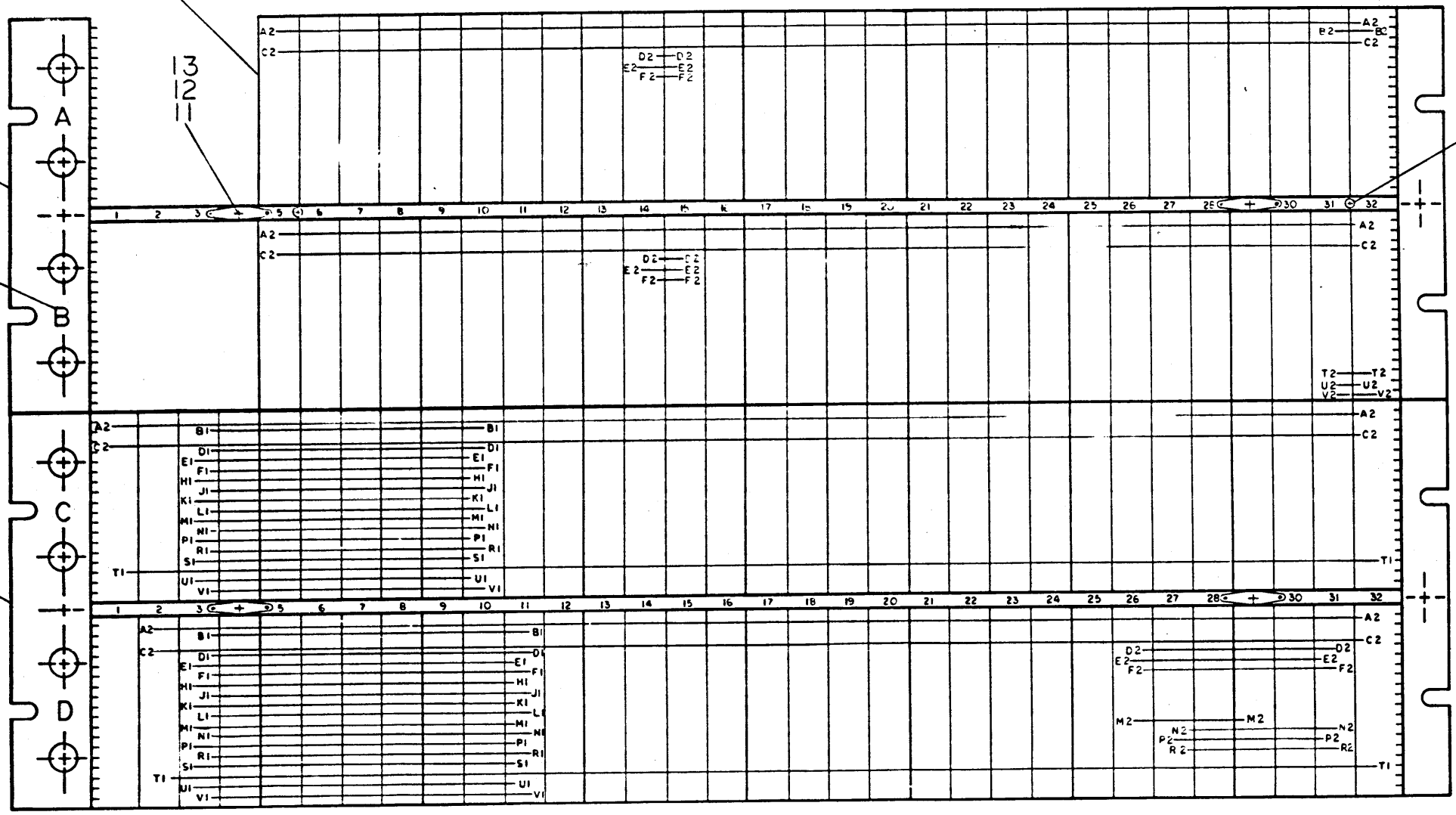


DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS				QUANTITY/VARIATION												
PARTS LIST																
MADE BY P. LEBLANK		CHECKED R. COOK		SECTION												
DATE 10-7-70		DATE 10-16-70		1												
ENG <i>J. Graham</i>		PROD <i>H. Bentley</i>		ISSUED SECT.												
DATE 11-4-70		DATE 11-12-70		1												
ITEM NO.	DWG NO./PART NO.	DESCRIPTION														
1	9906794	SPACER, 1/2 AF x 1/8 LG#6 HOLE			4											
2	D-AD-7006331-2-0	INDICATOR PANEL ASSEMBLY			1											
3	D-AD-7006569-0-0	LOGIC ASSY VT15-A			1											
4	1203185-2	POWER MATE POWER SUPPLY			1											
5	D-UA-716-0-0	INDICATOR POWER SUPPLY			1											
6	A-PL-H721-Ø-Ø	POWER SUPPLY, 20 AMP. (1209603)			1											
7	D-IA-7006691-2-0	+ 15 PWR CABLE			1											
8	E-IA-7007120-0-0	DC PWR CABLE			1											
9	9107440-29	WIRE #14 AWG STRD TWP RED/WHT			A/R											
10	9107440-03	WIRE #14 AWG STRD TWP BLK/ORN			A/R											
11	9006074-1	SCR, PHL HD PAN #10-32 x 5/8			8											
12	9007786	NUT, TINNERMAN #C31758-032-27			8											
13	9107370-00	WIRE #14 AWG STRD TEF BLK			A/R											
14	9107370-11	WIRE #14 AWG STRD TEF BRN			A/R											
15	9107440-09	WIRE #14 AWG STRD TWP BLK/WHT			A/R											
16	9007919	CONN, SOLDERLESS #50906 ARKLESS			A/R											
17	D-UA-H950-DA-0	H950-DA MTG PANEL DOOR R.H.			1											
TITLE		ASSY NO.		SIZE	CODE	NUMBER			REV.	ECO NO.						
GRAPHIC DISPLAY		D-UA-VT15-B-Ø		A	PL	VT15-2-0			B	VT15-00058						
		SHEET 1 OF 1		DIST.												

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- NOTES:
1. CONNECTIONS ON ITEM NUMBER 1#2 TO BE LOCATED AND SOLDERED AT MINIMUM PRACTICAL HEIGHT ABOVE BLOCKS.
  2. ALL CONNECTOR BLOCKS TO BE GROUNDED TO GROUND LUGS AS SHOWN, 4 PLACES
  3. JUMPER GROUND BUSSING AS SHOWN, 8 PLACES.
  4. USE YELLOW WIRE (ITEM#4) FOR MACHINE WRAPPED AND BLUE WIRE (ITEM#5) FOR HAND WRAPPED WIRING.

D  
C  
B  
A

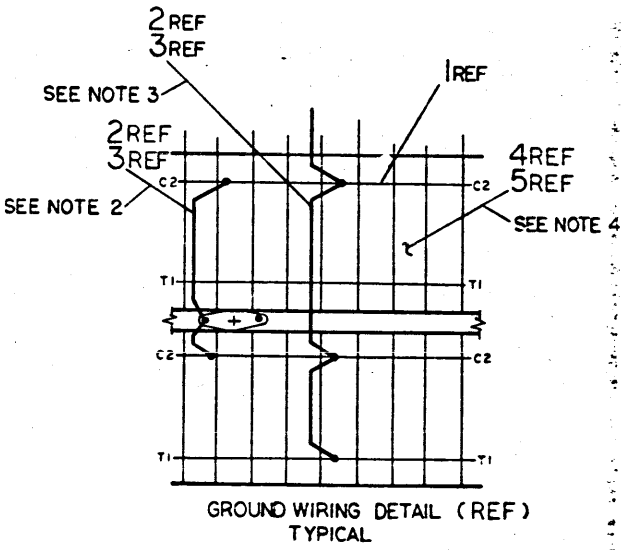
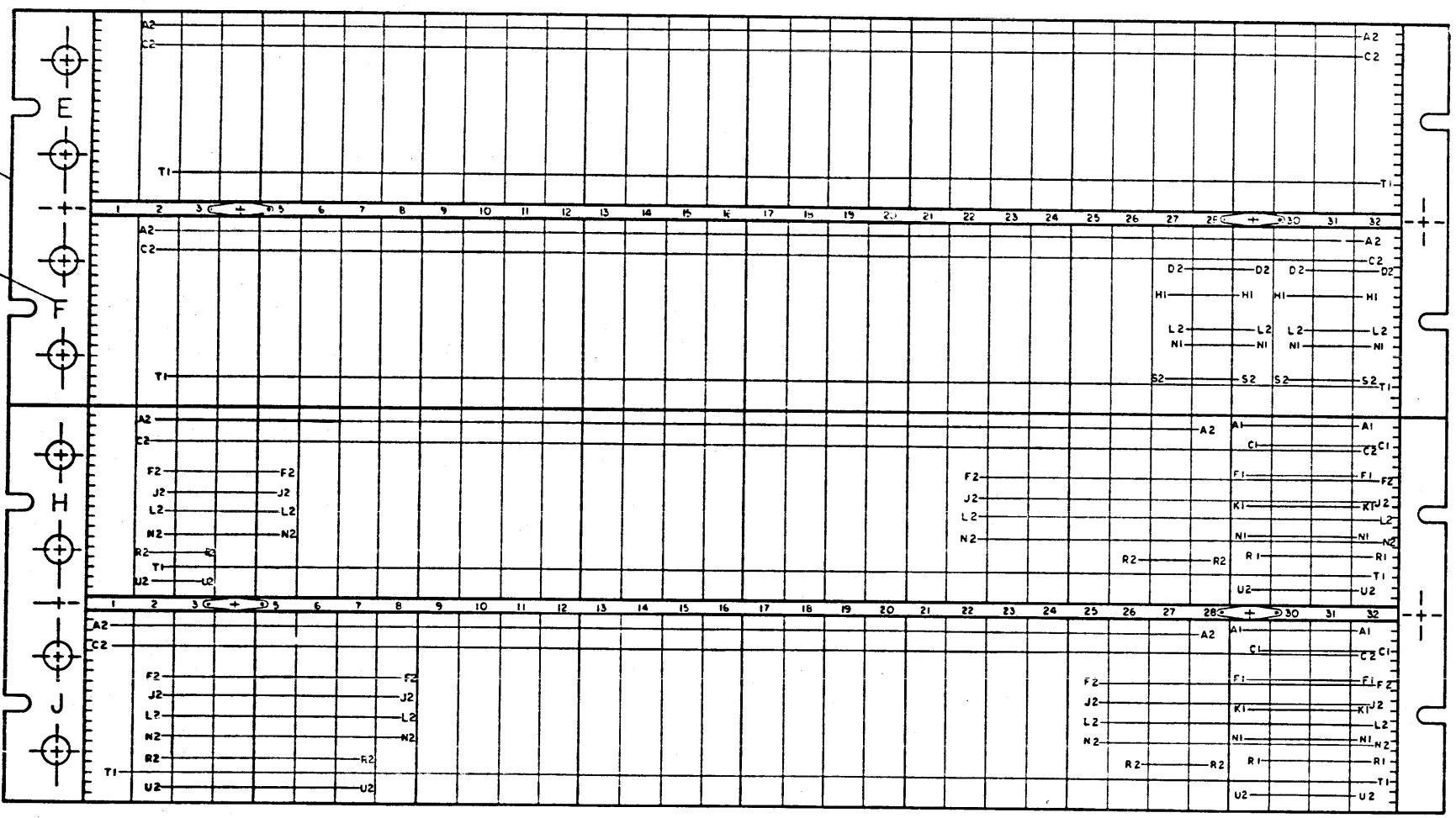


REV.	CHG. NO.	DATE	BY
1	VT15-00010	10-11-70	A
2	VT15-00011	10-11-70	U
3	VT15-00012	10-11-70	U
4	VT15-00013	10-11-70	C
5	VT15-00014	10-11-70	C
6	VT15-00015	10-11-70	C
7	VT15-00016	10-11-70	C
8	VT15-00017	10-11-70	C
9	VT15-00018	10-11-70	C
10	VT15-00019	10-11-70	C
11	VT15-00020	10-11-70	C
12	VT15-00021	10-11-70	C
13	VT15-00022	10-11-70	C
14	VT15-00023	10-11-70	C
15	VT15-00024	10-11-70	C
16	VT15-00025	10-11-70	C
17	VT15-00026	10-11-70	C
18	VT15-00027	10-11-70	C
19	VT15-00028	10-11-70	C
20	VT15-00029	10-11-70	C
21	VT15-00030	10-11-70	C
22	VT15-00031	10-11-70	C
23	VT15-00032	10-11-70	C
24	VT15-00033	10-11-70	C
25	VT15-00034	10-11-70	C
26	VT15-00035	10-11-70	C
27	VT15-00036	10-11-70	C
28	VT15-00037	10-11-70	C
29	VT15-00038	10-11-70	C
30	VT15-00039	10-11-70	C
31	VT15-00040	10-11-70	C
32	VT15-00041	10-11-70	C

FIRST USED ON OPTION/MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
VT15				
PARTS LIST				
EQUIPMENT CORPORATION MAYFIELD, MASSACHUSETTS				
WIRED ASS'Y VT15				
D AD 7006551-0-0				
SHEET 1 OF 5				

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- NOTES:**
1. CONNECTIONS ON ITEM NUMBER 1 & 2 TO BE LOCATED AND SOLDERED AT MINIMUM PRACTICAL HEIGHT ABOVE BLOCKS
  2. ALL CONNECTOR BLOCKS TO BE GROUNDED TO GROUND LUGS AS SHOWN, 4 PLACES
  3. JUMPER GROUND BUSSING AS SHOWN, 4 PLACES
  4. USE YELLOW WIRE (ITEM #4) FOR MACHINE WRAPPED AND BLUE WIRE (ITEM #5) FOR HAND WRAPPED WIRING.



FIRST USED ON OPTION/MODEL VT 15		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST					
DO NOT SCALE DRAWING	DRN. <i>[Signature]</i>	DATE	DIGITAL EQUIPMENT CORPORATION		
UNLESS OTHERWISE SPECIFIED	CHUCK <i>[Signature]</i>	DATE	TITLE		
DIMENSION IN INCHES	<i>[Signature]</i>	DATE	WIRED ASS'Y		
TOLERANCES	<i>[Signature]</i>	DATE	VT15		
DECIMALS FRACTIONS ANGLES	<i>[Signature]</i>	DATE	NEXT HIGHER ASSY		
± .005 ± .001 ± .0007	PROJ. <i>[Signature]</i>	DATE	D-AD-7006551-0-0		
FINAL SURFACE QUALITY	PROD. <i>[Signature]</i>	DATE	SCALE CODE NUMBER		
REMOVE BURRS AND BREAK SHARP CORNERS			D AD 7006551-0-0		
MATERIAL			SCALE NUMBER		
			D AD 7006551-0-0		
FINISH			SCALE NONE		
			SHEET 2 OF 3		

REV. J  
D AD-7006551-0-0

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WIRE TABLE				
ITEM	DESCRIPTION		FROM	TO
NO.	AWG	COLOR	CONNECTION	CONNECTION
2,3	22	WHITE	A31 - E2	A20 - E2
			A17 - E2	A15 - E2
			A17 - E2	A20 - E2
			A17 - F2	A15 - F2
			A17 - F2	A20 - F2
			A20 - D2	A15 - D2
			A14 - D2	B14 - D2
			A14 - E2	B14 - E2
			A14 - F2	B14 - F2
			B31 - T2	B28 - T2
			B31 - U2	B28 - U2
			B31 - V2	B28 - V2
			E25 - T2	B20 - F2
			E25 - U2	B20 - E2
			E25 - V2	B20 - D2
			B15 - D2	B17 - D2
			B15 - E2	B17 - E2
			B15 - F2	B17 - F2
			B17 - D2	E20 - D2
			B17 - E2	E20 - E2
			B17 - F2	E20 - F2
			B25 - T2	E28 - T2
			B25 - U2	E28 - U2
			B25 - V2	E28 - V2
			A15 - D2	A17 - D2
			A20 - F2	B20 - F2
2,3	22	WHITE	A17 - F2	B17 - F2
2,3	22	WHITE	B32 - D2	B20 - F2

REV	
CHANGE NO.	
CHK	

FIRST USED ON OPTION/MODEL VT15	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST				
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES TOLERANCES	DRN. LEBLANC DATE 04-73	CHK'D. [Signature] DATE 12-73	DIGITAL EQUIPMENT CORPORATION MAYNARD MASSACHUSETTS	
DECIMALS .005 XX .02 X .1	ANGLES ±0° 30'	ENG. HALIO PROJ. ENG. HALIO DATE 3-11-73	TITLE WIRED ASSY VT 5	
REMOVE BURRS AND BREAK SHARP CORNERS SURFACE QUALITY ✓	PRODD. RUNDY DATE 3-11-73	NEXT HIGHER ASSY. D-AD-7005569-0-0		
MATERIAL	FINISH	SCALE NONE	SHEET 2 OF 2	SIZE CODE NUMBER REV D-AD-7005569-0-0 DAF 7005569-0-0 J

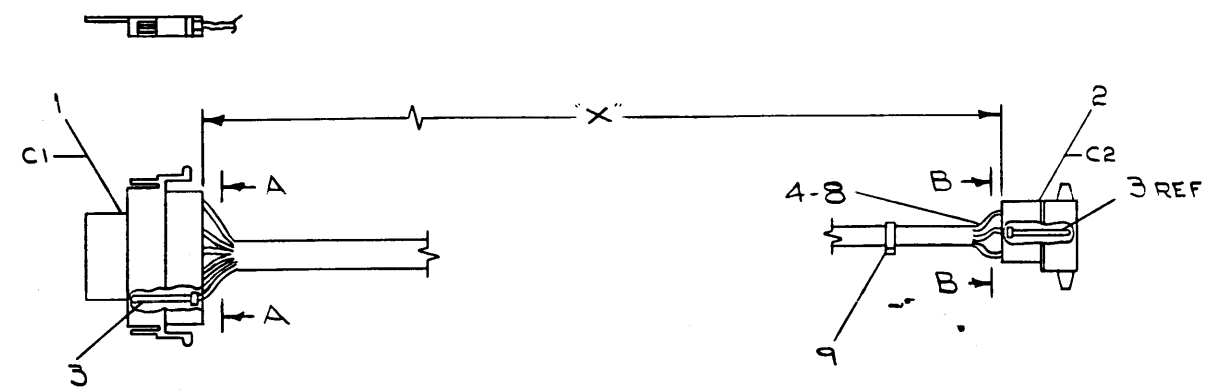
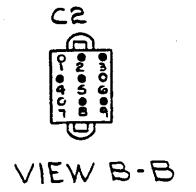
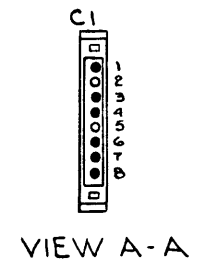
REV J  
ITEM NO. 7005569-0-0  
SIZE CODE DAF



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LEGEND		
NUMBER	VARIATION	FIRST USED ON
7006691-1	13.25	VT15-A
7006691-2	52	VT15-B

WIRE TABLE							
ITEM NO	DESCRIPTION	FROM		TO		CONNECTION WITH	CONNECTION WITH
		CONNECTION	WITH	CONNECTION	WITH		
4	18 BLK	C1-1	3	C2-4	3		
5	18 RED	C1-3	3	C2-9	3		
6	18 ORN	C1-4	3	C2-8	3		
7	18 BLU	C1-6	3	C2-3	3		
8	18 VIO	C1-7	3	C2-2	3		
4	18 BLK	C1-8	3	C2-5	3		



QTY.	DESCRIPTION	PART NO.	ITEM NO.
	ARTIE WRAP PANDUIT #SST-28	9007032	9
	AW WIRE #18 STRD TEF VIO	9107360-77	8
	AW WIRE #18 STRD TEF BLU	9107360-66	7
	AW WIRE #18 STRD TEF CRN	9107360-33	6
	AW WIRE #18 STRD TEF RED	9107360-22	5
	AW WIRE #18 STRD TEF BLK	9107360-03	4
	12 MTE CONTACT PIN	1209378	3
	1 PANEL MOUNT CONN MATE-N-LOCK	1209351-09	2
	1 SOCKET HOUSING MATE-N-LOCK	1209340-01	1

REV	CHANGE NO	DATE
1	VT15-0011	11-1-70
2	VT15-0011	11-1-70
3	VT15-0011	11-1-70
4	VT15-0011	11-1-70
5	VT15-0011	11-1-70
6	VT15-0011	11-1-70
7	VT15-0011	11-1-70
8	VT15-0011	11-1-70

FIRST USED ON OPTION/MODEL  
SEE LEGEND

DO NOT SCALE DRAWING  
UNLESS OTHERWISE SPECIFIED  
DIMENSION IN INCHES  
TOLERANCES  
DECIMALS FRACTIONS ANGLES  
±.000 ±.004 ±.020  
FINAL SURFACE QUALITY  
REMOVE BURRS AND BREAK SHARP CORNERS  
MATERIAL  
FINISH

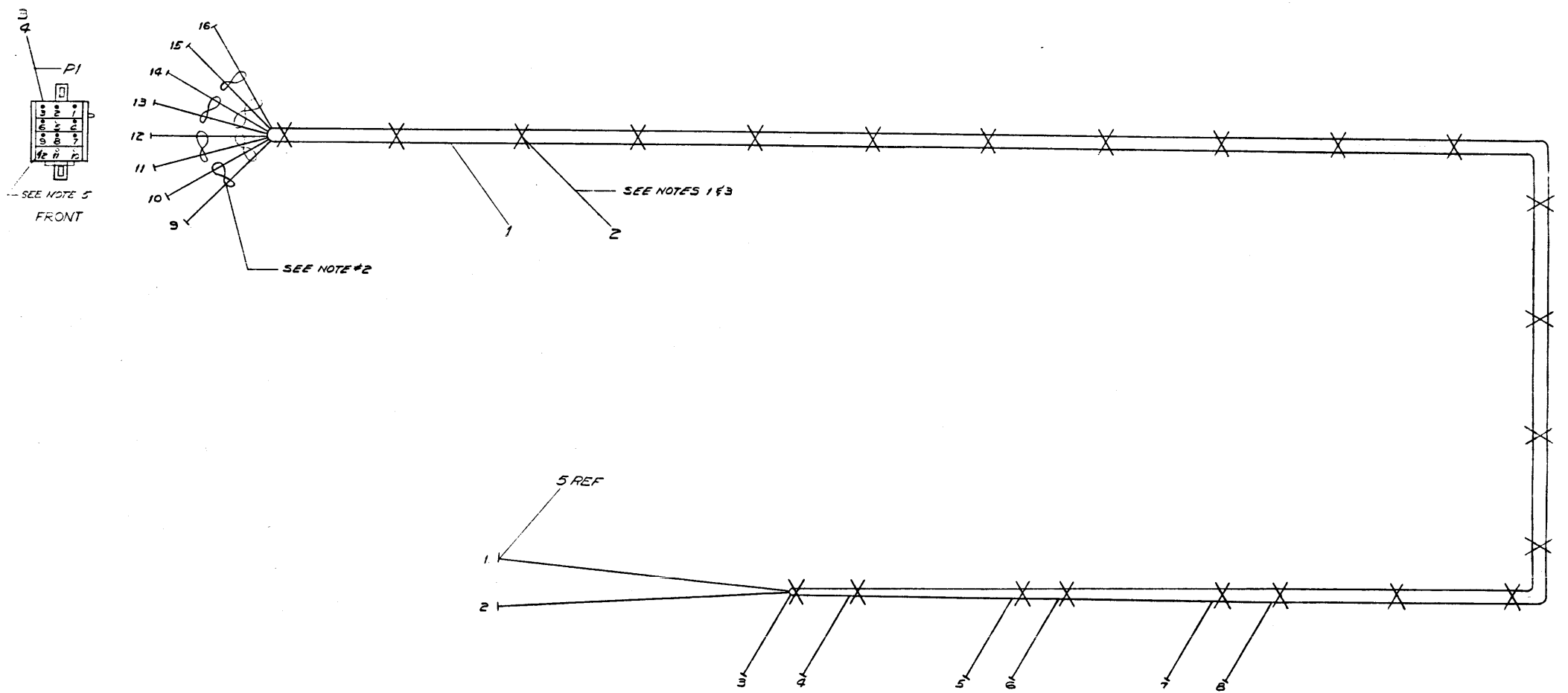
DRN: [Signature] DATE: 11-1-70  
CHKD: [Signature] DATE: 11-1-70  
ENG: [Signature] DATE: 11-1-70  
PROJ: [Signature] DATE: 11-1-70  
NEXT HIGHER ASSY  
D-UA-VT15-A-0

digital EQUIPMENT CORPORATION  
MAYNARD, MASSACHUSETTS  
TITLE  
±15V PWR CABLE (VT15)  
SIZE CODE: DIA7006691-0-0  
NUMBER: 1  
REV: 1  
SHEET 1 OF 1

1. A wiring diagram is a schematic diagram which shows the electrical connections between components of a system. It is a representation of the physical system in a simplified manner. It is used to design, troubleshoot, and repair electrical systems.

WIRE TABLE								
NO.	FROM	TO	POINT CONNECTION WITH	POINT CONNECTION WITH	TO	POINT CONNECTION WITH	POINT CONNECTION WITH	TO
1	16	PI-6	1	5	15	PI-8	3	9
1	16	PI-7	2	5	15	PI-7		
1	16	PI-8	3	5	15	PI-8		
1	16	PI-9	4	5	15	PI-9		
1	16	PI-10	5	5	15	PI-10		
1	16	PI-11	6	5	15	PI-11		
1	16	PI-12	7	5	15	PI-12		
1	16	PI-13	8	5	15	PI-13		

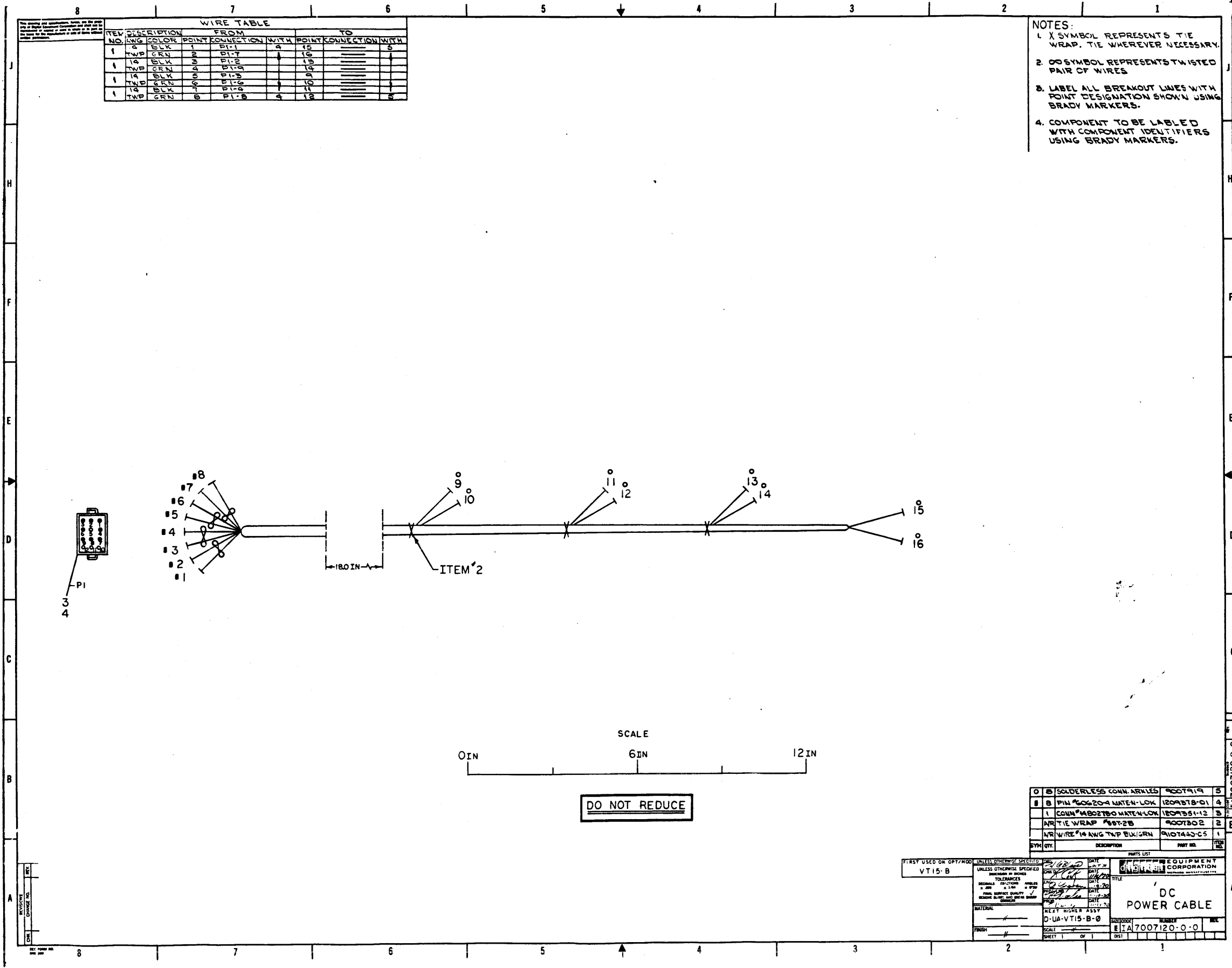
- NOTES:
- 1 SYMBOL REPRESENTS TIE WRAPS.
  - 2 X SYMBOL REPRESENTS TWISTED PAIR OF WIRES.
  - 3 TIE WRAP TO BE PLACED WHERE SHOWN ON DWG.
  - 4 WIRE LENGTHS INCLUDE STRIPPING STEP ALL WIRES 3/8 EXCEPT PI STRIP 3/16.
  - 5 FILLED IN CIRCLE INDICATES A WIRE EMPTY CIRCLE INDICATES NO WIRE.



WIRELESS COMM. ACCESS	9007319	1
PIN # 60620-0 WIRE-N-LESS	1205378-01	2
CONN # 180278-0 WIRE-N-LESS	1205378-01	3
TIE WRAPS 337-2B	9007302	2
WIRE #12 AWG TWP BLK/WH	9107400-55	1

VTIC		EQUIPMENT CORPORATION	
UNLESS OTHERWISE SPECIFIED		DC POWER CABLE	
MATERIAL		E.I. 700665-0-C	
DATE		1-8-70	
SCALE		1:1	

DO NOT REDUCE



**WIRE TABLE**

ITEM NO.	DESCRIPTION	FROM		TO	
		NO.	COLOR	POINT CONNECTION WITH	NO.
6	BLK	1	P1-1	4	15
1	TRP	2	P1-2	4	16
14	BLK	3	P1-2	1	13
1	TRP	4	P1-3	1	14
14	BLK	5	P1-3	1	9
1	TRP	6	P1-6	1	10
14	BLK	7	P1-4	1	11
1	TRP	8	P1-8	4	12

- NOTES:**
- 1 X SYMBOL REPRESENTS TIE WRAP, TIE WHEREVER NECESSARY.
  - 2 OO SYMBOL REPRESENTS TWISTED PAIR OF WIRES.
  - 3 LABEL ALL BREAKOUT LINES WITH POINT DESIGNATION SHOWN USING BRADY MARKERS.
  - 4 COMPONENT TO BE LABELED WITH COMPONENT IDENTIFIERS USING BRADY MARKERS.

REV. 1  
DATE  
ISSUED BY

FIRST USED ON OPT/MOD: VT15-B

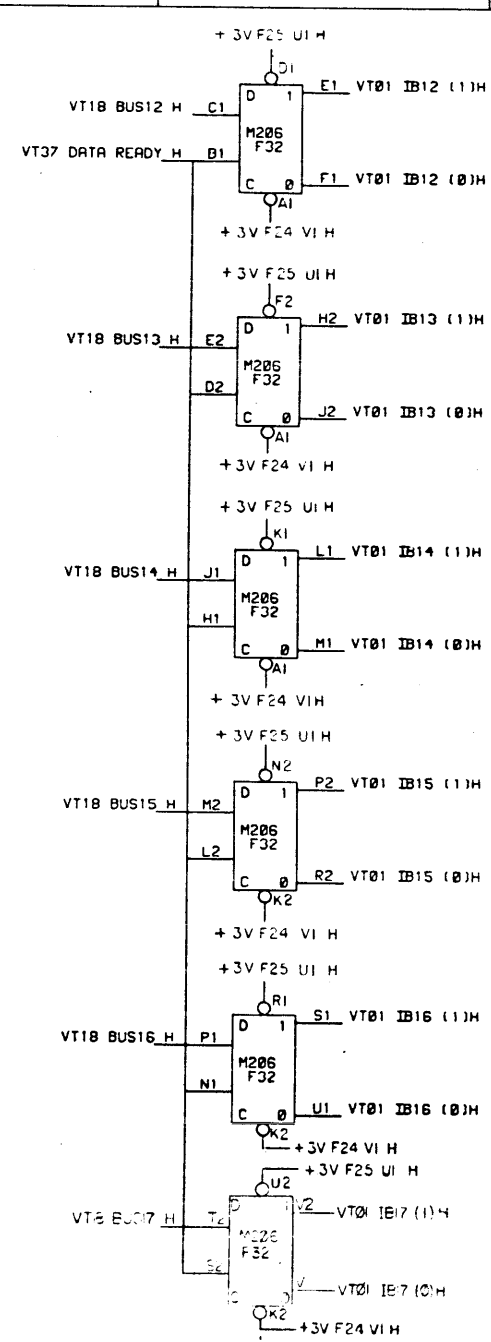
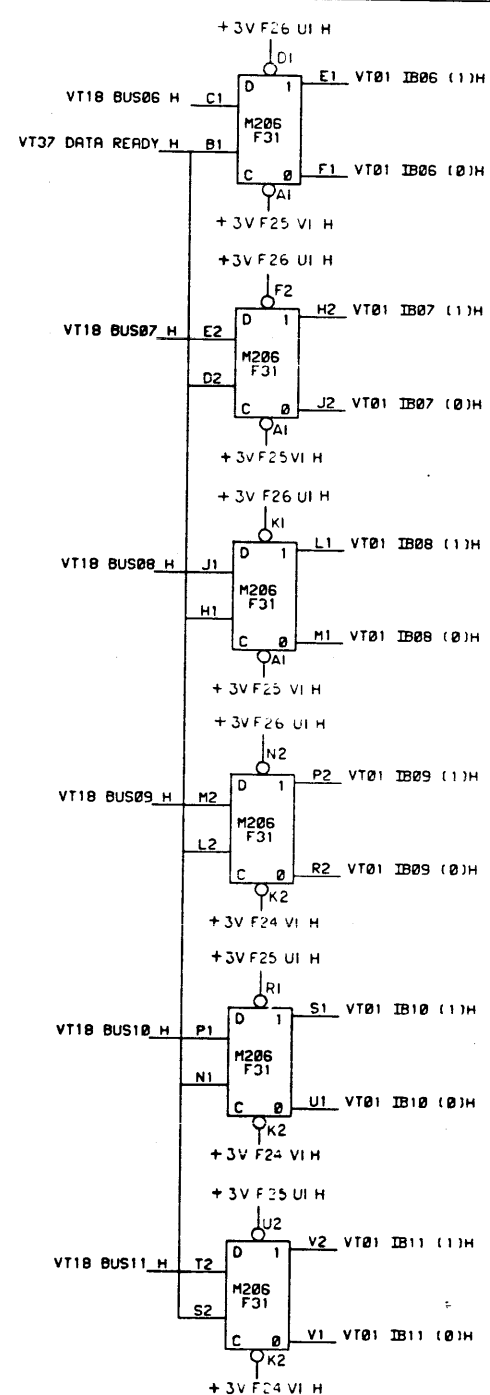
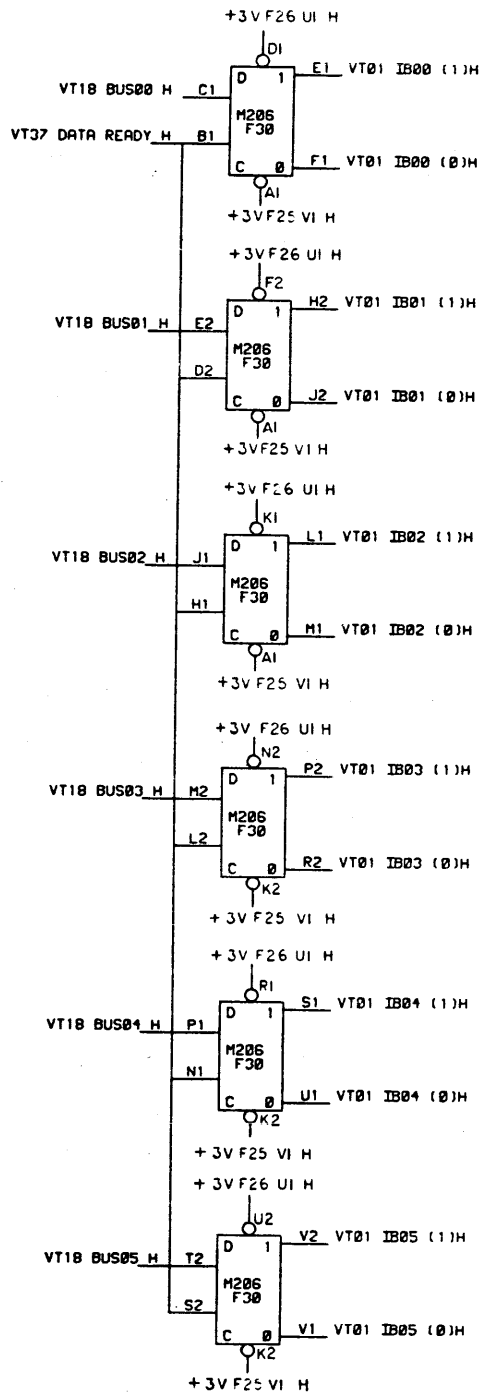
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES	TOLERANCES UNLESS OTHERWISE SPECIFIED	DATE	BY
FRACTIONAL DECIMALS	±.005	12-28-20	[Signature]
DECIMALS	±.005	DATE	BY
TITLES	±.005	DATE	BY
±.005	±.005	DATE	BY
±.005	±.005	DATE	BY
±.005	±.005	DATE	BY
±.005	±.005	DATE	BY
±.005	±.005	DATE	BY
±.005	±.005	DATE	BY
±.005	±.005	DATE	BY

SYM	QTY	DESCRIPTION	PART NO.	ITEM NO.
0	1	SOLDERLESS CONN. ARKLES	9007919	5
8	8	PIN #00620-4 MATEN-LOK	1204818-01	4
1	1	CONN #402750 MATEN-LOK	1207851-12	3
1	1	TIE WRAP #88-25	9007802	2
1	1	WIRE #14 AWG TRP BLK/GRN	9107443-C5	1

EQUIPMENT CORPORATION	TITLE
	DC POWER CABLE
D-1A-VT15-B-0	NUMBER
EIA 7007120-0-0	REVISION
	SHEET 1 OF 1



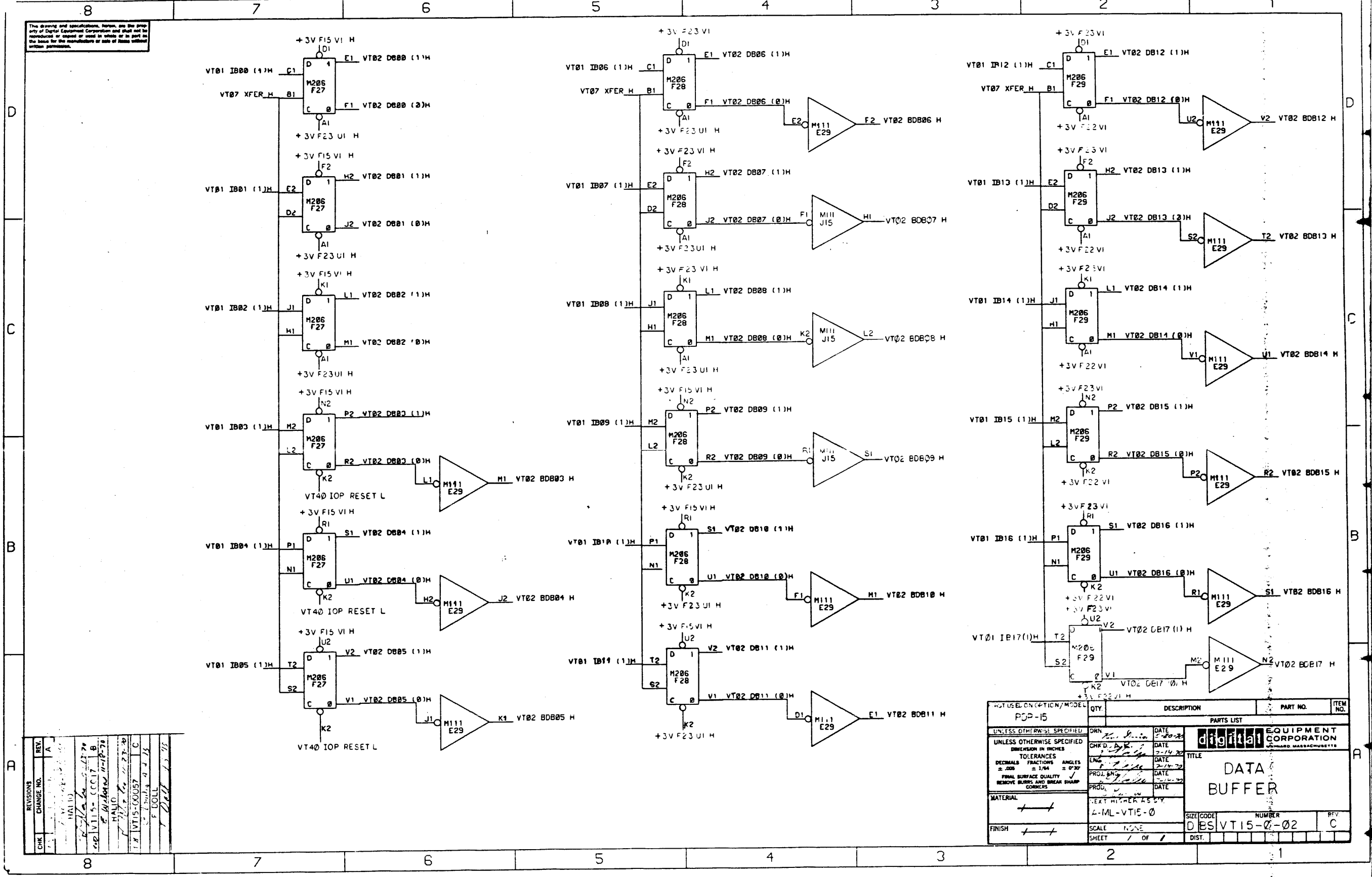
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REV.	CHG.	DATE	BY
1	1	11/12/70	HALO
2	1	11/12/70	HALO

QTY.	DESCRIPTION	PART NO.	ITEM NO.
	PARTS LIST		
	UNLESS OTHERWISE SPECIFIED		
	DIMENSIONS IN INCHES		
	TOLERANCES		
	DECIMALS FRACTIONS ANGLES		
	± .005 ± 1/64 ± 30°		
	FINISH SURFACE QUALITY		
	REMOVE BURRS AND BREAK SHARP CORNERS		
	MATERIAL		
	NEXT HIGHER ASSY		
	A-ML-1715-0		
	SCALE NONE		
	SHEET 1 OF 1		
	DISTRIBUTION		

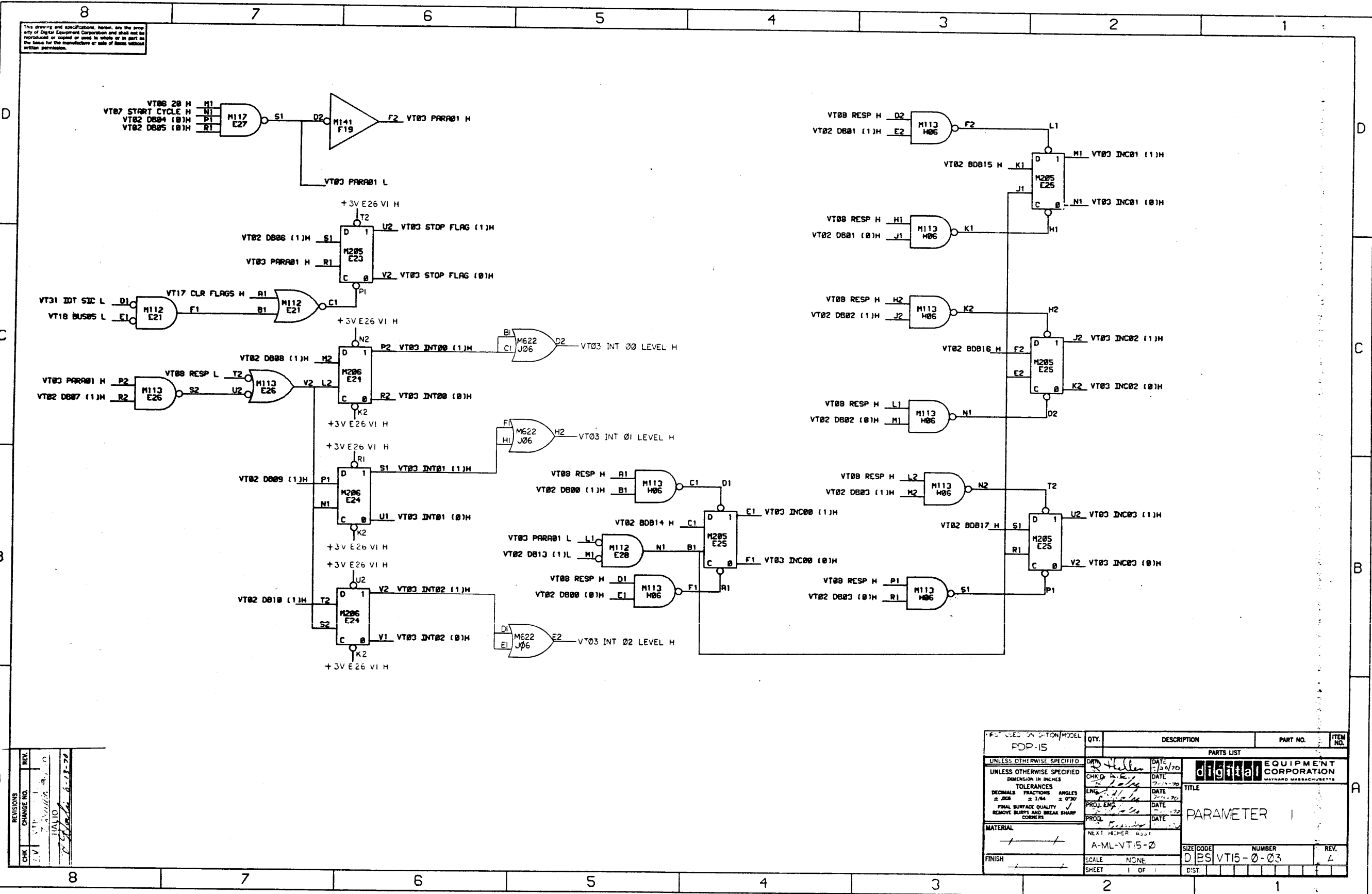
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CHK	REVISIONS	CHANGE NO.	REV.
	1		A
	2		B
	3		C
	4		D
	5		E
	6		F
	7		G
	8		H
	9		I
	10		J
	11		K
	12		L
	13		M
	14		N
	15		O
	16		P
	17		Q
	18		R
	19		S
	20		T
	21		U
	22		V
	23		W
	24		X
	25		Y
	26		Z

QTY.	DESCRIPTION	PART NO.	ITEM NO.
	PPS-15		
PARTS LIST			
UNLESS OTHERWISE SPECIFIED: DIMENSION IN INCHES TOLERANCES DECIMALS FRACTIONS ANGLES ±.008 ±.004 ±.010			
FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS			
MATERIAL: NEXT HIGHER ASSEMBLY			
FINISH: SCALE: NONE SHEET / OF /			
TITLE: DATA BUFFER		SIZE CODE: D	NUMBER: BS1VT15-0-02
		REV: C	

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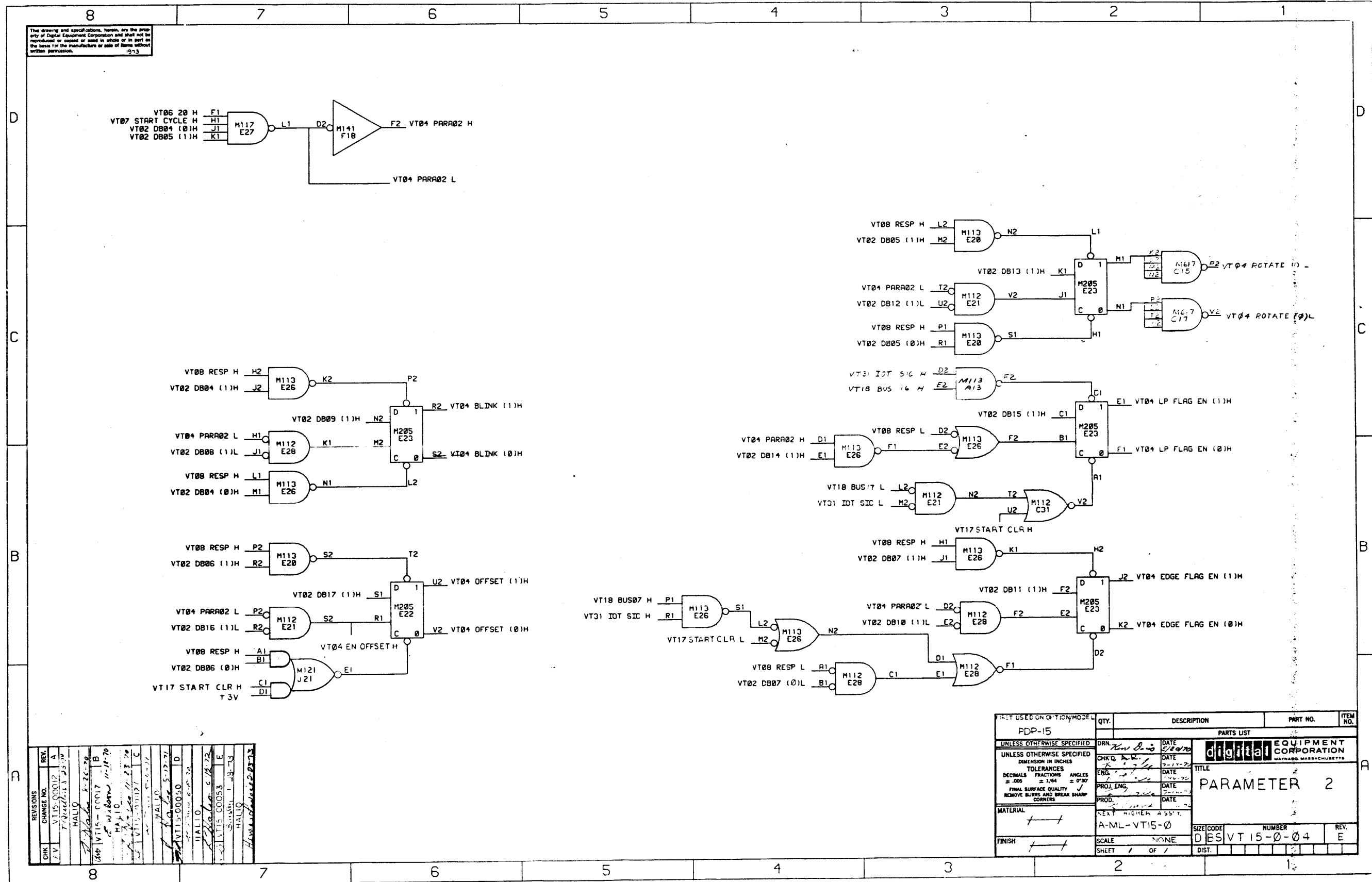


REV.	1	DATE	7-29-70
CHK	J.V.	DATE	7-29-70
DESIGN	J.V.	DATE	7-29-70
ENG	J.V.	DATE	7-29-70
PROL	J.V.	DATE	7-29-70
PROD	J.V.	DATE	7-29-70

REVISIONS  
CHANGE NO. 1  
DATE 6-17-72  
BY J.V.

POP-15	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST				
UNLESS OTHERWISE SPECIFIED	DATE	DATE	DIGITAL EQUIPMENT CORPORATION	
UNLESS OTHERWISE SPECIFIED	DATE	DATE	MAYNARD MASSACHUSETTS	
TOLERANCES	DATE	DATE	TITLE	
DECIMALS FRACTIONS ANGLES	DATE	DATE	PARAMETER 1	
± .008 ± 1/64 ± 0°30'	DATE	DATE	SIZE CODE NUMBER	
FINAL SURFACE QUALITY	DATE	DATE	DES-VT15-0-03	
REMOVE BURRS AND BREAK SHARP CORNERS	DATE	DATE	REV. 4	
MATERIAL	NEXT RECHER ASST	SCALE	SHEET 1 OF 1	
FINISH	A-ML-VT15-0	SCALE NONE	DIST.	

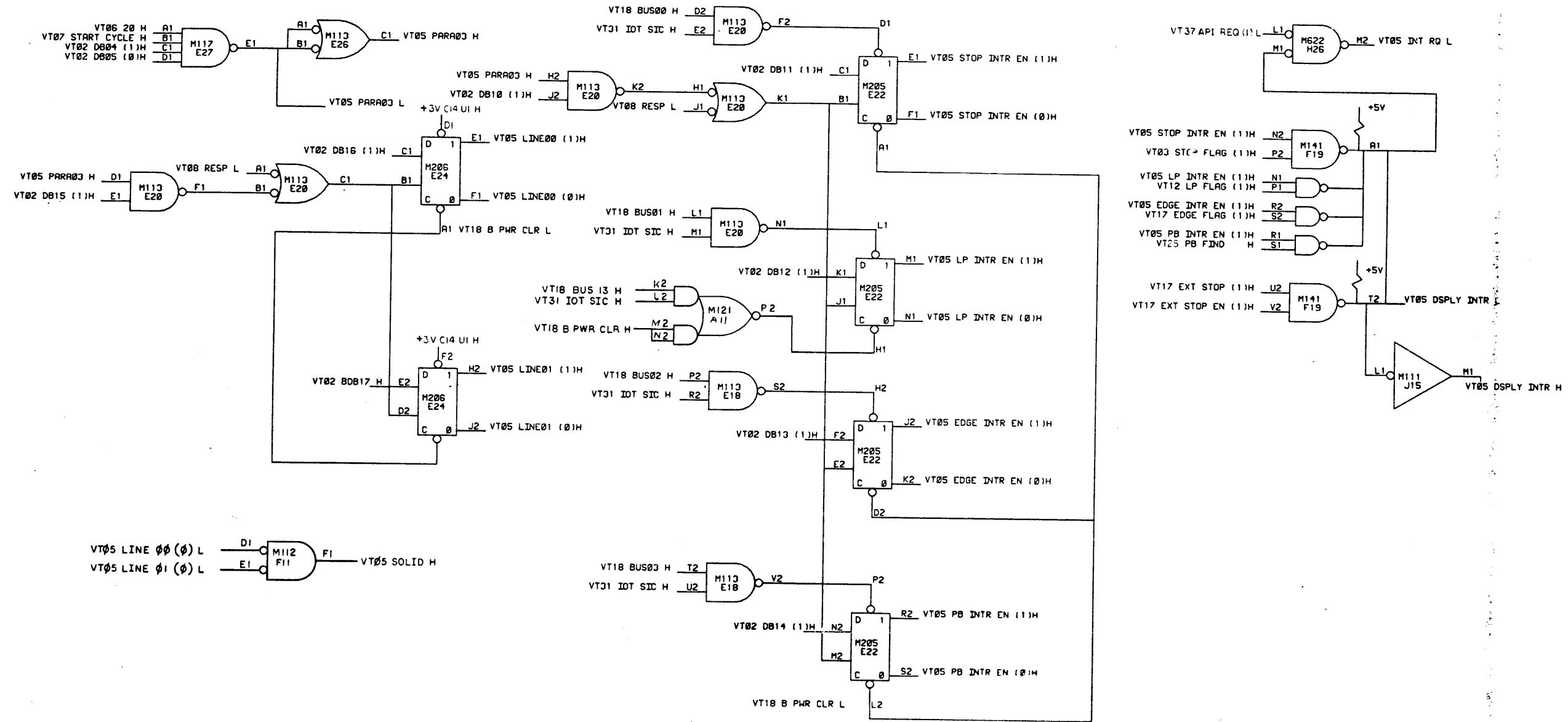
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 1973



REV.	CHANGE NO.	DATE	BY
A	V115-00012	7-23-70	HALLO
B	V115-00017	11-18-70	HALLO
C	V115-00027	5-12-71	HALLO
D	V115-00050	5-12-71	HALLO
E	V115-00053	5-12-71	HALLO
F	V115-00053	5-12-71	HALLO
G	V115-00053	5-12-71	HALLO
H	V115-00053	5-12-71	HALLO
I	V115-00053	5-12-71	HALLO
J	V115-00053	5-12-71	HALLO
K	V115-00053	5-12-71	HALLO
L	V115-00053	5-12-71	HALLO
M	V115-00053	5-12-71	HALLO
N	V115-00053	5-12-71	HALLO
O	V115-00053	5-12-71	HALLO
P	V115-00053	5-12-71	HALLO
Q	V115-00053	5-12-71	HALLO
R	V115-00053	5-12-71	HALLO
S	V115-00053	5-12-71	HALLO
T	V115-00053	5-12-71	HALLO
U	V115-00053	5-12-71	HALLO
V	V115-00053	5-12-71	HALLO
W	V115-00053	5-12-71	HALLO
X	V115-00053	5-12-71	HALLO
Y	V115-00053	5-12-71	HALLO
Z	V115-00053	5-12-71	HALLO

PART USED ON OPTION MODE L	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15				
UNLESS OTHERWISE SPECIFIED				
ORN	DATE	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS		
CHKD.	DATE	TITLE		
ENG.	DATE	PARAMETER 2		
PROJ. ENG.	DATE	SIZE CODE NUMBER REV.		
PROD.	DATE	DESIGN NUMBER REV.		
MATERIAL	NEAT HIGH QUALITY			
FINISH	A-ML-VT15-0			
SCALE	NONE			
SHEET	OF	DIST.		
1	1	DESIGN NUMBER REV.		
		DESIGN NUMBER REV.		

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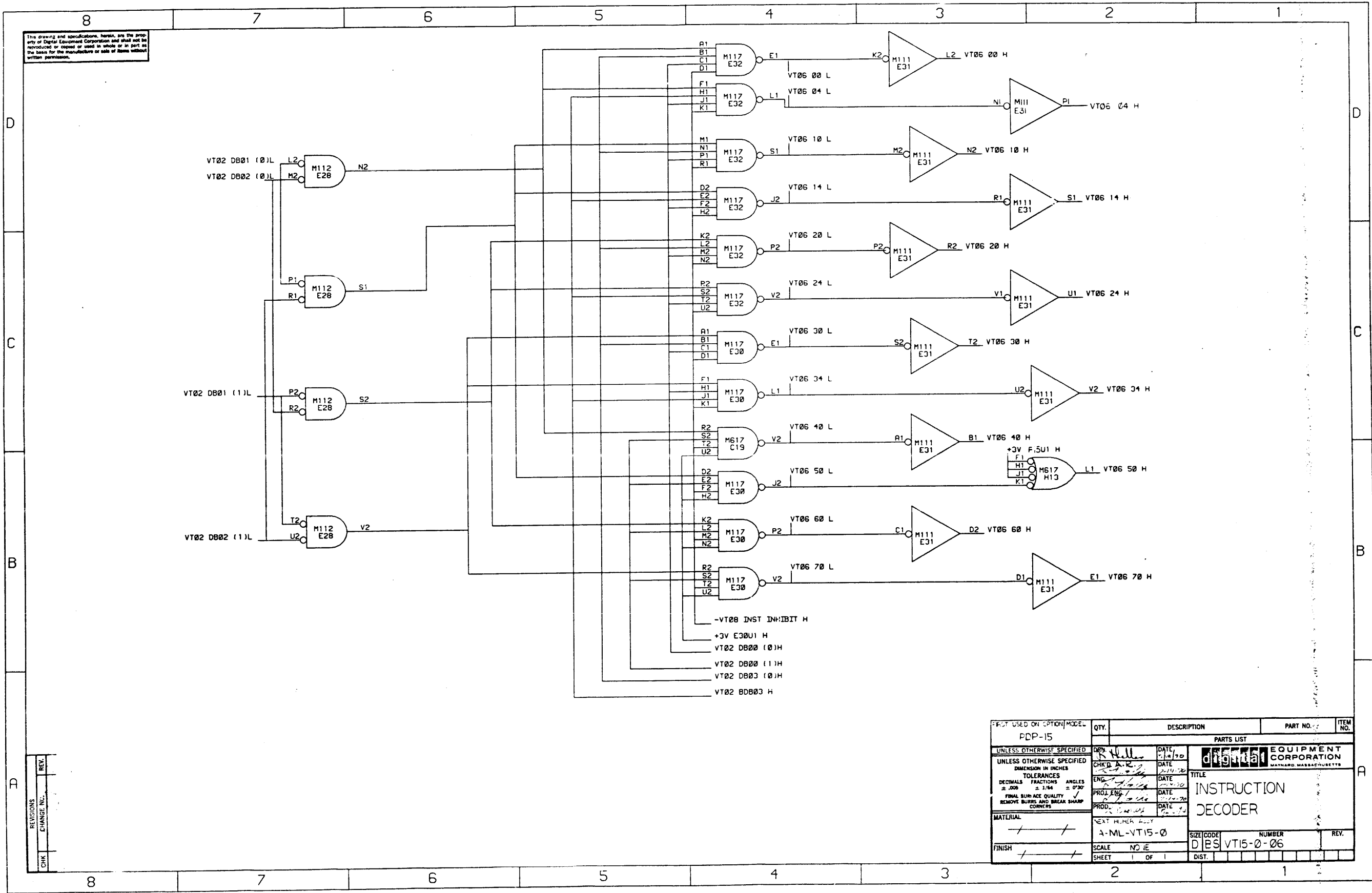
REV.	CHG.	NO.	DATE	BY	APP.
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2		2	12-22-70	HALIO	
3		3	12-22-70	HALIO	
4		4	12-22-70	HALIO	
5		5	12-22-70	HALIO	
6		6	12-22-70	HALIO	
7		7	12-22-70	HALIO	
8		8	12-22-70	HALIO	

REV.	CHG.	NO.	DATE	BY	APP.
1		1	12-22-70	HALIO	
2		2	12-22-70	HALIO	
3		3	12-22-70	HALIO	
4		4	12-22-70	HALIO	
5		5	12-22-70	HALIO	
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7		7	12-22-70	HALIO	
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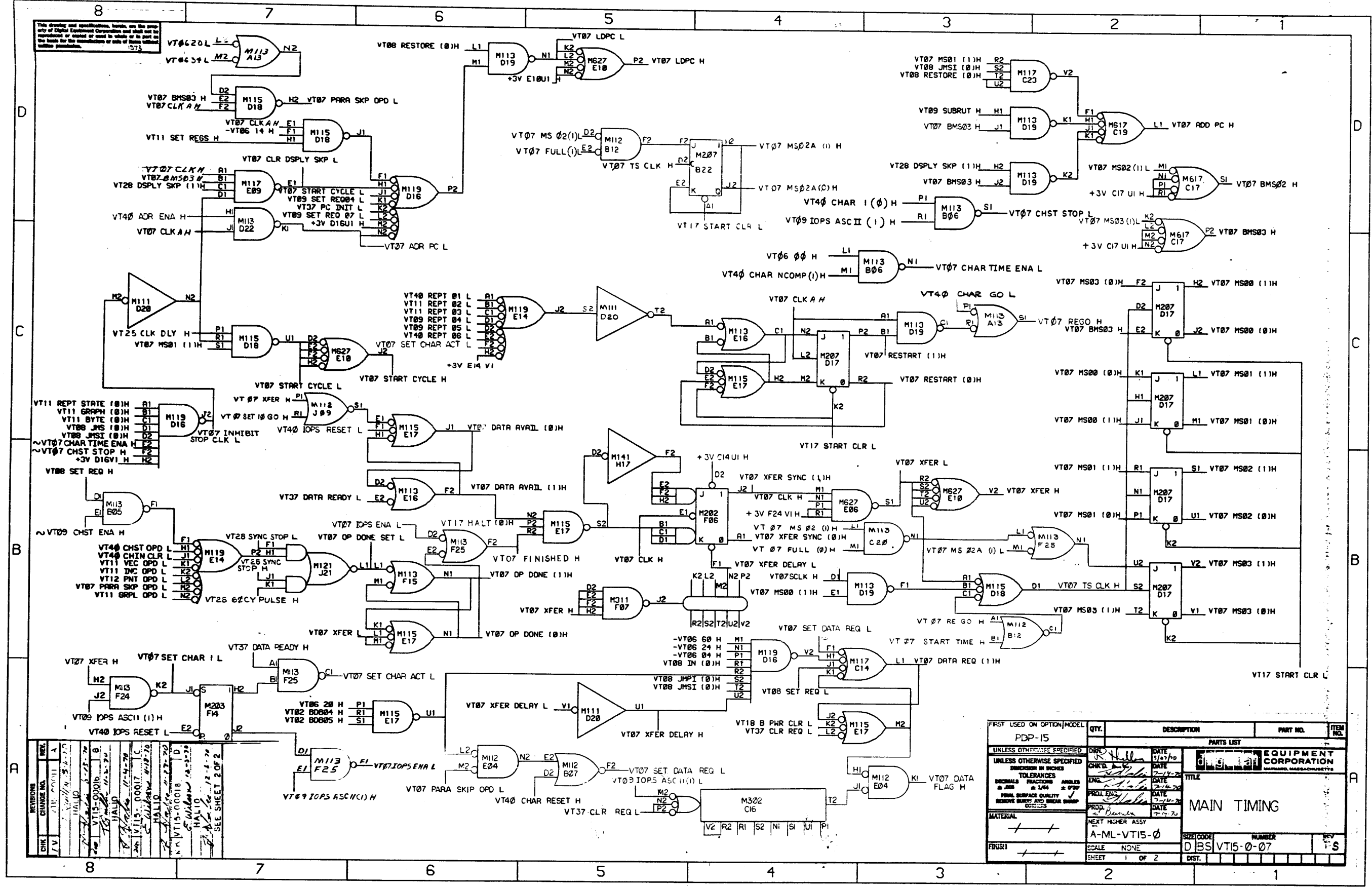
FACT USED ON SECTION MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15				
UNLESS OTHERWISE SPECIFIED:				
UNLESS OTHERWISE SPECIFIED	DATE	DATE	PARTS LIST	
DIMENSION IN INCHES	12/22/70	12/22/70	DIGITAL EQUIPMENT CORPORATION	
TOLERANCES			MAYNARD, MASSACHUSETTS	
DECIMALS FRACTIONS ANGLES			TITLE	
±.005 ±1/64 ±0°30'			PARAMETER 3	
FINAL SURFACE QUALITY	PROJ. ENG.	DATE	SIZE CODE	
REMOVE BURRS AND BREAK SHARP CORNERS			NUMBER	
			DES-VT15-0-05	
MATERIAL	SCALE	DATE	REV.	
	1/16"		C	
FINISH	SHEET	OF	DIST.	
	1	1		

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REVISIONS	CHK	REC
CHANGE INC.		

QTY.	DESCRIPTION	PART NO.	ITEM NO.																								
PARTS LIST																											
<table border="1"> <tr> <td>UNLESS OTHERWISE SPECIFIED</td> <td>DRY</td> <td>DATE</td> <td>2/19/70</td> </tr> <tr> <td>UNLESS OTHERWISE SPECIFIED</td> <td>CHK'D</td> <td>DATE</td> <td>2/19/70</td> </tr> <tr> <td>UNLESS OTHERWISE SPECIFIED</td> <td>ENG</td> <td>DATE</td> <td>2/19/70</td> </tr> <tr> <td>UNLESS OTHERWISE SPECIFIED</td> <td>PROJ. ENG.</td> <td>DATE</td> <td>2/19/70</td> </tr> <tr> <td>UNLESS OTHERWISE SPECIFIED</td> <td>PROD.</td> <td>DATE</td> <td>2/19/70</td> </tr> </table>				UNLESS OTHERWISE SPECIFIED	DRY	DATE	2/19/70	UNLESS OTHERWISE SPECIFIED	CHK'D	DATE	2/19/70	UNLESS OTHERWISE SPECIFIED	ENG	DATE	2/19/70	UNLESS OTHERWISE SPECIFIED	PROJ. ENG.	DATE	2/19/70	UNLESS OTHERWISE SPECIFIED	PROD.	DATE	2/19/70				
UNLESS OTHERWISE SPECIFIED	DRY	DATE	2/19/70																								
UNLESS OTHERWISE SPECIFIED	CHK'D	DATE	2/19/70																								
UNLESS OTHERWISE SPECIFIED	ENG	DATE	2/19/70																								
UNLESS OTHERWISE SPECIFIED	PROJ. ENG.	DATE	2/19/70																								
UNLESS OTHERWISE SPECIFIED	PROD.	DATE	2/19/70																								
<table border="1"> <tr> <td>TOLERANCES</td> <td></td> </tr> <tr> <td>DECIMALS</td> <td>FRACTIONS</td> </tr> <tr> <td>± .008</td> <td>± 3/64</td> </tr> <tr> <td></td> <td>± 0°30'</td> </tr> <tr> <td colspan="2">FINAL SURFACE QUALITY</td> </tr> <tr> <td colspan="2">REMOVE BURRS AND BREAK SHARP CORNERS</td> </tr> </table>		TOLERANCES		DECIMALS	FRACTIONS	± .008	± 3/64		± 0°30'	FINAL SURFACE QUALITY		REMOVE BURRS AND BREAK SHARP CORNERS		<table border="1"> <tr> <td colspan="2">TITLE</td> </tr> <tr> <td colspan="2">INSTRUCTION DECODER</td> </tr> <tr> <td>SIZE CODE</td> <td>NUMBER</td> </tr> <tr> <td>D BS</td> <td>VT15-0-06</td> </tr> <tr> <td>SCALE</td> <td>NO. IE</td> </tr> <tr> <td>SHEET</td> <td>1 OF 1</td> </tr> </table>		TITLE		INSTRUCTION DECODER		SIZE CODE	NUMBER	D BS	VT15-0-06	SCALE	NO. IE	SHEET	1 OF 1
TOLERANCES																											
DECIMALS	FRACTIONS																										
± .008	± 3/64																										
	± 0°30'																										
FINAL SURFACE QUALITY																											
REMOVE BURRS AND BREAK SHARP CORNERS																											
TITLE																											
INSTRUCTION DECODER																											
SIZE CODE	NUMBER																										
D BS	VT15-0-06																										
SCALE	NO. IE																										
SHEET	1 OF 1																										
<table border="1"> <tr> <td>MATERIAL</td> <td>NEXT NUMBER</td> </tr> <tr> <td>+</td> <td>A-ML-VT15-0</td> </tr> </table>		MATERIAL	NEXT NUMBER	+	A-ML-VT15-0	<table border="1"> <tr> <td>REV.</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>		REV.																			
MATERIAL	NEXT NUMBER																										
+	A-ML-VT15-0																										
REV.																											



REV. NO. | REL. DATE | DRAWN BY | CHECKED BY | TITLE

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2	2			
3	3			
4	4			
5	5			
6	6			
7	7			
8	8			

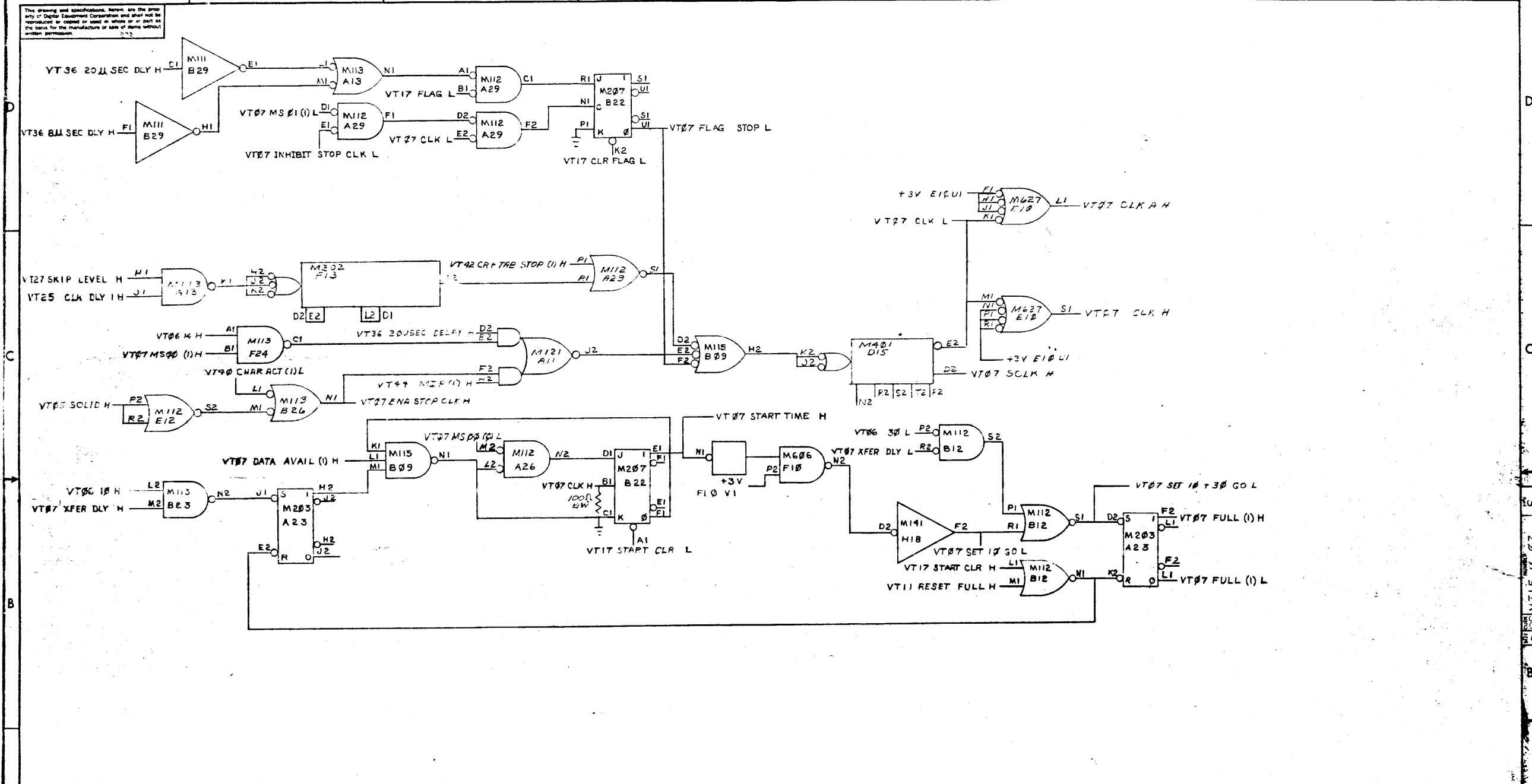
REV. NO.	REL.	DATE	DRAWN BY	CHECKED BY	TITLE
1	1				
2	2				
3	3				
4	4				
5	5				
6	6				
7	7				
8	8				

FIRST USED ON OPTION/MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15				
UNLESS OTHERWISE SPECIFIED				
UNLESS OTHERWISE SPECIFIED				
DIMENSIONS IN INCHES				
TOLERANCES				
DECIMALS FRACTIONS				
ANGLES				
30° 45° 90°				
FURNISH SURFACE QUALITY				
REMOVE BURRS AND BREAK SHARP CORNERS				
MATERIAL				
FINISH				

EQUIPMENT CORPORATION  
MATTAPAN, MASSACHUSETTS

SCALE: NONE  
SHEET 1 OF 2  
DIST.

TITLE: MAIN TIMING  
SIZE CODE: A-ML-VT15-0  
NUMBER: D BS VT15-0-07  
REV. S



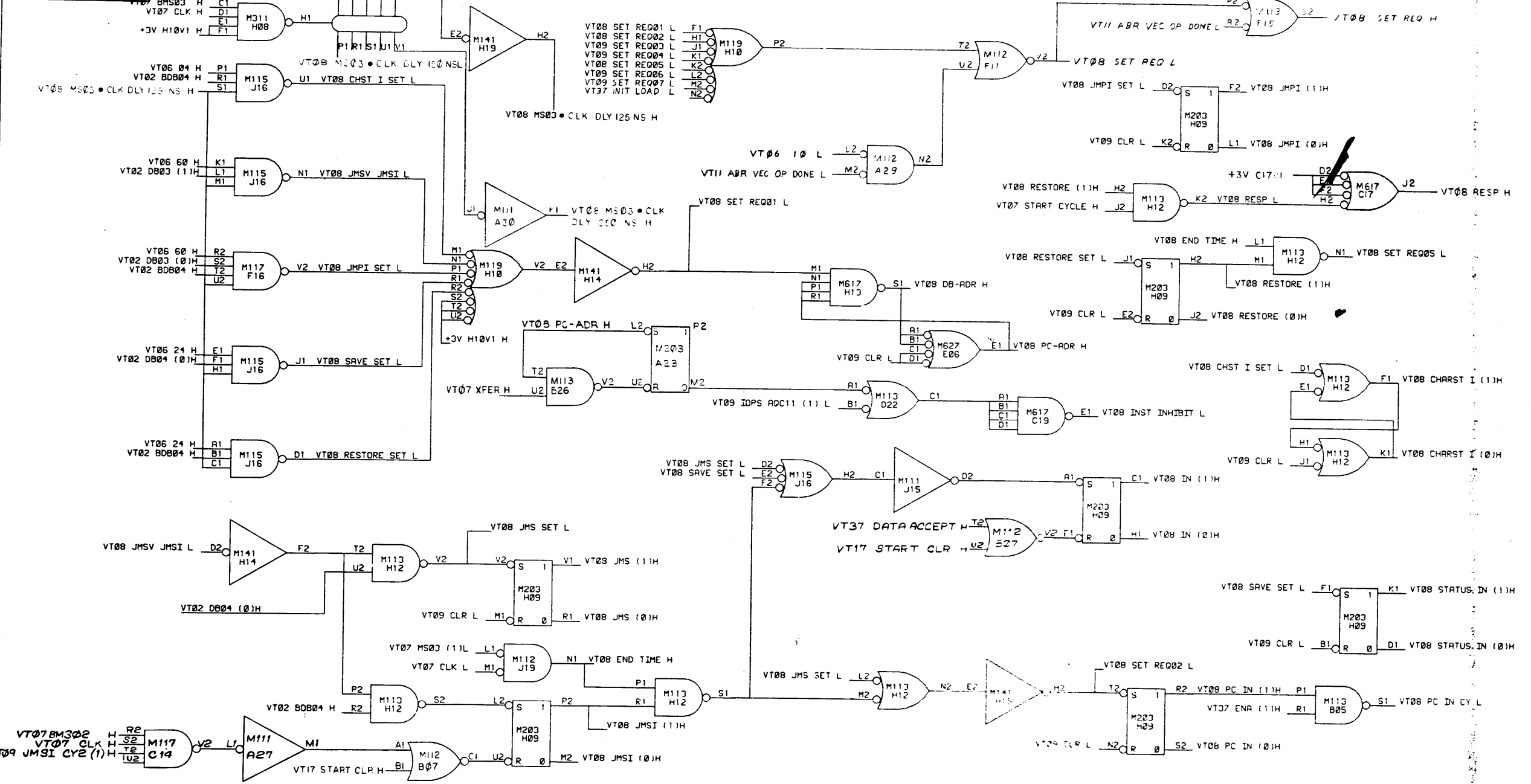
REV	DATE	BY	CHKD	DESCRIPTION
1	7-14-70	L. HALIO	L. HALIO	INITIAL DESIGN
2	7-14-70	L. HALIO	L. HALIO	REVISION
3	7-14-70	L. HALIO	L. HALIO	REVISION
4	7-14-70	L. HALIO	L. HALIO	REVISION
5	7-14-70	L. HALIO	L. HALIO	REVISION
6	7-14-70	L. HALIO	L. HALIO	REVISION
7	7-14-70	L. HALIO	L. HALIO	REVISION
8	7-14-70	L. HALIO	L. HALIO	REVISION

REV	DATE	BY	CHKD	DESCRIPTION
1	7-14-70	L. HALIO	L. HALIO	INITIAL DESIGN
2	7-14-70	L. HALIO	L. HALIO	REVISION
3	7-14-70	L. HALIO	L. HALIO	REVISION
4	7-14-70	L. HALIO	L. HALIO	REVISION
5	7-14-70	L. HALIO	L. HALIO	REVISION
6	7-14-70	L. HALIO	L. HALIO	REVISION
7	7-14-70	L. HALIO	L. HALIO	REVISION
8	7-14-70	L. HALIO	L. HALIO	REVISION

REV	DATE	BY	CHKD	DESCRIPTION
1	7-14-70	L. HALIO	L. HALIO	INITIAL DESIGN
2	7-14-70	L. HALIO	L. HALIO	REVISION
3	7-14-70	L. HALIO	L. HALIO	REVISION
4	7-14-70	L. HALIO	L. HALIO	REVISION
5	7-14-70	L. HALIO	L. HALIO	REVISION
6	7-14-70	L. HALIO	L. HALIO	REVISION
7	7-14-70	L. HALIO	L. HALIO	REVISION
8	7-14-70	L. HALIO	L. HALIO	REVISION



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REV	DATE	BY	CHKD	DESCRIPTION
1	12-22-71	L. HALIO		INITIAL
2	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
3	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 150 NS L
4	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
5	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
6	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
7	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
8	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H

REV	DATE	BY	CHKD	DESCRIPTION
1	12-22-71	L. HALIO		INITIAL
2	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
3	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 150 NS L
4	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
5	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
6	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
7	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
8	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H

REV	DATE	BY	CHKD	DESCRIPTION
1	12-22-71	L. HALIO		INITIAL
2	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
3	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 150 NS L
4	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
5	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
6	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
7	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
8	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H

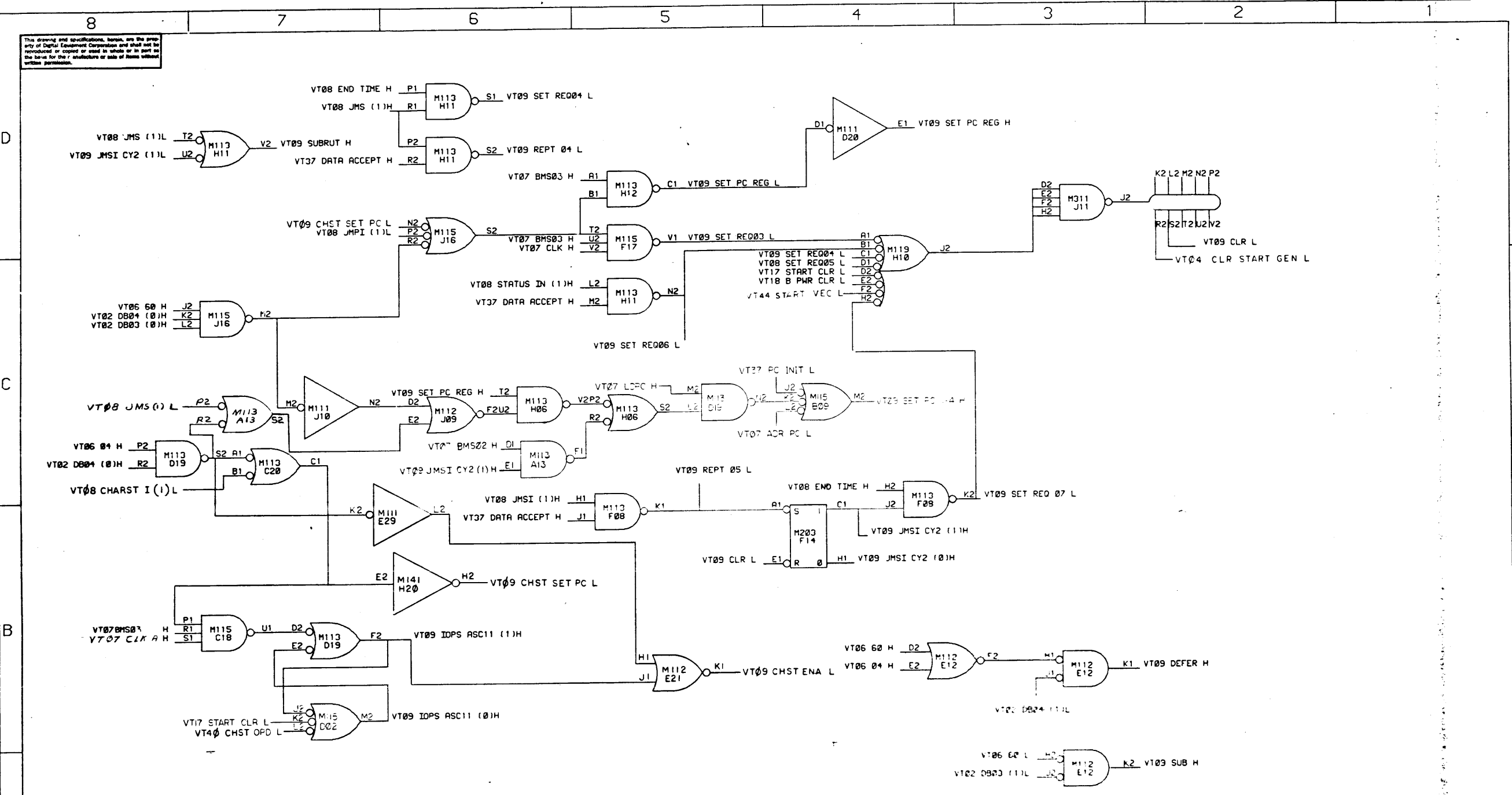
  

REV	DATE	BY	CHKD	DESCRIPTION
1	12-22-71	L. HALIO		INITIAL
2	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
3	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 150 NS L
4	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
5	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
6	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
7	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
8	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H

REV	DATE	BY	CHKD	DESCRIPTION
1	12-22-71	L. HALIO		INITIAL
2	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
3	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 150 NS L
4	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
5	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
6	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
7	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H
8	1-15-72	L. HALIO		VT08 MS03 • CLK DLY 125 NS H

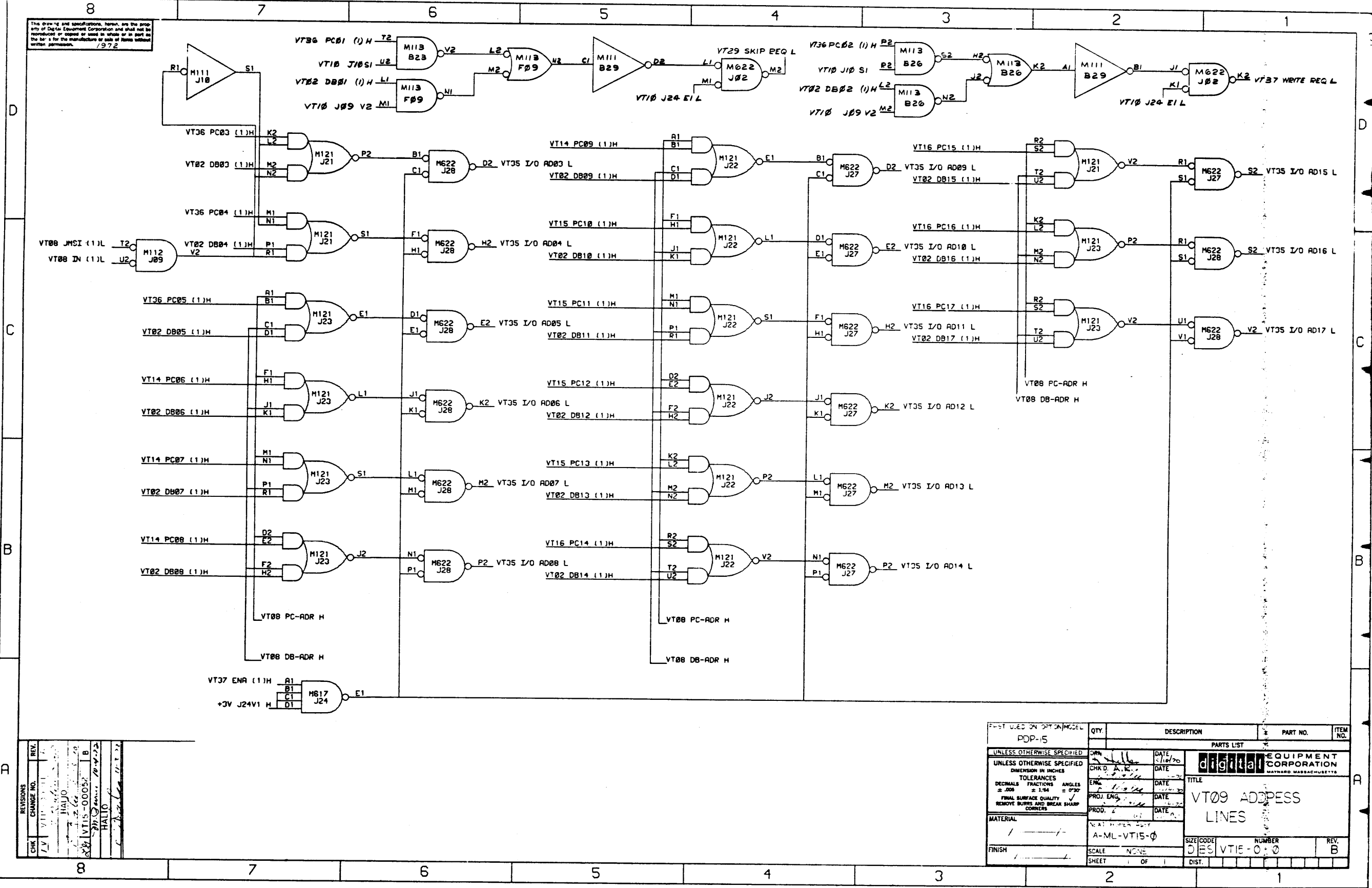
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CHK	REVISIONS	CHANGE NO.	REV.
	1	1	A
	2	2	B
	3	3	C
	4	4	D
	5	5	E
	6	6	F
	7	7	G
	8	8	H
	9	9	I
	10	10	J
	11	11	K
	12	12	L
	13	13	M
	14	14	N
	15	15	O
	16	16	P
	17	17	Q
	18	18	R
	19	19	S
	20	20	T
	21	21	U
	22	22	V
	23	23	W
	24	24	X
	25	25	Y
	26	26	Z

REV. USE OR OPTION MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
FDP-5				
PARTS LIST				
UNLESS OTHERWISE SPECIFIED	DATE	DATE	digital EQUIPMENT CORPORATION	
UNLESS OTHERWISE SPECIFIED	DATE	DATE	MAYFIELD MASSACHUSETTS	
DIMENSION IN INCHES	DATE	DATE	TITLE	
TOLERANCES	DATE	DATE	CONTROL	
DE SMALL FRACTIONS ANGLES	DATE	DATE	TIMING 2	
= .005 ± .004 ± .030	DATE	DATE	SIZE CODE	
FINAL SURFACE QUALITY	DATE	DATE	D ES VT15-0-09	
REMOVE BURRS AND BREAK SHARP CORNERS	DATE	DATE	NUMBER	
MATERIAL	DATE	DATE	F	
FINISH	DATE	DATE	SCALE NONE	
	DATE	DATE	SHEET 1 OF 1	
	DATE	DATE	DIST.	

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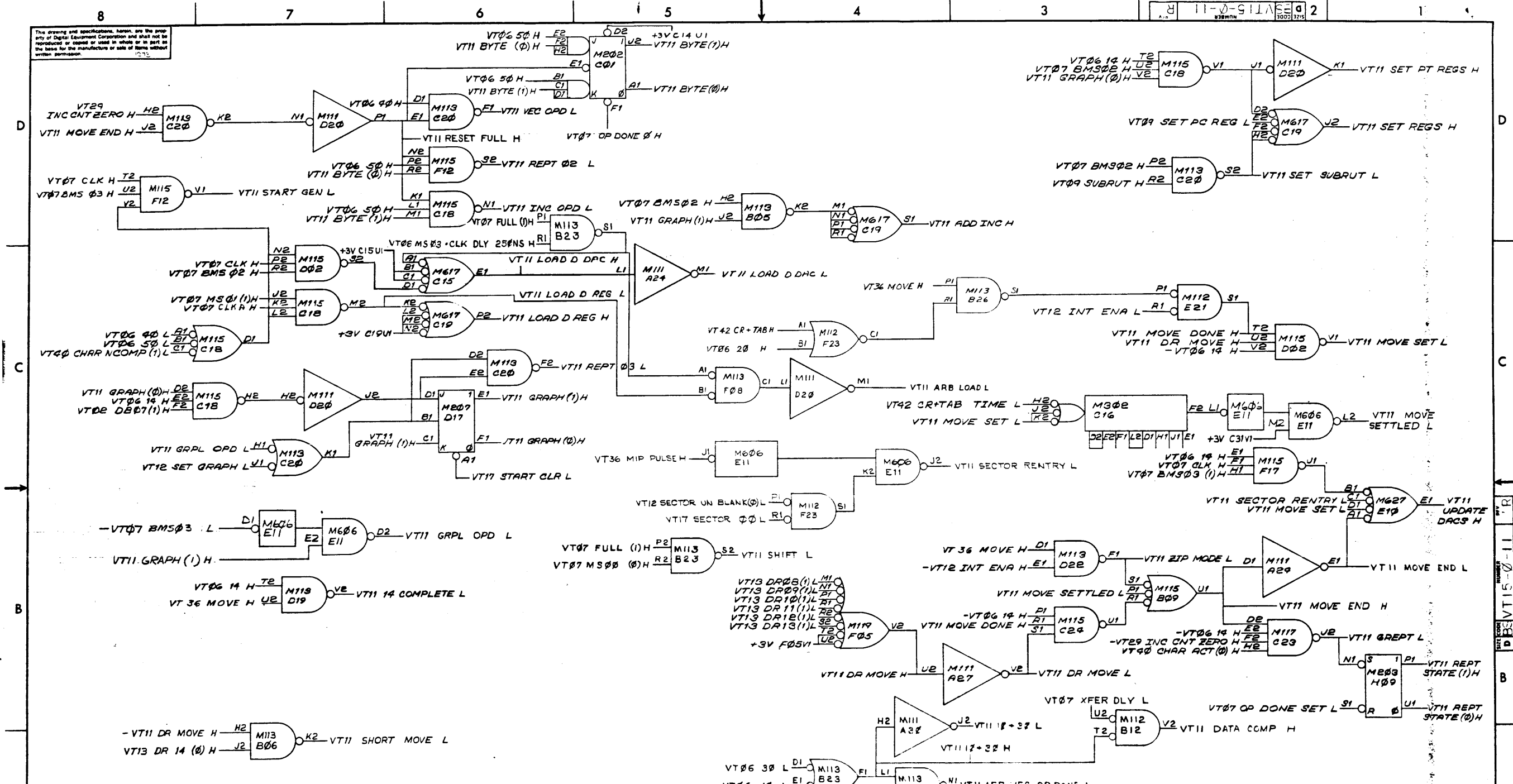
REV.	CHANGE NO.	DATE	BY	CHK
1				
2				
3				
4				
5				
6				
7				
8				

REV.	CHANGE NO.	DATE	BY	CHK
1				
2				
3				
4				
5				
6				
7				
8				

FAST USED ON OPT/MODEL	QTY	DESCRIPTION	PART NO.	ITEM NO.
POP-15				
UNLESS OTHERWISE SPECIFIED	DRN	DATE	PARTS LIST	
UNLESS OTHERWISE SPECIFIED	CHKD	DATE	digital EQUIPMENT CORPORATION	
DIMENSION IN INCHES	ENGR	DATE	MAYNARD MASSACHUSETTS	
TOLERANCES	PROJ. ENGR	DATE	TITLE	
DECIMALS FRACTIONS ANGLES	PROD.	DATE	VT09 ADDRESS LINES	
±.006 ±.1/64 ±0°30'			SIZE CODE	
FINAL SURFACE QUALITY			A-ML-VT15-0	
REMOVE BURRS AND BREAK SHARP CORNERS			NUMBER	
			DES VT15-0-0	
MATERIAL			REV.	
			B	
FINISH			SCALE NONE	
			SHEET 1 OF 1	
			DIST.	

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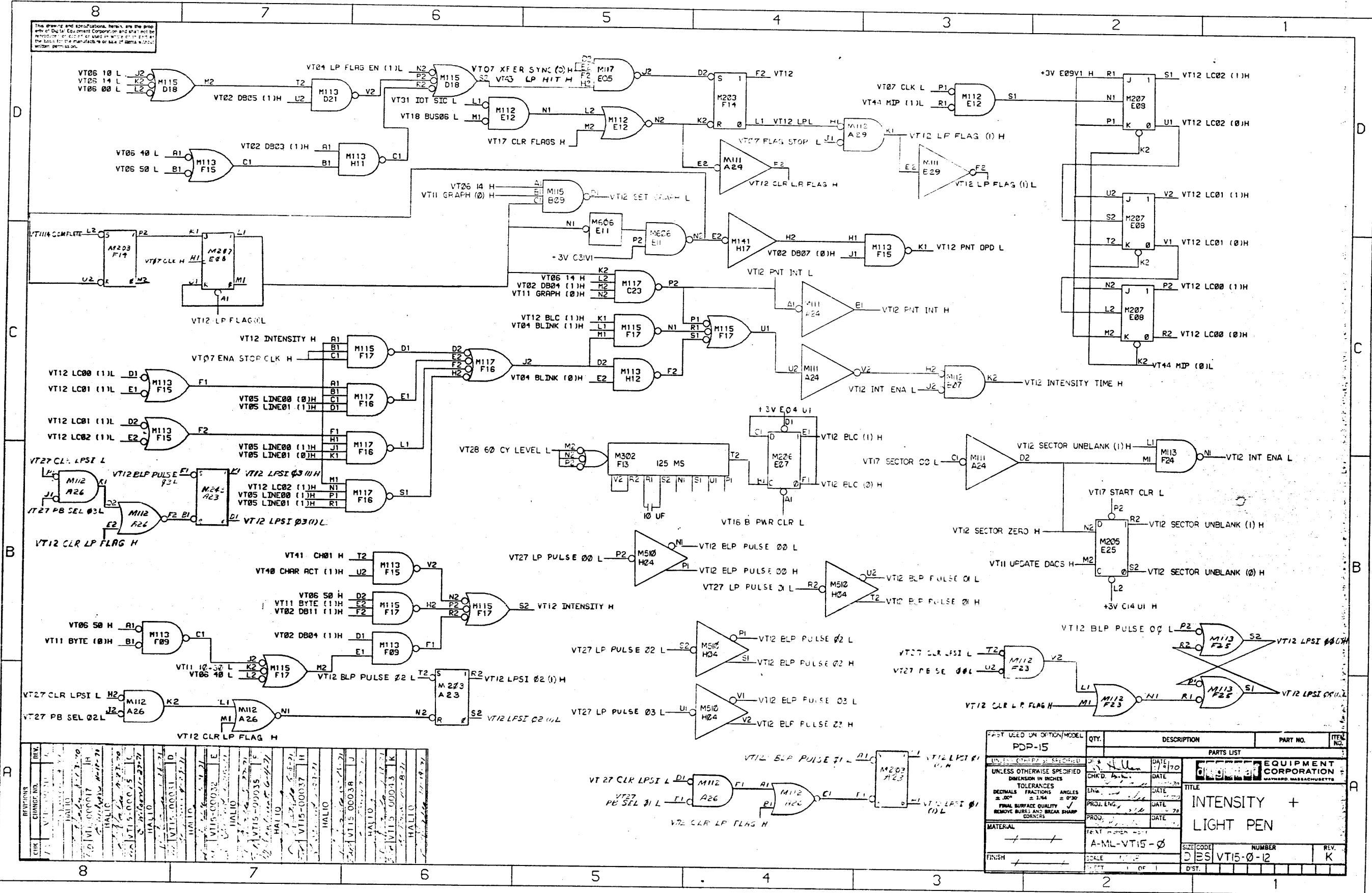
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2	11-27-70	...	...	...
3	11-27-70	...	...	...
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5	11-27-70	...	...	...
6	11-27-70	...	...	...
7	11-27-70	...	...	...
8	11-27-70	...	...	...

ITEM NO.	DESCRIPTION	QTY.	PART NO.
1	VT11 SET PT REGS H	1	M111 D20
2	VT11 SET REGS H	1	M617 C19
3	VT11 SET SUBROUT L	1	M113 C20
4	VT11 ADD INC H	1	M617 C19
5	VT11 LOAD D DAC L	1	M111 A24
6	VT11 LOAD D REG L	1	M111 A24
7	VT11 LOAD D REG H	1	M617 C19
8	VT11 ARB LOAD L	1	M111 D20
9	VT11 MOVE SET L	1	M115 D02
10	VT11 MOVE SETTLED L	1	M606 E11
11	VT11 MOVE END L	1	M111 A29
12	VT11 MOVE END H	1	M111 A29
13	VT11 REPT L	1	M111 D20
14	VT11 REPT STATE (1) H	1	M609 H09
15	VT11 REPT STATE (0) H	1	M609 H09
16	VT11 SHORT MOVE L	1	M113 B06
17	VT11 RESET FULL H	1	M113 A85

PDP-15		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST					
UNLESS OTHERWISE SPECIFIED		DRAWN	DATE	digital EQUIPMENT CORPORATION	
UNLESS OTHERWISE SPECIFIED		CHKD	DATE	MAYNARD MASSACHUSETTS	
TOLERANCES		ENG	DATE	TITLE	
DECIMALS FRACTIONS ANGLES		PROJ. ENG.	DATE	GRAPHLOT PT. VECTOR INCREMENT	
± .003 ± 1/64 ± 0°30'		PROD. ENGR.	DATE	SIZE CODE NUMBER REV.	
FINAL SURFACE QUALITY		B-DD-VT15-0 DBS VT15-0-11 R			
REMOV BURRS AND BREAK SHARP CORNERS		SCALE NONE SHEET 1 OF 1			

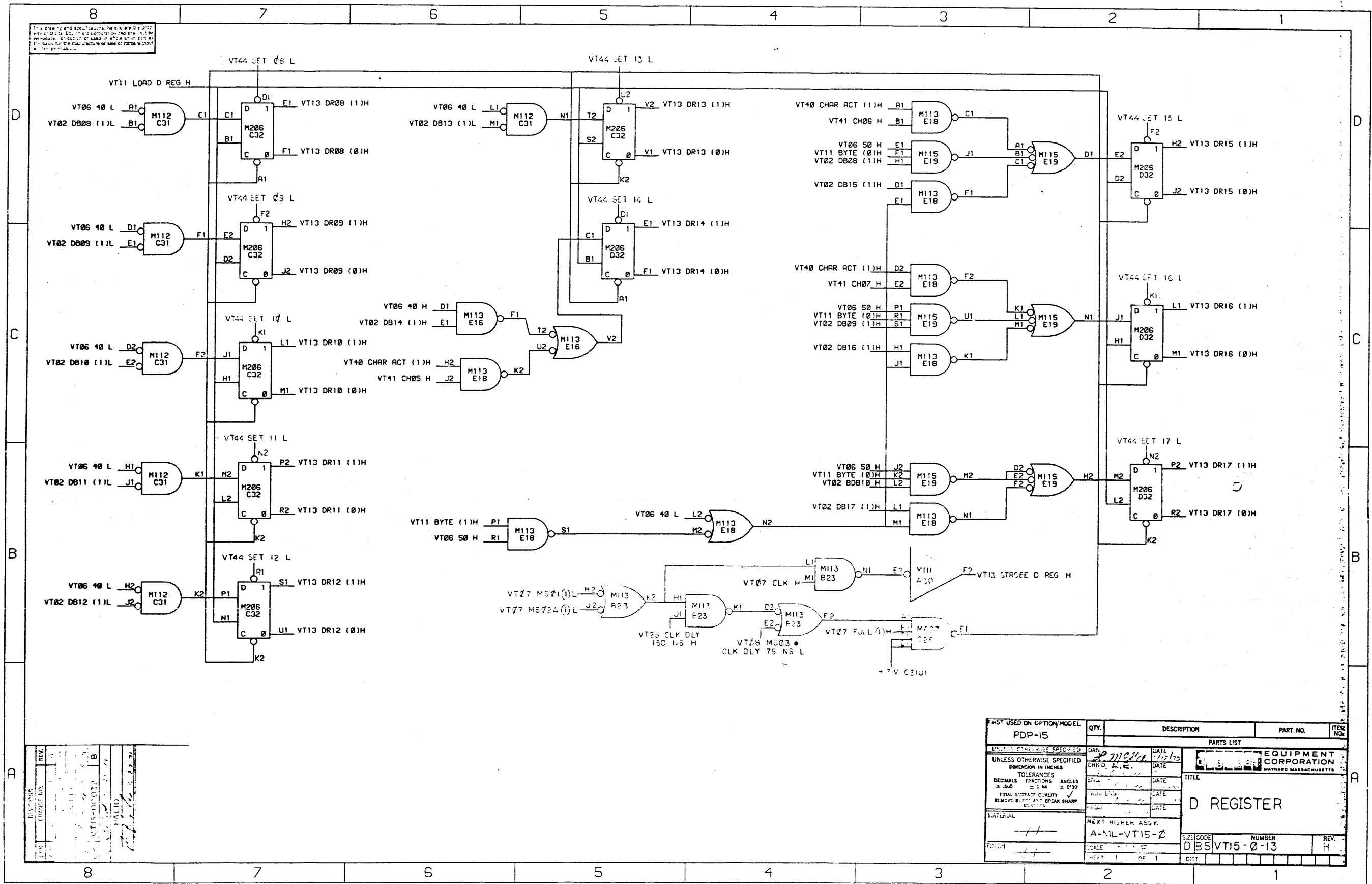
DEC FORM NO. 102A

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PART USED ON OPTION/MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15				
PARTS LIST				
UNLESS OTHERWISE SPECIFIED	DATE	DATE	<b>DIGITAL EQUIPMENT CORPORATION</b> MAYNARD, MASSACHUSETTS	
DIMENSION IN INCHES	DATE	DATE		
TOLERANCES	DATE	DATE		
DECIMALS FRACTIONS ANGLES	DATE	DATE		
±.00" ±.004" ±.030"	PROJ. ENG.	DATE	TITLE <b>INTENSITY + LIGHT PEN</b>	
FINISH	DATE	DATE		
MATERIAL	DATE	DATE		
FINISH	DATE	DATE		
A-ML-VT15-0		SCALE	NUMBER	
1 OF 1		DIST.	REV. K	

REV.	DATE	DESCRIPTION
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2	11-10-70	REVISION 1
3	12-10-70	REVISION 2
4	01-10-71	REVISION 3
5	02-10-71	REVISION 4
6	03-10-71	REVISION 5
7	04-10-71	REVISION 6
8	05-10-71	REVISION 7
9	06-10-71	REVISION 8
10	07-10-71	REVISION 9
11	08-10-71	REVISION 10
12	09-10-71	REVISION 11
13	10-10-71	REVISION 12
14	11-10-71	REVISION 13
15	12-10-71	REVISION 14
16	01-11-72	REVISION 15
17	02-11-72	REVISION 16
18	03-11-72	REVISION 17
19	04-11-72	REVISION 18
20	05-11-72	REVISION 19
21	06-11-72	REVISION 20
22	07-11-72	REVISION 21
23	08-11-72	REVISION 22
24	09-11-72	REVISION 23
25	10-11-72	REVISION 24
26	11-11-72	REVISION 25
27	12-11-72	REVISION 26
28	01-12-73	REVISION 27
29	02-12-73	REVISION 28
30	03-12-73	REVISION 29
31	04-12-73	REVISION 30

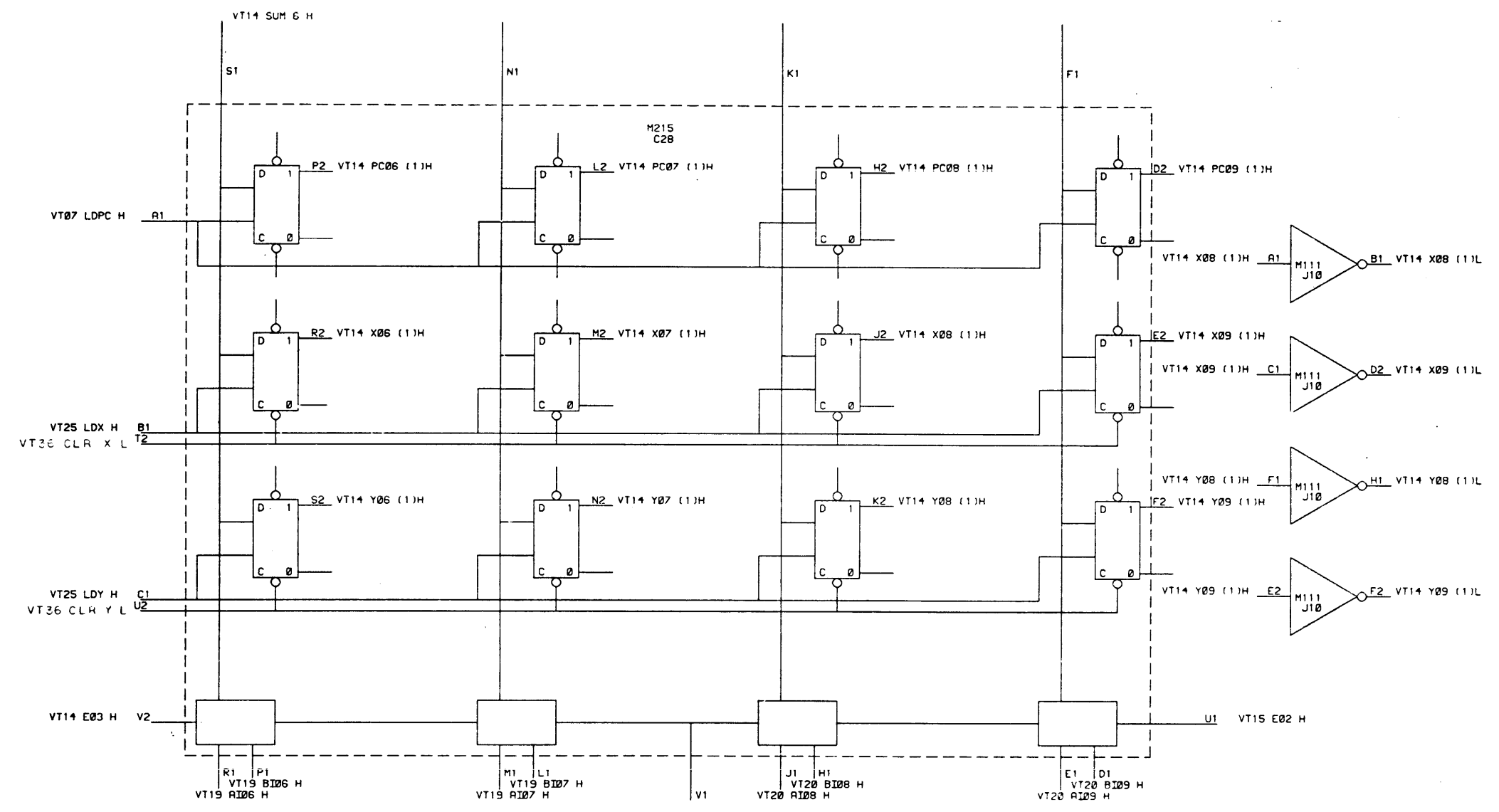


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REV	DATE	BY	CHKD
1			
2			
3			
4			
5			
6			
7			
8			

FIRST USED ON OPTION/MODEL PDP-15	QTY.	DESCRIPTION	PART NO.	ITEM NO.
UNLESS OTHERWISE SPECIFIED				
DIMENSION IN INCHES				
TOLERANCES				
DECIMALS	FRACTIONS	ANGLES		
±.005	± 1/64	± 0°30'		
FINAL SURFACE QUALITY				
REMOVE BURRS AND BREAK SHARP EDGES				
MATERIAL				
NEXT HIGHER ASSY.				
A-NL-VT15-0				
SCALE				
SHEET 1 OF 1				
TITLE			NUMBER	REV.
D REGISTER			DBSVT15-0-13	B
DIST.				

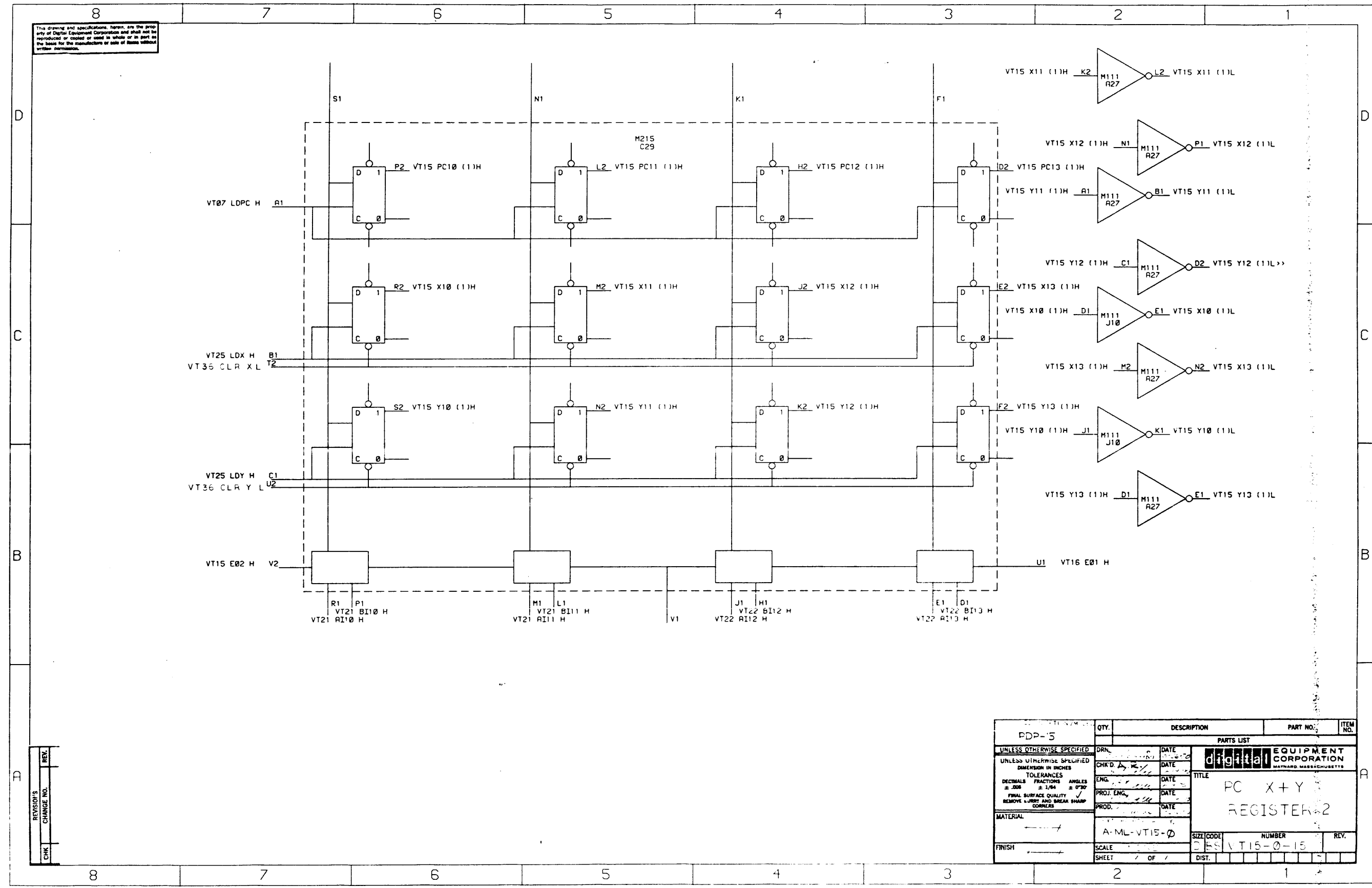
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REVISIONS	REV.
CHANGE NO.	
CHK	

40P-15		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST					
UNLESS OTHERWISE SPECIFIED		DRN.	DATE	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
UNLESS OTHERWISE SPECIFIED		CHK'D.	DATE	TITLE	
DIMENSION IN INCHES		ENG.	DATE	PC X+Y	
TOLERANCES		PROL. ENG.	DATE	REGISTER I	
DECIMALS FRACTIONS ANGLES		PROD.	DATE	SIZE CODE NUMBER REV.	
± .008 ± .014 ± 0°30'				A-ML-VT15-0	
FINAL SURFACE QUALITY				SCALE	
REMOVE BURRS AND BREAK SHARP CORNERS				SHEET 1 OF 1	
MATERIAL				DIST.	
FINISH				ESIVT15-C-14	

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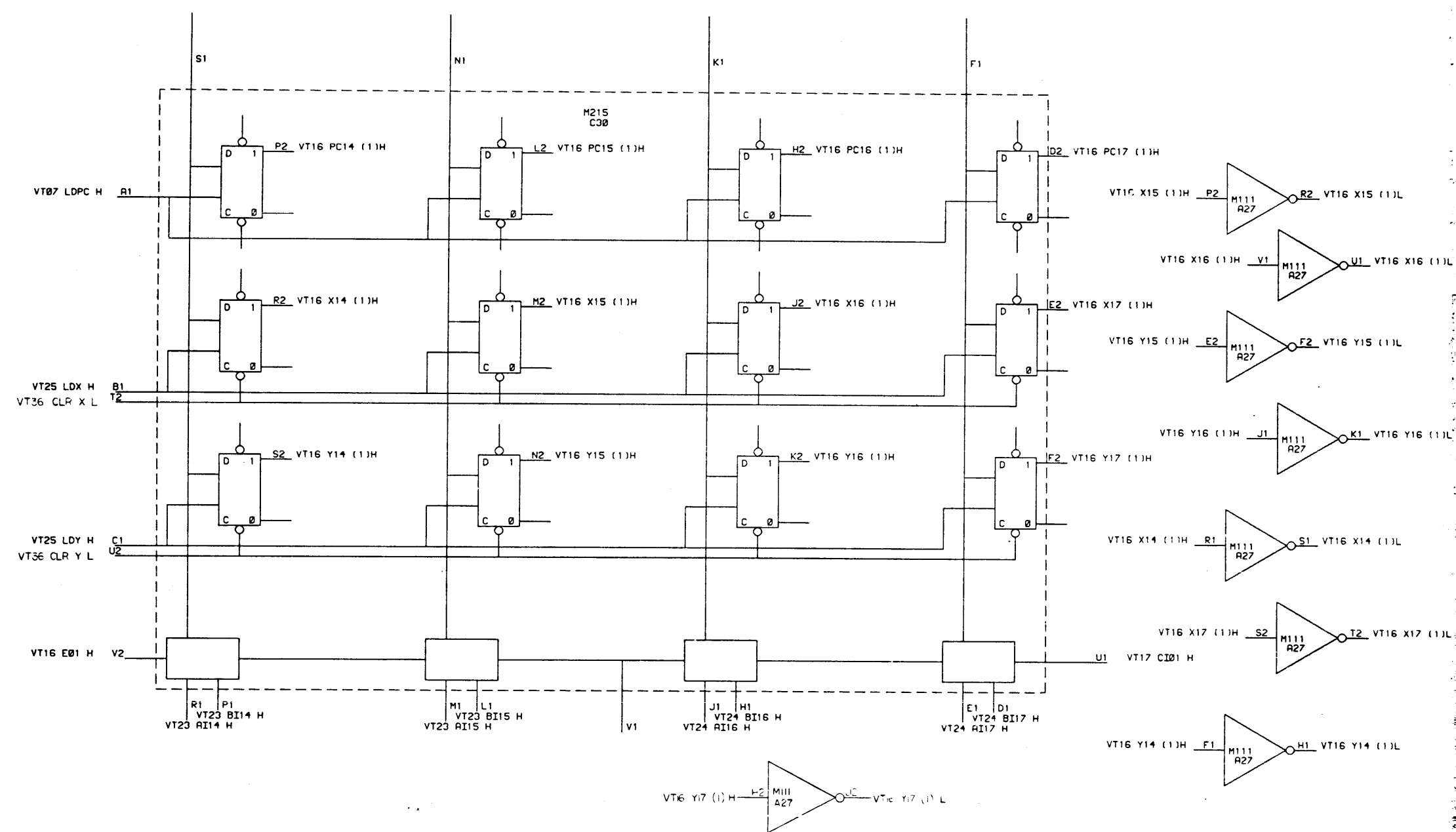


REV.	
CHANGE NO.	
CHK	

PDP-5		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST					
UNLESS OTHERWISE SPECIFIED	DRN.	DATE	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS		
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES	CHK'D.	DATE	TITLE PC X+Y REGISTER-2		
TOLERANCES	ENG.	DATE	SIZE CODE A-ML-VT15-0		
DECIMALS ± .008	PROJ. ENG.	DATE	NUMBER DES-VT15-0-15		
FRACTIONS ± 1/64	PROD.	DATE	REV.		
ANGLES ± 0°30'	SCALE				
FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS	SHEET / OF /				
MATERIAL	DIST.				
FINISH					



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REVISIONS	REV.
CHANGE NO.	
CHK	

PART USED ON OPTION/MODEL PDP-15	QTY.	DESCRIPTION	PART NO.	ITEM NO.
UNLESS OTHERWISE SPECIFIED				
UNLESS OTHERWISE SPECIFIED				
DIMENSION IN INCHES				
TOLERANCES				
DECIMALS	FRACTIONS	ANGLES		
± .005	± 1/64	± 15'		
FINAL SURF. IS QUALITY				
REMOVE BURRS AND BREAK SHARP CORNERS				
MATERIAL	NEXT HIGHER UNIT			
+	A-ML-VT15-0			
FINISH	SCALE	NONE	SIZE CODE	NUMBER
+	SHEET	1 OF 1	D BS VT15 0 16	REV.
			DIST.	

**digital EQUIPMENT CORPORATION**  
MAYNARD, MASSACHUSETTS

TITLE  
**PC X+Y REGISTER-3**

DATE  
7-1-60

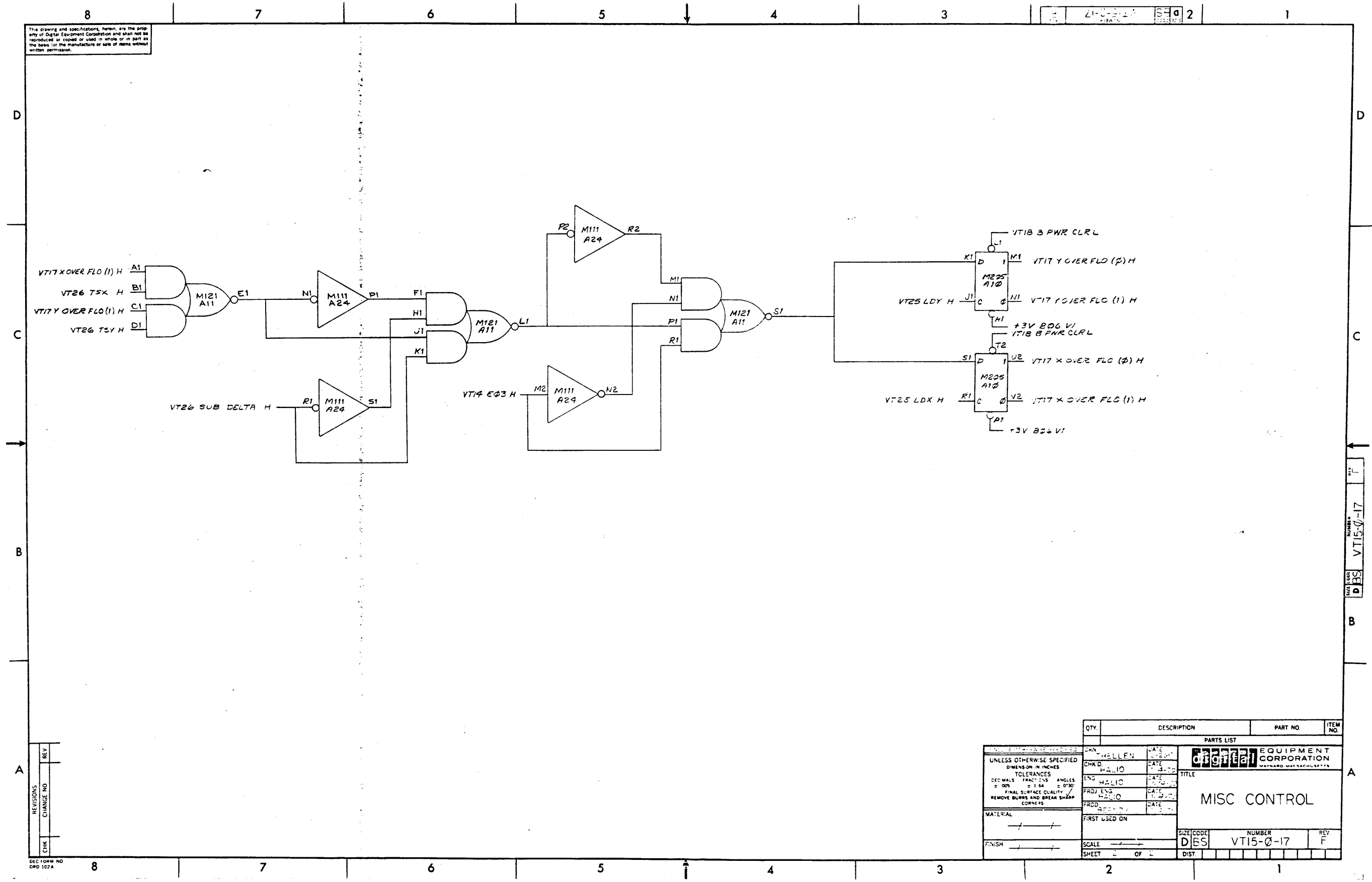
DATE  
7-1-60

DATE  
7-1-60

DATE  
7-1-60



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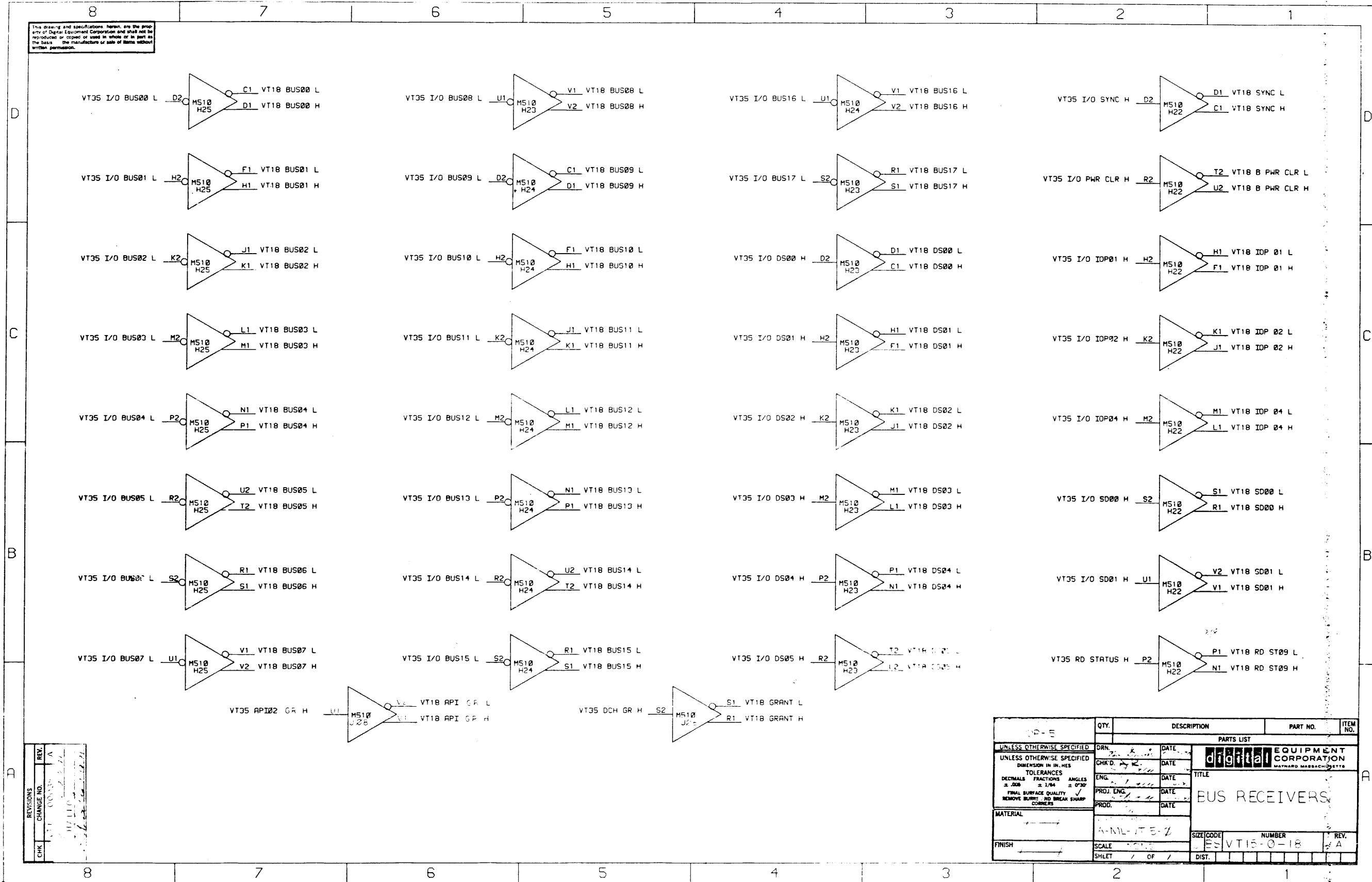
REV	
CHANGE NO	
CHK	

DEC FORM NO. 0124

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
UNLESS OTHERWISE SPECIFIED			
DIMENSIONS IN INCHES			
TOLERANCES			
DECIMALS	FRACTIONS	ANGLES	
± .005	± 1/64	± 0°30'	
FINAL SURFACE QUALITY / REMOVE BURRS AND BREAK SHARP CORNERS			
MATERIAL			
FINISH			
DRAWN: HALLEN		DATE: 1-1-68	
CHKD: HALIO		DATE: 1-4-68	
ENG: HALIO		DATE: 1-1-68	
PROJ ENG: HALIO		DATE: 1-1-68	
PRCD: HALIO		DATE: 1-1-68	
FIRST USED ON:			
SCALE:			
SHEET 2 OF 2		DIST:	
		TITLE	
		MISC CONTROL	
SIZE CODE		NUMBER	
D BS		VT15-0-17	
REV		F	

NUMBER  
 D BS  
 VT15-0-17  
 REV  
 F

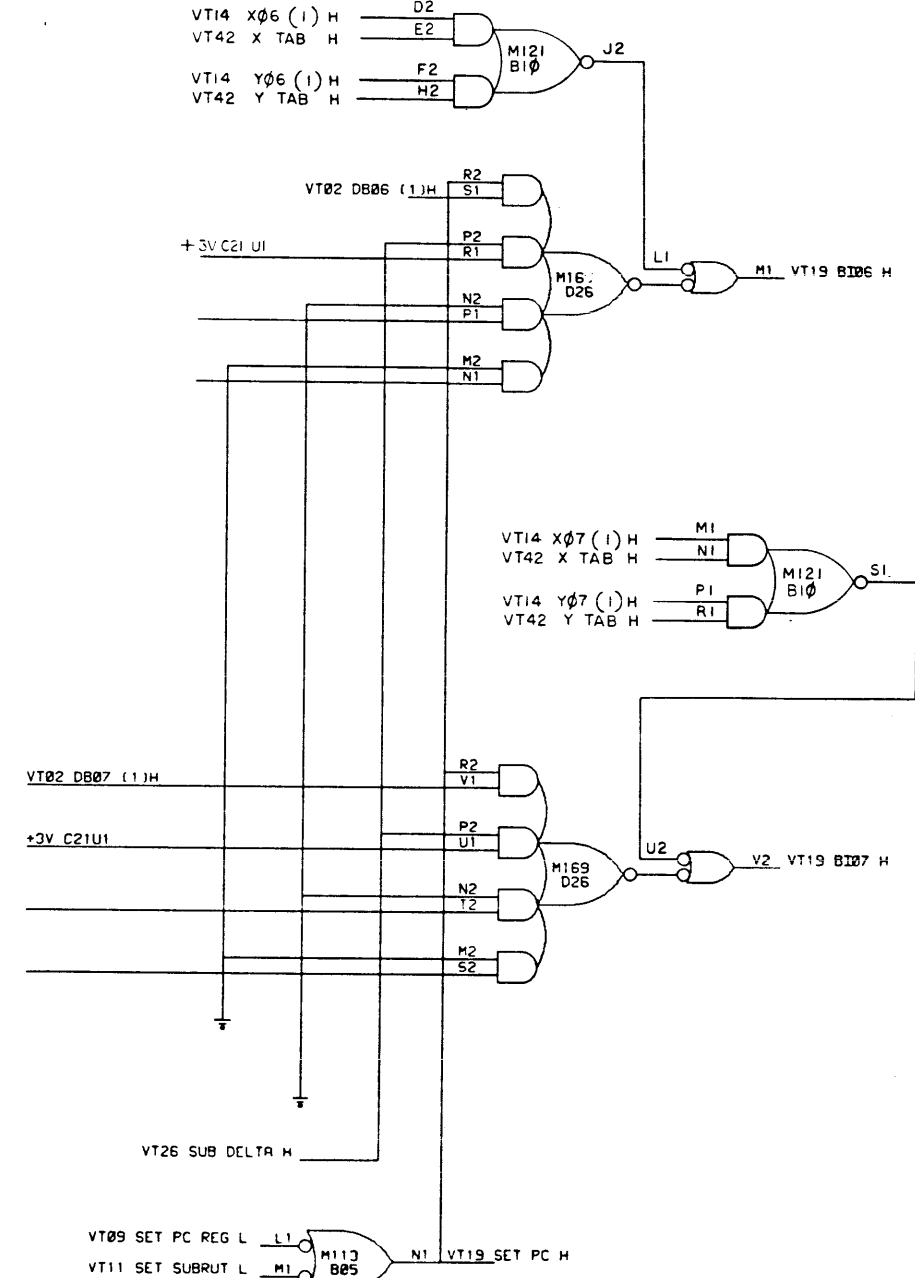
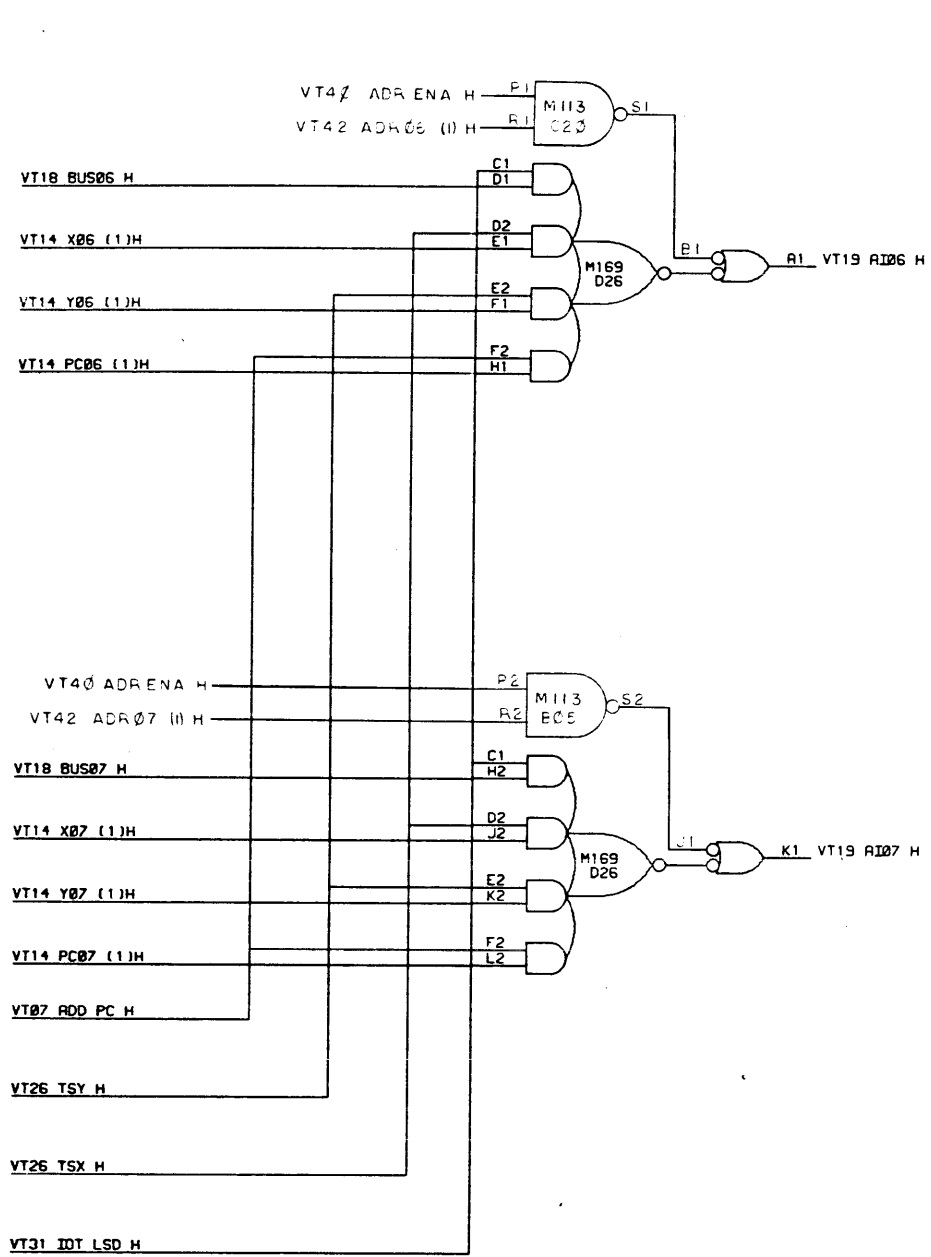
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REV.	CHANGE NO.	DATE	BY	CHK
1				

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
<b>digital EQUIPMENT CORPORATION</b> MAYNARD, MASSACHUSETTS			
TITLE <b>BUS RECEIVERS</b>			
MATERIAL		SIZE CODE	NUMBER
FINISH		SCALE	REV.
SHEET / OF /		DIST.	

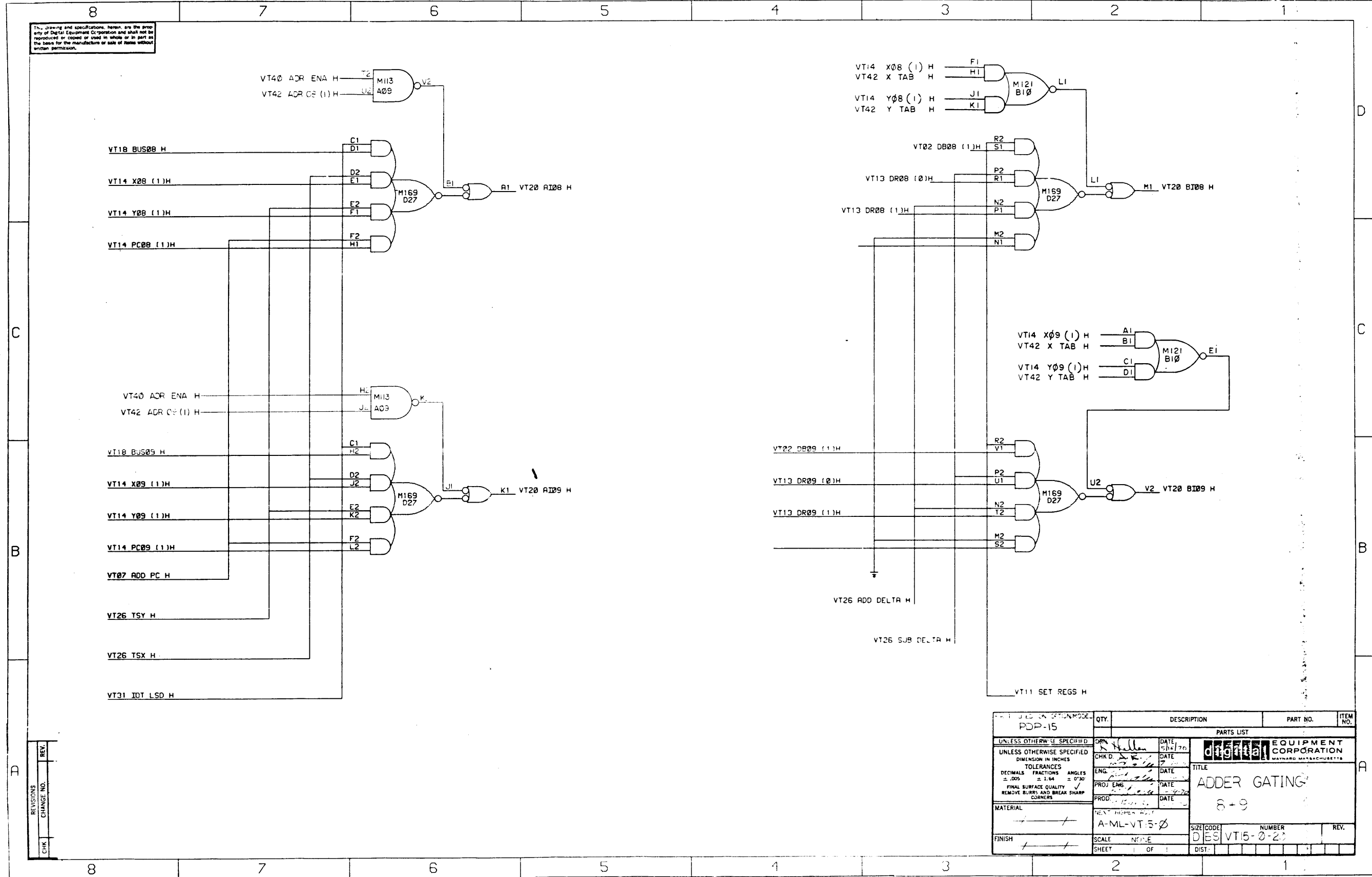
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REVISIONS	CHG	NO.	REV.
	FV	1	A

UNLESS OTHERWISE SPECIFIED		DRN.	DATE	PARTS LIST	
DIMENSION IN INCHES		CHK'D.	DATE	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
TOLERANCES		ENG.	DATE	TITLE: ADDER GATING 6+7	
DECIMALS	FRACTIONS	PROJ. ENG.	DATE	SIZE CODE	
± .005	± 1/64	PROD.	DATE	NUMBER	
FINAL SURFACE QUALITY		EXT. DIMENSIONS		REV.	
REMOVE BURRS AND BREAK SHARP CORNERS		A-ML-VT5-0		VT5-0-12	
MATERIAL	FINISH	SCALE	SHEET	OF	DIST.

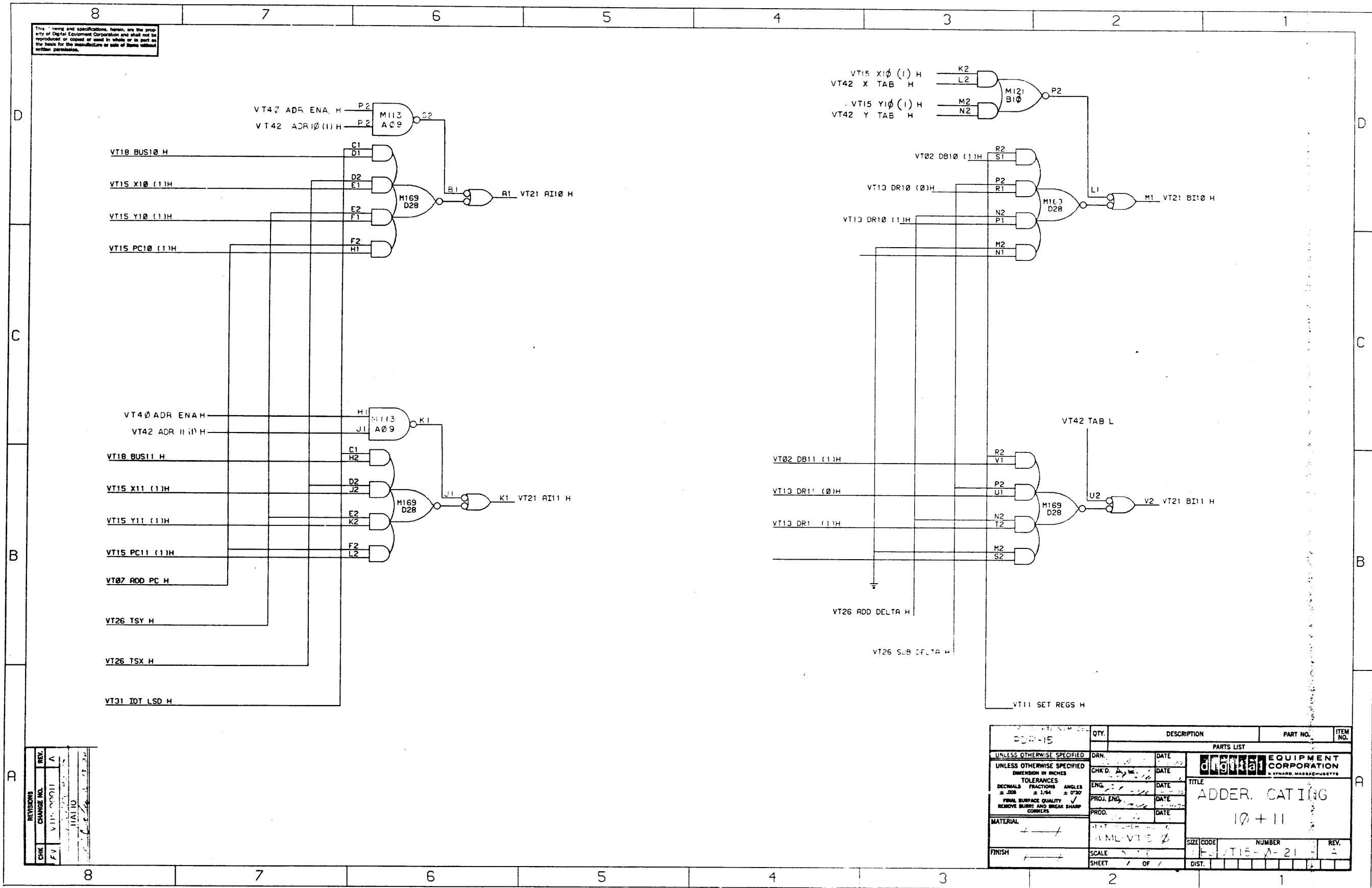
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REVISIONS	REV.
CHANGE NO.	
CHK	

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
UNLESS OTHERWISE SPECIFIED	DRN. <i>Hallen</i>	DATE 5/12/70	<b>digital</b> EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
UNLESS OTHERWISE SPECIFIED	CHK D. <i>Hallen</i>	DATE 7/1/70	
DIMENSION IN INCHES	ENG. <i>Hallen</i>	DATE 7/1/70	TITLE
TOLERANCES	PROJ. ENG. <i>Hallen</i>	DATE 7/1/70	ADDER GATING
DECIMALS FRACTIONS ANGLES	PROD. <i>Hallen</i>	DATE 7/1/70	8-9
± .005 ± .001 ± 0°30'			
FINAL SURFACE QUALITY			
REMOVE BURRS AND BREAK SHARP CORNERS			
MATERIAL	NEXT NUMBER		
	A-ML-VT.5-Ø	SIZE CODE	NUMBER
FINISH		DESIGN	REV.
		SCALE NONE	
SHEET	OF	DIST.	

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REV.	CHG.	NO.	DATE	BY
A				

QTY.	DESCRIPTION	PART NO.	ITEM NO.

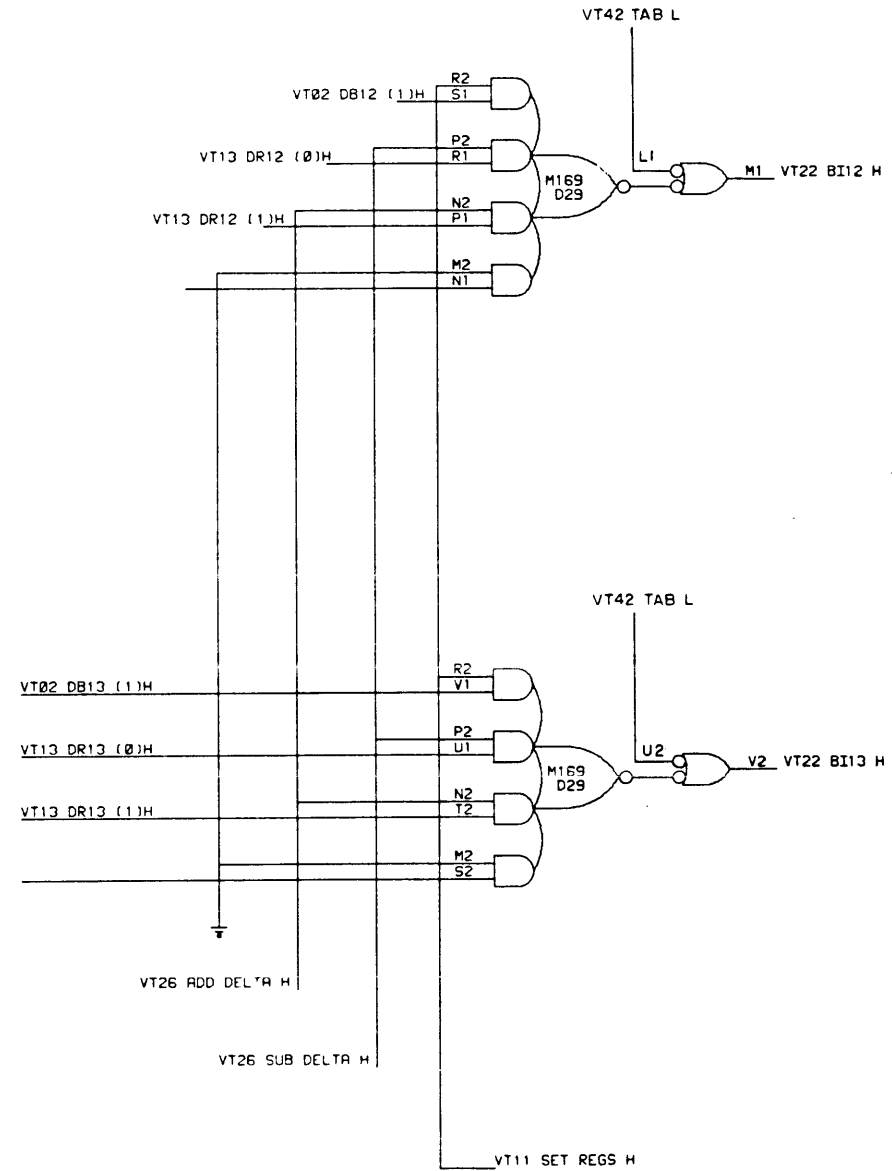
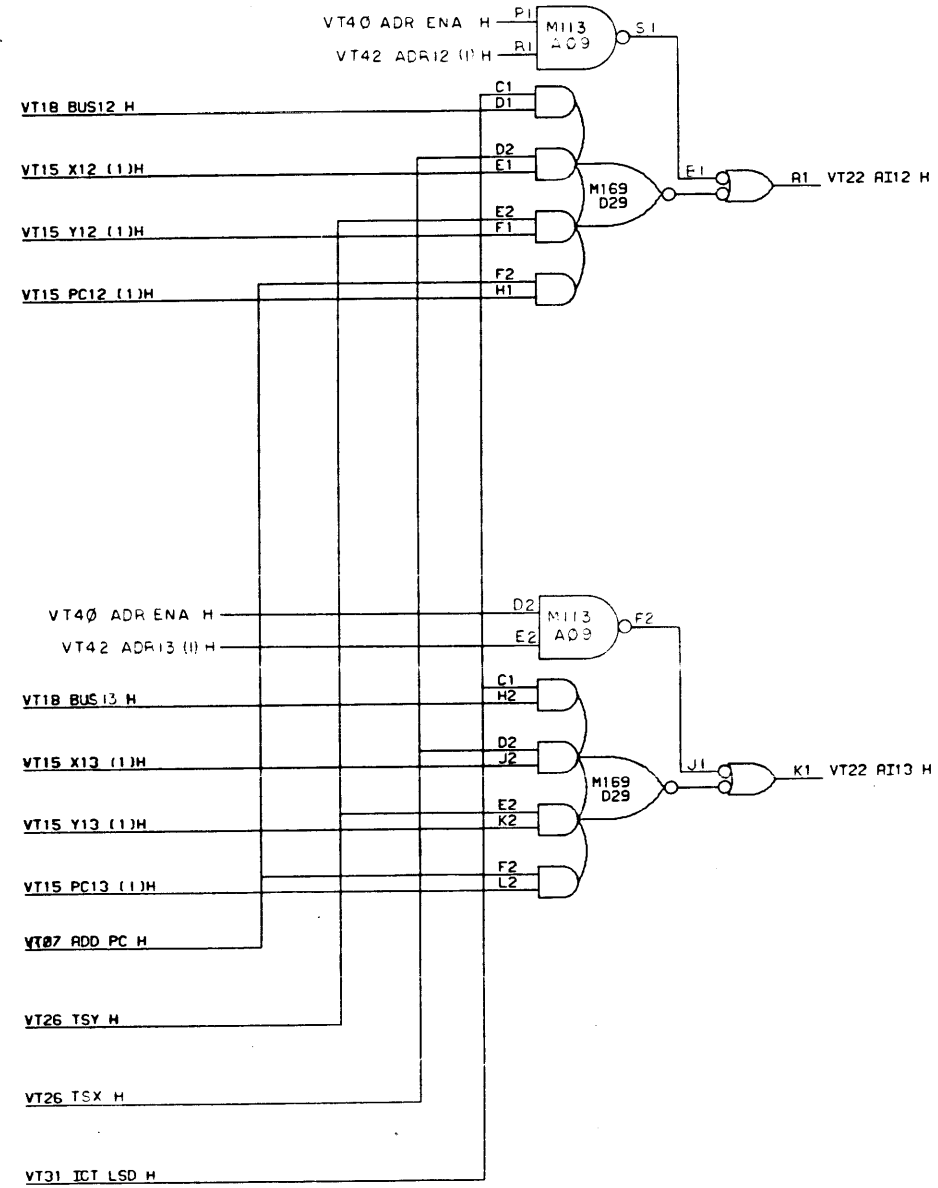
  

UNLESS OTHERWISE SPECIFIED		DRN.	DATE
UNLESS OTHERWISE SPECIFIED		CHK'D.	DATE
DIMENSION IN INCHES		ENG.	DATE
TOLERANCES		PROJ. ENG.	DATE
DECIMALS	FRACTIONS	PROD.	DATE
± .008	± 1/64		
	± 0°30'		
FINAL SURFACE QUALITY			
REMOVE BURRS AND BREAK SHARP CORNERS			
MATERIAL		DATE	
FINISH		SCALE	
		SHEET / OF /	

PARTS LIST		TITLE	
DIGITAL EQUIPMENT CORPORATION		ADDER. CATING	
RAYMOND, MASSACHUSETTS		10 + 11	
SIZE CODE	NUMBER	REV.	
ES-1715-A-21			
DIST.			

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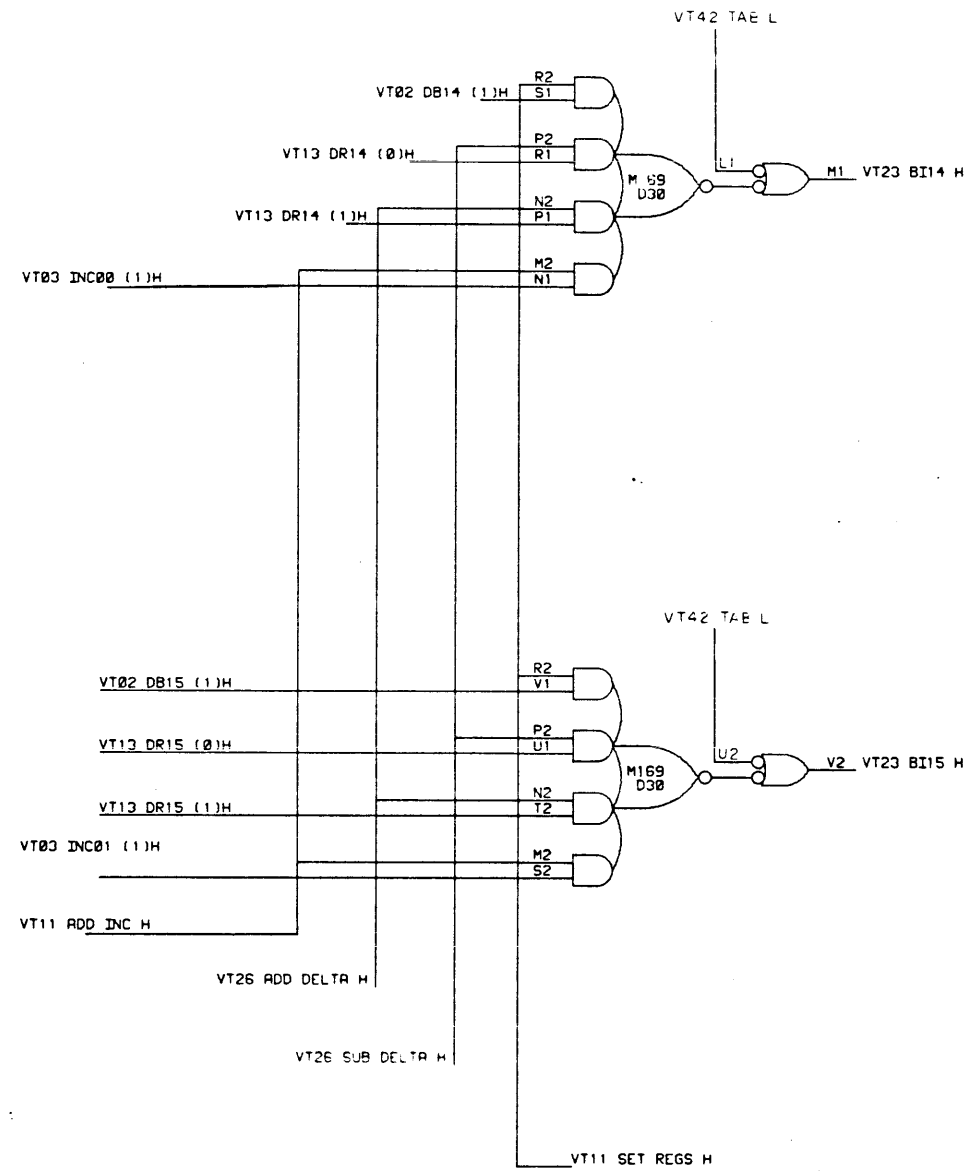
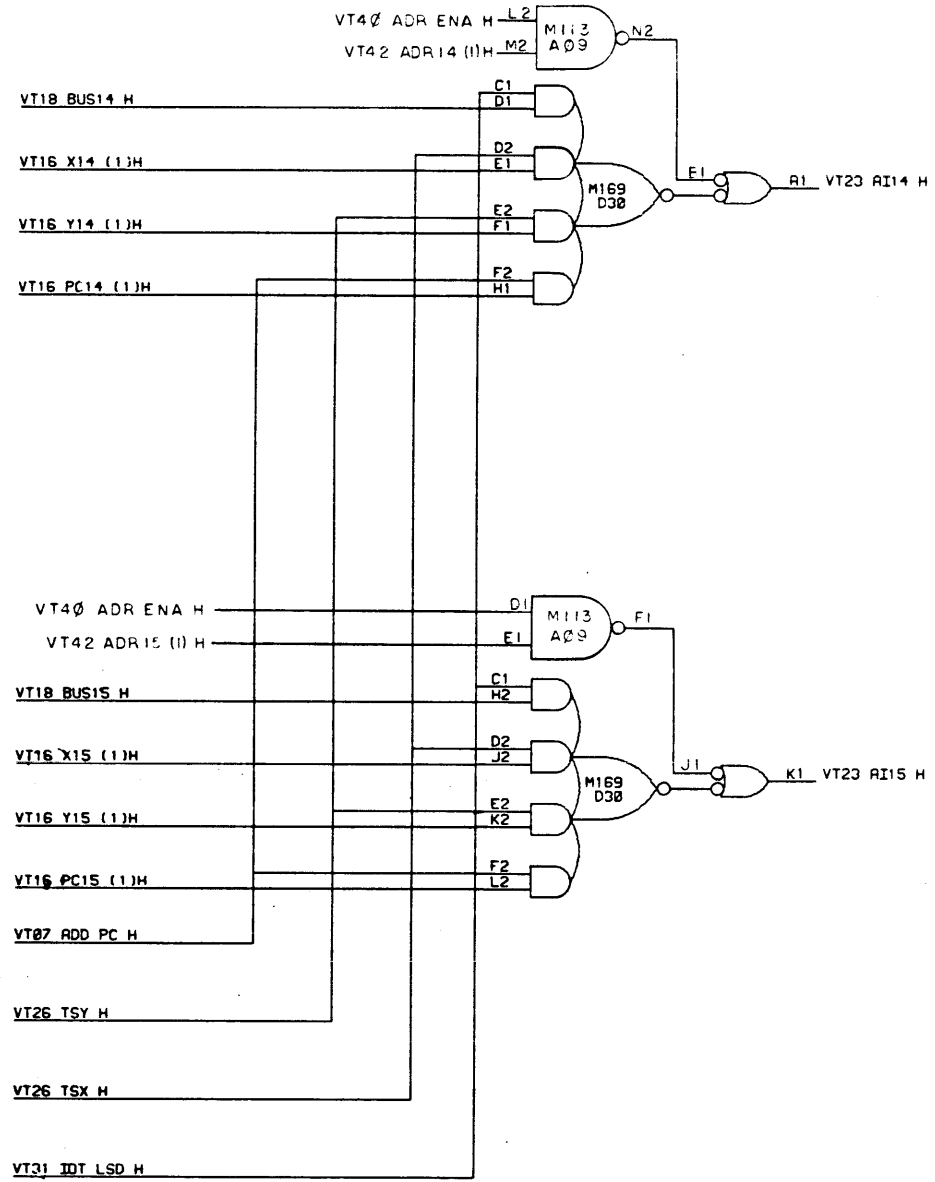


REVISIONS	CHANGE NO.	REV.
CHK		

PDP-15		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST					
UNLESS OTHERWISE SPECIFIED	DRN.	DATE	DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS		
UNLESS OTHERWISE SPECIFIED	CHK'D. A.K.	DATE	TITLE ADDER GATING 12 + 13		
TOLERANCES	ENG.	DATE	SIZE/CODE NUMBER REV.		
DECIMALS ±.005	PROJ. ENG.	DATE	ES VT15-0-22		
FRACTIONS ± 1/64	PROD.	DATE	SCALE NONE		
ANGLES ± 0°30'			SHEET 1 OF 1		
FINAL SURFACE QUALITY			DIST.		
REMOVE BURRS AND BREAK SHARP CORNERS					
MATERIAL					
FINISH					



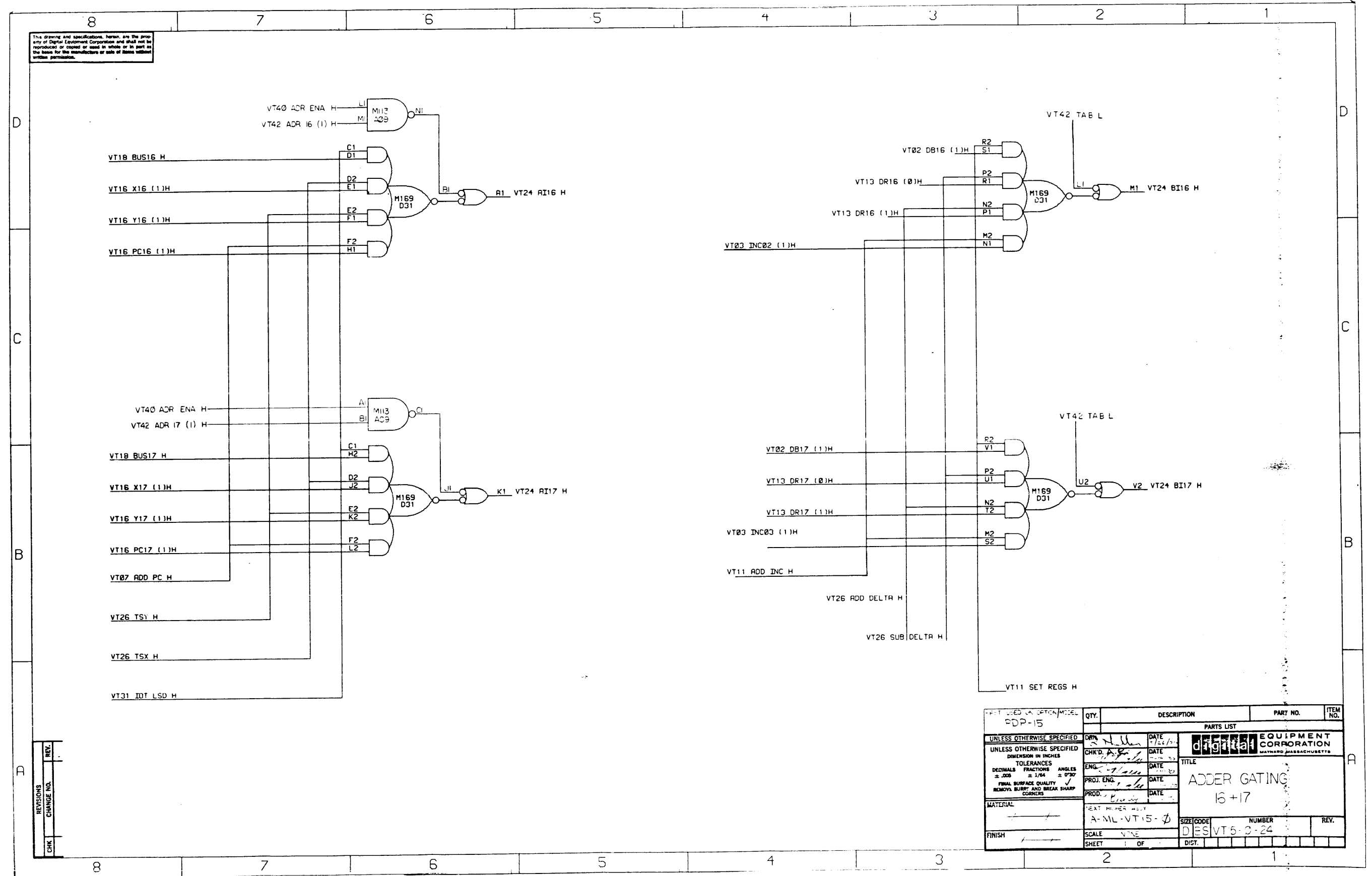
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REVISIONS	CHK	REV.
CHANGE NO.		

PDP-15		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST					
UNLESS OTHERWISE SPECIFIED	DRN.	DATE	digital EQUIPMENT CORPORATION MAYNARD MASSACHUSETTS		
UNLESS OTHERWISE SPECIFIED	CHKD.	DATE	TITLE ADDER GATING		
TOLERANCES			SIZE CODE NUMBER REV.		
DECIMALS	FRACTIONS	ANGLES	DIF VT15-0-23		
± .005	± 1/64	± 0°30'	DIST.		
FINAL SURFACE QUALITY			SCALE		
REMOVE BURRS AND BREAK SHARP CORNERS			SHEET 2 OF 7		
MATERIAL	TEST NUMBER		REV.		
	A-VL-VT15-0				
FINISH	SCALE		REV.		
	NONE				

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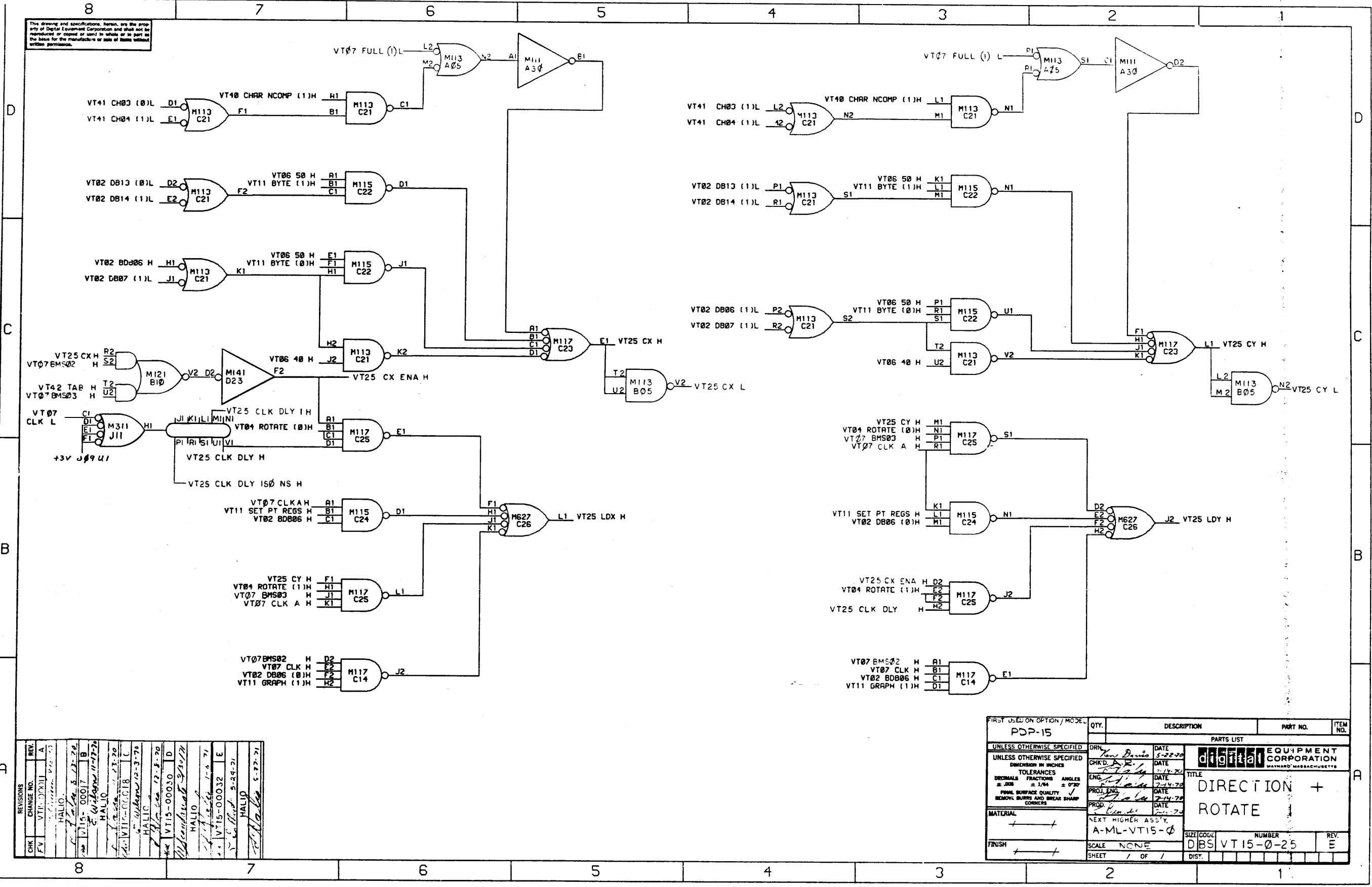


REVISIONS	REV.
CHANGE NO.	
CHECK	

UNLESS OTHERWISE SPECIFIED	DRW	DATE	7/26/64
UNLESS OTHERWISE SPECIFIED	CHK'D	DATE	
DIMENSION IN INCHES	ENG	DATE	
TOLERANCES	PROJ. ENG.	DATE	
DECIMALS ± .005	PROD.	DATE	
FRACTIONS ± 1/64			
ANGLES ± 0°30'			
FINAL SURFACE QUALITY			
REMOVE BURR AND BREAK SHARP CORNERS			
MATERIAL	TEXT NUMBER ONLY		
	A-ML-VT15-Ø	SIZE CODE	NUMBER
FINISH	SCALE	SHEET	OF
		DIGT.	

**digital EQUIPMENT CORPORATION**  
 TITLE: **ADDER GATING 16+17**  
 SIZE: **DESVT5-C-24**

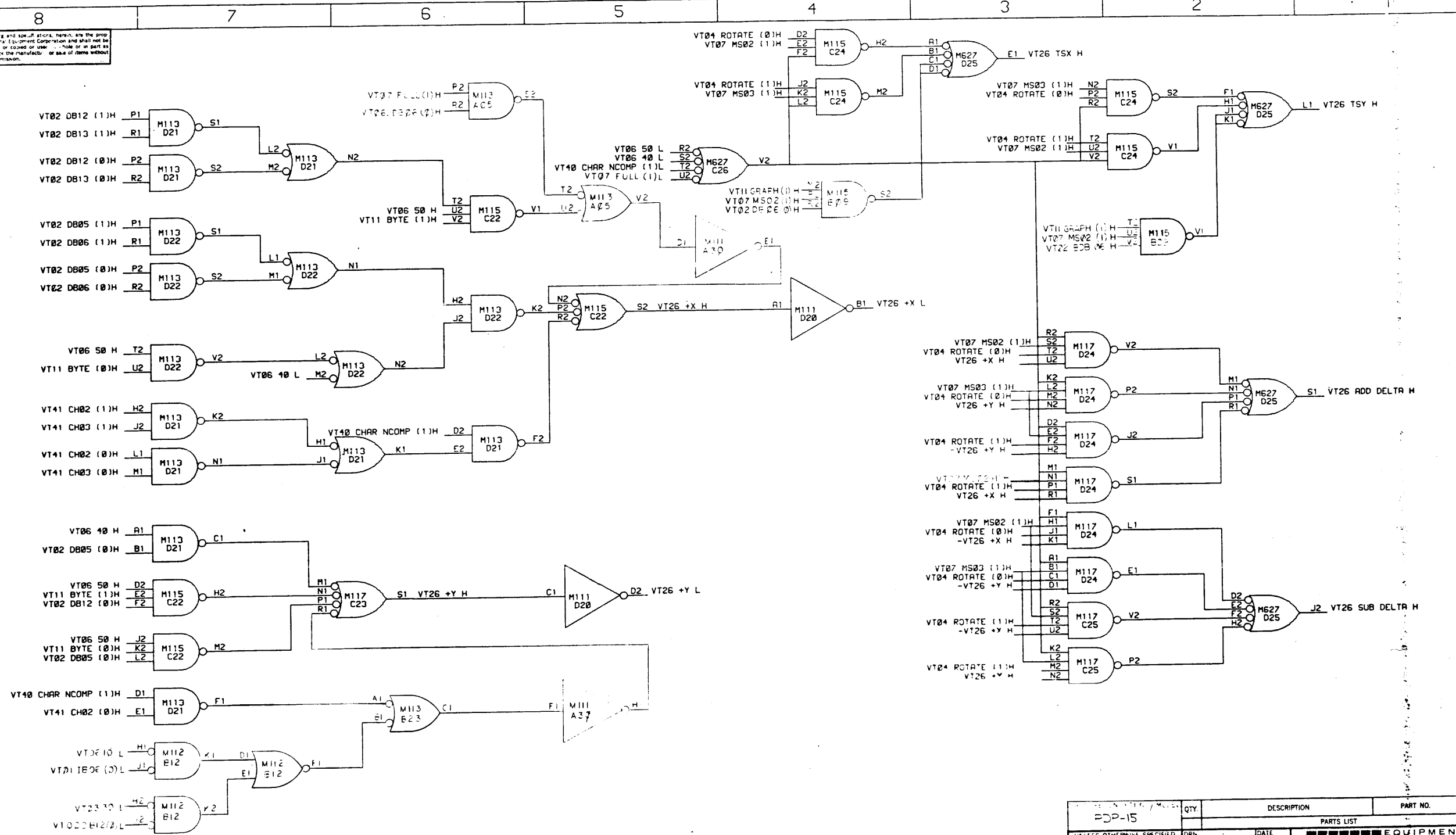
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REV.	DATE	BY	CHKD.	DESCRIPTION
1	5-22-70	Y. B.	A. R.	INITIAL DESIGN
2	7-14-70	Y. B.	A. R.	REVISED FOR MANUFACTURE
3	7-14-70	Y. B.	A. R.	REVISED FOR MANUFACTURE
4	7-14-70	Y. B.	A. R.	REVISED FOR MANUFACTURE
5	7-14-70	Y. B.	A. R.	REVISED FOR MANUFACTURE
6	7-14-70	Y. B.	A. R.	REVISED FOR MANUFACTURE
7	7-14-70	Y. B.	A. R.	REVISED FOR MANUFACTURE
8	7-14-70	Y. B.	A. R.	REVISED FOR MANUFACTURE

FIRST USED ON OPTION / MODEL		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15					
PARTS LIST					
UNLESS OTHERWISE SPECIFIED		DRN	DATE	DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
UNLESS OTHERWISE SPECIFIED		CHK'D.	DATE	TITLE	
DIMENSION IN INCHES		ENG.	DATE	DIRECTION + ROTATE	
TOLERANCES		PROJ. ENG.	DATE	SIZE CODE	
DECIMALS FRACTIONS ANGLES		PROD.	DATE	NUMBER	
±.008 ±.004 ±.002		NEXT HIGHER ASSY.			
FINAL SURFACE QUALITY		A-ML-VT15-0			
REMOVE BURRS AND BREAK SHARP CORNERS		SCALE NONE			
MATERIAL		SHEET 1 OF 1			
FINISH		DIST.			
		DBS VT15-0-25			
		REV. 1			

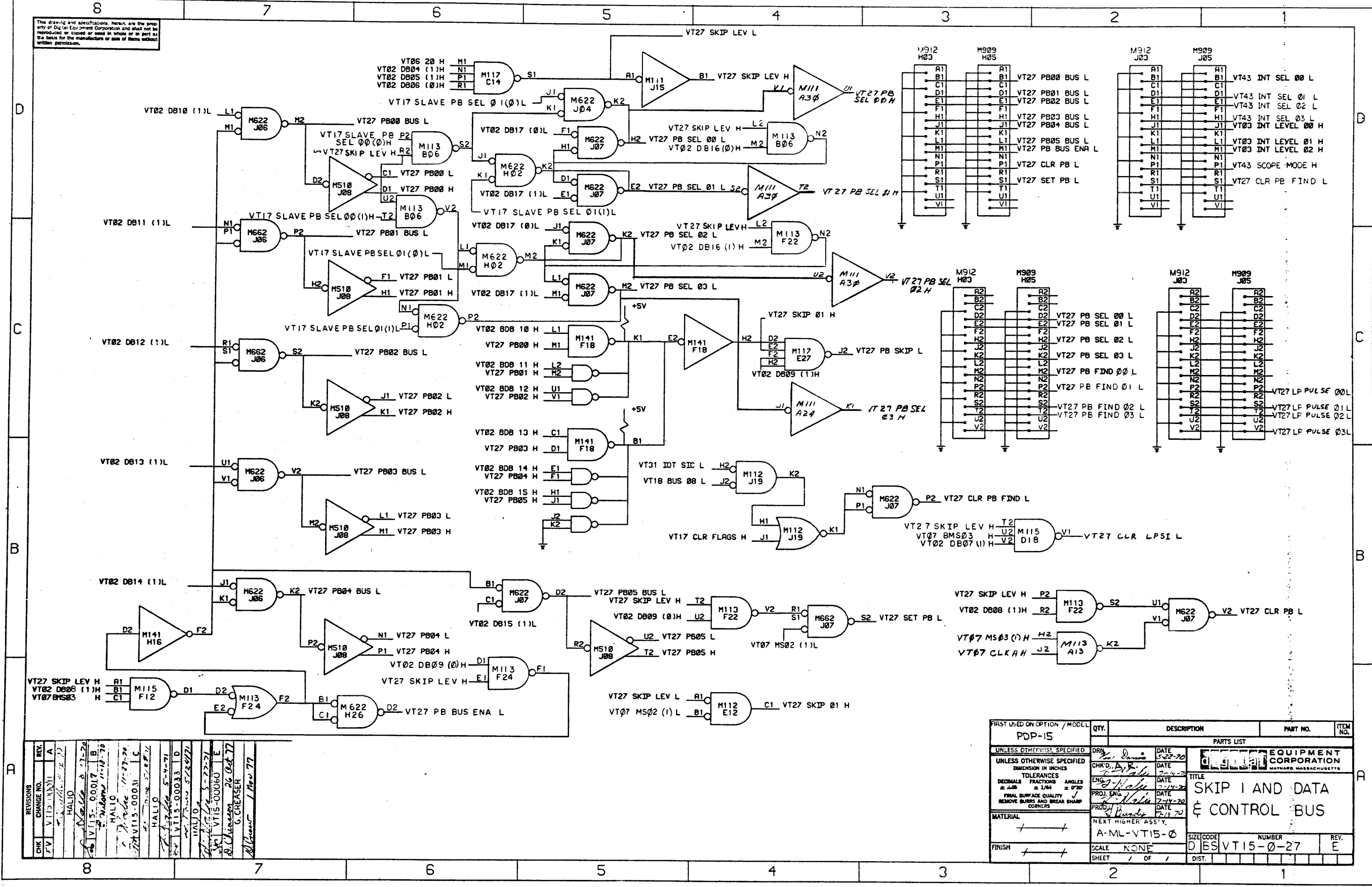
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REV.	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		
8		

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
<b>digital</b> EQUIPMENT CORPORATION MAYFIELD MASSACHUSETTS			
TITLE		NUMBER	
DIRECTION + ROTATE 2		VTIS-C-2	
MATERIAL		SCALE	
A-ML-VT-5-2		NONE	
FINISH		SHEET	
		/ OF /	
DIST		REV.	

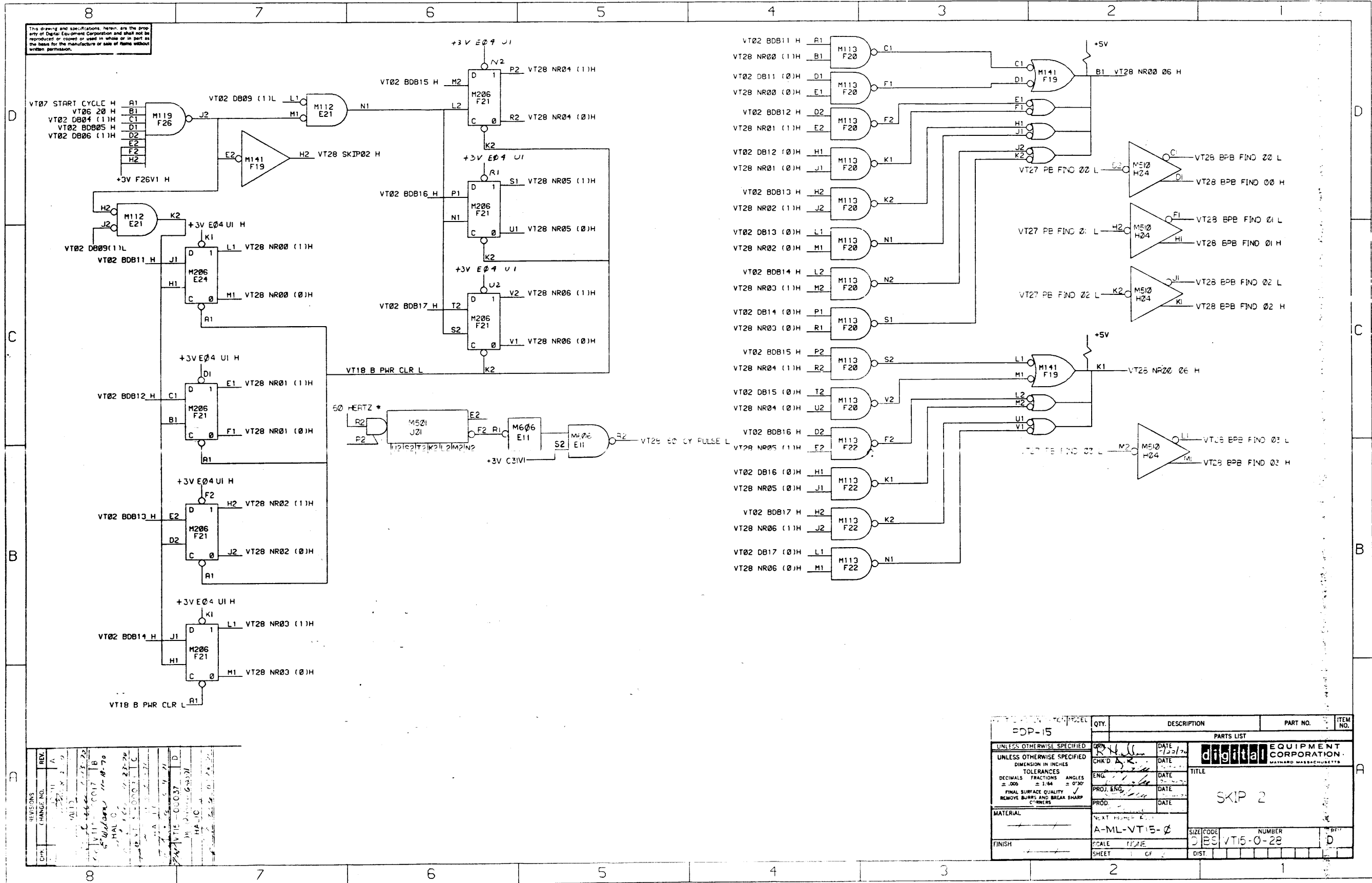
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REV.	DATE	BY	CHKD.	DESCRIPTION
1	5-22-70	HALIO	HALIO	REVISED
2	7-14-70	HALIO	HALIO	REVISED
3	7-14-70	HALIO	HALIO	REVISED
4	7-14-70	HALIO	HALIO	REVISED
5	7-14-70	HALIO	HALIO	REVISED
6	7-14-70	HALIO	HALIO	REVISED
7	7-14-70	HALIO	HALIO	REVISED
8	7-14-70	HALIO	HALIO	REVISED

FIRST USED ON OPTION / MODEL		QTY.	DESCRIPTION	PART NO.	ITEM NO.
POP-15					
UNLESS OTHERWISE SPECIFIED		PARTS LIST			
DRN	DATE				
CHKD.	DATE				
ENG.	DATE				
PROJ. ENG.	DATE				
PROD. ENGR.	DATE				
NEXT HIGHER ASSY.					
MATERIAL					
FINISH					
SCALE					
SHEET / OF /					
UNLESS OTHERWISE SPECIFIED		EQUIPMENT CORPORATION WATRBURY, MASSACHUSETTS			
DIMENSION IN INCHES		TITLE			
TOLERANCES		SKIP 1 AND DATA CONTROL BUS			
DECIMALS	FRACTIONS	SIZE CODE			
± .005	± 1/64	D E S VT15-0-27			
FURNISH TO SPECIFICATIONS		NUMBER			
REMOVING BURRS AND BREAK SHARP CORNERS		REV. E			
		DIST.			

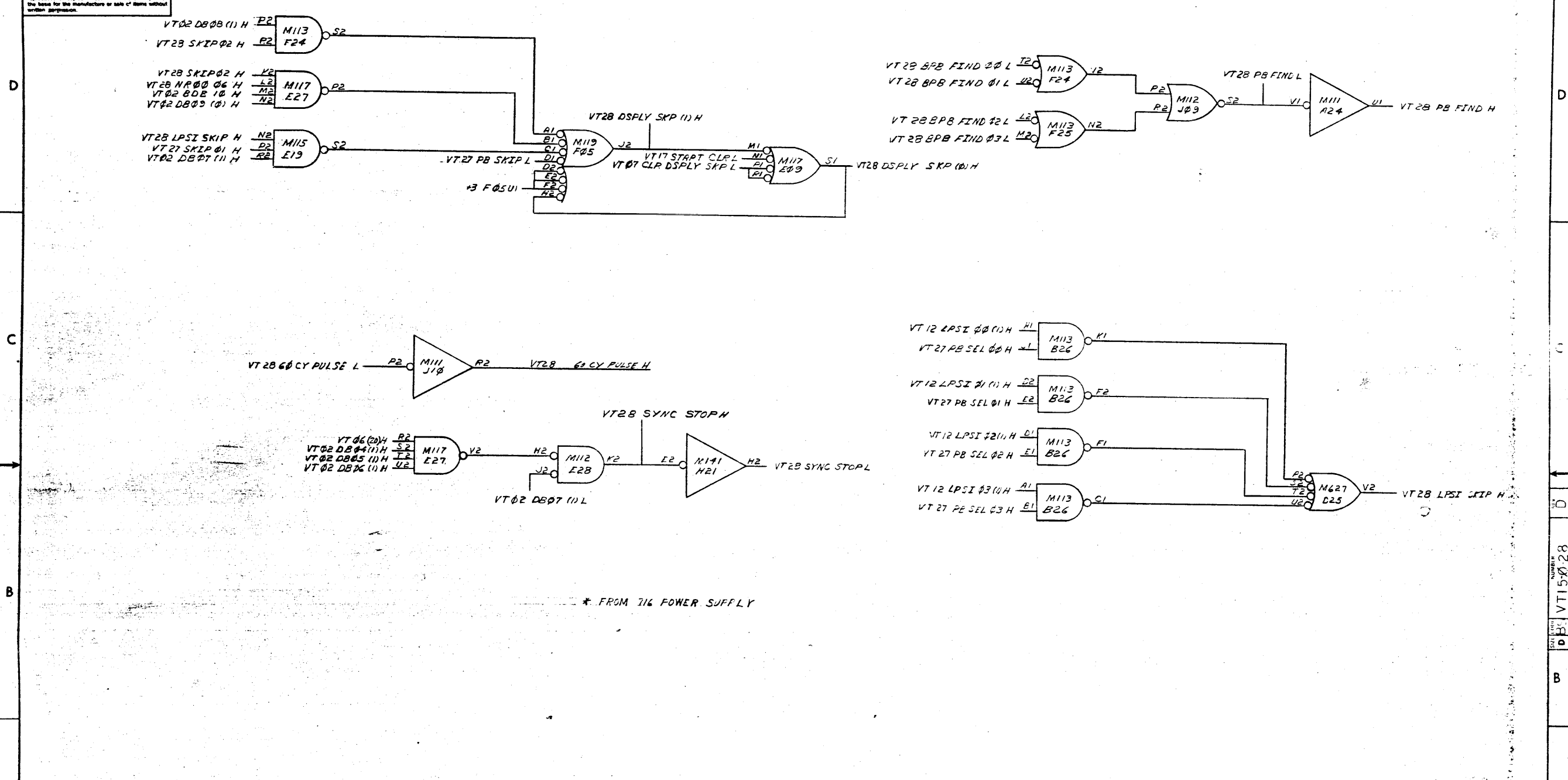
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REV.	DATE	BY	CHK'D
1	11-10-70	...	...
2	11-10-70	...	...
3	11-10-70	...	...
4	11-10-70	...	...
5	11-10-70	...	...
6	11-10-70	...	...
7	11-10-70	...	...
8	11-10-70	...	...

QTY.		DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST				
<b>digital</b> EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS				
TITLE <b>SKIP 2</b>				
MATERIAL		NEXT NUMBER		
FINISH		SCALE 11/16"		
SHEET		NUMBER D BS VT15-0-28		
DIST		BY		

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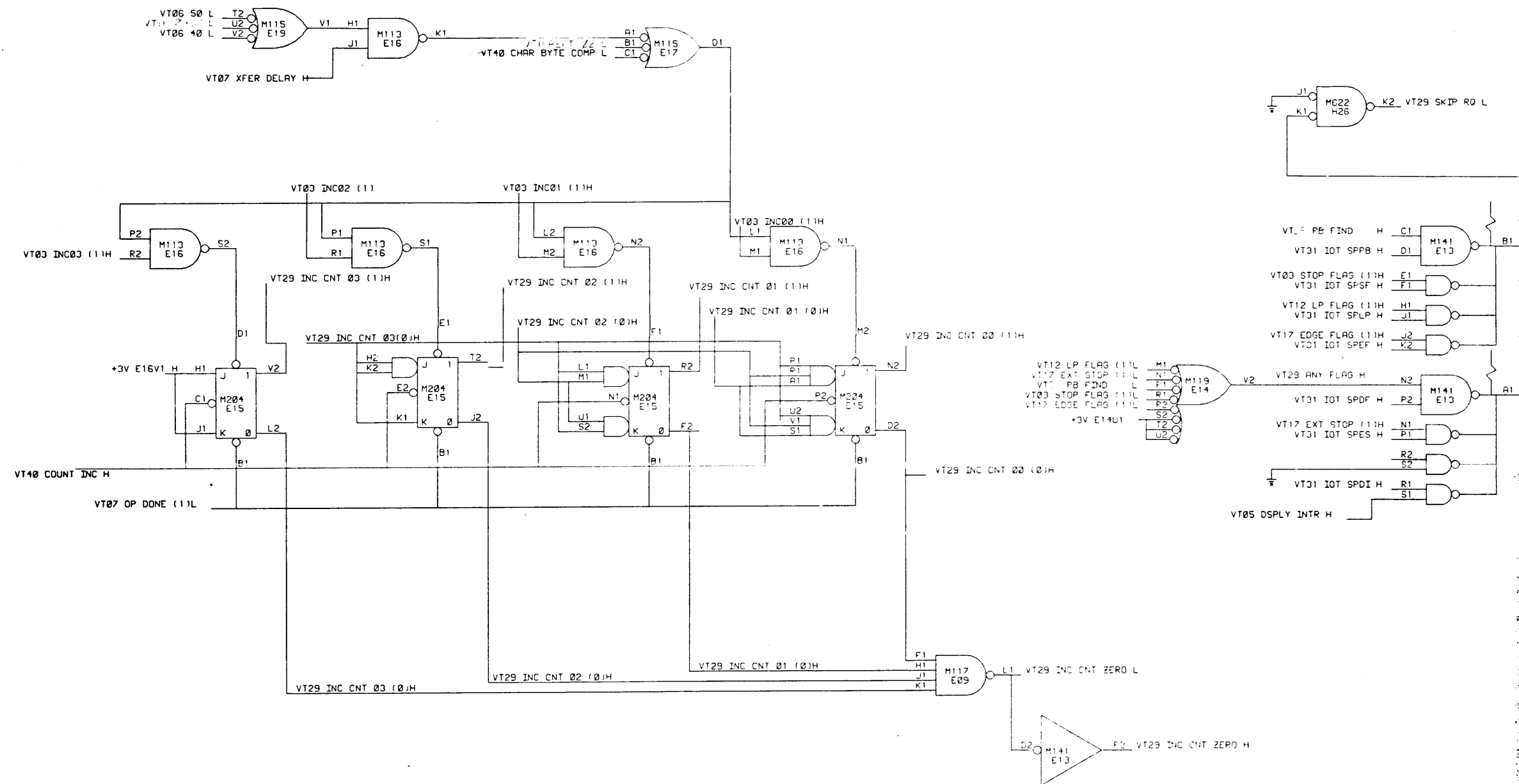
REV	
CHG	
CHK	

DEC FORM NO. 010 107A

QTY	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
UNLESS OTHERWISE SPECIFIED	DRN R. HELLEN	DATE 5-22-70	<b>digital</b> EQUIPMENT CORPORATION MAYNARD MASSACHUSETTS
UNLESS OTHERWISE SPECIFIED	CHK'D L. HALIO	DATE 7-16-70	
DIMENSION IN INCHES	ENG L. HALIO	DATE 7-15-70	
TOLERANCES	PROJ ENG L. HALIO	DATE 7-14-70	
DECIMALS FRACTIONS ANGLES	PROD S. BUNDY	DATE 7-14-70	
± .005 ± .010 ± .030	FIRST USED ON		
FINAL SURFACE QUALITY	PDP-15	SIZE/CODE	NUMBER
REMOVE BURRS AND BREAK SHARP CORNERS		DBSVT15-0-28	REV
MATERIAL			D
FINISH	SCALE	SHEET	
		2 OF 2	

DBSVT15-0-28

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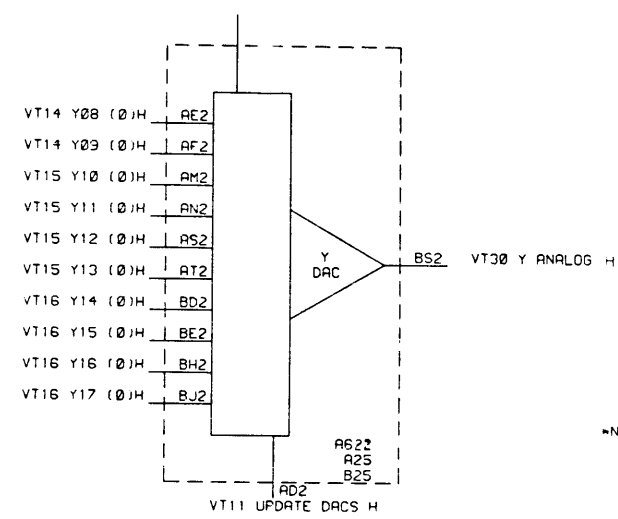
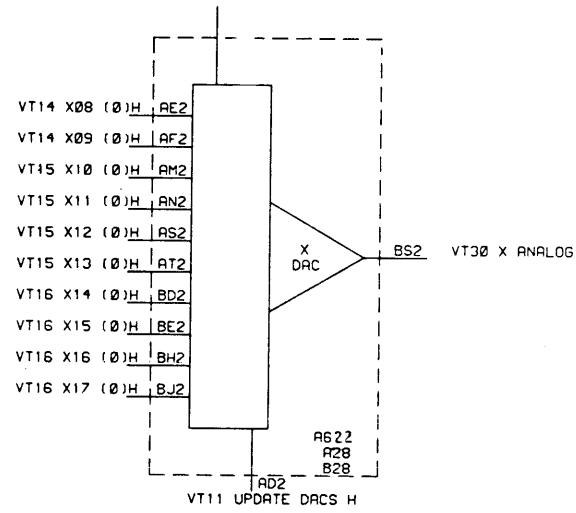
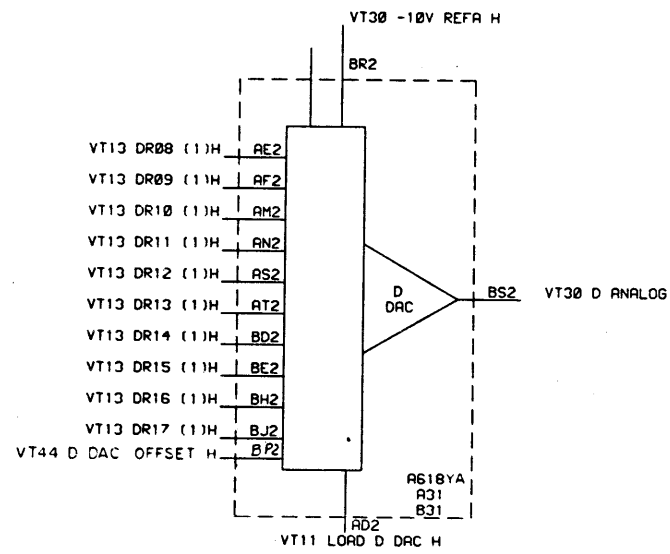
REV.	CHANGE NO.	DATE	DESCRIPTION
1			
2			
3			
4			
5			
6			
7			
8			

QUANTITY		DESCRIPTION	PART NO.	ITEM NO.
POP-15				
UNLESS OTHERWISE SPECIFIED				
DIMENSIONS IN INCHES				
TOLERANCES				
DECIMALS FRACTIONS ANGLES				
±.005 ±.004 ±.030				
FINAL SURFACE QUALITY				
REMOVE BURR AND BREAK CHAMFERS				
MATERIAL				
FINISH				
DATE		DATE	DATE	DATE
CHK'D	DATE	DATE	DATE	DATE
ENG	DATE	DATE	DATE	DATE
PROF'G	DATE	DATE	DATE	DATE
SCALE		PART CODE		
ASST		NUMBER		
		REV.		
		DATE		

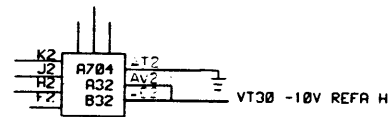
**digital** EQUIPMENT CORPORATION  
 TITLE: SKIP REQUEST AND INC COUNT REG  
 NUMBER: 0153 / 115-0-20  
 DATE: 11/15/70



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\*NOTE: A618 YA OUTPUT 0V TO +5V  
A622 OUTPUT 0V TO +5V



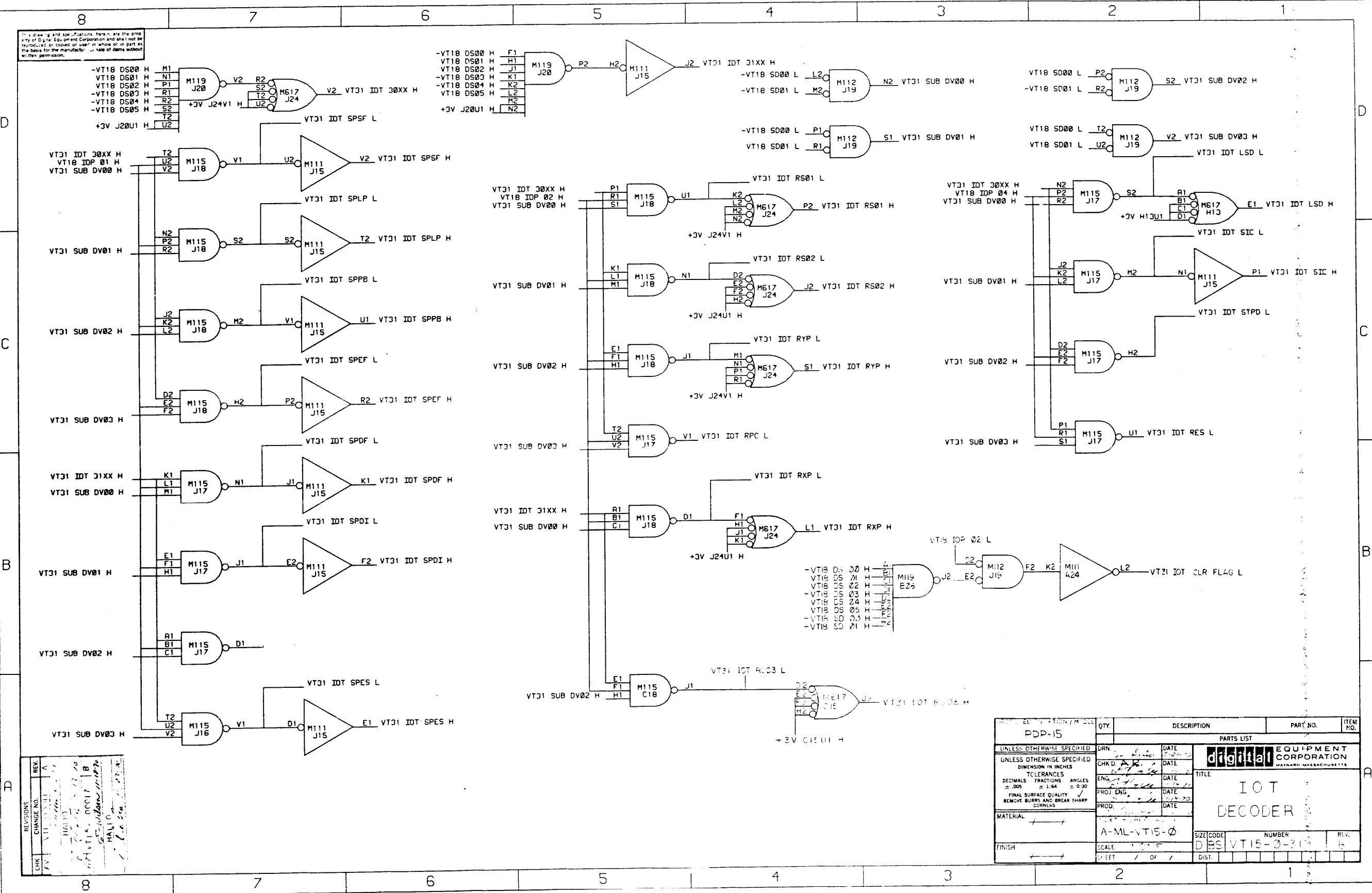
REV.	CHANGE NO.	DESCRIPTION
1	1	INITIAL
2	1	REVISED TO ACCORD WITH 11-10-70
3	1	REVISED TO ACCORD WITH 11-10-70
4	1	REVISED TO ACCORD WITH 11-10-70
5	1	REVISED TO ACCORD WITH 11-10-70
6	1	REVISED TO ACCORD WITH 11-10-70
7	1	REVISED TO ACCORD WITH 11-10-70
8	1	REVISED TO ACCORD WITH 11-10-70

REV.	CHANGE NO.	DESCRIPTION
1	1	INITIAL
2	1	REVISED TO ACCORD WITH 11-10-70
3	1	REVISED TO ACCORD WITH 11-10-70
4	1	REVISED TO ACCORD WITH 11-10-70
5	1	REVISED TO ACCORD WITH 11-10-70
6	1	REVISED TO ACCORD WITH 11-10-70
7	1	REVISED TO ACCORD WITH 11-10-70
8	1	REVISED TO ACCORD WITH 11-10-70

PROJ. USED ON: PDP-15	QTY.	DESCRIPTION	PART NO.	ITEM NO.
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES	CHK'D. A. K.	DATE 12/1/70	PARTS LIST	
TOLERANCES	ENG. J. S.	DATE	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
DECIMALS FRACTIONS ANGLES	PROJ. ENG. J. S.	DATE	TITLE	
±.005 ±.001 ±.030	PROD. J. S.	DATE	DAC	
FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS	MATERIAL	SCALE	SIZE CODE	NUMBER
	A-ML-VT15-Z	1:1	ES	VT15-0-32
	FINISH	SHEET	DIST	REV.
		OF 1		C

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REV.	DATE	BY	CHKD.
1	11/10/70	W. J. ...	...
2	11/10/70	...	...
3	11/10/70	...	...
4	11/10/70	...	...

REV.	DATE	BY	CHKD.
1	11/10/70	...	...
2	11/10/70	...	...
3	11/10/70	...	...
4	11/10/70	...	...

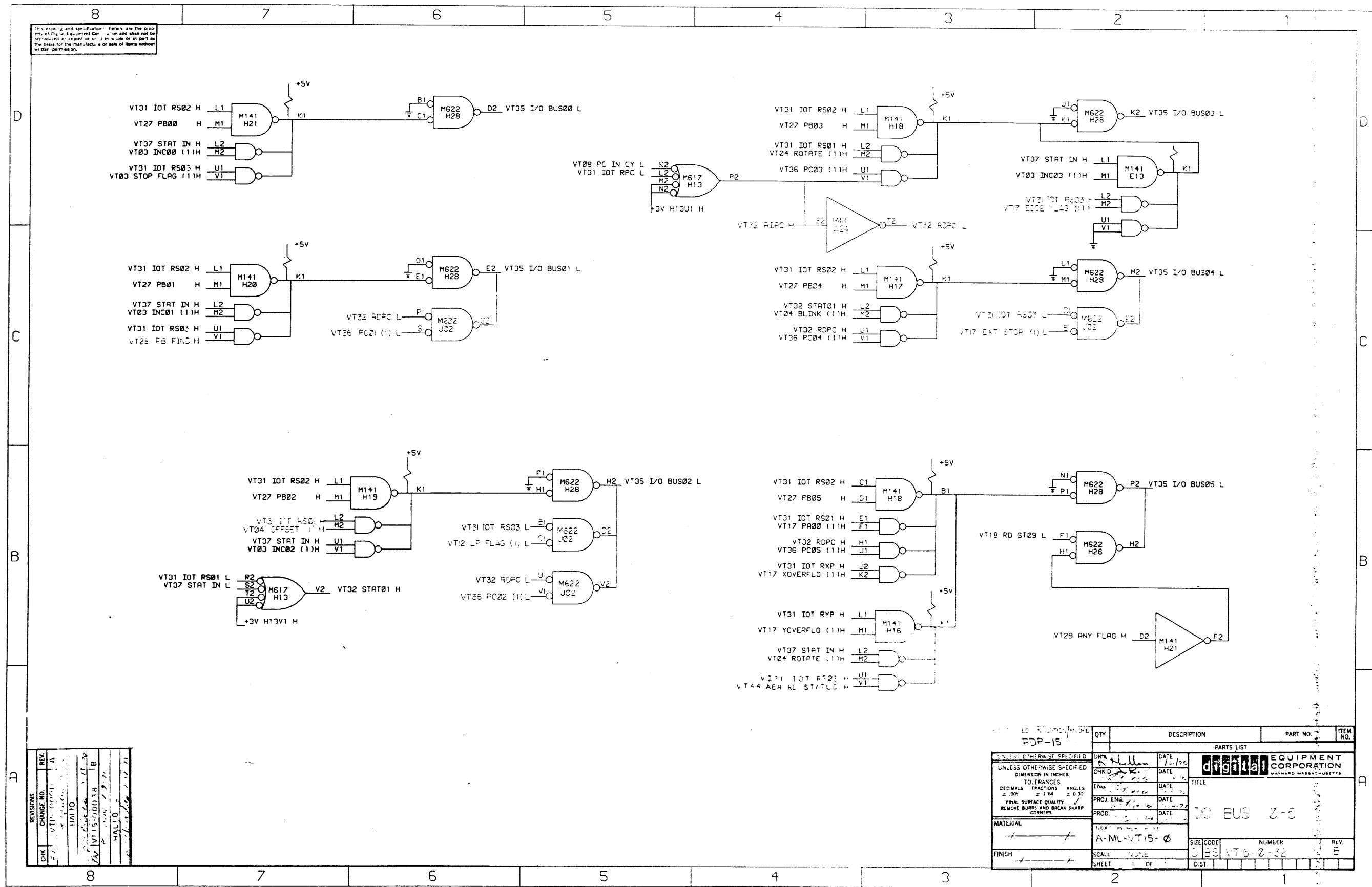
  

QTY.	DESCRIPTION	PART NO.	ITEM NO.

UNLESS OTHERWISE SPECIFIED		DATE	<b>digital</b> EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
UNLESS OTHERWISE SPECIFIED		DATE	
TOLERANCES		DATE	
DECIMALS	FRACTIONS	ANGLES	
± .005	± 1/64	± 0.30	
FINAL SURFACE QUALITY		DATE	TITLE <b>IOT DECODER</b>
REMOVE BURRS AND BREAK SHARP CORNERS		DATE	
MATERIAL		DATE	SIZE CODE NUMBER <b>D ES VT15-0-21</b>
FINISH		DATE	
SCALE		DATE	DIST.
SHEET / OF /		DATE	

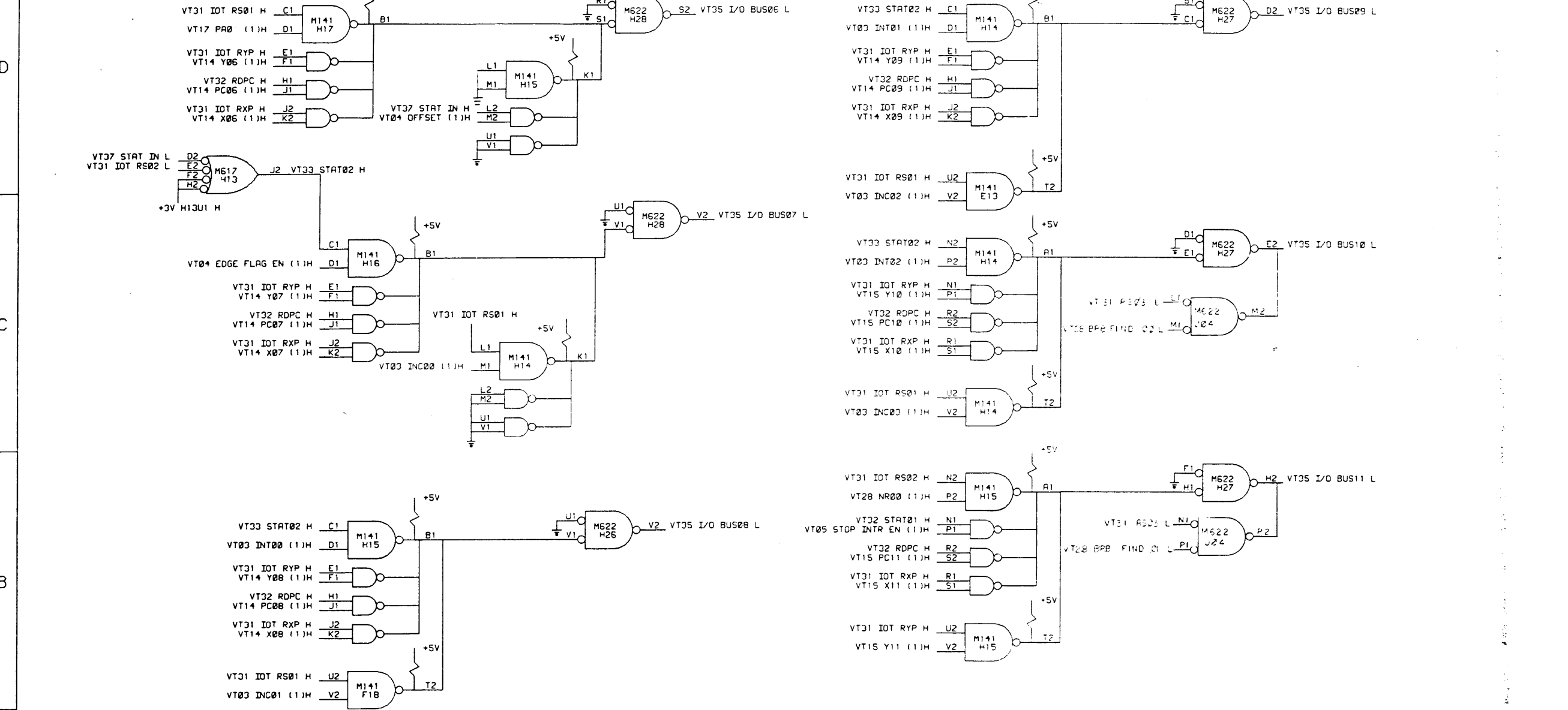
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REV.	CHG.	NO.	DATE	BY	REASON
1	A				
2	B				
3	C				
4	D				

QTY.	DESCRIPTION	PART NO.	ITEM NO.
	PARTS LIST		
	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS		
	TITLE: I/O BUS 2-5		
	SIZE CODE: A-ML-VT15-0		
	NUMBER: DES VT3-2-32		
	REV.:		
	SCALE: NONE		
	SHEET 1 OF 1		

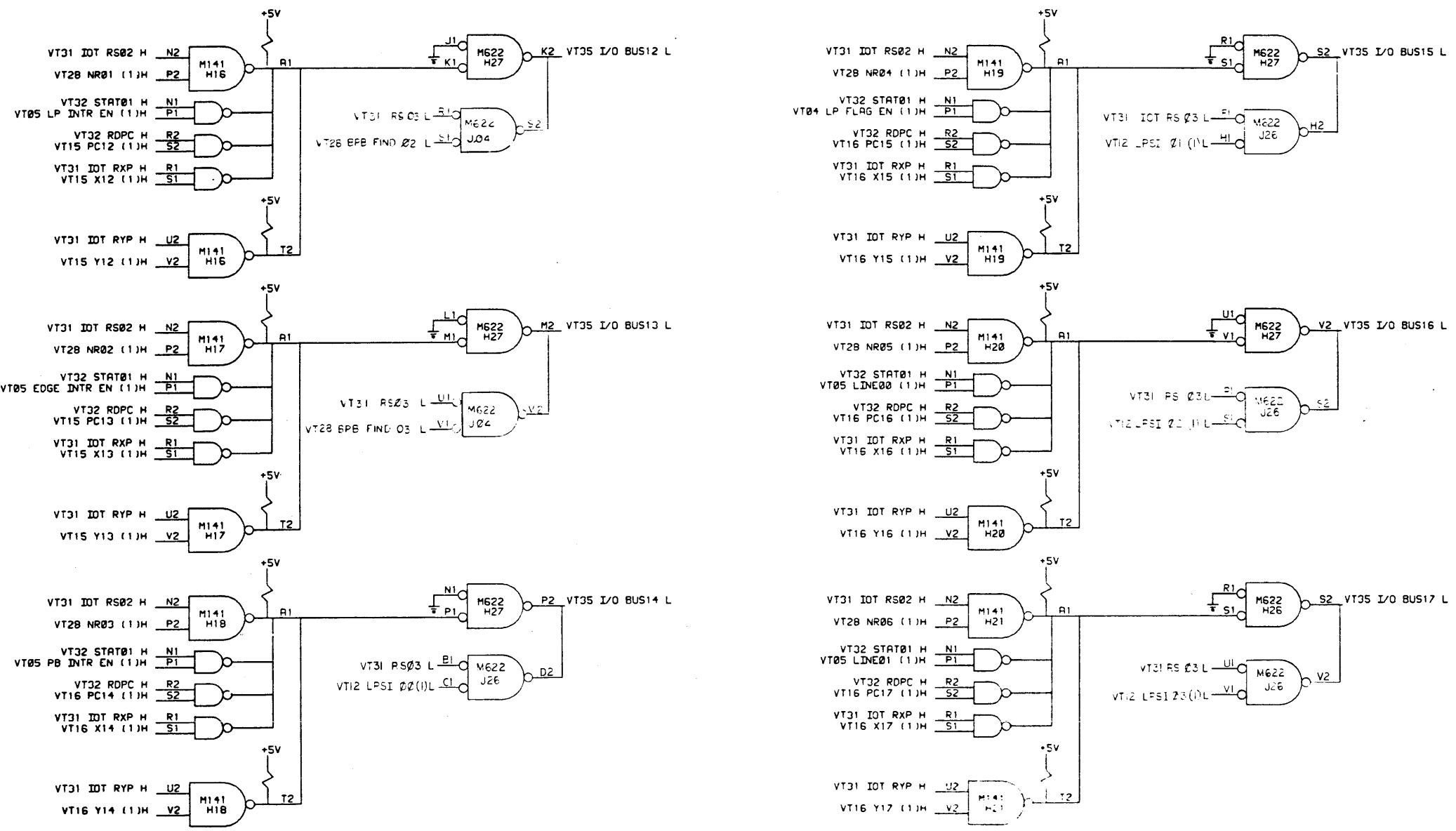
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REV.	CHANGE NO.	DATE	BY
1	1	10/14/73	A
2	1	11/10/73	A

QTY		DESCRIPTION		PART NO.		ITEM NO.	
FDP-5							
UNLESS OTHERWISE SPECIFIED:							
FINISH	SCALE	DATE	DATE	DATE	DATE	DATE	DATE
1 - 1	1:1	10/14/73	11/10/73	11/10/73	11/10/73	11/10/73	11/10/73
DIGITAL EQUIPMENT CORPORATION				TITLE			
1/0 BUS 6-11				SIZE CODE			
A ML VT15-0				NUMBER			
1 - 1				REV. A			

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REV.	CHANGE NO.	DATE
A	00043	10-8-71
B	00049	10-11-71

REVISIONS  
 HALLO  
 HALLO

QTY.	DESCRIPTION	PART NO.	ITEM NO.
1	I/O BUS 12-17		

UNLESS OTHERWISE SPECIFIED  
 DIMENSION IN INCHES  
 TOLERANCES  
 DECIMALS FRACTIONS ANGLES  
 ±.005 ±.125 ±.030  
 FINAL SURFACE QUALITY  
 REMOVE BURRS AND BREAK SHARP CORNERS

MATERIAL: A-ML-VT15-0  
 FINISH: NONE

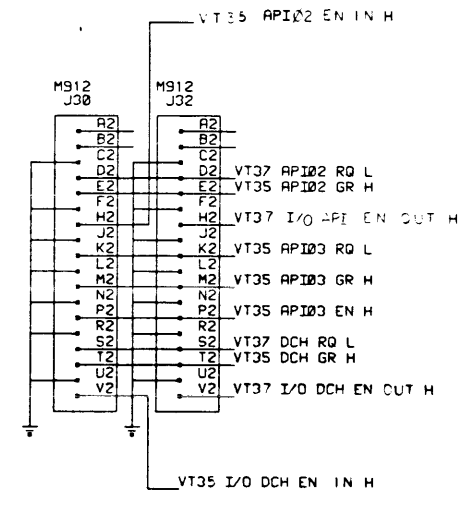
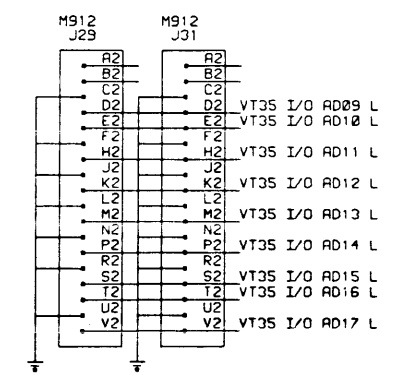
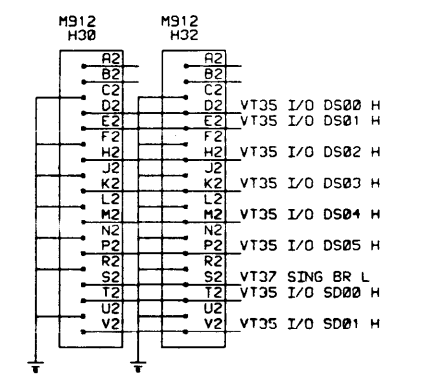
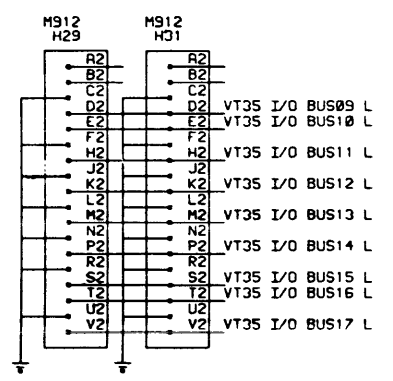
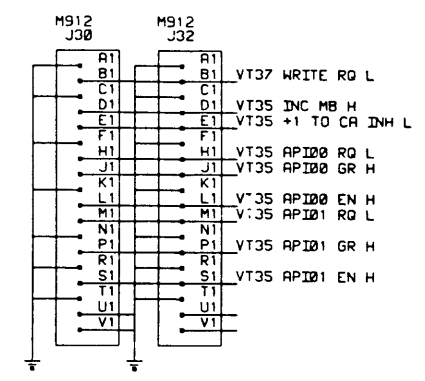
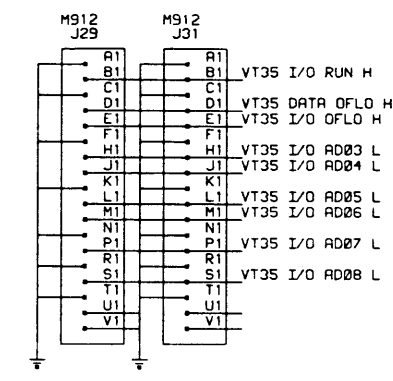
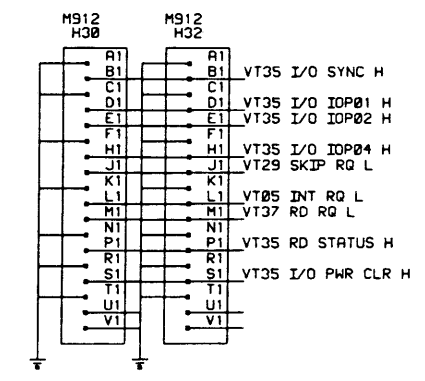
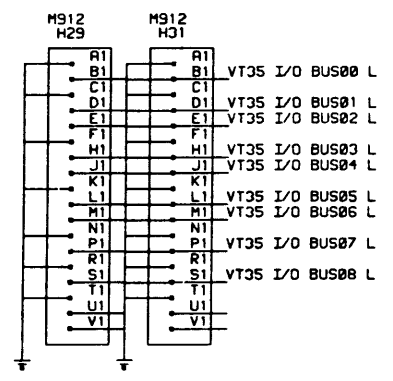
SCALE: NONE  
 SHEET: 1 OF 1

DATE: 10-11-71  
 CHK'D: A.R.  
 PROJ. ENG: [Signature]  
 PROD. [Signature]

digital EQUIPMENT CORPORATION  
 MAYNARD, MASSACHUSETTS

TITLE: I/O BUS 12-17  
 SIZE CODE: DIST  
 NUMBER: 0-22  
 REV: B

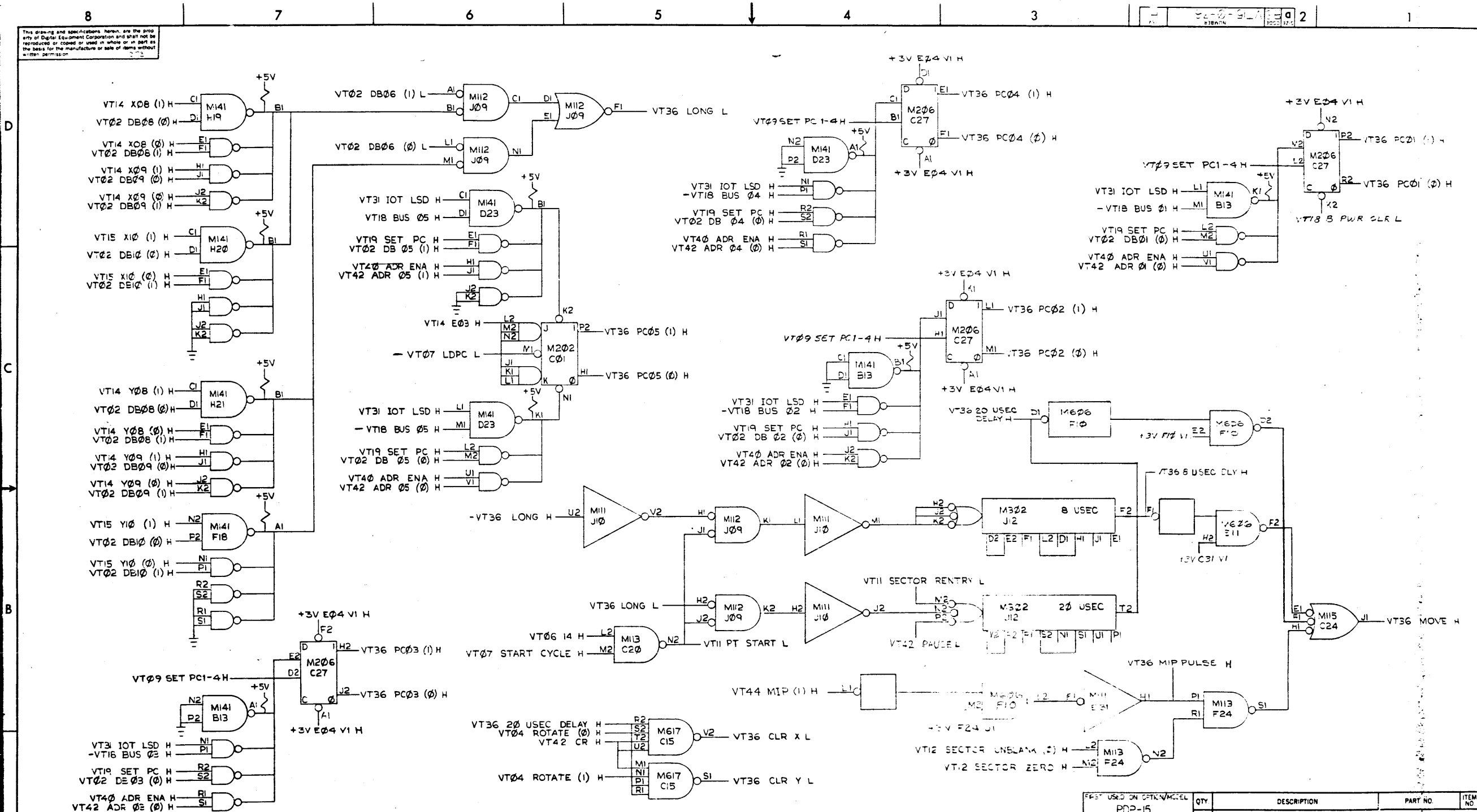
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REV.	CHANGE NO.	DATE
1	VT15-0007P	1/10/68
2		
3		
4		
5		
6		
7		
8		

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
UNLESS OTHERWISE SPECIFIED			
DATE	DATE	digital EQUIPMENT CORPORATION	
CHK'D	DATE	PAYNOR MASSACHUSETTS	
ENG.	DATE	TITLE	
PROJ. ENL.	DATE	CABLES	
PROD.	DATE	MATERIAL	
A-ML-VT15-0		SIZE CODE	NUMBER
FINISH	SCALE	01	VT15-0-35
SHEET	OF	DIST	REV. A

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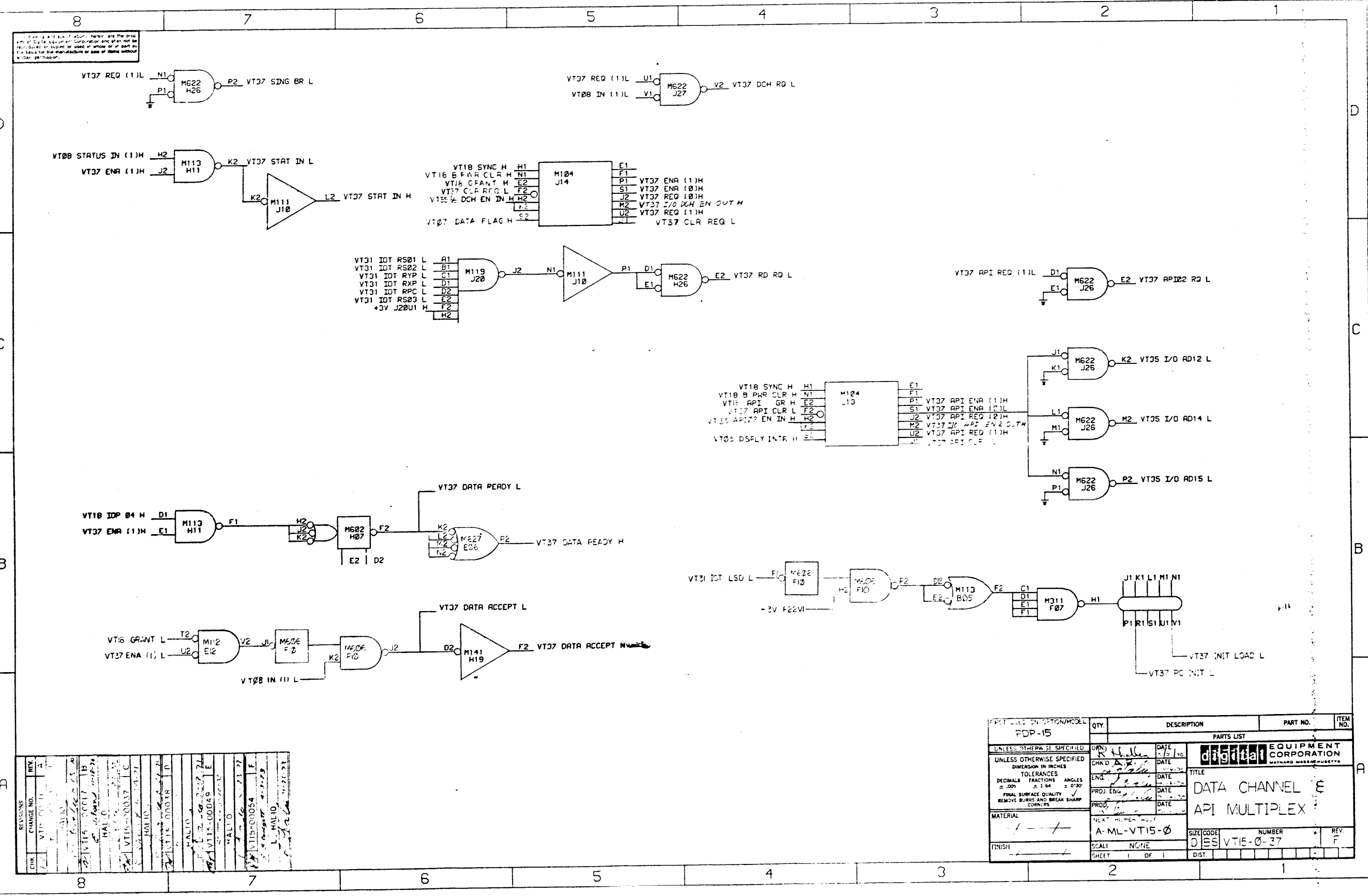
REV	DATE	BY	CHK	DESCRIPTION
1	11-13-70	HALIO	FV	VT15-00011 A
2	11-13-70	HALIO	TC	VT15-00011 B
3	11-13-70	HALIO	TC	VT15-00011 C
4	11-13-70	HALIO	TC	VT15-00011 D
5	11-13-70	HALIO	TC	VT15-00011 E
6	11-13-70	HALIO	TC	VT15-00011 F
7	11-13-70	HALIO	TC	VT15-00011 G
8	11-13-70	HALIO	TC	VT15-00011 H
9	11-13-70	HALIO	TC	VT15-00011 I
10	11-13-70	HALIO	TC	VT15-00011 J

REV	DATE	BY	CHK	DESCRIPTION
1	11-13-70	HALIO	FV	VT15-00011 A
2	11-13-70	HALIO	TC	VT15-00011 B
3	11-13-70	HALIO	TC	VT15-00011 C
4	11-13-70	HALIO	TC	VT15-00011 D
5	11-13-70	HALIO	TC	VT15-00011 E
6	11-13-70	HALIO	TC	VT15-00011 F
7	11-13-70	HALIO	TC	VT15-00011 G
8	11-13-70	HALIO	TC	VT15-00011 H
9	11-13-70	HALIO	TC	VT15-00011 I
10	11-13-70	HALIO	TC	VT15-00011 J

DEC 1974 NO. 010 1024

NUMBER 15-036  
 SHEET 1 OF 1  
 REV 4

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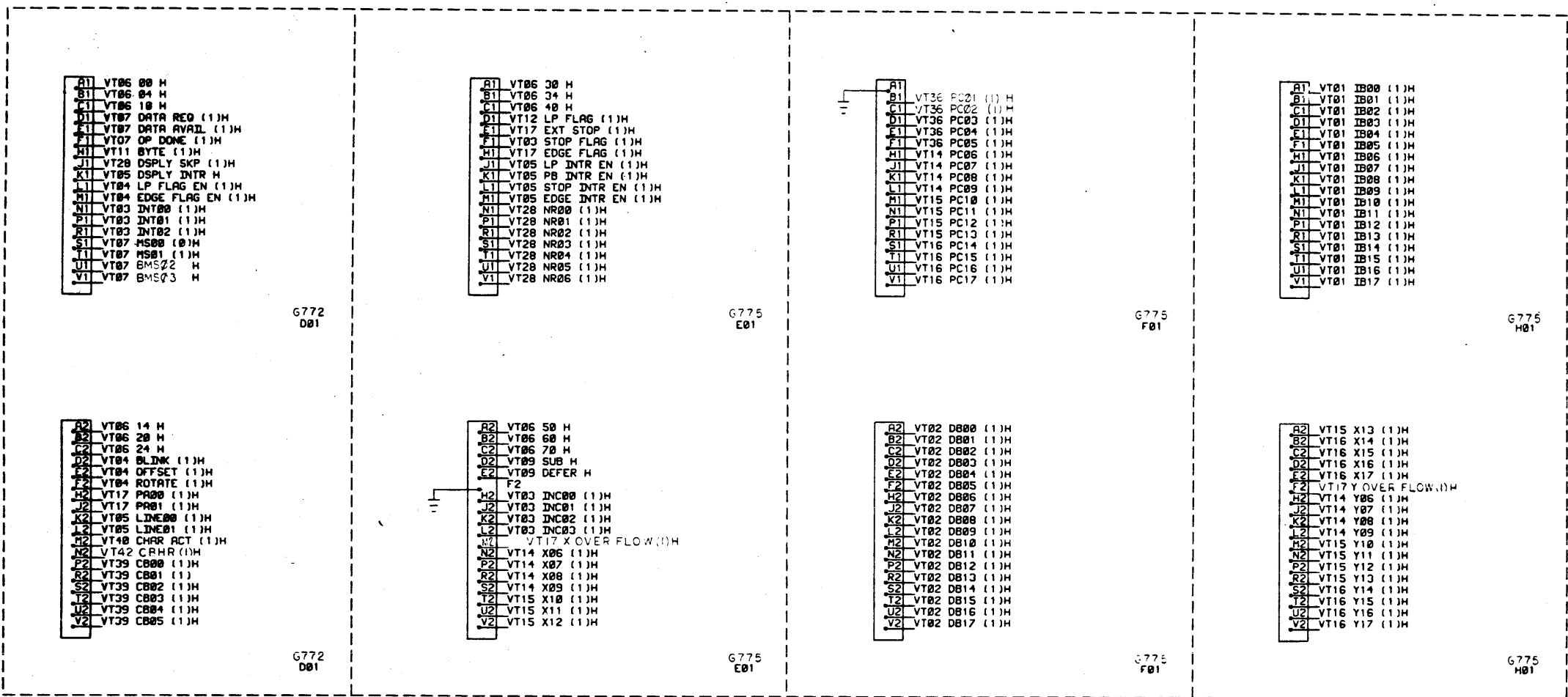


REV.	CHANGE NO.	DESCRIPTION	DATE	BY
1		REVISED TO ADD M622	1/15/68	WALLO
2		REVISED TO ADD M627	1/15/68	WALLO
3		REVISED TO ADD M606	1/15/68	WALLO
4		REVISED TO ADD M607	1/15/68	WALLO
5		REVISED TO ADD M608	1/15/68	WALLO
6		REVISED TO ADD M628	1/15/68	WALLO
7		REVISED TO ADD M112	1/15/68	WALLO
8		REVISED TO ADD M119	1/15/68	WALLO
9		REVISED TO ADD M124	1/15/68	WALLO
10		REVISED TO ADD M311	1/15/68	WALLO
11		REVISED TO ADD M606, M607, M608, M627, M628	1/15/68	WALLO

PART USED ON OPTION/MODEL		QTY.	DESCRIPTION	PART NO.	ITEM NO.
FDP-15					
PARTS LIST					
UNLESS OTHERWISE SPECIFIED (GRN)		DATE	<div style="text-align: right;"> </div>		
UNLESS OTHERWISE SPECIFIED		DATE			
DIMENSION IN INCHES		DATE			
TOLERANCES		DATE			
DECIMALS	FRACTIONS	ANGLES			
= .001	= 1/64	= 1°30'			
FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS					
MATERIAL		DATE	TITLE		
FINISH		DATE	DATA CHANNEL & API MULTIPLEX		
HEAT NUMBER		DATE	NUMBER		
SCALE		DATE	DES VTI5-0-37		
SHEET		DATE	REV. F		
OF		DATE	DIST.		



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- A1 VT06 00 H
- B1 VT06 04 H
- C1 VT06 10 H
- D1 VT07 DATA REQ (1)H
- E1 VT07 DATA AVAIL (1)H
- F1 VT07 OP DONE (1)H
- G1 VT11 BYTE (1)H
- H1 VT28 DSPLY SKP (1)H
- K1 VT05 DSPLY INTR H
- L1 VT04 LP FLAG EN (1)H
- M1 VT04 EDGE FLAG EN (1)H
- N1 VT03 INT00 (1)H
- P1 VT03 INT01 (1)H
- R1 VT03 INT02 (1)H
- S1 VT07 MS00 (0)H
- T1 VT07 MS01 (1)H
- U1 VT07 BMS02 H
- V1 VT07 BMS03 H

G772  
D01

- A1 VT06 30 H
- B1 VT06 34 H
- C1 VT06 40 H
- D1 VT12 LP FLAG (1)H
- E1 VT17 EXT STOP (1)H
- F1 VT03 STOP FLAG (1)H
- H1 VT17 EDGE FLAG (1)H
- J1 VT05 LP INTR EN (1)H
- K1 VT05 PB INTR EN (1)H
- L1 VT05 STOP INTR EN (1)H
- M1 VT05 EDGE INTR EN (1)H
- N1 VT28 NR00 (1)H
- P1 VT28 NR01 (1)H
- R1 VT28 NR02 (1)H
- S1 VT28 NR03 (1)H
- T1 VT28 NR04 (1)H
- U1 VT28 NR05 (1)H
- V1 VT28 NR06 (1)H

G775  
E01

- A1 VT36 PC01 (1)H
- B1 VT36 PC02 (1)H
- C1 VT36 PC03 (1)H
- E1 VT36 PC04 (1)H
- F1 VT36 PC05 (1)H
- H1 VT14 PC06 (1)H
- J1 VT14 PC07 (1)H
- K1 VT14 PC08 (1)H
- L1 VT14 PC09 (1)H
- M1 VT15 PC10 (1)H
- N1 VT15 PC11 (1)H
- P1 VT15 PC12 (1)H
- R1 VT15 PC13 (1)H
- S1 VT16 PC14 (1)H
- T1 VT16 PC15 (1)H
- U1 VT16 PC16 (1)H
- V1 VT16 PC17 (1)H

G775  
F01

- A1 VT01 IB00 (1)H
- B1 VT01 IB01 (1)H
- C1 VT01 IB02 (1)H
- D1 VT01 IB03 (1)H
- E1 VT01 IB04 (1)H
- F1 VT01 IB05 (1)H
- H1 VT01 IB06 (1)H
- J1 VT01 IB07 (1)H
- K1 VT01 IB08 (1)H
- L1 VT01 IB09 (1)H
- M1 VT01 IB10 (1)H
- N1 VT01 IB11 (1)H
- P1 VT01 IB12 (1)H
- R1 VT01 IB13 (1)H
- S1 VT01 IB14 (1)H
- T1 VT01 IB15 (1)H
- U1 VT01 IB16 (1)H
- V1 VT01 IB17 (1)H

G775  
H01

- A2 VT06 14 H
- B2 VT06 20 H
- C2 VT06 24 H
- D2 VT04 BLINK (1)H
- E2 VT04 OFFSET (1)H
- F2 VT04 ROTATE (1)H
- G2 VT17 PAR0 (1)H
- H2 VT17 PAR1 (1)H
- J2 VT05 LINE00 (1)H
- L2 VT05 LINE01 (1)H
- M2 VT40 CHR ACT (1)H
- N2 VT42 CHR RCT (1)H
- P2 VT39 CB00 (1)H
- R2 VT39 CB01 (1)H
- S2 VT39 CB02 (1)H
- T2 VT39 CB03 (1)H
- U2 VT39 CB04 (1)H
- V2 VT39 CB05 (1)H

G772  
D01

- A2 VT06 50 H
- B2 VT06 60 H
- C2 VT06 70 H
- D2 VT09 SUB H
- E2 VT09 DEFER H
- F2
- H2 VT03 INC00 (1)H
- J2 VT03 INC01 (1)H
- K2 VT03 INC02 (1)H
- L2 VT03 INC03 (1)H
- M2 VT17 X OVER FLOW (1)H
- N2 VT14 X06 (1)H
- P2 VT14 X07 (1)H
- R2 VT14 X08 (1)H
- S2 VT14 X09 (1)H
- T2 VT15 X10 (1)H
- U2 VT15 X11 (1)H
- V2 VT15 X12 (1)H

G775  
E01

- A2 VT02 DB00 (1)H
- B2 VT02 DB01 (1)H
- C2 VT02 DB02 (1)H
- D2 VT02 DB03 (1)H
- E2 VT02 DB04 (1)H
- F2 VT02 DB05 (1)H
- H2 VT02 DB06 (1)H
- J2 VT02 DB07 (1)H
- K2 VT02 DB08 (1)H
- L2 VT02 DB09 (1)H
- M2 VT02 DB10 (1)H
- N2 VT02 DB11 (1)H
- P2 VT02 DB12 (1)H
- R2 VT02 DB13 (1)H
- S2 VT02 DB14 (1)H
- T2 VT02 DB15 (1)H
- U2 VT02 DB16 (1)H
- V2 VT02 DB17 (1)H

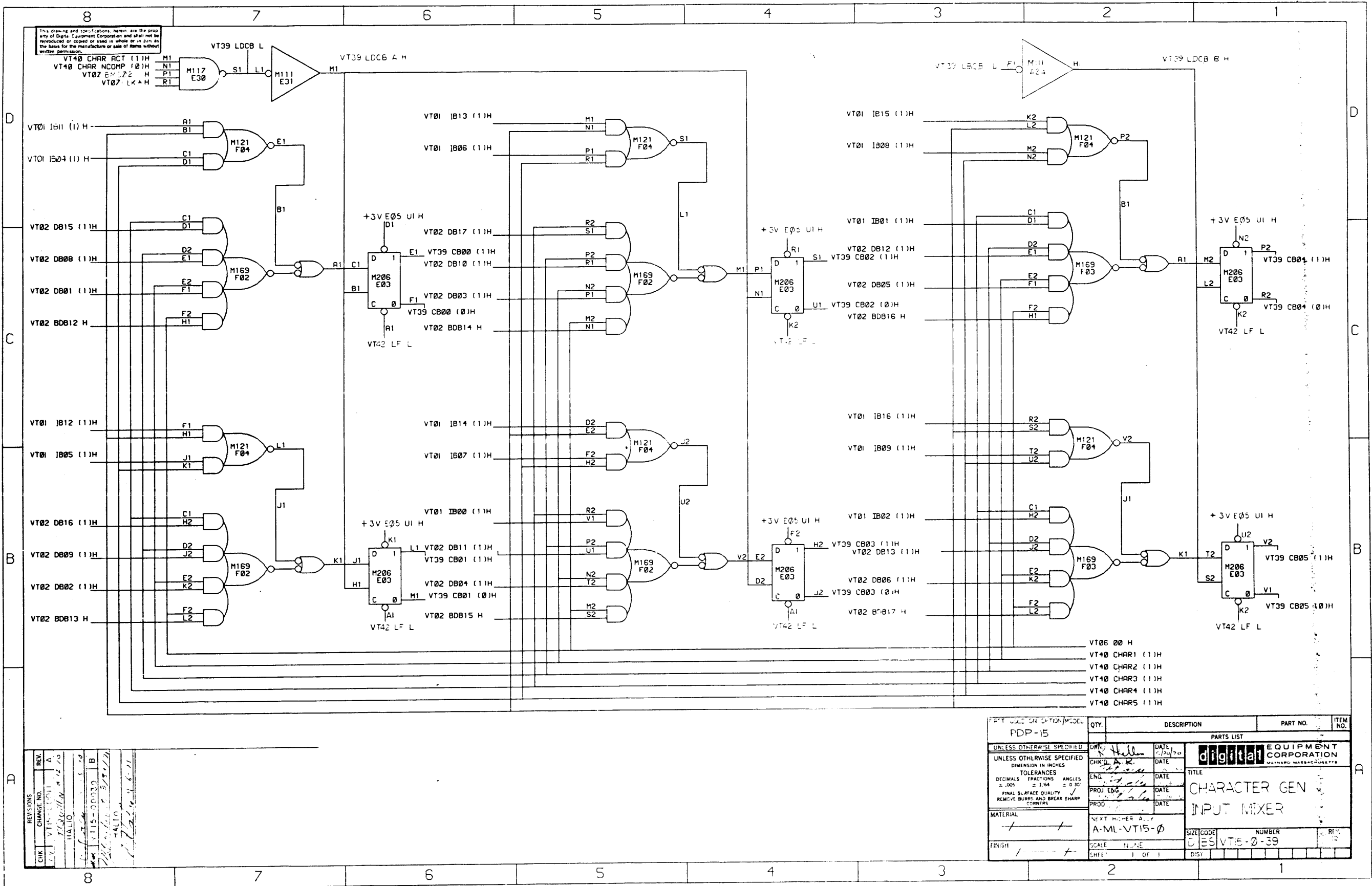
G775  
F01

- A2 VT15 X13 (1)H
- B2 VT16 X14 (1)H
- C2 VT16 X15 (1)H
- D2 VT16 X16 (1)H
- E2 VT16 X17 (1)H
- F2 VT17 Y OVER FLOW (1)H
- H2 VT14 Y06 (1)H
- J2 VT14 Y07 (1)H
- K2 VT14 Y08 (1)H
- L2 VT14 Y09 (1)H
- M2 VT15 Y10 (1)H
- N2 VT15 Y11 (1)H
- P2 VT15 Y12 (1)H
- R2 VT15 Y13 (1)H
- S2 VT16 Y14 (1)H
- T2 VT16 Y15 (1)H
- U2 VT16 Y16 (1)H
- V2 VT16 Y17 (1)H

G775  
H01

REV.	DATE	BY	CHKD.
A	11/15/70	A. J.	A. J.
B	11/15/70	A. J.	A. J.

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
UNLESS OTHERWISE SPECIFIED			
DIMENSIONS IN INCHES			
TOLERANCES			
DECIMALS	FRACTIONS	ANGLES	
± .005	± 1/64	± 0°30'	
FINAL SURFACE QUALITY			
REMOVE BURRS AND BREAK SHARP CORNERS			
MATERIAL			
NEXT HIGHER ASSY			
A-ML-VT15-0			
FINISH			
SCALE NONE			
SHEET 1 OF 1			
DATE 5/20/70		DATE 7/14/70	
CHKD. A. J.		DATE 7/14/70	
ENG. J. H.		DATE 7/14/70	
PROJ. ENG. J. H.		DATE 7/14/70	
PROD. J. H.		DATE 7/14/70	
TITLE		REV.	
LIGHT CABLES		A	
SIZE CODE		NUMBER	
D1C		VT15-0-38	
DIST.			



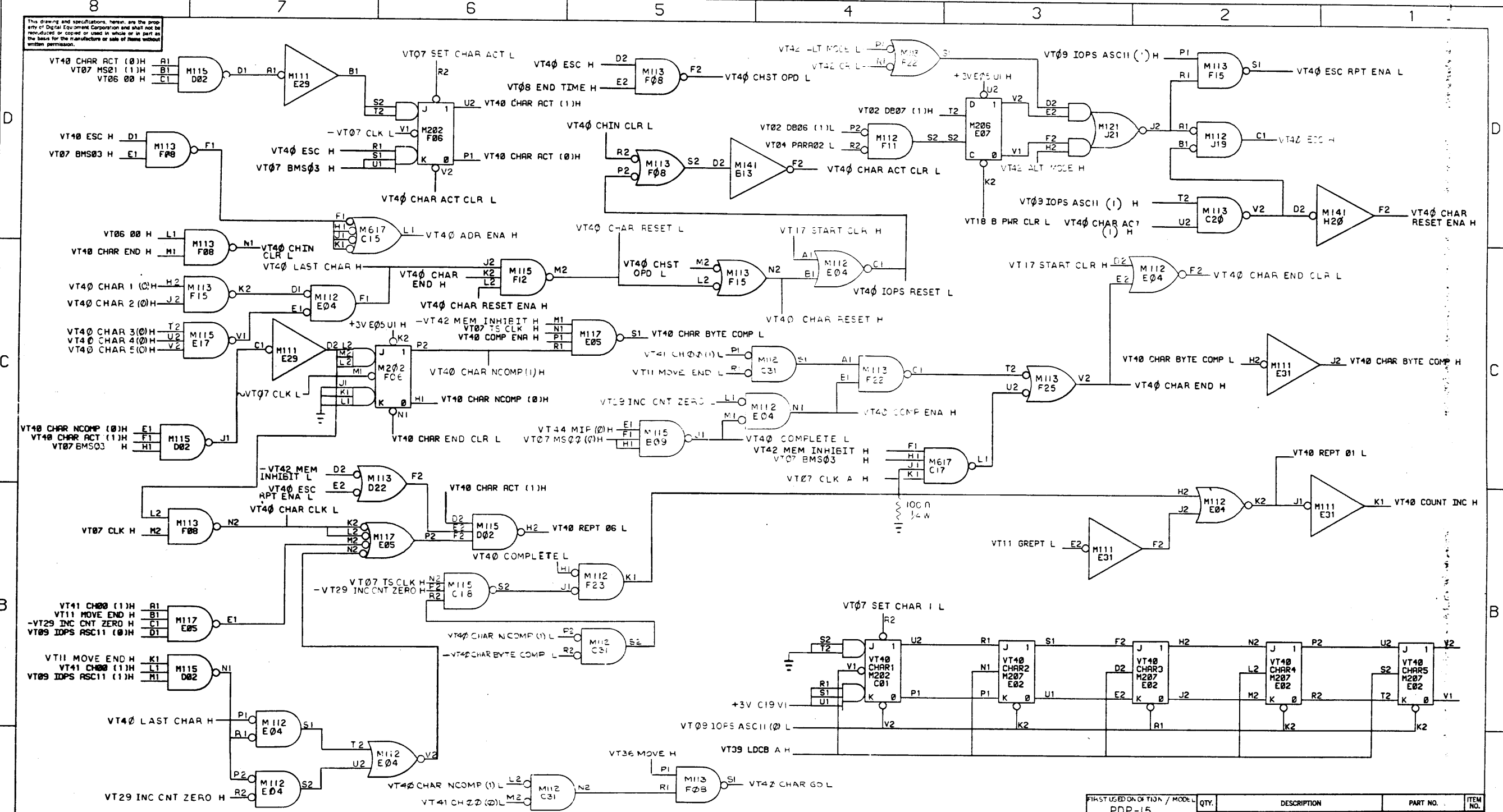
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REV.	CHANGE NO.	DATE	BY	CHKD.
A	1	11/15/70	WALTON	WALTON
B	2	11/15/70	WALTON	WALTON

PART USED ON OPTION/MODEL		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15					
UNLESS OTHERWISE SPECIFIED		DATE 1/24/70			
DIMENSION IN INCHES		DATE			
TOLERANCES		DATE			
DECIMALS FRACTIONS ANGLES		DATE			
±.005 ±.004 ±.030		DATE			
FINAL SURFACE QUALITY		DATE			
REMOVE BURRS AND BREAK SHARP CORNERS		DATE			
MATERIAL		NEXT HIGHER AUTHORITY			
FINISH		A-ML-VT15-0			
SCALE		NUMBER		REV.	
SHEET 1 OF 1		DESIGN		DESIGN	

PARTS LIST	
digital EQUIPMENT CORPORATION	
TITLE	
CHARACTER GEN	
INPUT MIXER	
SIZE CODE	NUMBER
DESIGN	DESIGN

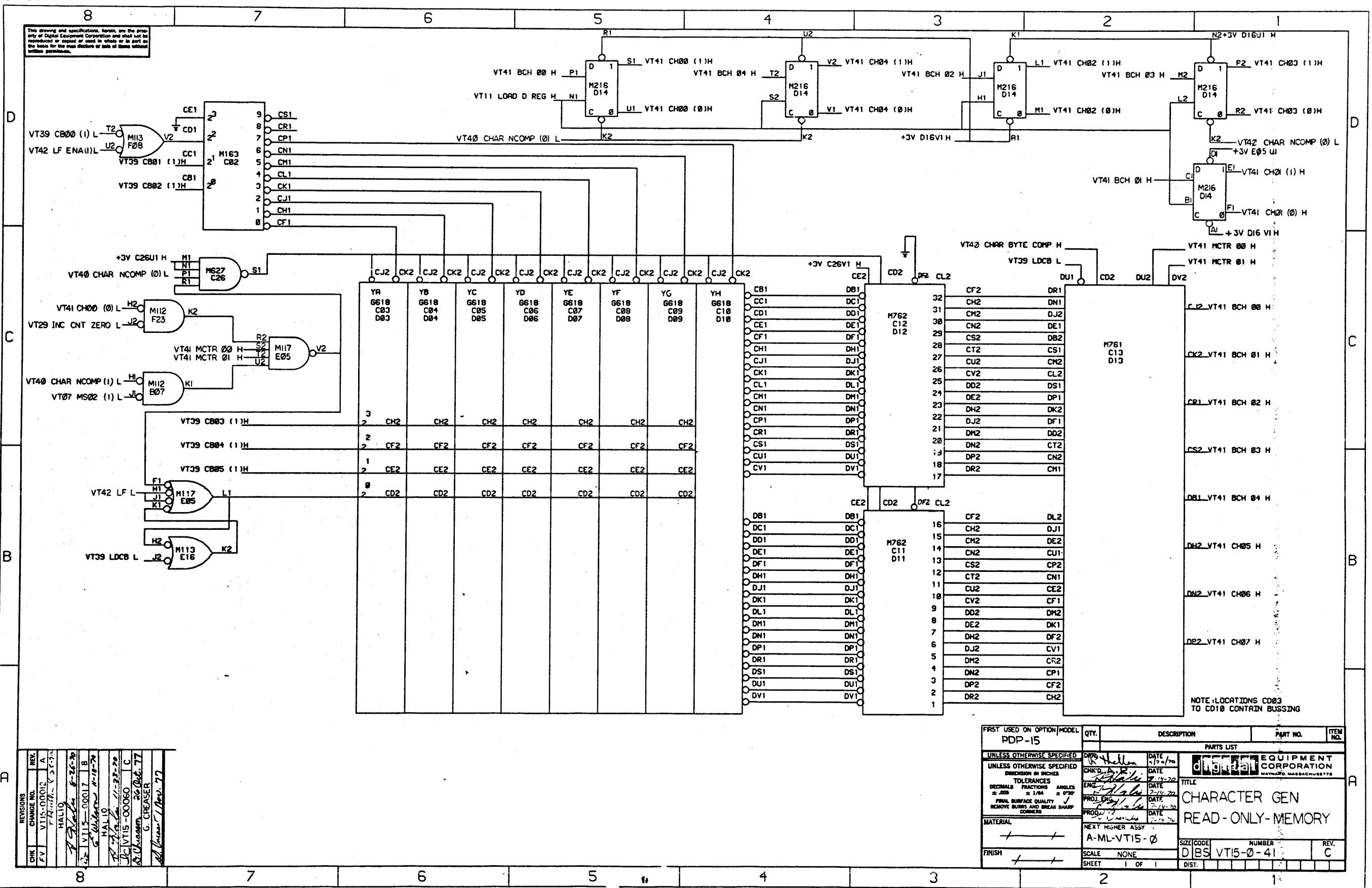
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REV	CHG	NO.	DATE	BY	CHKD
A		1	11-1-70		
B		2	11-1-70		
C		3	11-1-70		
D		4	11-1-70		
E		5	11-1-70		

QTY.	DESCRIPTION	PART NO.	ITEM NO.
FIRST USED ON OR TION / MODEL PDP-15			
UNLESS OTHERWISE SPECIFIED			
DRN	DATE	PARTS LIST	
CHKD	DATE	DIGITAL EQUIPMENT CORPORATION	
ENG	DATE	MAYNARD MASSACHUSETTS	
TOLERANCES			
DECIMALS FRACTIONS ANGLES			
±.005 ±.002 ±.001 ±.0005			
FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS			
MATERIAL			
NEXT HIGHER ASSY.			
A-11-VT15-0			
SCALE NONE			
SHEET 1 OF 1			
TITLE CHARACTER GEN CONTROL		SIZE CODE	NUMBER
DESIGNATION DESI-VT15-0-40		DIST.	REV

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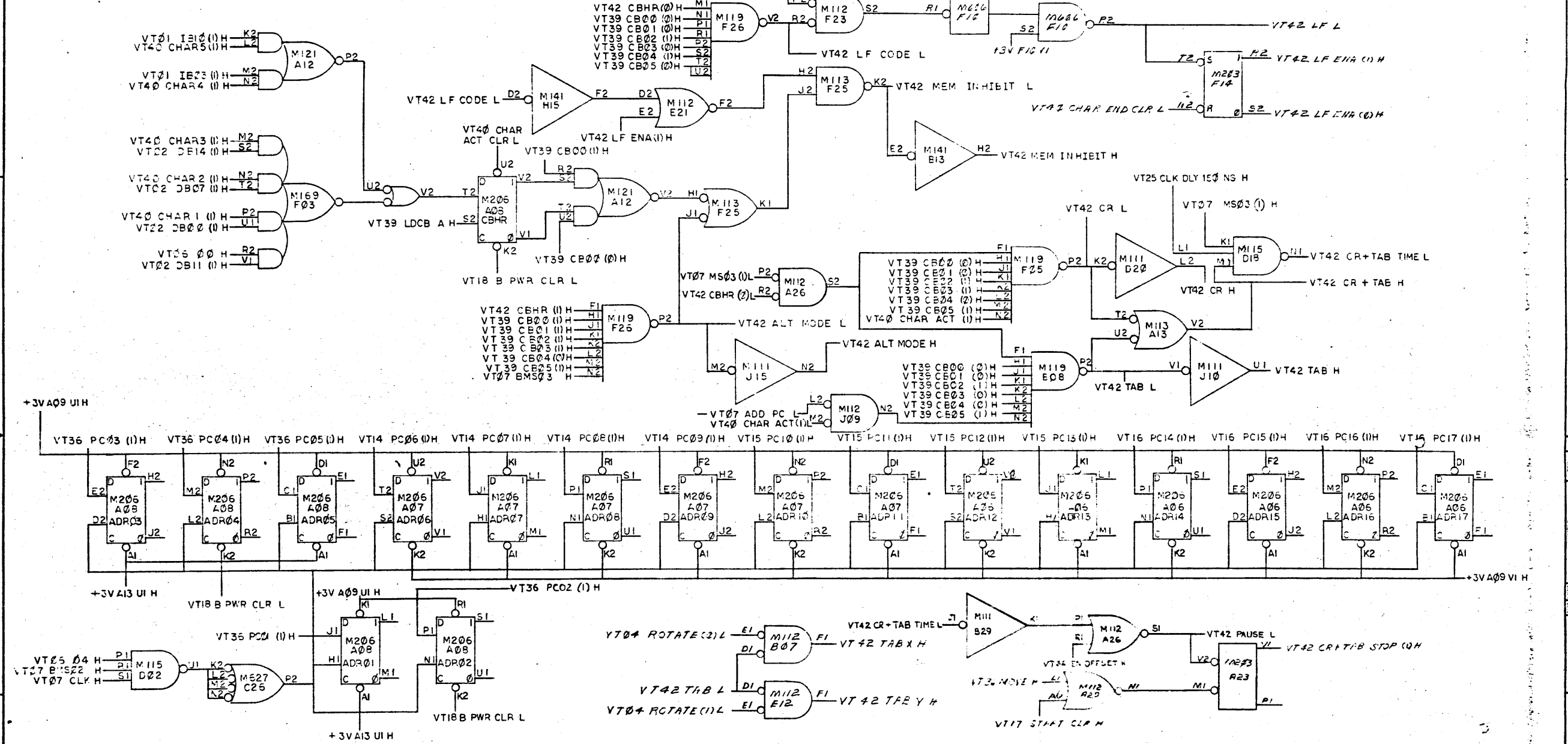


NOTE: LOCATIONS CD03 TO CD18 CONTAIN BUSSING

REV.	CHANGE NO.	DATE	BY	CHKD.
A	VT15-0001C	7-11-70	HALLO	HALLO
B	VT15-00017	7-14-70	HALLO	HALLO
C	VT15-00060	7-14-70	HALLO	HALLO
D	VT15-00060	7-14-70	HALLO	HALLO
E	VT15-00060	7-14-70	HALLO	HALLO
F	VT15-00060	7-14-70	HALLO	HALLO
G	VT15-00060	7-14-70	HALLO	HALLO
H	VT15-00060	7-14-70	HALLO	HALLO
I	VT15-00060	7-14-70	HALLO	HALLO
J	VT15-00060	7-14-70	HALLO	HALLO
K	VT15-00060	7-14-70	HALLO	HALLO
L	VT15-00060	7-14-70	HALLO	HALLO
M	VT15-00060	7-14-70	HALLO	HALLO
N	VT15-00060	7-14-70	HALLO	HALLO
O	VT15-00060	7-14-70	HALLO	HALLO
P	VT15-00060	7-14-70	HALLO	HALLO
Q	VT15-00060	7-14-70	HALLO	HALLO
R	VT15-00060	7-14-70	HALLO	HALLO
S	VT15-00060	7-14-70	HALLO	HALLO
T	VT15-00060	7-14-70	HALLO	HALLO
U	VT15-00060	7-14-70	HALLO	HALLO
V	VT15-00060	7-14-70	HALLO	HALLO
W	VT15-00060	7-14-70	HALLO	HALLO
X	VT15-00060	7-14-70	HALLO	HALLO
Y	VT15-00060	7-14-70	HALLO	HALLO
Z	VT15-00060	7-14-70	HALLO	HALLO

FIRST USED ON OPTION/MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15				
UNLESS OTHERWISE SPECIFIED				
DIMENSIONS IN INCHES				
TOLERANCES				
DECIMALS	FRACTIONS	ANGLES		
± .005	± 1/64	± 0°30'		
FINAL SURFACE QUALITY				
REMOVE BURRS AND BREAK SHARP CORNERS				
MATERIAL				
NEXT HIGHER ASSY				
A-ML-VT15-0				
FINISH				
SCALE NONE				
SHEET 1 OF 1				
PARTS LIST			EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
TITLE				
CHARACTER GEN READ-ONLY-MEMORY				
SIZE CODE			NUMBER	
D BS VT15-0-41			C	
DIST.				

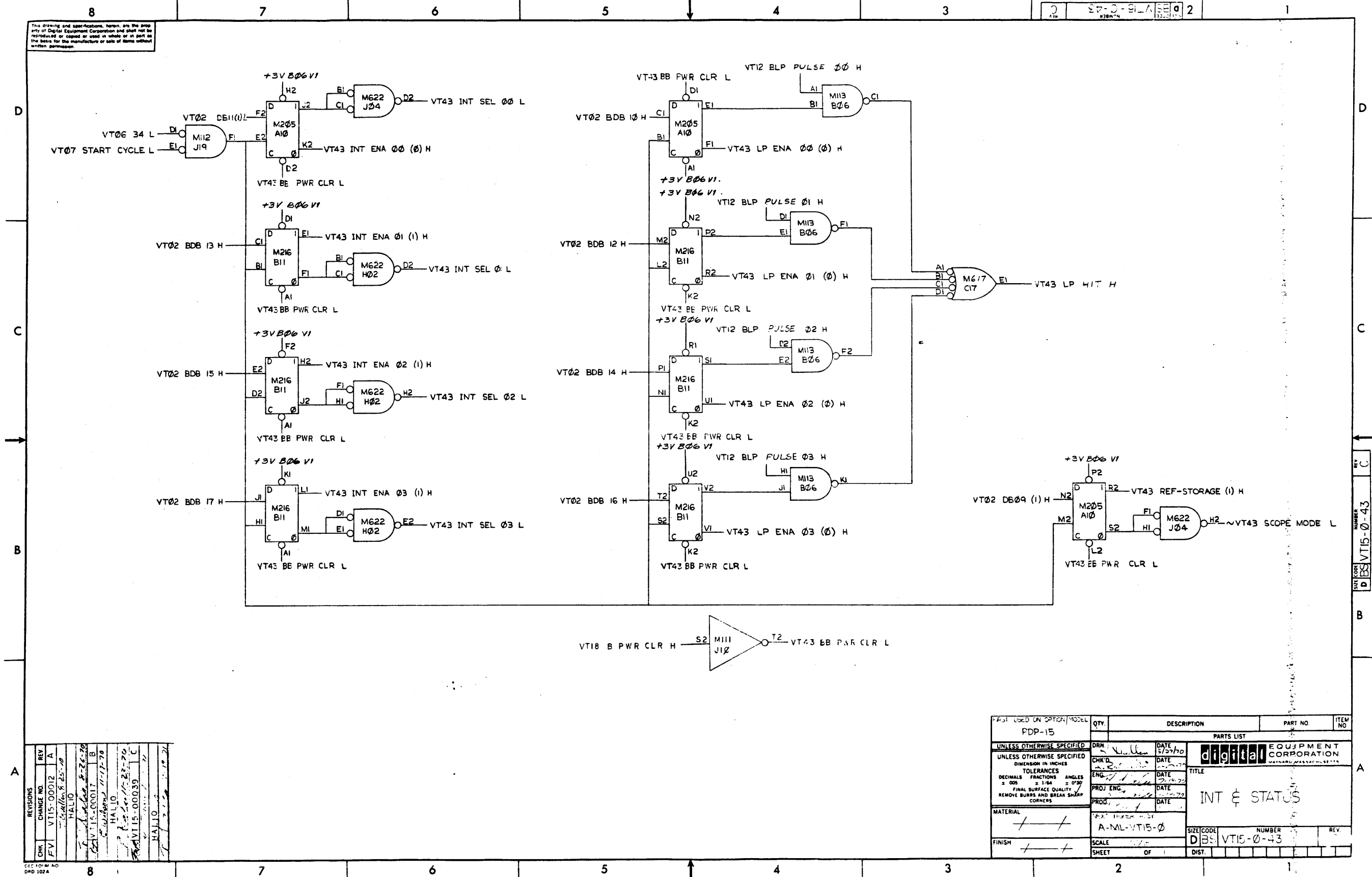
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REVISIONS table with columns for REV, DATE, and description. Includes entries for VT15-0001 through VT15-0039.

Technical specification and title block containing: PDP-15, PARTS LIST, DRN, CHK'D, ENG, PROD, MATERIAL, FINISH, and TITLE ADR & CHAR GEN CONTROL.

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REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00017
B	11-17-70	HALIO		REVISED TO PDP-15-00039
C	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

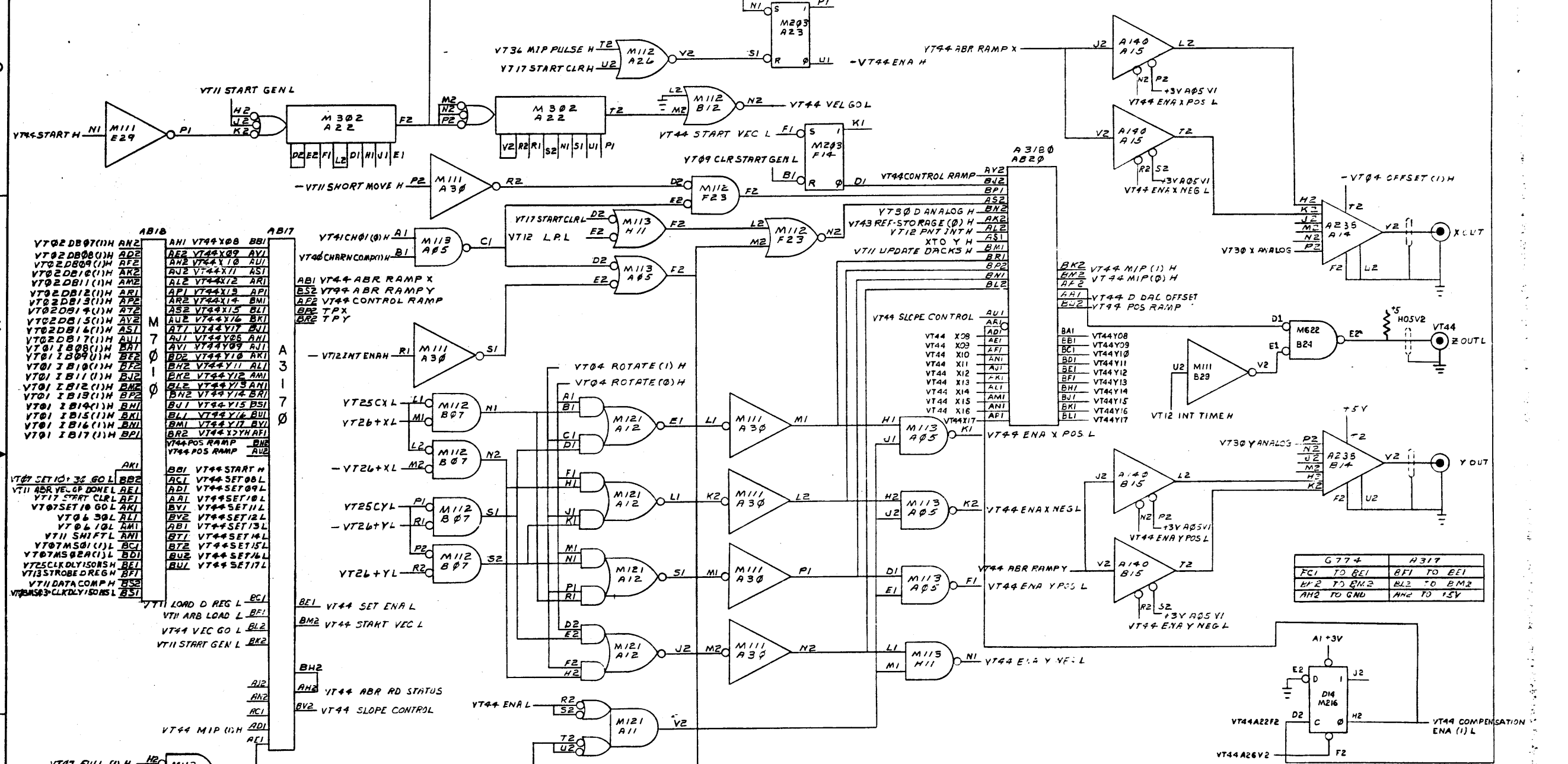
REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV	DATE	BY	CHKD	DESCRIPTION
A	11-17-70	HALIO		REVISED TO PDP-15-00039

REV C  
NUMBER D  
BS-VT15-0-43

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- VT02 DB07(1)H AN2  
VT02 DB08(1)H AD2  
VT02 DB09(1)H AF2  
VT02 DB10(1)H AK2  
VT02 DB11(1)H AM2  
VT02 DB12(1)H AN2  
VT02 DB13(1)H AP2  
VT02 DB14(1)H AR2  
VT02 DB15(1)H AS2  
VT02 DB16(1)H AT2  
VT02 DB17(1)H AU2  
VT01 I B08(1)H BA1  
VT01 I B09(1)H BB2  
VT01 I B10(1)H BC3  
VT01 I B11(1)H BD2  
VT01 I B12(1)H BE3  
VT01 I B13(1)H BF2  
VT01 I B14(1)H BG1  
VT01 I B15(1)H BH1  
VT01 I B16(1)H BI1  
VT01 I B17(1)H BJ1
- VT07 SET 10: 36 GO L BB2  
VT11 ABR VEL GP DONE L BE1  
VT17 START CLR BE1  
VT09 SET 10 GO L AK1  
VT04 30L AL1  
VT04 10L AM1  
VT11 SHIFTL AN1  
VT07MS01(1)J BC1  
VT07MS02(1)J BD1  
VT07MS03(1)J BE1  
VT07MS04(1)J BF1  
VT13 STROBE DREG H BF2  
VT11 DATA COMP H BS2  
VT07MS05(1)J BK2
- VT44 MIP (1)H AD1  
VT11 DR MOVE L AC
- VT44 SET ENA L  
VT44 START VEC L  
VT44 VEC GO L  
VT11 START GEN L
- VT44 MIP (1)H AD1  
VT44 MIP (0)H AF2  
VT44 D DAL OFFSET  
VT44 POS RAMP
- VT44 ROTATE (1) H  
VT44 ROTATE (0) H
- VT44 ENA X POS L  
VT44 ENA X NEG L  
VT44 ENA Y POS L  
VT44 ENA Y NEG L
- VT44 ABR RAMPY  
VT44 ABR RAMP X
- VT44 SLOPE CONTROL
- VT44 COMPENSATION ENA (1) L

- VT44 POS RAMP  
VT44 POS RAMP
- VT44 START H  
VT44 SET 08 L  
VT44 SET 09 L  
VT44 SET 10 L  
VT44 SET 11 L  
VT44 SET 12 L  
VT44 SET 13 L  
VT44 SET 14 L  
VT44 SET 15 L  
VT44 SET 16 L  
VT44 SET 17 L
- VT44 ABR RD STATUS  
VT44 SLOPE CONTROL
- VT44 A22F2  
VT44 A26V2

REV	DATE	BY	CHKD	DESCRIPTION
1	1-12-71	HALIO		VT15-00038 J
2	1-12-71	HALIO		VT15-00040 K
3	1-12-71	HALIO		VT15-00043 L
4	1-12-71	HALIO		VT15-00047 M
5	1-12-71	HALIO		VT15-00055 P
6	1-12-71	HALIO		VT15-00055 P
7	1-12-71	HALIO		VT15-00055 P
8	1-12-71	HALIO		VT15-00055 P

FIRST USED ON OPTION/MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PTF-15				
PARTS LIST				
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES TOLERANCES	DRN CHKD ENG. PROJ. ENG. PROD.	PAVIS RAMONLI HALIO A-10 EUNY	DATE DATE DATE DATE DATE	5-27-70 6-27-70 1-12-71 1-12-71 2-16-71
DECIMALS X.XX ± .005 X.X ± .01	ANGLES ± 0° 30'	TITLE <b>VECTOR GENERATOR</b>		
MATERIAL	NEXT HIGHER ASSY.	SIZE CODE	NUMBER	REV.
	B-DD-VT15-0	DBS	VT15-0-44	P
FINISH	SCALE	SHEET	OF	DIST.

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57-0-511A 03.02

USAGE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
					VT44 X-Y OUT VT44 ENA X POS VT44 ENA X NEG VT44 ENA X POS VT44 ENA X POS VT25 CY +3V A05VI	VT42 ADR 17 VT42 ADR 15 VT42 ADR 11 VT42 ADR 89 VT42 ADR 85 VT42 ADR 83 VT24 AI17 VT23 AI15 VT21 AI11 VT24 AI16 VT22 AI12 VT21 AI10 VT21 AI10 VT21 AI10	VT42 ADR 16 VT42 ADR 87 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 18 VT42 ADR 84 VT42 ADR 84 VT42 ADR 84 VT42 ADR 84 VT42 ADR 84 VT42 ADR 84	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82	VT42 ADR 14 VT42 ADR 12 VT42 ADR 88 VT42 ADR 86 VT42 ADR 82 VT42 ADR 82 VT42 ADR 82

REV	DATE	BY	CHK	DESCRIPTION
1	11-17-71	J	J	INITIAL
2	11-17-71	J	J	INITIAL
3	11-17-71	J	J	INITIAL
4	11-17-71	J	J	INITIAL
5	11-17-71	J	J	INITIAL
6	11-17-71	J	J	INITIAL
7	11-17-71	J	J	INITIAL
8	11-17-71	J	J	INITIAL
9	11-17-71	J	J	INITIAL
10	11-17-71	J	J	INITIAL
11	11-17-71	J	J	INITIAL
12	11-17-71	J	J	INITIAL
13	11-17-71	J	J	INITIAL
14	11-17-71	J	J	INITIAL
15	11-17-71	J	J	INITIAL
16	11-17-71	J	J	INITIAL
17	11-17-71	J	J	INITIAL
18	11-17-71	J	J	INITIAL
19	11-17-71	J	J	INITIAL
20	11-17-71	J	J	INITIAL
21	11-17-71	J	J	INITIAL
22	11-17-71	J	J	INITIAL

NOTES:  
 1. \* USED ONLY ON VM15 OPTION  
 2. \* USED ONLY ON VM15 OPTION EXCEPT AS OF 2/25/74, THESE MODULES ARE MANDATORY AND ALWAYS INCLUDED IN THE VM15

FIRST USED ON OPTION/MODEL PDP-15	DO NOT SCALE DRAWING UNLESS OTHERWISE SPECIFIED	DRAWN BY DATE CHECKED BY DATE PROJECT ENG DATE PROD. BY DATE	DATE 5-28-70	TITLE MODULE UTILIZATION
TOLERANCES DIMENSIONS IN INCHES DECIMALS FRACTIONS ANGLES ± .005 ± .010 ± .030 FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS	MATERIAL FINISH	NEXT HIGHER ASSY B-DD-VT15-0	SCALE NONE	SIZE/CODE DIMU VT15-0-45
SHEET 1 OF 4			NUMBER A48	REV A

PART NUMBER 0-45



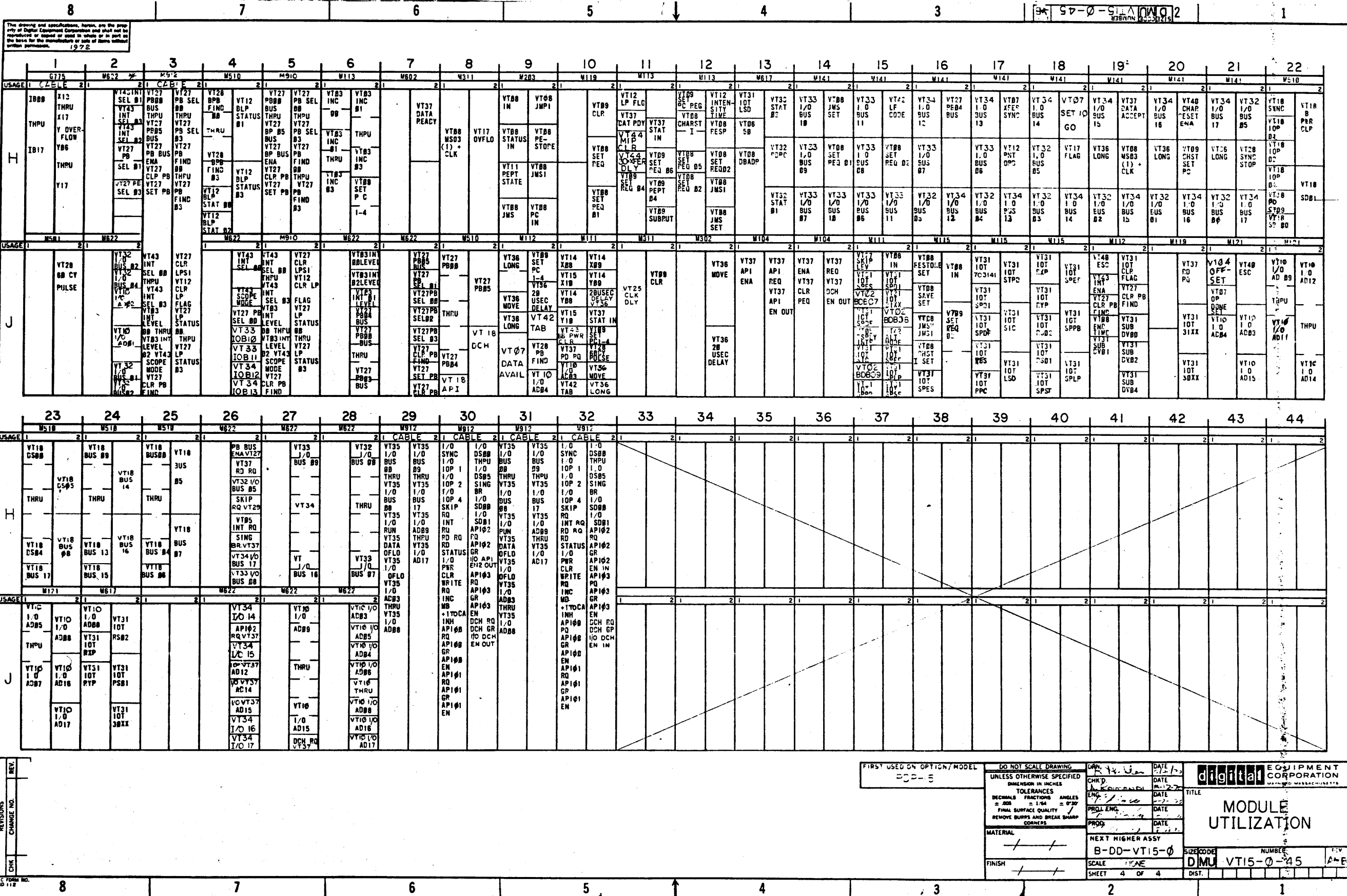


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1572

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
USAGE	E775	M287	M286	M112	M117	M627	M286	M287	M117	M627	M666	M112	M141	M19	M286	M115	M115	M113	M115	M113	M115	M113	M115
	CABLE																						
D	VT34 LP STOP	VT38 SUB DEFEF	VT48 CHAR 3	VT39 CBB3	VT48 CHAR END	VT48 PEPT #6	VT48 REPT #6	VT48 CHTE COMP	VT48 REPT #6	VT48 MEM INTR	VT12 LP FLAG	VT12 POINT	VT12 ELC	VT12 PAB1	VT12 PAB1	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB
E	VT34 LP STOP	VT38 SUB DEFEF	VT48 CHAR 3	VT39 CBB3	VT48 CHAR END	VT48 PEPT #6	VT48 REPT #6	VT48 CHTE COMP	VT48 REPT #6	VT48 MEM INTR	VT12 LP FLAG	VT12 POINT	VT12 ELC	VT12 PAB1	VT12 PAB1	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB
F	VT34 LP STOP	VT38 SUB DEFEF	VT48 CHAR 3	VT39 CBB3	VT48 CHAR END	VT48 PEPT #6	VT48 REPT #6	VT48 CHTE COMP	VT48 REPT #6	VT48 MEM INTR	VT12 LP FLAG	VT12 POINT	VT12 ELC	VT12 PAB1	VT12 PAB1	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB	VT12 LCBB

	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	
USAGE	M285	M286	M285	M113	M117	M112	M111	M117	M111	M117													
B	VT84 LP FLAG EN	VT84 EDGE FLAG EN	VT85 LINE B1	VT83 INC B2	VT83 INC B2	VT85 PARAD3	VT27 PB SKIP	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	
C	VT84 LP FLAG EN	VT84 EDGE FLAG EN	VT85 LINE B1	VT83 INC B2	VT83 INC B2	VT85 PARAD3	VT27 PB SKIP	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	
D	VT84 LP FLAG EN	VT84 EDGE FLAG EN	VT85 LINE B1	VT83 INC B2	VT83 INC B2	VT85 PARAD3	VT27 PB SKIP	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	VT84 EDGE FLAG EN	

REV.	NO.	DATE	BY	CHK'D.	DATE	BY	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE
REVISIONS	CHANGE NO.																						
FIRST USED ON OPTION MODEL DDP-15												DO NOT SCALE DRAWING UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES TOLERANCES DECIMALS FRACTIONS ANGLES = .005 = 1/64 = 0 30' FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS											
MATERIAL FINISH												NEXT HIGHER ASSY B-DD-VT15-0 SCALE NONE SHEET 3 OF 2											
DIGITAL EQUIPMENT CORPORATION WATBOROUGH, MASSACHUSETTS 01981												TITLE MODULE UTILIZATION SIZE CODE DMU VT15-0-45 NUMBER A-1											



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REVISIONS  
REV. CHANGE NO.  
CHK

FIRST USED ON OPTION/MODEL  
BDD-5

DO NOT SCALE DRAWING  
UNLESS OTHERWISE SPECIFIED  
DIMENSION IN INCHES  
TOLERANCES  
DECIMALS FRACTIONS ANGLES  
±.005 ±.010 ±.015 ±.020  
FINAL SURFACE QUALITY  
REMOVE BURRS AND BREAK SHARP CORNERS

DATE 7/2/73  
DATE 7/2/73  
DATE 7/2/73  
DATE 7/2/73

**digital EQUIPMENT CORPORATION**  
WATBOROUGH, MASSACHUSETTS

TITLE  
**MODULE UTILIZATION**

MATERIAL  
FINISH

NEXT HIGHER ASSY  
B-DD-VT15-0

SCALE 1:1  
SHEET 4 OF 4

SIZE CODE  
DIMU

NUMBER  
VT15-0-45

REV  
A-E

DIST.

SIZE CODE NUMBER  
DIMU VT15-0-45 A-E

**DIGITAL EQUIPMENT CORPORATION**  
MAYNARD, MASSACHUSETTS

**PARTS LIST**

MADE BY A. RAIMONDI CHECKED A. RAIMONDI SECTION 1  
 DATE 7/22/70 DATE 7/22/70  
 ENG *R. M. ...* PROD *R. M. ...* ISSUED SECT. 1  
 DATE 8/22/70 DATE *R. M. ...*

ITEM NO.	DWG NO. / PART NO.	DESCRIPTION	QUANTITY / VARIATION
	A140	DUAL ANALOG SWITCH	
	<del>A228</del>	<del>ANALOG SUMMER DRIVER</del>	
	<del>A318</del>	<del>DUAL ANALOG SWITCH</del>	
	A618YA	DIGITAL TO ANALOG CONVERTER	1
	A704	-10V PRECISION POWER SUPPLY	1
	A622	D-A CONVERTER	2
	M104	IO BUS MULTIPLEXER	2
	M111	INVERTER	9
	M112	NOR GATE	13
	M113	10-2 INPUT NAND GATES	26
	M115	8-3, INPUT NAND GATES	13
	M117	6-4 INPUT NAND GATES	10
	M119	3-8 INPUT NAND GATES	7
	M121	X OR GATES	7
	M141	AND/NOR GATES	13
	M163	DUAL BINARY TO DECIMAL DECODER	1
	M169	GATE MODULE	8
	M202	TRIPLE J-K FLIP-FLOP	2
	M203	SET-RESET FLIP-FLOP MODULE	3
	M204	COUNTER BUFFER	1
	M205	5 "D" FLIP-FLOPS	4
	M206	SIX FLIP-FLOPS	16

TITLE MODULE UTILIZATION  
 ASSY NO. D-MU-VT15-0-45  
 SHEET 1 OF 3  
 SIZE CODE A PL  
 NUMBER VT15-0-45  
 REV. ECO NO. VT15-00057  
 AB

DEC FORM NO. DRA 110

**DIGITAL EQUIPMENT CORPORATION**  
MAYNARD, MASSACHUSETTS

**PARTS LIST**

MADE BY A. RAIMONDI CHECKED A. RAIMONDI SECTION 1  
 DATE 7/22/70 DATE 7/22/70  
 ENG *R. M. ...* PROD *R. M. ...* ISSUED SECT. 1  
 DATE 8/22/70 DATE *R. M. ...*

ITEM NO.	DWG NO. / PART NO.	DESCRIPTION	QUANTITY / VARIATION
	M207	FLIP-FLOP	4
	M215	REGISTER MODULE	3
	M216	SIX FLIP-FLOPS	1
	M302	ONE SLOT DELAY	4
	M311	TAP DELAY	3
	M401	CLOCK	1
	M501	SCHMITT TRIGGER	1
	M510	IO BUS RECEIVER	6
	M602	PULSE GENERATOR	1
	M606	PULSE GENERATOR	2
	M617	6-4 INPUT NOR BUFFERS	5
	M622	BUS DRIVER	10
	M627	POWER AMPLIFIER MODULE	4
	M761	32 TO 8 BIT MULTIPLEXER	1
	M762	ROM DIODE MATRIX RECEIVERS	2
	M910	CP TERMINATOR CARD	2
	<del>A144</del>	<del>BREAK POINT GENERATOR</del>	4
	G618YA	ROM DIODE MATRIX AND DECODE	1
	G618YB	ROM DIODE MATRIX AND DECODE	1
	G618YC	ROM DIODE MATRIX AND DECODE	1
	G618YD	ROM DIODE MATRIX AND DECODE	1
	G618YE	ROM DIODE MATRIX AND DECODE	1

TITLE MODULE UTILIZATION  
 ASSY NO. D-MU-VT15-0-45  
 SHEET 2 OF 3  
 SIZE CODE A PL  
 NUMBER VT15-0-45  
 REV. ECO NO. VT15-00057  
 AB

DEC FORM NO. DRA 110

# DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS PARTS LIST

QUANTITY / VARIATION										
VT15										

MADE BY RAIMONDI	CHECKED RAIMONDI	SECTION
DATE 7/22/70	DATE 7/22/70	1
ENG <i>H. Helle</i>	PROD <i>G. B. Murphy</i>	ISSUED SECT.
DATE 7-2-70	DATE 9-2-70	1

ITEM NO.	DWG NO. / PART NO.	DESCRIPTION
	G618YF	ROM DIODE MATRIX AND DECODE
	G618YG	ROM DIODE MATRIX AND DECODE
	G618YH	ROM DIODE MATRIX AND DECODE
	<del>K7010</del>	<del>VV15 CONTROL</del>
	<del>A317</del>	<del>APP. VEC. GEN.</del>
	A-PL VV1500	(EACH) MODULES ARE INCLUDED IN VT15

TITLE	ASSY NO.	SIZE CODE	NUMBER	REV.	ECO NO.
MODULE UTILIZATION	D-MU-VT15-Ø-45	<b>A</b> <b>PL</b>	VT15-Ø-45	A-B	
	SHEET 3 OF 3	DIST.			

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<b>DIGITAL EQUIPMENT CORPORATION</b> MAYNARD, MASSACHUSETTS						
						DATE 01-01-74
TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE						
REVISIONS						
REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE
-	ORIGINATED PER ECO	VT15-00055	H.LAVOIE	11/73	—	—
ENG <i>Herve E Lavoie</i>	APPD <i>Herve E Lavoie</i>	SIZE <b>A</b>	CODE SP	NUMBER VT15-0-51	REV	

<b>ENGINEERING SPECIFICATION</b>		CONTINUATION SHEET
TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE		
<ul style="list-style-type: none"> <li>1.0 Introduction</li> <li>2.0 System Condition <ul style="list-style-type: none"> <li>Figure 2.1</li> </ul> </li> <li>3.0 Equipment</li> <li>4.0 Summary Theory <ul style="list-style-type: none"> <li>4.1 Supply Functions</li> <li>4.2 Arbitrary Vectoring and Modules</li> <li>4.3 Phasing Accuracy</li> <li>4.4 Noise Attention</li> <li>4.5 Display Front End <ul style="list-style-type: none"> <li>Figure 4.5.1</li> <li>Table 4.5.1</li> </ul> </li> </ul> </li> <li>5.0 Logic Checks and Adjustments <ul style="list-style-type: none"> <li>5.1 Table Summary</li> <li>5.2 +5V</li> <li>5.3 System Clock</li> <li>5.4 System Displays</li> <li>5.5 Move Settle Delay</li> <li>5.6 Data Flag Delay</li> <li>5.7 Short Point Settle Delay</li> <li>5.8 Long Point Settle Delay</li> <li>5.9 Display Console Bus Delay</li> <li>5.10 Blink Delay</li> <li>5.11 Arbitrary Vector Start Up Settle Delay</li> <li>5.12 Arbitrary Vector Start Gen Delay</li> </ul> </li> </ul>		
SIZE <b>A</b>	CODE SP	NUMBER VT15-0-51
		REV

**ENGINEERING SPECIFICATION**

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

- 6.0 Analog Voltages - Checks and Adjustments
  - Table 6.0
  - 6.1 +15 Volts
  - 6.2 -15 Volts
  - 6.3 DDAC Reference Voltage
- 7.0 Initial Analog Adjustments
  - 7.1 Pot Definitions
  - 7.2 Initial Pot Set Up
    - Figure 7.1
  - 7.3 DDAC Adjustment
  - 7.4 Display Phase Check and Adjustment
  - 7.5 Variable Terminator Adjustment
  - 7.6 Vector Time Verification
- 8.0 Analog Vectoring Adjustments
  - 8.1 Set Up of Brightness Levels
  - 8.2 Output Offset Adjustment
  - 8.3 MDAC Phase Adjustments
  - 8.4 Tuning of Vector Length and Intensity
  - 8.5 Character Fine Tuning
  - 8.6 Character Speed Verification Versus Quality
  - 8.7 Closer Observation of Vector Gain Vs. Phase Error
  - 8.8 Observation for Arbitrary Vector Mode Compensation

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

**ENGINEERING SPECIFICATION**

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

- 1.0 INTRODUCTION
 

The VT15 display system adjustment must be undertaken with care and patience. Please attempt to understand the circuit and adjustment functions before starting. During adjustment try to correlate visual changes with the knowledge of how you are causing them.
- 2.0 SYSTEM CONDITION
 

The display system must be reasonably up-to-date for this procedure to apply.

  - A. Display Front End
    - 1. Should have a new type yoke i.e. black and serialized rather than brown.
    - 2. Should have a new type deflection amp mounted on the right side below muffin fan (when facing the screen), identifiable by the 200 potentiometer on it (old amplifier had no pot).
    - 3. Should have an RC network on the rear chassis as shown in figure 2.1. If it is not correct, modify it to conform to figure 2.1.
    - 4. Should have a variable terminator (74-09303-0-0) on one deflection axis (only on the last scope if there are multiple scopes).
  - B. Backplane
    - 1. ECO VT15 #47 should be installed.

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

**ENGINEERING SPECIFICATION**

CLASSIFIED

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

C. A3180

1. Should be up through circuit schematic rev.C.

D. A3170

1. Should be circuit schematic Rev. B or greater.

E. M7010

1. Should have a shield installed see ECO #M7010-1

F. A238

1. Should be circuit schematic Rev. C or greater.

G. A140

1. Should be circuit schematic Rev. C or greater. See ECO #A140-3

3.0 EQUIPMENT

The following equipment is needed:

A. Dual trace oscilloscope.

B. 3 probes with grounding leads at least two lx probes are needed.

C. Alignment tool or small screwdriver.

Check that all probes are properly compensated and that both channels have their gains and phases calibrated. Very Important.

4.0 SUMMARY THEORY

An understanding of how the analog portion of the system

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works is necessary to get a good adjustment in a reasonable length of time.

4.1 Supply Functions

The display processor uses +5V  $\pm .15$ , +15V  $\pm .5V$ , and -15V  $\pm .5V$ . All voltages should be stable. If they are outside of their specified ranges they may cause general deterioration of picture quality. Because of the dependence of the display on stable analog supply voltages, it is desirable to maintain an on-site record of the +15V supply voltages. The +15V supply should be checked as a part of PM procedure and at every adjustment session with a properly calibrated test instrument and the results recorded in a chart.

4.2 Arbitrary Vectoring and Modules

In order to avoid redundancy in reading material you are referred to read the chapters in Volume 1 of the VT15 manual. They are as follows:

3.1.7 Analog Function Group

5.1.9 A3180 Vector Generator

5.1.10 M7010 VV15 Timing Control

5.1.11 A3170 Arbitrary Vector Generator

5.1.12 A140 Dual Analog Switch

5.1.13 A238 Dual Analog Summer Driver

4.3 Phasing

An area which affects picture quality is differences in

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throughput between the X and Y axis (that is signal path between the ramp generation of the integrator in the VT15 and the beam deflection in the CRT of the display unit). Differences in throughput may occur in the A3170 arbitrary vector generator module, the A140's analog switches the A238 summer-drivers, the coax cables, the deflection amplifier network. Phase distortion on the A3170 is compensated at the time of manufacture by capacitors C26 and C27 (see print D-CS-A3170-0-1). Phase distortion resulting from the A3170, A140, and A238 are factory tested. Phase distortion on the cables is adjusted by attaching a variable terminator to one end of one of the cables. Phase distortion in the display deflection amplifier and yoke are provided for by an adjustment potentiometer on the front end deflection amplifier.

4.4 Noise

The system is designed to provide adequate settling time between operation in the logic timing (refer to sec.5 to deal with normal noise within the analog circuits). Peculiarities at the beginning/or end of vectors are probably the result of excessive oscillation or noise and should be trouble-shot accordingly.

4.5 Display Front End

The display has a number of straight forward adjustments. See figure 4.5.1 and Table 4.5.1

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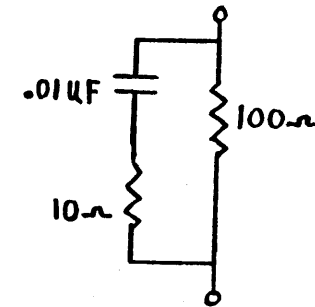
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Figure 2.1

R.C. Grounding Network



(Rear View)  
Display C.R.T.

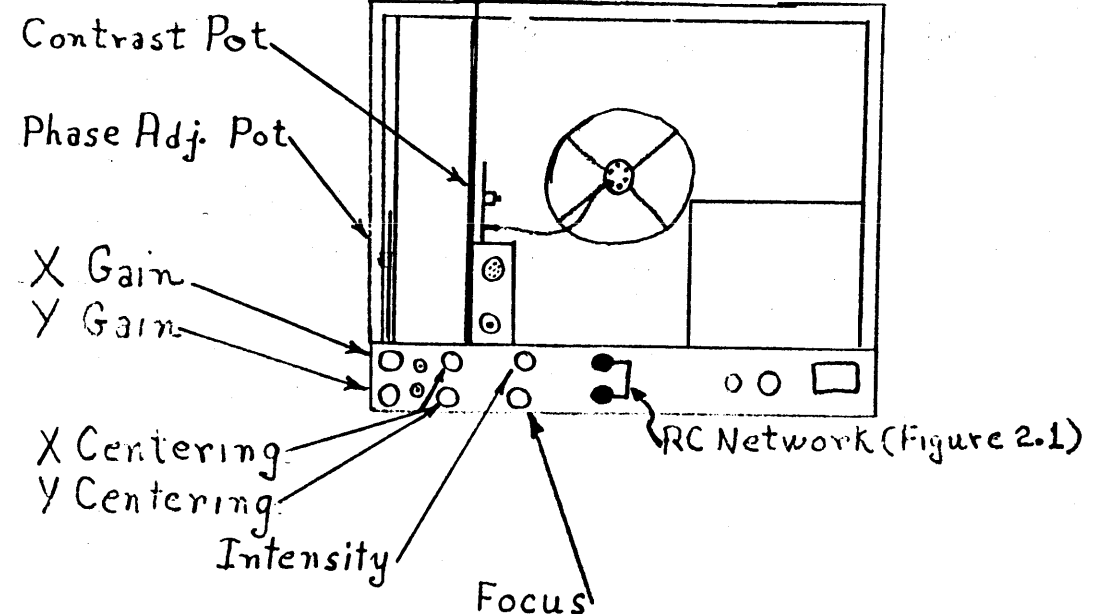


FIGURE 4.5.1

DISPLAY ADJUSTMENTS

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TABLE 4.5.1  
DISPLAY ADJUSTMENTS

<u>ADJUSTMENT</u>	<u>EFFECT</u>	<u>ADJUSTMENTS INDICATIONS</u>
X Centering	Lateral display position	So that display is centered
Y Centering	Vertical display position	So that display is centered
X Gain	Lateral display size	So that main display area is 9 1/4" on a side
Y Gain	Vertical display size	Same as X Gain
Intensity	Display brightness	So that little pictures test 5(8) intensity level $\beta$ is at the boarder-line of visibility.
Contrast	Range of digitally selected intensities	So that little pictures test 5(8) intensity 7 is set at which it does not bloom.
Focus	Focus	So that little pictures test 16(8) shows uniform quality throughout the display area.

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- A. X Gain  
Controls the size of the display in the X axis by controlling attenuation of the X axis deflection input. Adjusted so that a full screen vector in X is 9 1/4 inches long. May be adjusted for shorter lengths if the customer desires (the smaller the viewing area the less visible any distortion).
- B. Y Gain  
Controls the size of the display in the Y axis by controlling attenuation of the Y axis deflection input. Adjusted so that a full screen vector in Y is 9 1/4 inches long (or to match X).
- C. X Centering  
Controls the position of the display in the X axis by controlling biasing of the X deflection amplifier. Adjusted to permit viewing of the entire display in the center of the viewing area. If the customer does not use the offset area he may desire that the main viewing area be centered.
- D. Y Centering  
Controls the position of the display in the Y axis by controlling the biasing of the Y deflection amplifier. Adjusted to permit viewing of the entire display in the center of the viewing area.

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E. Intensity

Controls the intensity which will be displayed by controlling grid bias in the CRT. Has proportional control over all intensity levels. Adjusted (with contrast) to provide enough intensity so that level 0 is barely visible.

F. Contrast

Controls the intensity which will be displayed by controlling the cathode bias in the CRT. Has proportional control over all intensity levels. Adjusted so that level 7 does not bloom over 30 mil spot size.

Note that the intensity and contrast adjustments are interactive.

G. Focus

Controls the focus by controlling the grid bias in the CRT. Adjusted to provide as uniform and sharp a picture throughout the displayable area as possible. Sharpest picture in center of screen.

H. Phase

See discussion on phasing, Section 7.3.

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TABLE 5.1  
LOGIC ADJUSTMENTS

ADJUSTMENT	POT LOC	MODULE	SLOT	PIN #	SET TO
* Clock	Only	M401	D15	D2	250 nsec repetition rate
* Move settled Delay	Top	M302	C16	F2	3.5 usec high pulse
* Data Flag Delay (latency Delay)	Bottom	M302	C16	T2	300 nsec high pulse; may be changed by customer requirements.
Short Point Settle Top Delay	Top	M302	J12	F2	8 usec high pulse
* Long Point Settle Delay	Bottom	M302	J12	T2	20 usec high pulse
* Display Console Bus Delay (push button Delay)	Top	M302	F13	F2	750 nsec high pulse for standard 30' cable (add 4 ns/ft of length over 30')
Blink Delay	Bottom	M302	F13	T2	90 msec high pulse
* Arbitrary Vector Startup Settle Delay	Top	M302	A22	F2	500 nsec high pulse (may vary with system)

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(CONTINUED)

TABLE 5.1

LOGIC ADJUSTMENTS

ADJUSTMENT	POT LOC	MODULE	SLOT	PIN #	SET TO
* Arbitrary Vector Start Gen Delay	Bottom	M302	A22	T2	100 nsec high pulse

\* settings are made running VT15 Instruction Test Part II with ACS 17 on a  $\beta$ .

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5.0 LOGIC CHECKS AND ADJUSTMENTS

5.1 Table Summary 5.1

5.2 +5 Volt Logic Power

- A. Scope Points - A05A2, C02A2, E02A2.
- B. Adjustment - Accessible potentiometer on top left of the H721 power supply (bottom of VT15).
- C. Procedure - Adjust to achieve +5 volts average for all points -0 or +.15volts.

5.3 System Clock

- A. Scope Points - D15D2
- B. Adjustment - Potentiometer on back of M401 module in location D15.
- C. Procedure - With the display stopped, adjust for 250 ns between pulses.

5.4 System Delays

The duration of a delay is the amount of time between the positive going leading edge and the trailing edge. To take the following measurements, use an oscilloscope and SYNC + on channel one.

5.5 Move Settled Delay

- A. Scope Points - C16F2
- B. Adjustment - Top potentiometer on back of M302 module in location C16.

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C. Procedure - Run the first section of VT15 Part II (Blink Square) and adjust to 3.5 usec.

5.6 Data Flag Delay

- A. Scope Points - C16T2
- B. Adjustment - Bottom potentiometer on back of M302 module in location C16.
- C. Procedure - Run the first section of VT15 Instruction Test, Part II (Blink Square) and adjust for minimum (400 nsec).

NOTE: Early versions of VT15 Instruction Test, Part II will not run with this delay below 3 1/2 usec. To run the old version diagnostic, change memory location 3211 to 140.000.

5.7 Short Point Settle Delay

- A. Scope Points - J12F2
- B. Adjustment - Top potentiometer on back of M302 module in location J12.
- C. Procedure - Run the Test 13<sub>(8)</sub> VT15<sup>L.R</sup> and adjust for 8 usec.

5.8 Long Point Settle Delay

- A. Scope Points - J12T2
- B. Adjustment - Bottom potentiometer on back of M302 module in location J12.
- C. Procedure - Run the first section of Instruction Test,

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Part II (Blink Square) and adjust for 20 usec.

5.9 Display Console Bus Delay

- A. Scope Points - F13F2
- B. Adjustment - Top potentiometer on back of M302 module in location F13.
- C. Procedure - Run the first section of Instruction Test, Part II (Blink Square) and adjust to 750 nsec + (X-30) times 4 nsec, where X equals the cable length in feet between the VT15 and the furthest VT04 (for standard 30 Ft. cable adjust to 750 nsec).

5.10 Blink Delay

- A. Scope Points - F13T2
- B. Adjustment - Bottom potentiometer on back of M302 module in location F13.
- C. Procedure - With the display stopped, adjust to between 80 and 120 milliseconds.

5.11 Arbitrary Vector Start Up Settle Delay

- A. Scope Points - A22F2
- B. Adjustment - Top potentiometer on M302 module in location A22.
- C. Procedure - This delay is factory set to allow for the maximum settling time without exceeding the specification for the character drawing rate. Its normal setting is about 500 nsec, but will vary from system to system.

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If adjustment of this delay is necessary, run the first section of Instruction Test, Part II (Blink Squares) and adjust to 500 nsec. Then go to normal adjustment procedure starting in Section 8.

5.12 Arbitrary Vector Start Gen Delay

- A. Scope Point - A22T2
- B. Adjustment - Bottom potentiometer on M302 module in location A22.
- C. Procedure - Run the first section of VT15 Instruction Test, Part II and adjust to 100 nsec.

6.0 ANALOG VOLTAGES - CHECKS AND ADJUSTMENTS

The +15 volt and -15 volt precision supplies provide a base for most of the VT15 analog adjustments. They may be set as much as one-half volts from nominal and still provide normal operation. However, once these voltages are set and the analog adjustments have all been done, these voltages should not be readjusted. If a precision voltage is changed for any reason, the vector length analog adjustment could possibly have to be redone.

See Adjustment Summary Pot Table 6.0.

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TABLE 6.0

ADJUSTMENT SUMMARY POT TABLE

ADJUSTMENT	TEST POINT	COMMENTS
+5V	X01A2 and X32A2 of every row	Adjust H721 (through hole in its cover) - should be 5V $\pm$ .15V OV
+15V	B32V2	Adjust H707 - lefthand pot. Caution: On earlier VT15's it is possible to short live points within the power supply if a metal adjusting tool is used should be +15V $\pm$ .5V.
-15V	B32U2	Adjust H707 righthand pot. Caution: As above should be -15V +.5V

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- 6.1 +15 Volts
    - A. Test Points - B32V2
    - B. Adjustment - Lefthand potentiometer on the H707 power supply (mounted in upper part of VT15).
    - C. Procedure - Adjust to achieve +15.0 volts.
  - 6.2 -15 Volts
    - A. Test Point - B32U2
    - B. Adjustment - Righthand potentiometer on the H707 power supply (mounted in upper part of VT15).
    - C. Procedure - Adjust to achieve -15.0 volts
  - 6.3 D DAC Reference Voltage
    - A. Test Point - A32V2
    - B. Adjustment - Potentiometer on the back of A704 module in location AB32.
    - C. Procedure - Adjust to obtain -10 volts. May be factory set at a value slightly higher than -10 volts.
- NOTE: Additional information for adjustments is given in section 7.0.

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- 7.0 INITIAL ANALOG ADJUSTMENT PROCEDURE
- 7.1 Pot Definitions
  - A3180-P1 Point Intensity Delay  
This pot controls a delay triggered by a signal called Start Generator which simultaneously starts up the vectoring. We delay the intensity turn on to match up the delay introduced in the X and Y analog networks.
  - A3180-P2 Vector Length  
This pot controls the end point of the vector being drawn on the CRT. It is done by introducing a linear voltage error to the D DAC, which in turn controls the magnitude of the ramped voltage in the integrator.
  - A3170-P1 X Gain  
This pot will allow one to match the vector length of the Y axis. Any error between vector lengths of a positive and negative direction will occur due to errors beyond the A3170 signal path.
  - A3170-P2 X Phase Control
  - A3170-P4 Y Phase Control  
These pots set the zero volt start position for the output of the MDAC's. When the pots are set so that the outputs are zero for a DC voltage level, turning more counter-clockwise on each pot generates a phase control which allows one to set the X and Y final outputs to a zero phase error

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referenced to each other. These controls should always be set last, after phasing in the CRT and the cables and setting the A3170-P3 and P5 pots to zero offset.

A3170-P3 X Output Offset

A3170-P5 Y Output Offset

These pots correct any inherent offsets produced by the operational amplifiers following the MDAC's. They cannot be used to correct an error produced by the MDAC.

A704-P1 Coarse Vector Length Error Control

A704-P2 Fine Vector Length Error Control

These pots should be used to correct percentage error of vector lengths meeting their predetermined end point. This is most noticeable as the vector lengths determined are longer and longer. Test 13<sub>(8)</sub> with PE1 in a one or zero shows the accuracy of end point matching.

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TABLE 7.2  
INITIAL POT SET UP

MODULE	INSTRUCTION	DESCRIPTION
A3180:		
Pot 1	Turn pot fully CCW	(Intensity Turn On)
Pot 2	Leave pot in present position if paragraph 7.3 has been executed	(Vector Length)
A3170:		
Pot 1	Leave pot in present position if paragraph 7.3 has been executed	(X Gain Control)
Pot 2	Set both pots fully CCW	(X Phase Control)
Pot 4		(Y Phase Control)
Pot 3	Set both pots to approximately their center position	(X Output Offset)
Pot 5		(Y Output Offset)
A704:		
P1	Leave pot in present position if paragraph 6.0 has been executed	(Coarse Vector Length)
P2		(Fine Vector Length)

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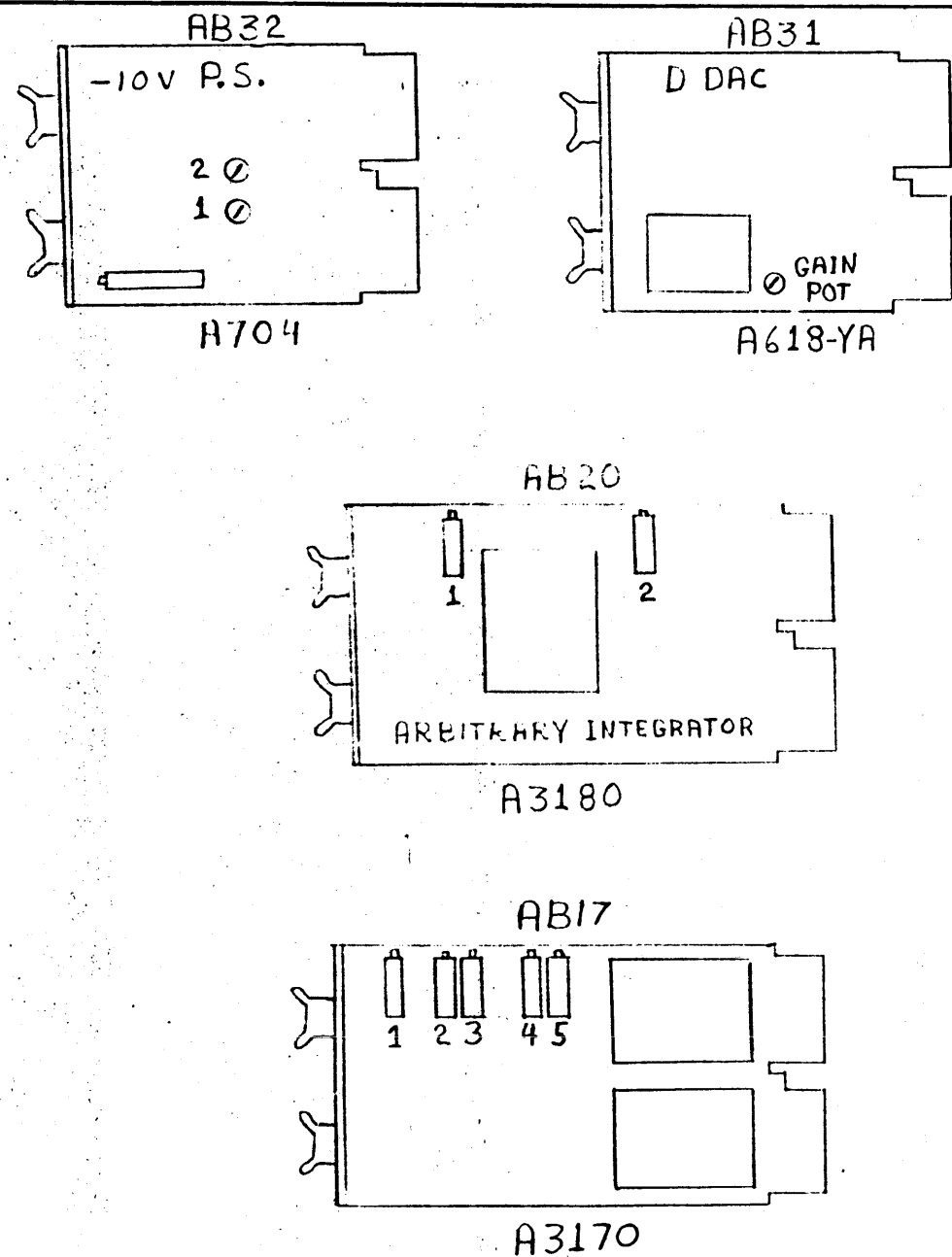


FIGURE 7.1

Pot Locations for Analog Adjustment

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7.3 D DAC (Digital to Analog Converter) Adjustment

NOTE: In addition to the Basic Vector adjustments, there is also a gain adjustment of the D DAC module. This adjustment is factory set to a very close tolerance; however, if the DAC drifts or is replaced, there is a method which may be used to adjust it.

- A. Select test 13(8) of the VT15 Little Pictures program with PBl on a 1. Assure that the shortest vectors just meet the point (A3180-P2 vector length adjustment). Observe for overshooting or undershooting on all length vectors. If so, follow next few steps to correct the error.
- B. To adjust, place the D DAC module (AB31) on a double height extender board and turn the "trim pot" until the lines just meet the points. Go back to the vector length adjustment and readjust if necessary.
- C. -10V Reference Voltage Adjustment  
The D DAC reference voltage supplied from the A704 module has a direct control on the output of the D DAC. Since the adjustment on the A618YA D DAC module doesn't always allow a sufficient output of the D DAC, it is sometimes necessary to increase the negative voltage output of the A704.
- D. If a sufficient output cannot be obtained with the D DAC adjustment, then the -10 volt reference may be varied as follows:
  1. Put the A704 module (AB32) on a double height extender module.

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2. Follow the D DAC adjustment given in Section 7.3-B but use the medium and coarse adjustments on the A704 instead of the adjustment on the D DAC module.

NOTE: Both the -10 volt reference adjustment and the D DAC adjustment have a larger effect on long lines than on short lines. Since the vector length adjustment has the same effect on long and short lines, favorable results may be obtained by going back and forth between these adjustments. However, it must be remembered that there are some non-linearities in the system with regard to line lengths and it is nearly impossible to achieve perfect results over the entire range.

3. With PBI on a  $\emptyset$ , observe the horizontal vector lengths. If lengths do not meet the intensified points adjust A3170-P1 for X Gain. This pot allows you to set X Vector lengths to Y Vector lengths.

## 7.4 Display Phase Check and Adjustment

The VT15/VT04 system is sensitive to circuit delays and circuit throughput time. For this reason care is taken to make sure that the X and Y deflection signals leave the VT15 logic in the exact correct time relation to each other. This time relationship is termed "phase".

Since the coax cables that connect the VT15 to the VT04 may introduce a phase change between the X and Y analog signals,

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a variable resistance terminator is used at the end of one of these cables. The end of the other cable will have the standard 100 ohms terminator. The throughput time of the variable terminated cable may be changed by adjusting the terminator. In this way the phase of the X and Y cables may be corrected.

Before adjusting the variable terminator check the phase of the display oscilloscope as follows:

- A. Turn the intensity on the Kratos display to minimum (fully counterclockwise) and remove power from the display chassis.
- B. Unplug the X input BNC connector at the display chassis.
- C. Using a lead with alligator clip terminations, (not longer than 3 inches) jumper the X and Y inputs under the chassis where the BNC connectors are soldered to wires leading to the amplifier.
- D. Load and start Little Pictures Test 2<sub>(8)</sub> (Phase).
- E. Apply power to the Kratos and slowly turn up the intensity, being careful not to burn any spots on the phosphor.
- F. The display should be a diagonal line of varying intensity. If the Kratos is not properly phased the display will appear as two lines touching at each end, but separating noticeably over some part of their length. Should there be a gap, observe this picture and adjust

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the pot on the preamplifier of the Kratos unit until there is no gap. Non-linearities may show up at the end points of the lines which will show up in all adjustment tests concerning phasing.

- G. Turn the intensity on the Kratos to minimum and remove power from it.
- H. Remove the jumper between X and Y inputs and reconnect the X input.

## 7.5 Variable Terminator Adjustment

- A. Shutdown the system and remove the Y output coax termipoint on pin B14V2 and connect the termipoint to pin A14V2 using a lead with alligator clips (not longer than 2 inches).
- B. Select routing 2 (8) (Vector Curvature) of the Little Pictures diagnostic and observe the large diagonal line display. This diagonal line is made up of two crosses, drawn in different directions, superimposed on each other. If any part of the superimposed lines of the cross separate much more than a line width, then adjust the variable terminator as necessary.
  1. Put the variable terminator at the end of the X coax cable and leave the standard 100 ohm terminator on

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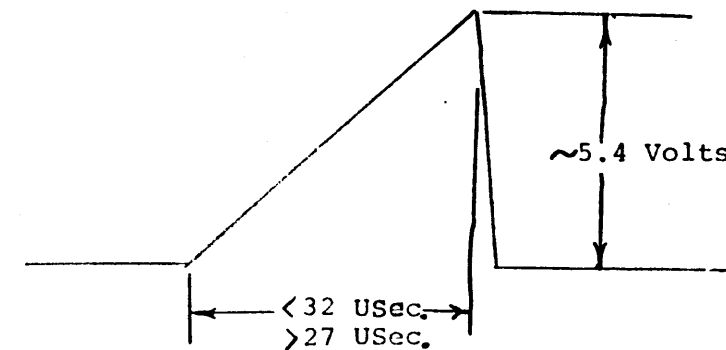
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the coax cable.

2. Adjust the variable terminator until the superimposed lines line up on top of each other.
  3. Remove the variable terminator and meter its resistance. If it is over 100 ohms, then swap it with the Y axis terminator and readjust it as described in 2 above. Again, meter the resistance value. It must be between 50 and 100 ohms. Otherwise there is a problem elsewhere in the system.
- C. Shutdown system and replace the Y output coax back to B14V2.

## 7.6 Vector Time Verification

- A. Select Test 16 (8) in Little Pictures Test.
- B. Place oscilloscope channel A to 1 volt per cm on pin A17B1. Sync external positive with sync probe to pin E31B1. Set time base to 5 microseconds per centimeter.
- C. You are observing a full scale vector being executed. The time verification should be as shown below:



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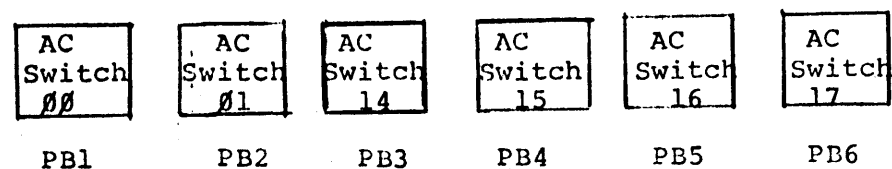
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## 8.0 ANALOG VECTORING ADJUSTMENTS

## 8.1 Set Up of Brightness Levels

- A. Select Little Pictures Test 5 (8)
- B. Set the  $\emptyset$  level of intensity so that it is just barely visible.

NOTE: Use of Push Buttons on CRT console for selecting individual test and subtest is recommended. They are decoded as follows with the AC switch  $\emptyset 3$  on the PDP15 console selected to a 1 position,



The only subpicture not possible to select is the vertical phosphor test, which is selectable by setting the PDP15 AC switch  $\emptyset 2$  to a one position.

Be sure when setting Brightness of the CRT that you do it in the environment of ambient light that the customer will be frequently using. This will help in adjusting the CRT for best quality.

## 8.2 Output Offset Adjustment

- A. Select Little Pictures Test 2 (8)
- B. Observe the box at top center. Turn the A3170-P3 pot and converge the six vertical lines to two lines.

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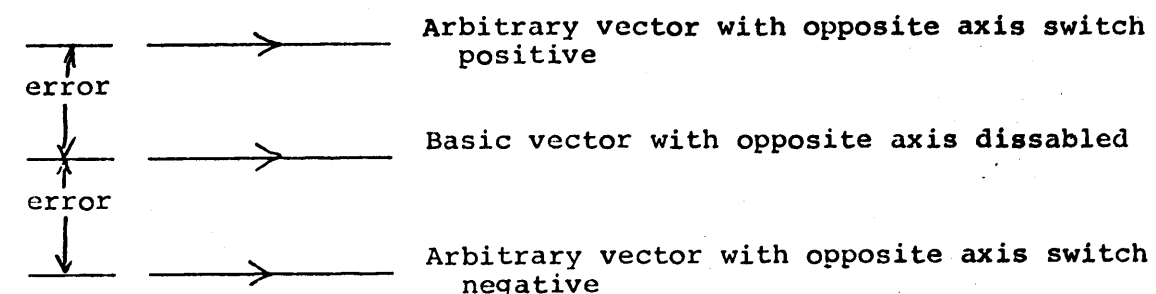
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- C. Turn the A3170-P5 pot and converge the six horizontal lines to two lines.

Concept of Box:

This box was drawn specifically to set the offset pots. As can be observed each side of the box has three lines. The lines are drawn as follows:



When there is no error on offset the three lines converge to one. Superimposition of lines drawn in this way do not include phase problems as long as A3170-P2 and P4 are fully counterclockwise

## 8.3 MDAC Phase Adjustment

- A. Select Little Pictures Test 2 (8)
- B. Observe the 45° rotated box at the upper center of the screen.

NOTE: In this adjustment it is a prerequisite that the box above this one must be correctly aligned as explained in paragraph 8.2. Also paragraph 7.4 and 7.5 must be completed

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so as not to confuse the convergence of these lines.

Do not bother observing the large X convergence at this point.

- C. Turn pot A3170-F2 while observing that the 45° box will converge from 2 lines on each side to one. If the lines are not converging set the pot back fully counter-clockwise. Then turn pot A3170-F4 to converge the lines to one on each side of the box.
- D. If there is a need to get more speed throughput in the A3170 you can turn one of the two pots clockwise a number of times. Then correct the out of phase 45° box by turning the other pot clockwise until line convergence occurs once again.

NOTE: By turning either pot to far clockwise, the starting point of the intensified vector will move off its true position as an offset in the same axis as the vector is being generated. This can be easily noticed by observing the upper box starting positions.

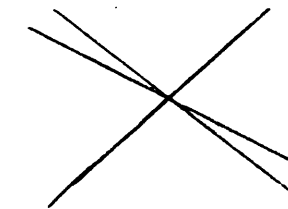
- E. Observe the large X in Test 2 (8). The X may look double visioned. If so, turn the pot A3170-P1 (the X Gain pot) so that the doubled X converges to one.

NOTE: If you cannot get a perfect large X and you have tuned in the two boxes your possible problems may be as follows:

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- a) Set A3170-P1 (X Gain) so that the large X looks like this if possible:



(somewhat exaggerated)

This means that the phase of the CRT when drawing from the positive of the X amplifier and the negative of the Y amplifier or vice-versa is in phase error. This would mean that the preamplifier in the CRT could be in error. Be sure to run tests in section 8.7 before accepting error to be in preamp.

Otherwise the preamp should be replaced.

- b)  (endpoint curve)  
Y Axis Problem  
or  
 X Axis Problem

This would mean most likely that an op-amp reaches its limit in linearity; that possibly the A140 has not received ECO#A140-0003. If you change the position pots of the CRT display and the lines straighten out, the CRT preamplifier or power amplifier is in error.

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

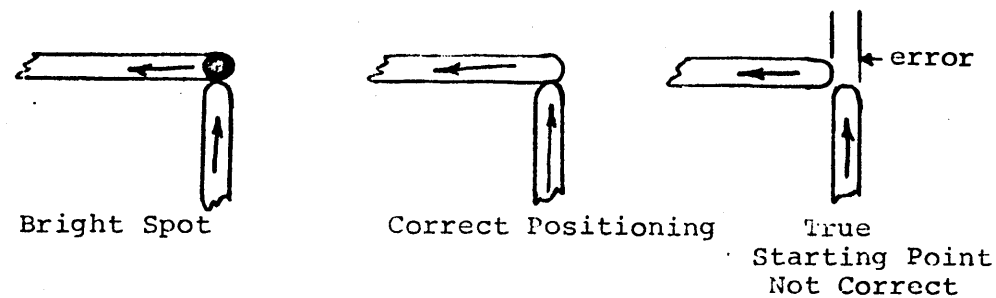
TITLE

VT15 SYSTEM ADJUSTMENT PROCEDURE

8.4 Tuning of Vector Lengths and Intensity Turn On

- A. Select Test 3 (8) of Little Pictures Test.
- B. Set PBI to a one. This will give you a number of different size squares on the screen. Sizes 7, 17, 20, 37, 47, 77, 177, , and 1000 octal line lengths. They are drawn counter-clockwise.
- C. Observe starting points of lines. They should have a bright spot because the A3180-P1 is fully counter-clockwise. Turn this pot clockwise until the spot becomes equal in intensity as the rest of the line.

If you turn the pot some more you will observe that the starting point of the vector will move off its true position, as shown below. Arrows show direction of vector being drawn.



NOTE: A brighter spot may occur when the two lines overlap each other. Keep this in mind when setting up the intensity starting point. If necessary, turn the A3180-P2 (Vector length control) pot so the end of the vector appears as

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

TITLE

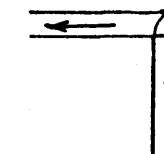
VT15 SYSTEM ADJUSTMENT PROCEDURE

shown above.

The fact that you cannot accomplish true position start up may be due to the offset controls A3170-P3 and P5 not set accurately enough, or the MDAC phase adjustments A3170-P2 and P4 are producing a positive from 0 volts starting position.

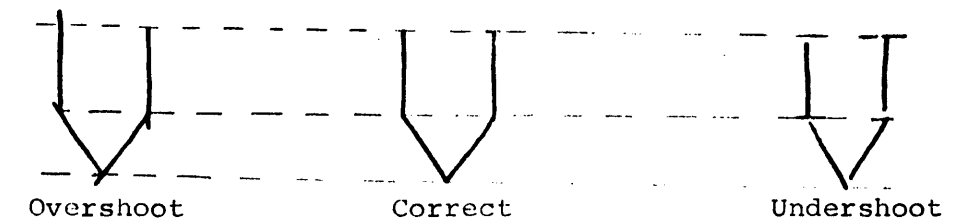
- D. Observe end points of lines. Especially lines on smaller boxes because they are the same vector lengths that generate characters.

Turn pot A3180-P2 so that the lines overlap the starting points of the next lines as shown below. Arrow shows direction of line being drawn.



8.5 Character Fine Tuning

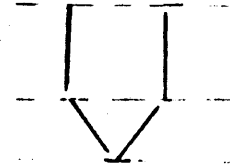
- A. 1. Select Test 16 (8) and lengthen the vector length so that characters will look squared up as so. Pick this character from somewhere in the middle of the bottom of the screen.



SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

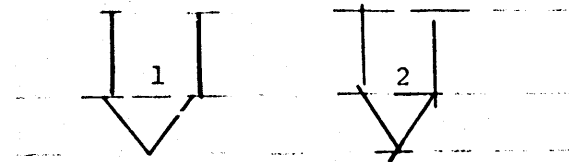
TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

2. If you cannot accomplish this it is possible you have not set another pot correctly. It may look like this:



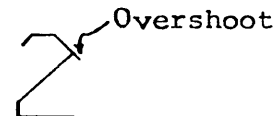
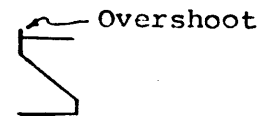
This would be a problem similar to paragraph 8.4, step C. Please refer to it.

3. Another phenomenon would be for the character to look like this:



This could mean that the X and Y output offsets A3170-P3 and P5 are not set accurately. They are producing here bad starting in the X axis on 1 and bad starting in the Y axis on 2.

- B. At this point all characters should be looked at for best quality in Test 16 (8). Vector length and Intensity delay should be moved so as to satisfy overall quality.
- C. The one error that may show up when everything else looks good is in either character may show up as follows:



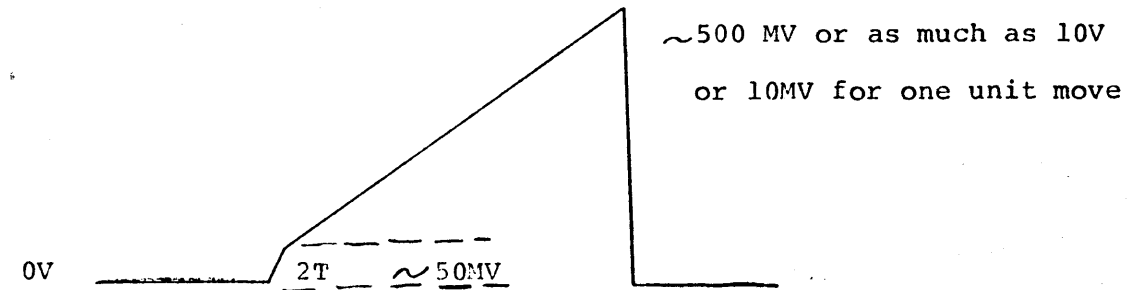
This occurs due to nonlinearity in the start up of the

SIZE <b>A</b>	CODE SP	NUMBER VT15-0-51	REV 47
------------------	------------	---------------------	-----------

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

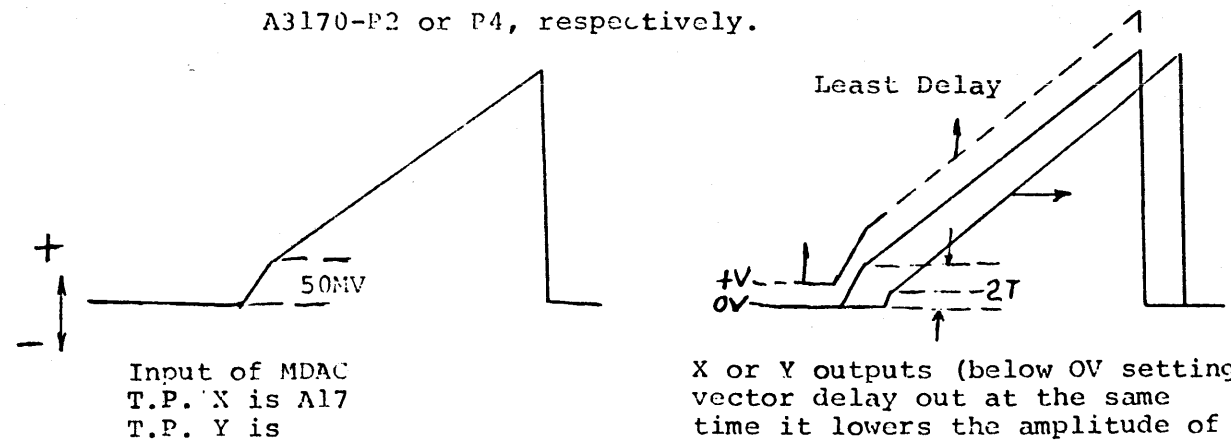
CRT. It is possible that your scope might exhibit this. You can get some of it out by understanding some technical points of the Analog.

1. The Integrator pin A20U2 looks like the example given below when drawing any line on the screen:



NOTE: This step is produced by capacitor C on the integrator in the A3180. A47 PF should be there. A 39 PF capacitor would make a faster step.

2. The X or Y outputs A17B1 or B17S2 respectively, look as follows, depending on the position of A3170-P2 or P4, respectively.

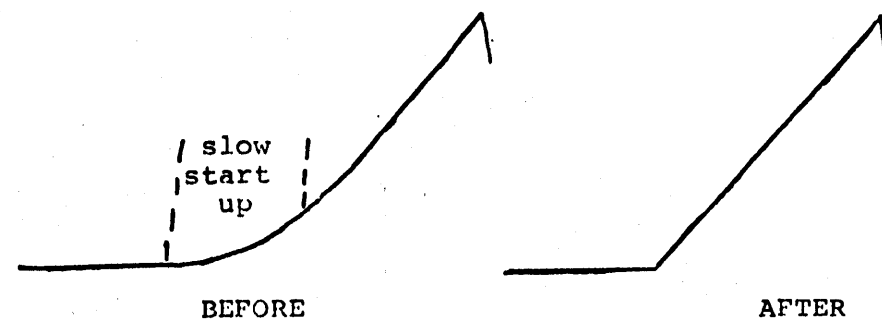


SIZE <b>A</b>	CODE SP	NUMBER VT15-0-51	REV 47
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TITLE

VT15 SYSTEM ADJUSTMENT PROCEDURE

3. The reaction of this start up of the vector outputs will correct most CRT defficiencies.



#### 8.6 Character Speed Verification vs Quality

- A. Place oscilloscope channel A to 1 volt per cm. on pin E31S1 (character Input H) and Sync. internal positive to Channel A. Set time base to .1 millisecond per centimeter.
- B. Select Test 16<sub>(8)</sub> of Little Pictures Test. Observe the time that Channel A remains high ( $\sqrt{3}V$ ). It has to be less than 660 microseconds. This time is produced by a sentence structured in the test. It says, "The little brown fox jumped over the lazy dog."

The time for execution of each character averaged out is  $660 \div 44$  characters = 12 microseconds.

- C. This time can be increased by two methods. Both involve eventually decreasing quality in the characters.
1. By turning the pots A3170-P2 and P4 clockwise being careful for phase adjustment and non-true position start up of vectors. To avoid redundancy I refer you

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

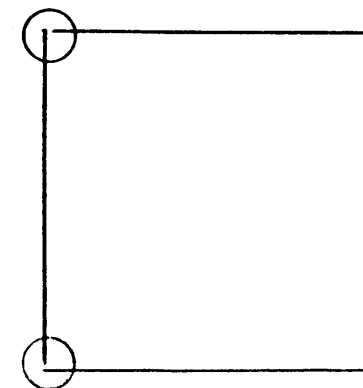
TITLE

VT15 SYSTEM ADJUSTMENT PROCEDURE

- to paragraph 8.3 Section D.
2. By lowering the delay (Start Gen.L):
    - a) First select the Directory, Test  $\emptyset$  (8)
    - b) Choose the line  
 $\emptyset\emptyset1\emptyset =$  OCTOGONS OR SQUARES
    - c) Turn the top potentiometer clockwise or counter-clockwise in slot A22 while observing the tops of the characters; scanning from character to character.

When the tops of these characters begin to look like they are waivering, back off with the pot until they are normal once again. This problem occurs due to the limitation of the position DAC's settling times.

- #### 8.7 Closer Observation of Vector Gain Versus Phase Errors
- While observing lines of different vector lengths, for example in Test 13<sub>(8)</sub> or 3<sub>(8)</sub> with the push button PB1 on a one, you may observe errors such as below:



SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	



**ENGINEERING SPECIFICATION**

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

These are possible errors of positive going vectors versus negative going vectors. These errors will deteriorate square looking larger boxes as well as the quality of the Large X in Test 2 (8) [Refer to section 8.3 E(a) which is effected by this error].

In order to help observe these errors more closely, two display files have been generated. They were generated in MACRO so as to allow one to generate a papertape from it, if so desired. The mnemonics for the file is as follows with the program following it.

```

703004 LSD=703004
703001 SDSF=703001
203020 PAR1=203020
215252 PAR2=215252
220004 PAR3=220004
144000 PX=144000
140000 PY=140000
400000 V0=400000
402000 V1=402000
404000 V2=404000
406000 V3=406000
410000 V4=410000
412000 V5=412000
414000 V6=414000
416000 V7=416000
600000 DJMP=600000
204000 DSTOP=204000
020000 INT=020000
750004 LAS=750004
    
```

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

**ENGINEERING SPECIFICATION**

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

```

10200 .LOC 10200
10200 750004 START LAS
10201 741100 SPA
10202 610210 JMP STR
10203 210272 LAC (ADD1)
10204 703004 DO LSD
10205 703001 SDSF
10206 610205 JMP .-1
10207 610200 JMP START
10210 210273 STR LAC (ADD0)
10211 610204 JMP DO
10212 203020 ADD0 PAR1
10213 215252 PAR2
10214 220004 PAR3
10215 144377 PX1377
10216 140777 PY1777
10217 421000 V011000!INT
10220 404010 V2110
10221 431000 V411000!INT
10222 144777 PX1777
10223 140377 PY1377
10224 425000 V211000!INT
10225 400010 V0110
10226 435000 V611000!INT
10227 144377 PX1377
10230 140377 PY1377
10231 421000 V011000!INT
10232 425000 V211000!INT
10233 431000 V411000!INT
10234 435000 V611000!INT
10235 204000 DSTOP
10236 203020 ADD1 PAR1
10237 215252 PAR2
10240 220004 PAR3
10241 144000 PX
10242 140000 PY
10243 423777 V111777!INT
10244 433777 V511777!INT
10245 145777 PX11777
10246 140000 PY
10247 427777 V311777!INT
10250 437777 V711777!INT
10251 144377 PX1377
10252 140357 PY1357
10253 423000 V111000!INT
10254 433000 V511000!INT
10255 145377 PX11377
10256 140357 PY1357
10257 427000 V311000!INT
    
```

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

**ENGINEERING SPECIFICATION**

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

10260	437000	V711000!INT
10261	144730	PX1730
10262	141050	PY11050
10263	422100	V11100!INT
10264	432100	V5!100!INT
10265	145050	PX11050
10266	141050	PY11050
10267	426100	V3!100!INT
10270	436100	V7!100!INT
10271	204000	DSTOP
	000000	.END
10272	010236	*L
10273	010212	*L

**ENGINEERING SPECIFICATION**

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

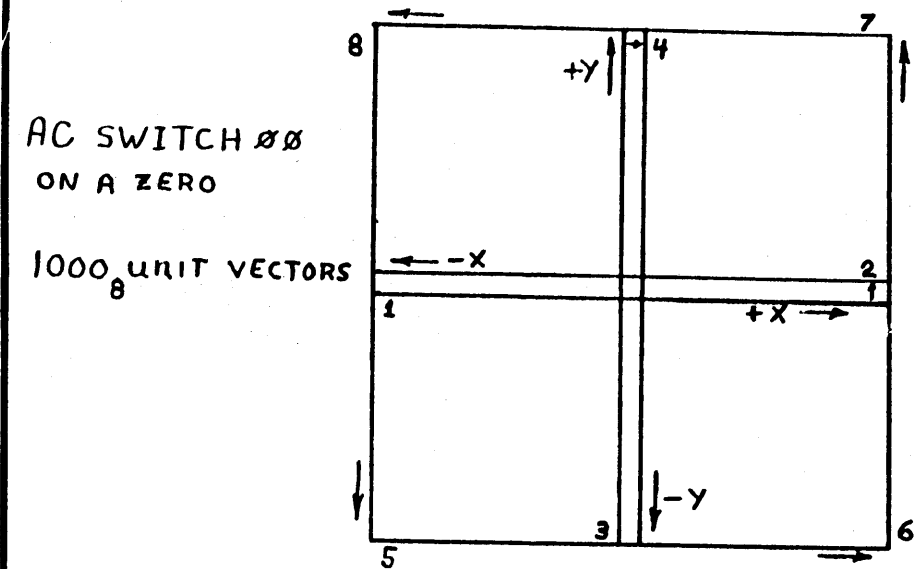


Figure 8.7.1

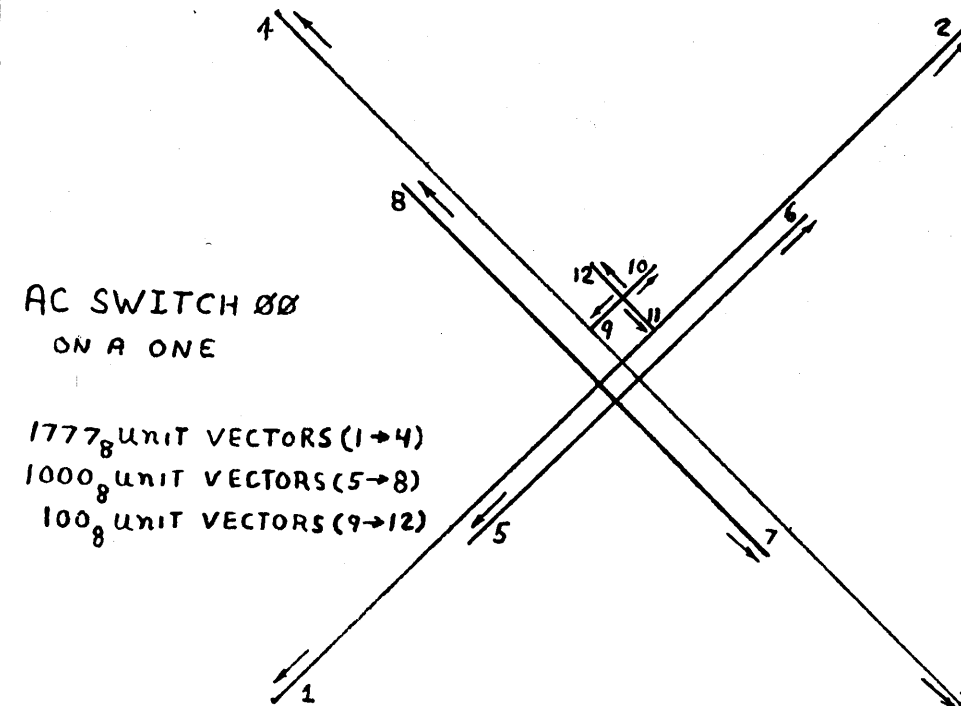


Figure 8.7.2

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

**ENGINEERING SPECIFICATION**

SECRET

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

A. Figure 8.7.1 is on the screen when one starts the program at location 10200(8) with the AC switch 00 on a zero. This picture allows one to reference a perpendicular line against the end point of a 1000(8) unit vector. Caution must be observed that the starting positions of the opposite polarity lines are equal. The error you will find here is increased as the vector lengths are made longer and decreased as the vector lengths are made shorter. There are three possible problems that can produce this symptom.

- a. The A140 in that axis has unequal output waveform in positive to negative throughput. One easy way to check this is to switch the A140's axis.
- b. The A238 may be showing unequal gain entering the positive side compared to the negative side of the LM318 amplifier. In this case it is possible to retrim the amplifier by changing the value of the resistor R2 in the X axis and R6 in the Y axis. Instructions are if the negative vector is shorter than the positive vector decrease the R value by approximately 75 to 100K ohms. If the opposite vector errors occur than increase the R value by approximately 200K ohms.

SIZE A	CODE SP	NUMBER VT15-0-51	REV
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**ENGINEERING SPECIFICATION**

SECRET

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

c. The CRT can exhibit nonlinearities as the vector is being drawn towards one end of the screen. A vector may start at true position because the CRT has been given time to catch up with the normal display file latencies.

By moving the total picture with the position pots around the screen one can observe how the scope remains linear with position sensitivity. Increasing the Gain pots and moving the picture around will force the scope to work harder. Possibly showing up its inability to slew linearly. Observe though that the actual error will increase with the gains increased.

Preamplifier and power amplifier stages have possibly been strained by some previous catastrophe. This test will show it up. Power transistor emitter balancing resistors could also have changed their values which would effect this type of problem.

B. Figure 8.7.2 is on the screen when one starts the program at location 10200(8) with the AC switch 00 on a one. This picture allows one to accurately check if vectors drawn of different lengths in X pattern will show up any out of phase conditions. Possible errors can occur as follows:

SIZE A	CODE SP	NUMBER VT15-0-51	REV
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## ENGINEERING SPECIFICATION

original

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

- a. Figure 8.7.2 has a gain error. The largest diagonal lines (3,4) will not match but cross each other towards the center. Lines (7,8) will show smaller errors. No error in lines in (11,12).
- b. 100 (8) unit vectors are out of phase, while others are in phase. Start up unlinearity in vectors, offsets the small vector phase accuracy making it look like a simple adjustment of phase pot necessary. If adjustment is made large vectors will be out of phase.

This is usually due to a bad preamplifier in the CRT. If not so the problem should be scoped out.

- c. End points of vectors not meeting. This problem is mentioned in section 8.3.E(b) please refer to it for the case of the A140's.

This problem can also be in the CRT as mentioned in section 8.7.A(c). Please use those directions for this picture.

- d. Lines waiver in and out of phase during their slew across the screen. This would mean that the vector being drawn is either exhibiting linearity limitations in the CRT, or an oscillation has been surperimposed on the waveform.

SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

## ENGINEERING SPECIFICATION

original

CONTINUATION SHEET

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

If there is unlinearity limitations or superimposition it must be scoped out and the bad amplifier must be replaced. Superimposition can sometimes be due to queer effects of the AC ground terminator (figure 2.1) in the rear of the CRT. Bad ground shielding on the coax cables can also exhibit this problem.

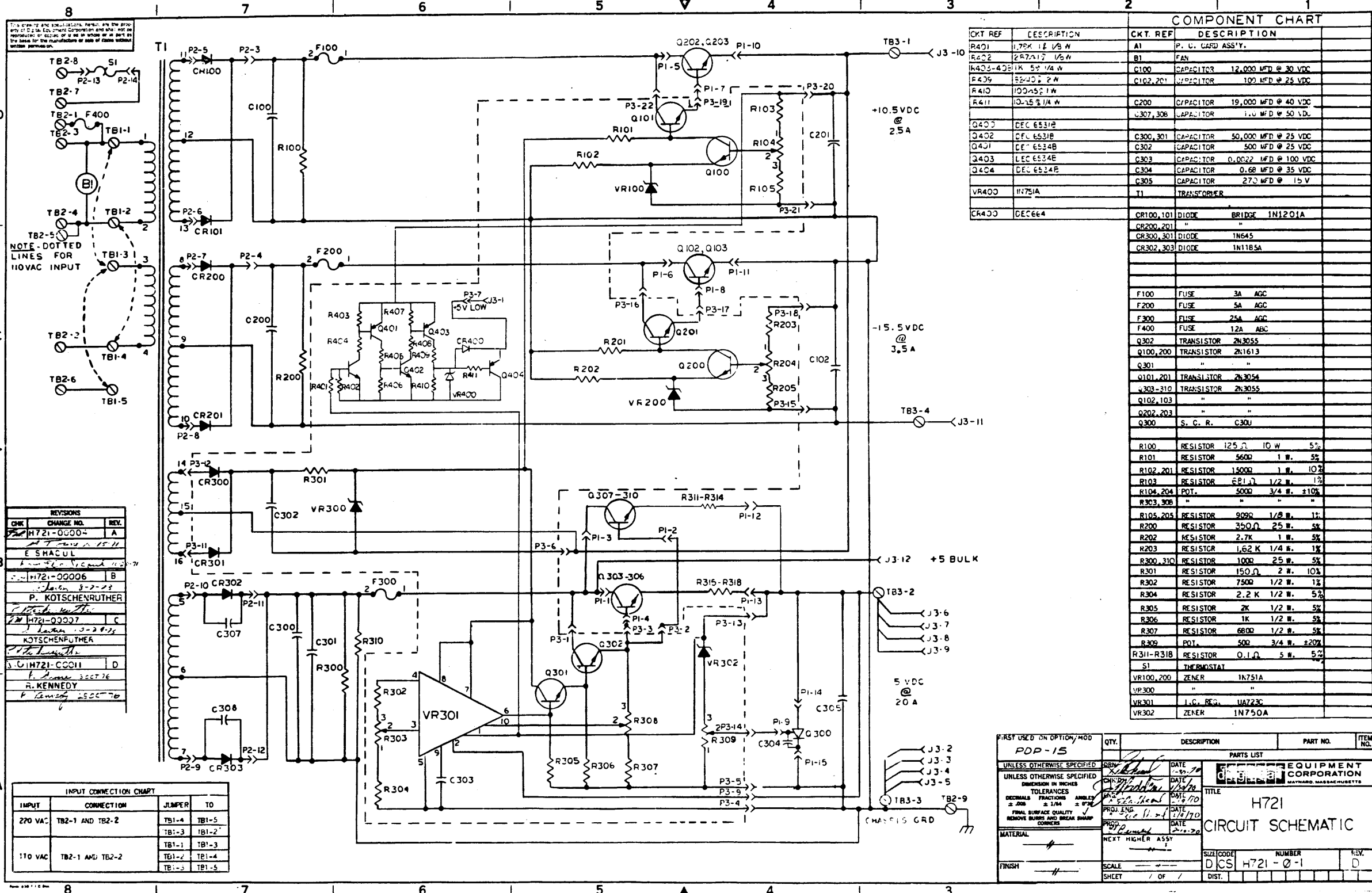
SIZE	CODE	NUMBER	REV
A	SP	VT15-0-51	

TITLE VT15 SYSTEM ADJUSTMENT PROCEDURE

## 8.8 Observation For Arbitrary Vector Mode

- A. Select Test 11 (8)
- B. Observe the 100 unit arbitrary box compared to basic box. The arbitrary vectored lines should not be any longer than 10 mils over or under the basic vectored lines. If this occurs as an error the compensation could be at fault in the A3180 module. It is also obviously erroring when the other arbitrary boxes vary in end point matching when all the respective basic boxes are correct.

SIZE	CODE	NUMBER	REV
A	SE	VT15-0-51	



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NOTE - DOTTED LINES FOR 110VAC INPUT

CHK	CHANGE NO.	REV.
	H721-0000-	A
E. SMACUL		
	H721-00006	B
P. KOTSCHENPUTHER		
	H721-00007	C
KOTSCHENPUTHER		
	H721-00011	D
R. KENNEDY		

INPUT	CONNECTION	JUMPER	TO
270 VAC	TB2-1 AND TB2-2	TB1-4 TB1-3	TB1-5 TB1-2
110 VAC	TB2-1 AND TB2-2	TB1-1 TB1-2	TB1-3 TB1-4

### COMPONENT CHART

CKT REF	DESCRIPTION	CKT REF	DESCRIPTION
R401	1.75K 1/2 W 5% W	A1	P. U. CARD ASSY.
R402	2.2K 1/2 W 5% W	B1	FAN
R403-405	1K 50 1/4 W	C100	CAPACITOR 12,000 MFD @ 30 VDC
R406	500 1/2 W 5% W	C102, 201	CAPACITOR 100 MFD @ 25 VDC
R410	100 1/2 W 5% W	C200	CAPACITOR 19,000 MFD @ 40 VDC
R411	10.15 1/4 W	C307, 308	CAPACITOR 1.0 MFD @ 50 VDC
Q400	DEC 6531E		
Q402	DEC 6531E	C300, 301	CAPACITOR 50,000 MFD @ 25 VDC
Q403	DEC 6534B	C302	CAPACITOR 500 MFD @ 25 VDC
Q404	DEC 6534E	C303	CAPACITOR 0.0022 MFD @ 100 VDC
Q405	DEC 6534E	C304	CAPACITOR 0.68 MFD @ 35 VDC
VR400	1N751A	C305	CAPACITOR 270 MFD @ 15 V
CR400	DEC 664	T1	TRANSFORMER
		CR100, 101	DIODE BRIDGE 1N1201A
		CR200, 201	"
		CR300, 301	DIODE 1N645
		CR302, 303	DIODE 1N1185A
F100	FUSE 3A AGC		
F200	FUSE 5A AGC		
F300	FUSE 25A AGC		
F400	FUSE 12A ABC		
Q302	TRANSISTOR 2N3055		
Q100, 200	TRANSISTOR 2N1613		
Q301	"		
Q101, 201	TRANSISTOR 2N3054		
Q303-310	TRANSISTOR 2N3055		
Q102, 103	"		
Q202, 203	"		
Q300	S. C. R. C300		
R100	RESISTOR 125 10 W 5%		
R101	RESISTOR 5600 1 W 5%		
R102, 201	RESISTOR 15000 1 W 10%		
R103	RESISTOR 621.0 1/2 W 1%		
R104, 204	POT. 5000 3/4 W ±10%		
R303, 308	"		
R105, 205	RESISTOR 9090 1/2 W 1%		
R200	RESISTOR 350 25 W 5%		
R202	RESISTOR 2.7K 1 W 5%		
R203	RESISTOR 1.62 K 1/4 W 1%		
R300, 310	RESISTOR 1000 25 W 5%		
R301	RESISTOR 150 2 W 10%		
R302	RESISTOR 7500 1/2 W 1%		
R304	RESISTOR 2.2 K 1/2 W 5%		
R305	RESISTOR 2K 1/2 W 5%		
R306	RESISTOR 1K 1/2 W 5%		
R307	RESISTOR 6800 1/2 W 5%		
R308	POT. 500 3/4 W ±20%		
R311-R318	RESISTOR O.T.D. 5 W 5%		
S1	THERMOSTAT		
VR100, 200	ZENER 1N751A		
VR300	"		
VR301	I.C. REG. UA723C		
VR302	ZENER 1N750A		

FIRST USED ON OPTION/MOD	QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP-15				

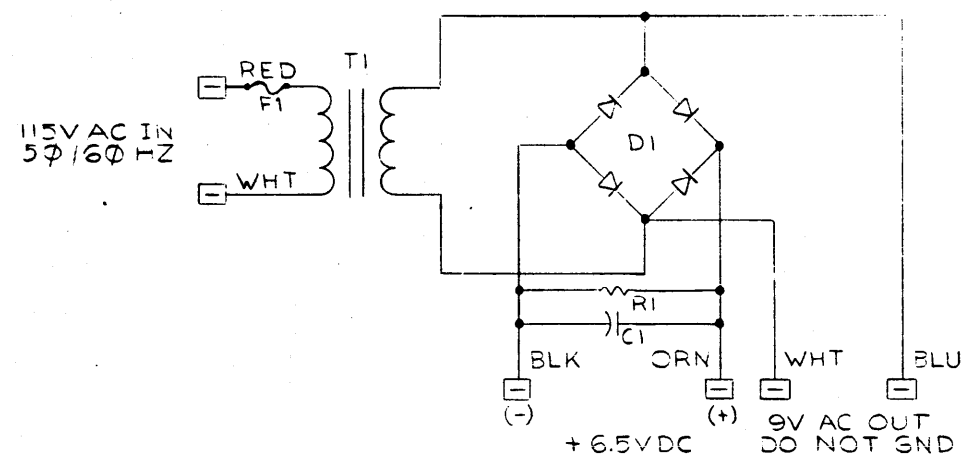
  

UNLESS OTHERWISE SPECIFIED	DATE	DATE	DATE	DATE
DRW	10/70	10/70	10/70	10/70
CHKD	10/70	10/70	10/70	10/70
APP'D	10/70	10/70	10/70	10/70
PROJ ENG	10/70	10/70	10/70	10/70
PROD	10/70	10/70	10/70	10/70

PARTS LIST		EQUIPMENT CORPORATION	
TITLE	SCALE	NUMBER	REV.
H721	D/C S	H721-0-1	D
CIRCUIT SCHEMATIC			

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F1	1/2 AMP S.E. FUSE	90072C9
R1	5ohm 25W RES	1300165
C1	18000MFD 10V DCCAP	1009437
	PARTS LIST	D-UA-716-0-0
T1	XMFR #F64-U TRIAD	1609552
D1	DIODE PACK DM-2	1105397
REF DESIGNATION	DESCRIPTION	PART NO

PARTS LIST

REV	CHG	NO	DATE
1			

DEC FORM NO. DRC 102

DRN	DATE

TRANSISTOR & DIODE CONVERSION CHART			
DEC	EIA	DEC	EIA

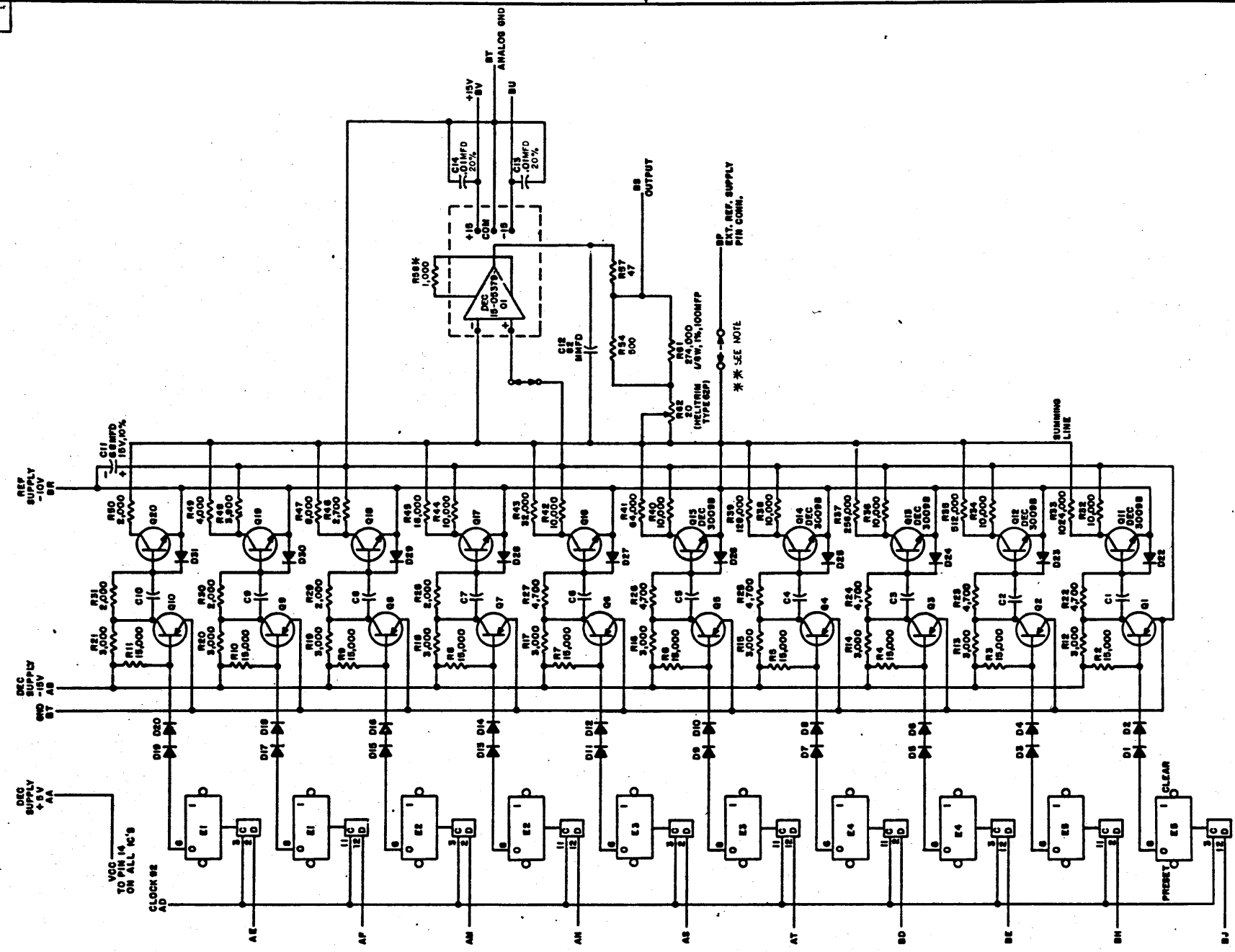
EQUIPMENT CORPORATION  
MAYNARD, MASSACHUSETTS

TITLE		
CIRCUIT SCHEMATIC		
716		
SIZE	CODE	NUMBER
C	CS	716-0-1
PRINTED CIRCUIT REV.		

REV. C  
NUMBER 716-0-1  
SIZE CODE C CS

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REV. 11/70 CS AG18-YA-1



\* \* \* WHEN THE AG18-YA IS USED IN A VHS TO PROVIDE THE MODULE WITH AN EXTERNAL REFERENCE VOLTAGE.

UNLESS OTHERWISE INDICATED:  
 TRANSISTORS ARE 2N3638  
 DIODES ARE 1N4148  
 RESISTORS ARE 1/4W, 5%  
 IC'S ARE DEC7410  
 PIN 14 ON EACH IC = GND  
 PIN 7 ON EACH IC = +5V  
 RESISTORS R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25 ARE 1/4W, 1%, 50PPM/°C  
 R26, R27, R28, R29, R30 ARE 1/4W, 1%, .01%, 5PPM/°C  
 PARTS LIST IS 4-PL-AG18-YA-0  
 HWS IS INSERTED IN ASSEMBLY, BUT MAY BE REPLACED BY A DIFFERENT OHMIC VALUE FOR FINE TUNING PURPOSES AT THE DISCRETION OF THE MODULE TEST DEPARTMENT ONLY. POWER AND ACCURACY TOLERANCES WILL REMAIN THE SAME.

\* \* \* SEE NOTE  
 BT EXT. REF. SUPPLY  
 PIN CONN.

REV.	DATE	BY	CHKD.
1	11-17-70	WJ	WJ
2	11-17-70	WJ	WJ

TRANSISTOR & DIODE CONVERSION CHART			
DATE	DEC	EIA	EIA
11-17-70	2N3638	2N3638	2N3638
DATE	DEC	EIA	EIA
11-17-70	1N4148	1N4148	1N4148

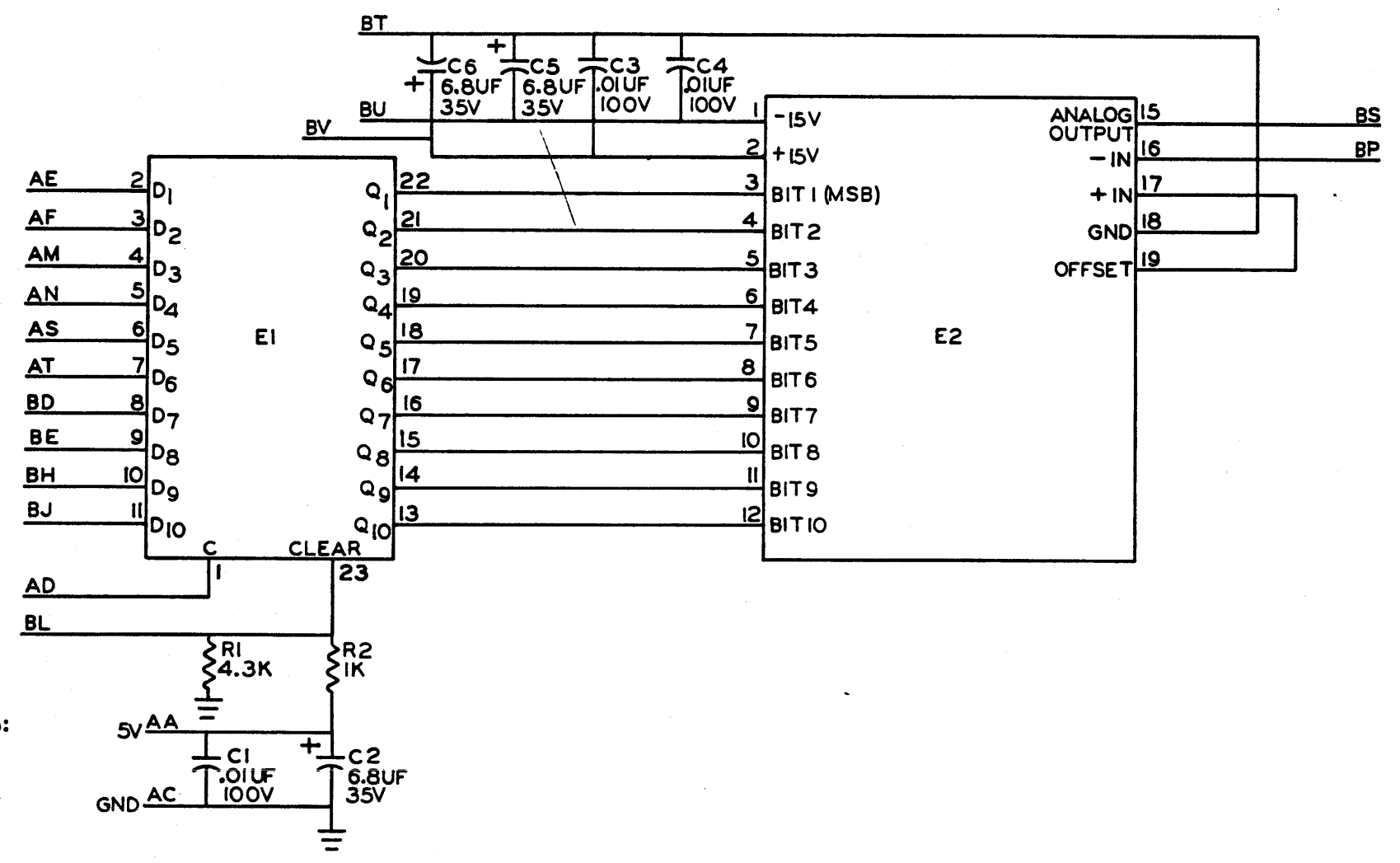
TITLE		DIGITAL TO ANALOG CONVERTER AG18-YA	
SIZE	CODE	NUMBER	REV
D	CS	AG18-YA-1	D
EQUIPMENT CORPORATION		PRINTED CIRCUIT REV.	
MAYFIELD, MASSACHUSETTS		E	

DEC FORM NO. 500 101

REV. 11/70 CS AG18-YA-1



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UNLESS OTHERWISE INDICATED:  
 CAPACITORS ARE 20%  
 RESISTORS ARE 1/4W, 5%  
 PIN 12 = GND ON E1  
 PIN 24 = +5V  
 E1 = DEC 8202  
 E2 = (DAC-HB-10B-5) CONVERTER

REV	NO	REV
0001	C	

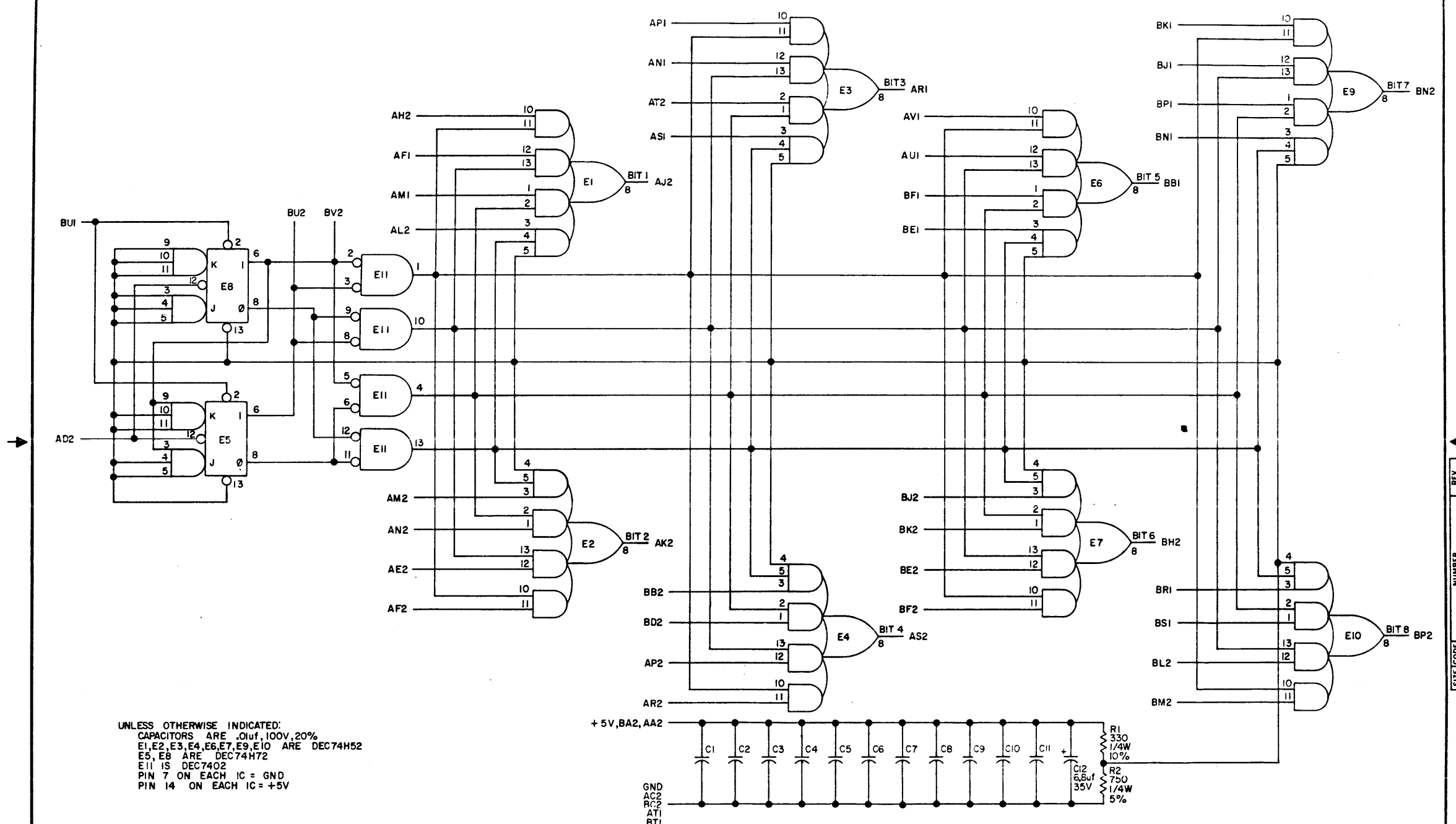
DRN. <i>G. J. Donnell</i>	DATE 4/8/71
CHK'D <i>R. Waldin</i>	DATE 9/12/71
ENG <i>A. J. ...</i>	DATE 6-23-71
PROD.	DATE

TRANSISTOR & DIODE CONVERSION CHART			
DEC	EIA	DEC	EIA



TITLE 10 BIT SINGLE BUFFERED DAC 0 TO 5V			
SIZE	CODE	NUMBER	REV
B	CS	A622-0-1	C
PRINTED CIRCUIT REV.			C

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UNLESS OTHERWISE INDICATED:  
 CAPACITORS ARE .01uF, 100V, 20%  
 E1, E2, E3, E4, E6, E7, E9, E10 ARE DEC74H52  
 E5, E8 ARE DEC74H72  
 E11 IS DEC7402  
 PIN 7 ON EACH IC = GND  
 PIN 14 ON EACH IC = +5V

REV. NUMBER M761-0-1  
 SIZE CODE C CS

REV	CHG	NO	BY

DATE	2-26-70
DATE	
DATE	5/24/70
DATE	

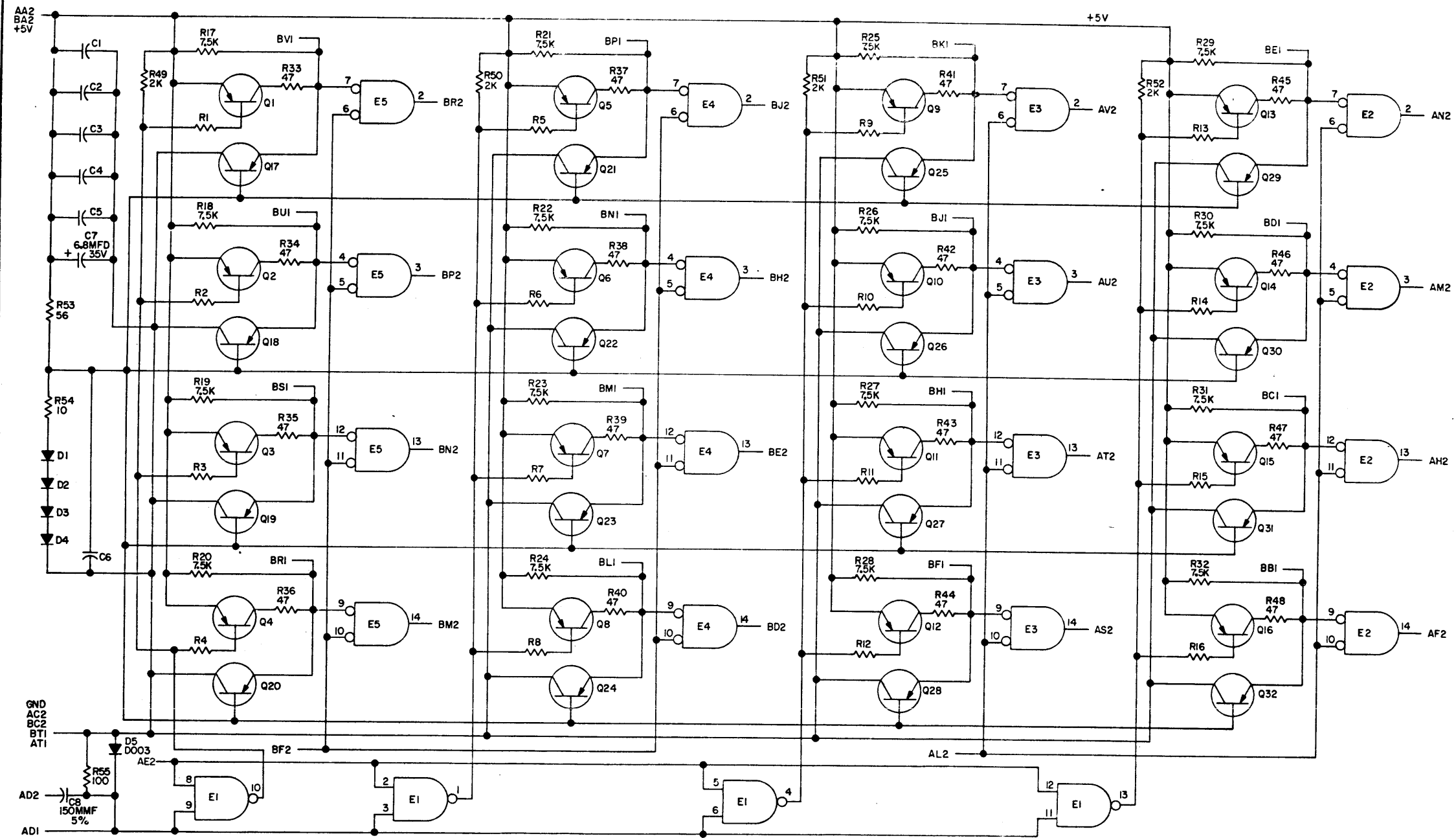
TRANSFORMER & LOAD CONVERSION CHART			

EQUIPMENT CORPORATION  
 MAYFORD, MASSACHUSETTS

TITLE		32- TO- 8 BIT MULTIPLEXER M761	
SIZE	CODE	NUMBER	REV
C	CS	M761-0-1	A
PRINTED CIRCUIT REV			

M5491-1

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UNLESS OTHERWISE INDICATED:  
 RESISTORS ARE 1/4W, 5%  
 CAPACITORS ARE 0.1MFD, 100V, 20%  
 DIODES ARE D662  
 TRANSISTORS ARE 2N3639B  
 E2, E3, E4, E5 ARE DEC380  
 PIN 1 ON E2-E5 = GND  
 PIN 8 ON E2-E5 = +5V  
 E1 IS DEC7401  
 PIN 7 ON E1 = GND  
 PIN 14 ON E1 = +5V

REV	NO	CHG	REVISIONS

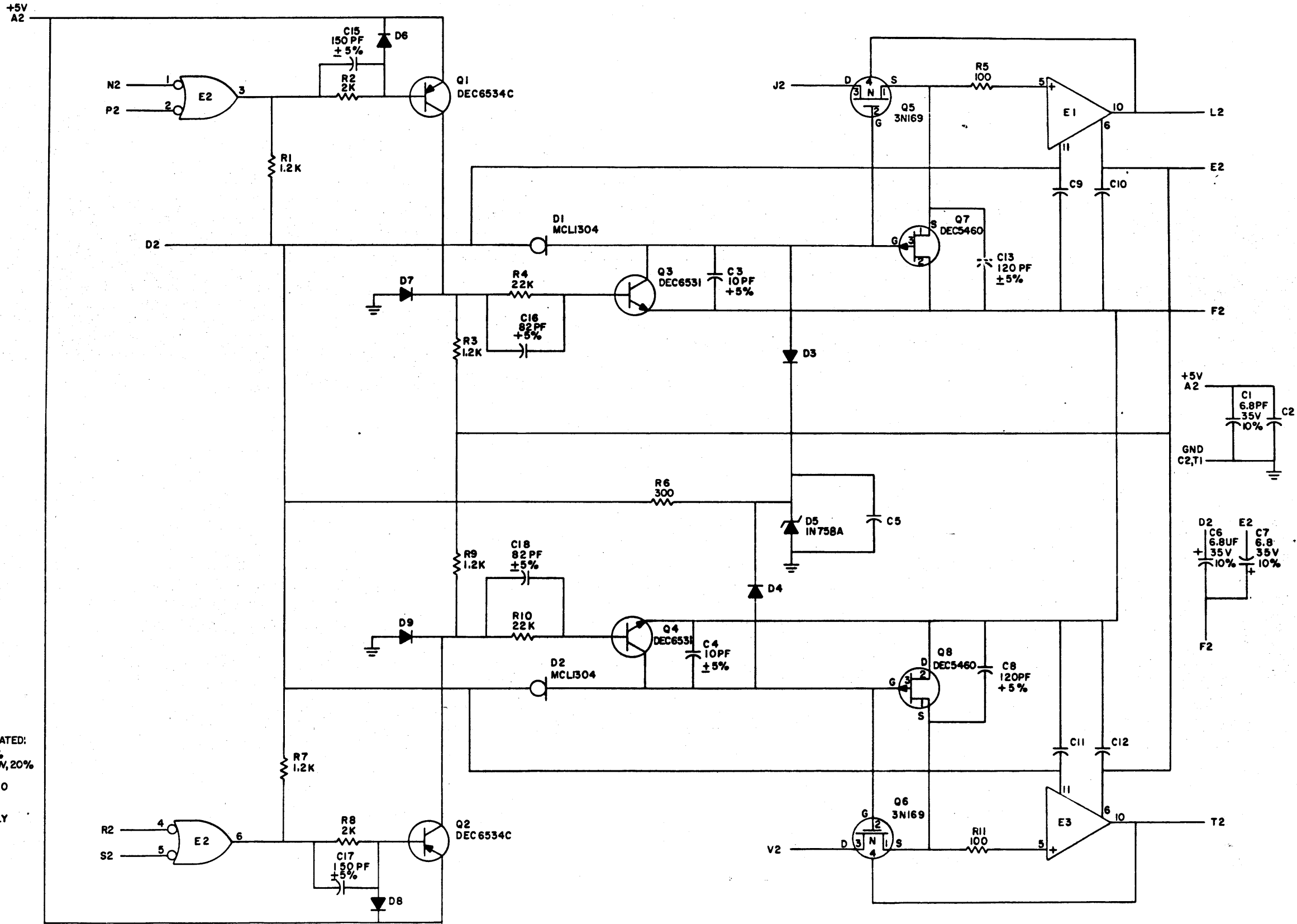
DEC FORM NO. DRC 102

DATE		DATE		DATE		DATE	

TITLE		ROM DIODE MATRIX RECEIVERS M762	
SIZE	CODE	NUMBER	REV
C	CS	M762-0-1	
PRINTED CIRCUIT REV		A	

REV. NUMBER M762-0-1

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UNLESS OTHERWISE INDICATED:  
 RESISTORS ARE 1/4W, 5%  
 CAPACITORS ARE .01UF, 100V, 20%  
 DIODES ARE D664  
 E1 AND E3 ARE DEC310  
 E2 IS DEC7426  
 PIN 7= GND  
 PIN 14= +5V ON E2 ONLY

REV	CHG NO	REV	A
00001			
00002			
00003			
00004			
00005			

DRN	N. MOORE	DATE	4-22-70
CHK'D	D. SMITH	DATE	4-22-70
ENG	<i>4. Lavie</i>	DATE	6-3-71
PROD	R. SILVERMAN	DATE	7-20-70

TRANSISTOR & DIODE CONVERSION CHART			
DEC	EIA	DEC	EIA
D664	IN3608	DEC6534C	NONE
IN756A		DEC6531	
MCL1304		2N5460	
		3N169	

**digital**  
 EQUIPMENT CORPORATION  
 MAYNARD, MASSACHUSETTS

TITLE	DUAL ANALOG SWITCH AI40		
SIZE	CODE	NUMBER	REV
C	CS	AI40-0-1	C
PRINTED CIRCUIT REV			C

REV. C  
 NUMBER AI40-0-1  
 SIZE CODE C CS

5 V... 324,454,423 Pink

## CUSTOMER PRINT SET INDEX

THIS IS PRINT SET

	SEQUENCE	
ARBITRARY VECTORING		B-DD-VV15-Ø
ARBITRARY VECTORING		A-PL-VV15-Ø-Ø
ENGINEERING SPECIFICATIONS		A-SP-VV15-Ø-1
ACCESSORY LIST		A-AL-VV15-Ø-2
ANALOG SUMMER DRIVER		D-CS-A238-Ø-1
BASIC VECTOR GENERATOR		D-CS-A318Ø-Ø-1
BUS DRIVER		B-CS-M622-Ø-1
ABR. VEC. GEN.		D-CS-A317Ø-Ø-1
VV15 CONTROL		E-CS-M7Ø1Ø-Ø-1
PUSH BUTTON ASSY		D-AD-7009597-0-0
PUSH BUTTON BOARD		D-CS-5410685-0-1

UNIT VARIATIONS		PRINT SET		
VAR	TITLE	VV15-Ø		
VV15-A	ARBITRARY VECTORING	X		
VV15-K	ARBITRARY VECTORING	X		

<p>DEC 16-13251-1062-1A-R072</p> <p>REVISIONS</p> <table border="1"> <thead> <tr> <th>DATE</th> <th>CHG. NO.</th> <th>REV</th> </tr> </thead> <tbody> <tr> <td>12/73</td> <td>VV15-00001</td> <td>A</td> </tr> <tr> <td>9/74</td> <td>VV15-00002</td> <td>B</td> </tr> </tbody> </table>		DATE	CHG. NO.	REV	12/73	VV15-00001	A	9/74	VV15-00002	B	USED ON OPTION/MODEL	DRN. D.K. CRABBE	DATE 11/29/73	TITLE
DATE	CHG. NO.	REV												
12/73	VV15-00001	A												
9/74	VV15-00002	B												
		CHK'D. <i>[Signature]</i>	DATE 11-29-73	ARBITRARY VECTORING										
		PROJ ENG. <i>[Signature]</i>	DATE 11/29/73											
		PROD. <i>[Signature]</i>	DATE 12/10/73	SIZE CODE NUMBER										
		FIELD SERV. <i>[Signature]</i>	DATE 12/11/73	B DD VV15-Ø REV B										
SHEET 1 OF 2		DIST												

CUSTOMER PRINT SET			ELECTRICAL					CUSTOMER PRINT SET			MECHANICAL						
VV15-Ø		MFG. SET	FIND NO.	DRAWING NO.	REV	NO OF SHT	DESCRIPTION	OPTION NO./FILE DATE	VV15-Ø		MFG. SET	FIND NO.	DRAWING NO.	REV	NO OF SHT	DESCRIPTION	OPTION NO./FILE DATE
X			1	A-PL-VV15-Ø-Ø	A	1	ARBITRARY VECTORING		X			2	D-AD-7009597-0-0	#	1	PUSH BUTTON ASSY	
X				A-SP-VV15-Ø-1	B	12	ENGINEERING SPECS.						D-CS-5410685-0-1	#		PUSH BUTTON BOARD	
X				A-AL-VV15-Ø-2	X	1	ACCESSORY LIST										
X				D-CS-A238-Ø-1	#		ANALOG SUMMER DRIVER										
X				D-CS-A318Ø-Ø-1	#		BASIC VECTOR GENERATOR										
X				B-CS-M622-Ø-1	#		BUS DRIVER										
X				D-CS-A317Ø-Ø-1	#	1	ABR. VEC. GEN.										
X				E-CS-M7Ø1Ø-Ø-1	#	1	VV15 CONTROL										
X			2	D-CS-5410685-0-1	#		PUSH BUTTON BOARD										

CUSTOMER PRINT SET CODES	X = PRINT OF DOCUMENT INCLUDED IN PRINT SET	TITLE	SIZE	CODE	NUMBER	REV
	C = INCLUDES ALL PRINTS INDICATED ON DOCUMENT	ARBITRARY VECTORING				
	S = CONFIDENTIAL AUTHORIZED SIGNATURE REQUIRED					

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**PARTS LIST**

MADE BY D.K. CRABBE	CHECKED <i>E. Reed</i>	SECTION 1
DATE 11/29/73	DATE 11-29-73	
ENG <i>D.K. Crabbe</i>	PROD <i>A. Mah</i> 12/10/73	ISSUED SECT. 1
DATE 11-30-73	DATE	

**QUANTITY / VARIATION**

ITEM NO.	DWG NO. / PART NO.	DESCRIPTION	VV15-A	VV15-K						
1	A238	ANALOG SUMMER DRIVER	1	1						
2	A318Ø	BASIC VECTOR GENERATOR	1	1						
3	M622	BUS DRIVER	1	1						
4	A317Ø	ABR. VEC. GEN.	1	1						
5	7009597	PUSH BUTTON ASSY. FOR VTØ4/VTØ7	-	1						
6	M7Ø1Ø	VV15 CONTROL	1	-						
7	7411403	"U" HOLD DOWN BRACKET	-	1						

TITLE ARBITRARY VECTORING	ASSY NO. <i>+/+</i>	SIZE <b>A PL</b>	CODE <b>PL</b>	NUMBER VV15-Ø-Ø	REV. <b>A</b>	ECO NO. VV15-00002
	SHEET 1 OF 1	DIST.				

DEC FORM DEC 16-(325)-1031-N870  
DRA 110

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ENGINEERING SPECIFICATION

DATE 5/25/71

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE
	ORIGINATED		L. Halio	9/30/71	<i>LH</i>	10-5-71
A	ECO CHANGE	VV15-00001	ADELMAN	12/73	<i>HA</i>	1/15/74
B	ECO CHANGE	VV15-00002	CREASER	8/74	<i>TC</i>	10/1/74

/jan

3

ENG Len Halio	APPD <i>TC</i>	SIZE A	CODE SP	NUMBER VV15-0-1	REV B
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DEC FORM NO.  
DRA 107A

SHEET 1 OF 12

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

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DEC FORM NO.  
DRA 108A

SIZE A	CODE SP	NUMBER VV15-0-1	REV B
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SHEET 2 OF 12



TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

1.0 GENERAL

The need for this option arises out of the inability of the basic system to draw vectors in more than the normal eight directions in hardware. Previously, if a "non-basic" vector was desired, a software algorithm was required to simulate that vector by a series of basic vector commands. This tends to be very inefficient from a core usage and time of execution standpoint. For example, a 22.5° vector would take 512 basic vector instructions whereas by using the VV15 option only two are required. Addition of the VV15 option however, does slow down execution of basic vectors and characters due to the longer overhead of the option.

The Graphic 15 with the arbitrary vector option (VV15) installed are shown below:

Character*	15us AVE
Long Vector†	
17g Units	14µs MAX
20g	18µs MAX
100g	19µs MAX
400g	26µs MAX
1777g	50µs MAX

\*Execution time of "The quick brown fox jumps over the lazy dog," in Character Input Mode/44 characters.

† Execution time of 10 vectors including I/O Latency with the I/O loading delay (C16T2) adjusted to .3µs, divided by 10.

Further, since the arbitrary vector data requires two PDP-15 words, the vector execution requires two fetches from the PDP-15 memory and therefore extends the time of execution. In essence, this means the double buffering action of the VT15 on basic vectors is not available on arbitrary vectors.

2.0 THEORY OF OPERATION

The VV15 option consists of two modules. The first, the M7010, is concerned with routing the data from the DB (data buffer) and IB (input buffer) through to the proper registers, in the proper sequence, depending on the instruction (long or short arbitrary vector). The second, the A317, is analog in nature and takes its inputs from the M7010 and the existing basic vector generator, and modifies the slope of the output ramp to reflect the given vector command. A general theory of operation of each board and a overall system view will follow.

SIZE A	CODE VV15-0-1	NUMBER	REV B
-----------	------------------	--------	----------

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

3.0 M7010

The M7010 consists of the following logical groups. An input data multiplexer, two - 10 bit registers, a timing chain, magnitude comparator, and gated output circuits (see Figure 1).

The 8263 input multiplexers are connected to the input buffer, data buffer, and the outputs of the  $\Delta X$  and  $\Delta Y$  holding registers (8202) mounted on the M7010. The function of the multiplexer is to take the data from the IB and DB and gate it into the X and Y register. The data is unpacked in format according to the actual instruction being executed. For example, if the instruction is a long arbitrary vector (two - 18 bit words) then the DB register is gated through to the  $\Delta X$  and the IB gated to the  $\Delta Y$  holding registers. Should the instruction be a short arbitrary vector, then the proper bits of the DB are routed into the X and Y registers. Upon a "go pulse" from the main VT timing the registers are loaded and the 8263's are set up for the shift left operation. In order to draw at an approximately constant rate on the screen, the vectors must be scaled up proportionately. The most significant bit of the X and Y registers is examined for a logical one. When this bit is found shifting stops, and a "START GEN" is given causing the start of the actual drawing process. The last state of the 8263 multiplexer is that of "all ones", where each output is a logical one. This occurs whenever an instruction 10 or 30 is not being processed.

The 8202 ten bit registers hold the X and Y Slope information and are directly connected to the Multiplying Digital-to-Analog Converters (MDAC) located on the A317 module.

Before shifting, the SN7485 magnitude comparators sense the larger value of the two values of  $\Delta X$  and  $\Delta Y$  slopes and sets a FET switch located on the A317 as well as gate the larger value into the DR Register at the proper time.

The timing consists of a 250 NS delay line where a pulse is put in one end. Timing sequencing occurs as the pulse travels down the line, and is reshaped and recycled if a logical one is not sensed in the MSB position of either the X or Y 8202 register.

The output gating circuitry connects the X Register, the Y Register, and the larger of the two, to the DR Register at the appropriate times.

SIZE A	CODE SP	NUMBER VV15-0-1	REV B
-----------	------------	--------------------	----------

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

## BLOCK DIAGRAM OF M7010

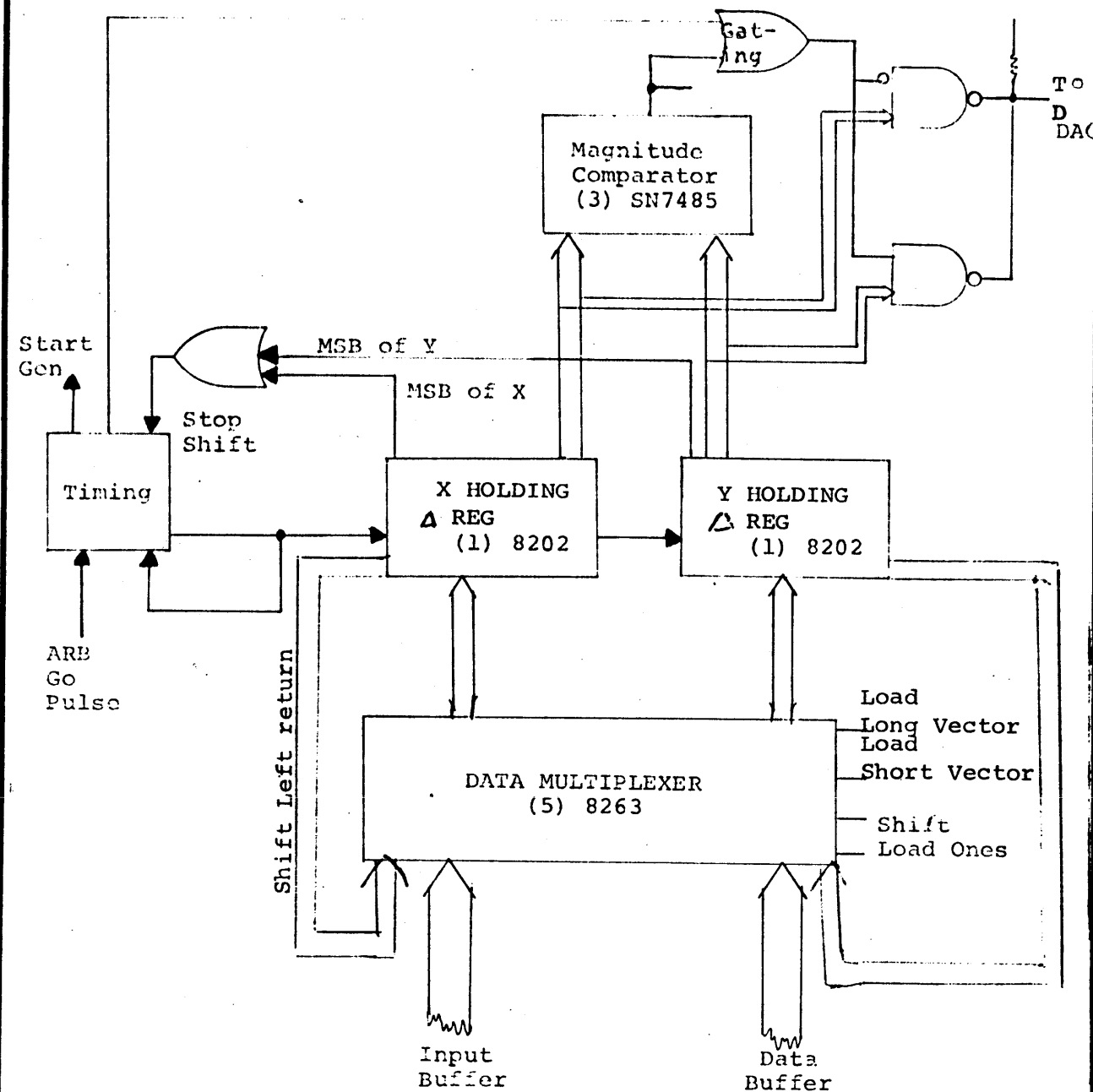


FIGURE 1

SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

## 4.0 A3170

The A3170 consists of distinct sections:

1. Two multiplying digital-to-analog converters (MDACS), and associated amplifiers.
2. Magnitude controlled feedback switches.

Each of the two MDACS receive 10 bits of digital slope information from the M7010 module. The basic ramp is brought into the A3170 and buffered by two DEC 310 voltage followers (see Figure 2). The output of the followers drive the reference input of the MDACS. In addition, an offset adjustment is provided at the MDAC reference input to bias up the MDAC input for phase relationship between X and Y.

The output of the MDAC is a current that is converted to a voltage of the proper polarity and magnitude by the output op-amps (LM318). An offset adjustment is provided for in both X and Y, and a gain trim for the X output. Slope modification is performed by the MDAC; whereas the output is equal to the reference input times the 10 bit digital input word. In other words, the MDAC is digitally adjustable variable gain follower where MAX gain is equal to all ones at the digital input and zero gain is equal to all zeros at the digital input. At maximum gain the amplification through the MDAC chain is 1/2.

The output of the MDACS are fed-back to two FETS driven by the "greater than" output of the M7010. If X is > than Y; X is fed-back to the A3180 comparator otherwise Y is fed-back.

The maximum gain (MDAC inputs all ones) from the input of the LM310 to the output of the LM318 is one half. Therefore, addition of the Arbitrary vector option to the VT15 system will require that the ramp output of the A3180 module (input to the A3170) will have to ramp to twice the voltage to reach the final compare value on the output of the A3170. To compensate for the doubling of the execution time which this would cause and the system non linearities which this would show, the ramp speed is automatically doubled in the A3180 module.

SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

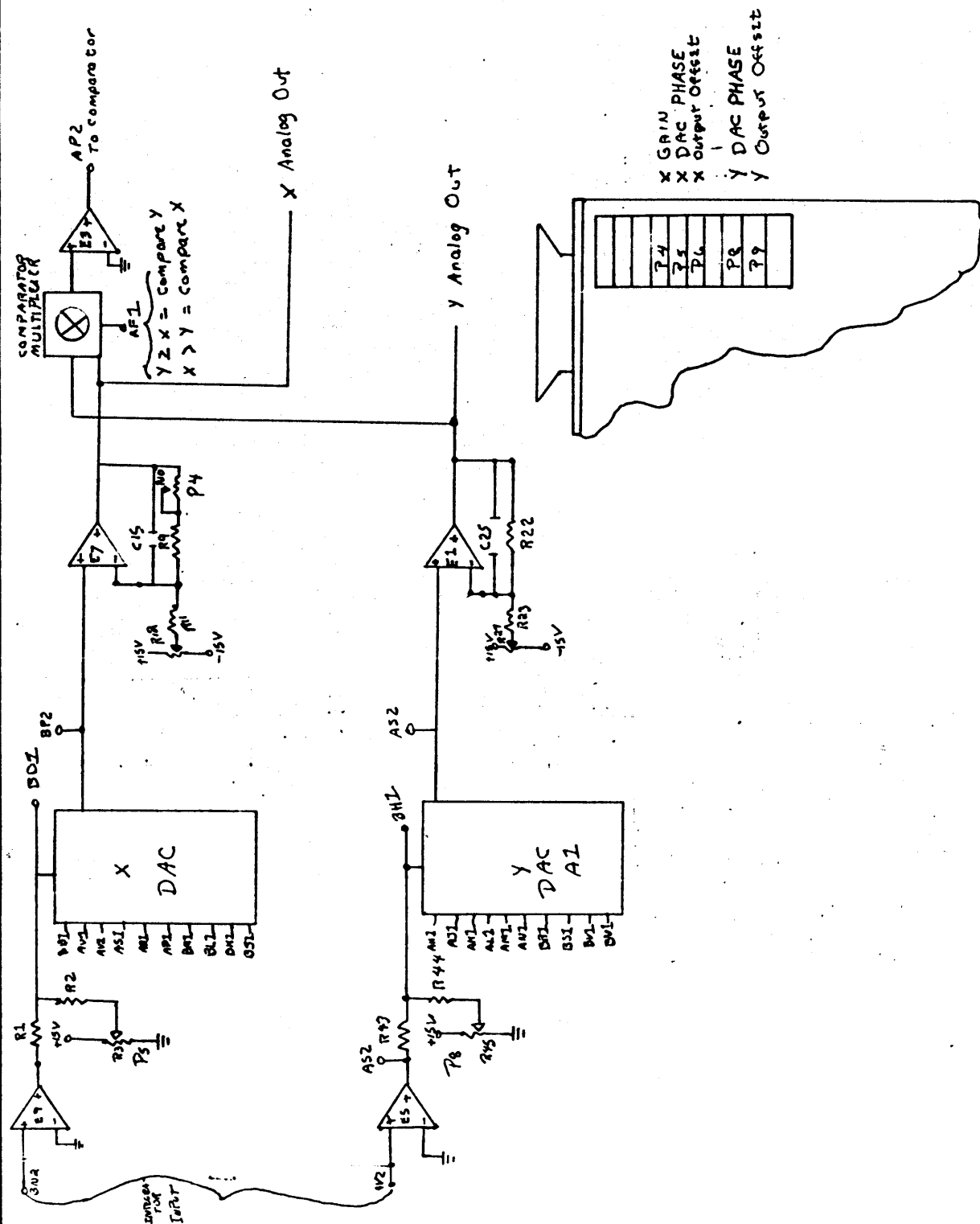


Figure 2 - Arbitrary Vector Generator

SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B

TITLE

4.0 (Continued)

Adjustment of the input ramp's slope is necessary due to the CRT monitor's sensitivity to vector speed. For example, if a vector of  $X = Y = 1000g$  units were to be drawn in the arbitrary vector mode, the "normalization" sequence would leave the A3170 adjusted for half gain. This would mean the vectors would be drawn at half the speed of maximum comparable basic vectors. Under these conditions the length of the lines would be longer than the same basic vectors due to non-linearities in the CRT monitor performance. To compensate for this problem, the A3180 provides a ten bit DAC which monitors the major axis normalized binary number and corrects the speed of the integrator. As an example of the correction, if the above example were executed the DAC would return a voltage sufficient to double the ramp speed thereby overcoming the one-half gain of the MDAC. The arbitrary and basic vectors would now be drawn in about the same time.

Arbitrary vectors cannot be rotated using the rotate bit of parameter 2.

SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B



TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

## 5.0 SYSTEM OVERVIEW

## 5.1 Arbitrary Long Vector

When an instruction 10 is brought into the data buffer (DB) and decoded, initiation of the instruction is delayed until the second word is received into the input buffer (IB). Upon receipt of the second word the following timing sequence occurs:

- Time State 1: 1) increment PC  
 MS01 + 150us 2) DB 8-17 to the  $\Delta X$  holding register  
 MS01 + CLK 3)  $\Delta X$  holding register into DR register  
 Time State 2: 1) Add DR to X position register, IB 8-17 to the  $\Delta Y$  holding register  
 Time State 2A: 1)  $\Delta Y$  holding register to DR register  
 Time State 3: 1) add DR to Y position register  
 MS03 + 150ns: 1) Compare  $\Delta X$  and  $\Delta Y$  slope values  
 2) greatest component to DR register  
 MS03 + 250ns: 1) DR register to  $\Delta$  DAC  
 2) begin normalization

The "arbitrary go" pulse initiates the M7010 internal timing where both the  $\Delta X$  and  $\Delta Y$  holding registers on the M7010 module are shifted together until a logical "1" is sensed at the MSB position of either register.

It is for this reason that  $\Delta X = \Delta Y = 0$  is not allowed in mode 10 and mode 30 instructions.

At this time a start pulse is initiated by the M7010 to the control circuitry associated with the analog generator.

The pulse drives a 500ns delay and supplies the time delay necessary for the multiplying DAC's setting before moving the reference input.

At the termination of this delay time a pulse sets the generator start flip-flop and the ramp generator begins.

SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B



TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

Previously, signals to determine which component,  $\Delta X$  or  $\Delta Y$ , is greater sets the comparator multiplex switches.

BEFORE the input ramp goes from zero to its proper level, the MDAC's modify its slope according to their "normalized" inputs. The greater of these output slopes is returned via the comparator multiplexer to the magnitude comparator on the A3180 where it is compared for equality with the  $\Delta$  DAC, as well as being summed at the A238 for line drawing on the CRT monitor.

When comparison is reached the MIP flip-flop goes to zero, terminating the vector and recycling the mode if the repeat register is not zero, or going on to the next instruction if it is.

## 5.2 Arbitrary Short Vector

This mode operates essentially the same as the Arbitrary Long Vector mode with the exception of eliminating two requests on the I/O bus before initiating the mode. Since, both vector components are contained within one instruction word, only a single pass at the memory is required. Usually the vector will be in the Data Buffer when desired due to the double buffering action of the VT15.

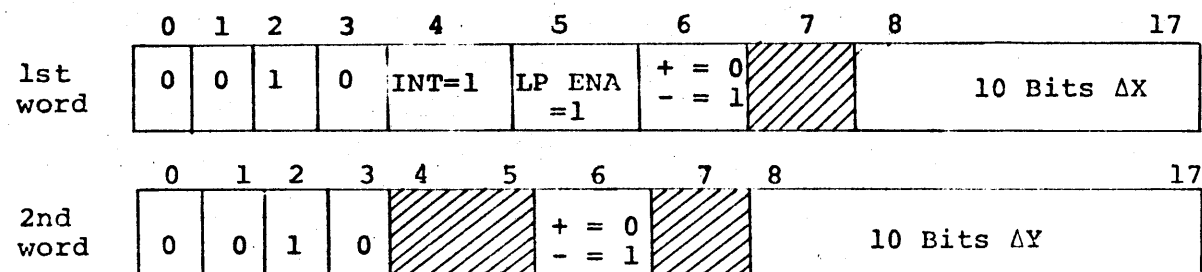
SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

6.0 Programming

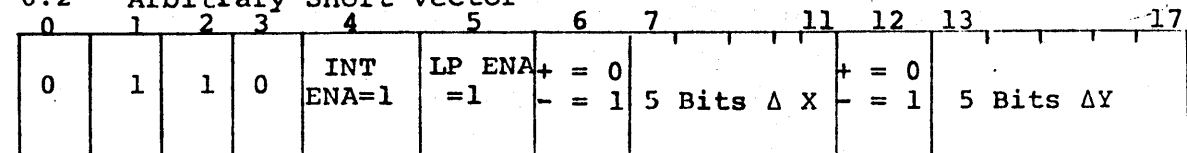
Two instructions are added to the Graphic 15 repertoire as part of the VV15 option - Arbitrary Long Vector and Arbitrary Short Vector.

6.1 Arbitrary Long Vector



The long vector instruction requires two PDP-15 words for definition. The first word defines the ΔX component (bits 8 through 17), its relative direction (right = 0, left = 1, bit 6), whether the full vector is intensified (bit 4 = 1) or blanked (bit 4 = 0) and has the option to enable the light pen for this vector (bit 5 = 1). The second word contains the ΔY component (bits 8 through 17), and its relative direction (bit 6 = 0 is up, bit 6 = 1 is down). Order codes for both words are 10<sub>8</sub> as shown. Restrictions to this mode are that both words must be present to properly execute the vector and that the condition of ΔX = ΔY = 0 (zero) is illegal. Under the conditions of ΔX = ΔY = 0, the VT15 will hang in an endless "normalization" loop.

6.2 Arbitrary Short Vector



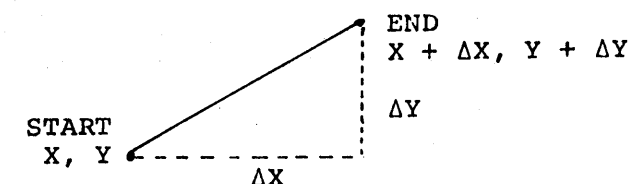
The arbitrary short vector is very similar to the long vector with the exception of both ΔX and ΔY components being defined within one PDP-15 word. This gives the advantage of both compact core usage and more efficient bus timing (double buffering is in effect for short vector instructions), but allows only short vectors to be drawn (up to 37 raster units). However, by

SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B

TITLE VV15 ARBITRARY VECTOR OPTION TO VT15

using the scaling register longer effective vectors may be drawn. The definition of the bit functions are the same as long vector.

Both modes draw in relative format, that is the start point in from the present position on the screen and moves to an end position equal to X INITIAL+ ΔX, Y INITIAL + ΔY as shown below.



In addition, care must be taken not to allow the condition of ΔX = ΔY = 0 to occur in either Arbitrary Long or Short Vector modes. A zero length vector maybe defined in the basic vector modes. ALSO SEE PAR. 5.3.1.

6.3 PROGRAMMING RESTRICTIONS

6.3.1 ZERO LENGTH VECTOR

X = Y = 0 is not allowed and will cause the VT15 to hang in an endless normalization loop. Zero length vectors may be specified in the basic vector modes. OPTION ECO \*M7010-00003 WILL ALLOW THE VV15 TO ACCEPT ZERO LENGTH VECTORS.

6.3.2 ROTATE:

Arbitrary vectors must not be rotated. Care must be taken to clear the rotate flip-flop before entering arbitrary vector modes.

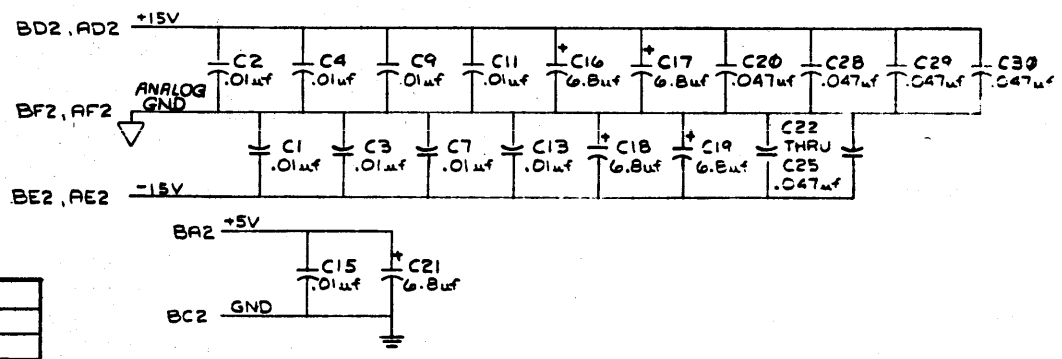
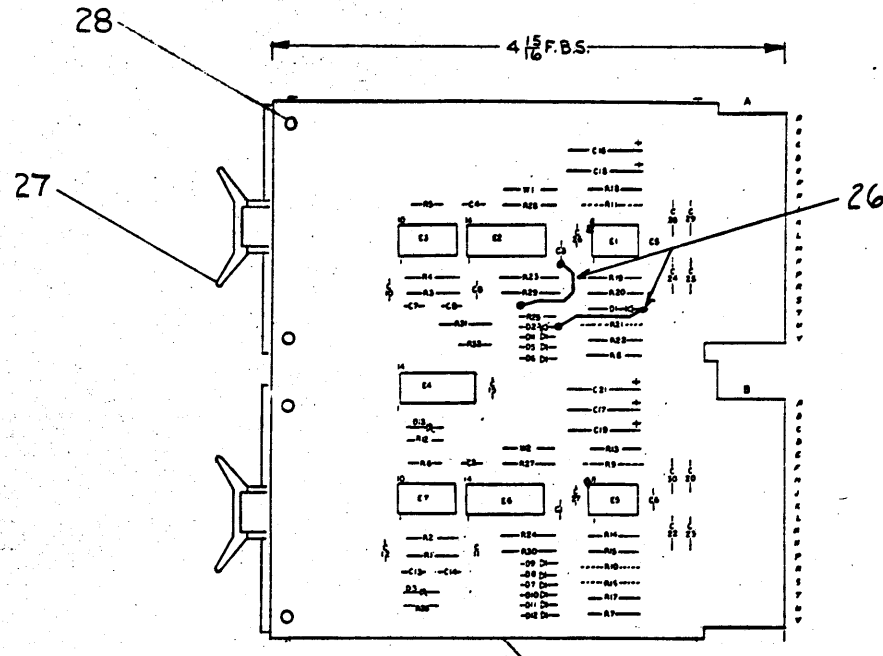
7.0 ADJUSTMENT PROCEDURE

The adjustment procedure is covered in detail in "VT15 system adjustment procedure" A-SP-VT15-0-51.

SIZE	CODE	NUMBER	REV
A	SP	VV15-0-1	B

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**NOTES:**



IC TYPE	GND	+5V	+15V	-15V
DEC 0002	-	-	2	4
DEC 318	-	-	7	4
DEC 310	-	-	11	6

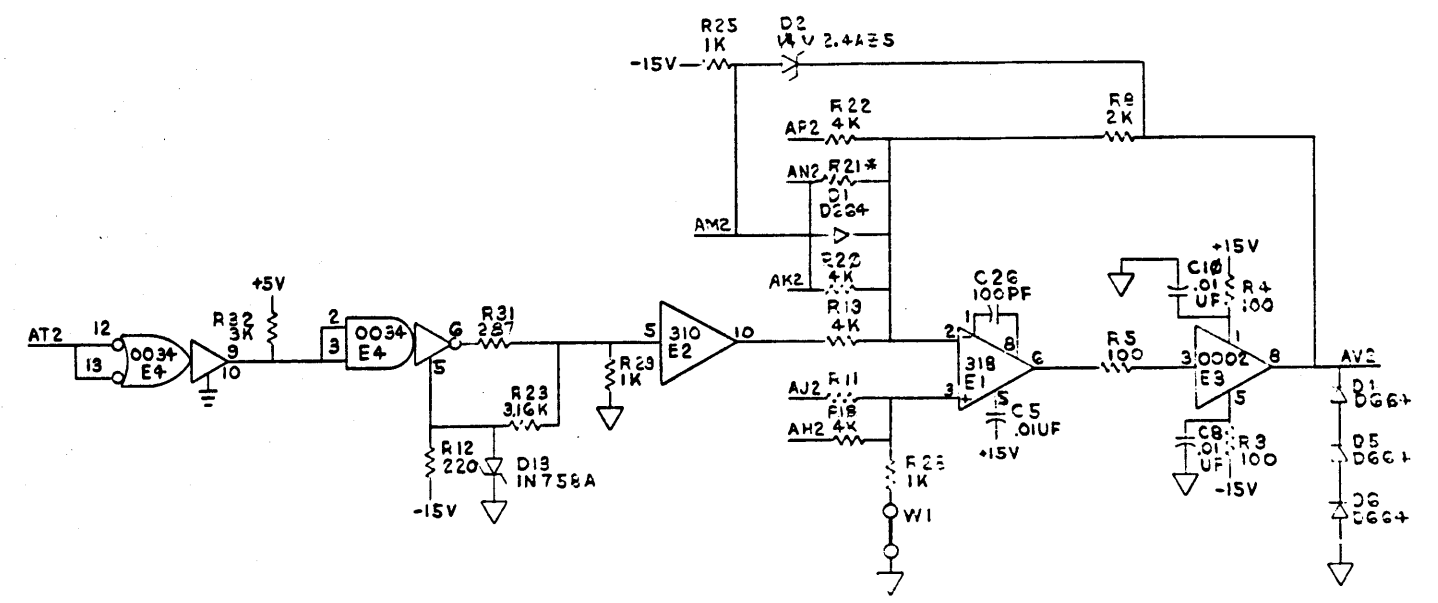
GND AND 5V ARE USUALLY PIN 7 AND 14 RESPECTIVELY. EXCEPTIONS ARE STATED ABOVE.

**IC PIN LOCATIONS**

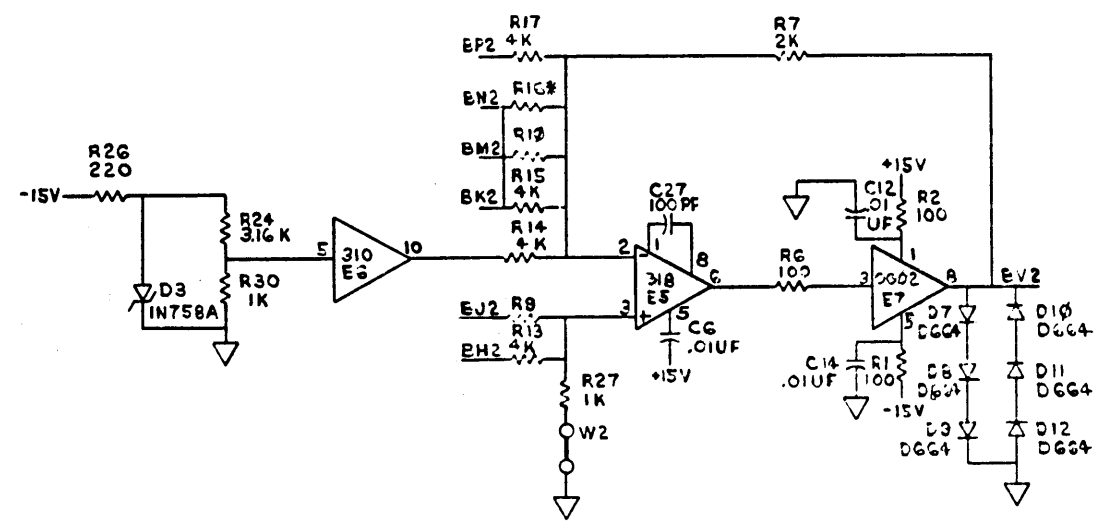
QTY	REF DESIGNATION	DESCRIPTION	PART NO	ITEM NO
		X-Y COORDINATE HOLE LOCATION	KCO-9238 Q-4	REF
		REVISION/DRILLING HOLE LAYOUT	D-AH-6238 Q-5	REF
		MODULE ECO HISTORY	B-MH-A238 Q-6	REF
1		ETCHED CRT. BOARD	5009939	1
15	C1 THRU C15	CAP. .01uF 100V 20% DISC	1001610-21	2
5	C16 THRU C19, C21	CAP. 6.8uF 35V 10% TAHT	1005306	3
8	C22, C22 THRU C25, C28, C30	CAP. .047uF 20% 250V MYAR	1003053	4
2	C26, C27	CAP. 100uF 5% 100V DM	1000016	5
2	D13, D3	DIODE IN758A, ZENER	1100125	6
10	D1, D4 THRU D12	DIODE D664	1100714	7
4	R1 THRU R4	RES. 100 5% 1/2W	1300228	8
2	R5, R6	RES. 100 5% 1/4W	1300229	9
2	R7, R8	RES. 2K 1% 1/8W (RN55C2031B)	1305353	10
8	R13, R14, R15, R17, R18, R19, R20, R22	RES. 4K 1% 1/8W (RN55C4001B)	1305354	11
2	R27, R28	RES. 1K 1% 1/8W (RN55E1001B)	1304865	12
1	R31	RES. 267 1% 1/8W (RN55D2870F)	1305124	13
1	R32	RES. 3K 5% 1/4W	1300432	14
2	R12, R26	RES. 220 5% 1/4W	1300271	15
2	R29, R30	RES. 1K 1% 1/8W (RN55D1001F)	1303114	16
2	R23, R24	RES. 3.16K 1% 1/8W (RN55D3161F)	1303045	17
2	R16, R21	RES. 820K 1/4W 10%	1303187	18
1	R25	RES. 1K 5% 1/4W	1300365	19
2	E2, E6	I.C. DEC 310	1910235	20
1	E4	I.C. DEC 0034	1910734	21
2	E1, E5	I.C. DEC 318	1910735	22
2	E3, E7	I.C. DEC 0002	1910440	23
2	W1, W2	JUMPER (INSULATED)	9004185	24
1	D2	DIODE 1/4 M 2.4A25	1101938	25
A/R		WIRE #30AWG GREEN	9105740-55	26
2		HANDLE FLIP-CHIP (AMBER)	9008937-0	27
4		EYELET	9006732	28

FIRST USED ON OPTION MODEL		ETCH BOARD REV		PARTS LIST	
/T15		C			
DATE	BY	DATE	BY	DATE	BY
8/1/73	...	8/1/73	...	8/1/73	...
DIGITAL EQUIPMENT CORPORATION		TITLE		DUAL ANALOG SUMMER & DRIVER	
SEMICONDUCTOR CONVERSION CHART		SCALE		NONE	
SHEET		OF		2	

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NOTES  
 R9, R10, R11, ARE OPTIONAL COMPONENTS - DO NOT INSERT.  
 \* R10, R21 MAY BE CHANGED IN TEST TO IMPROVE GAIN ACCURACY.



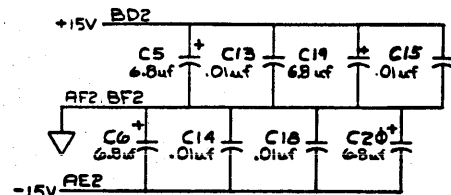
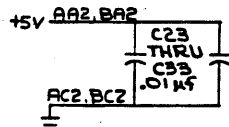
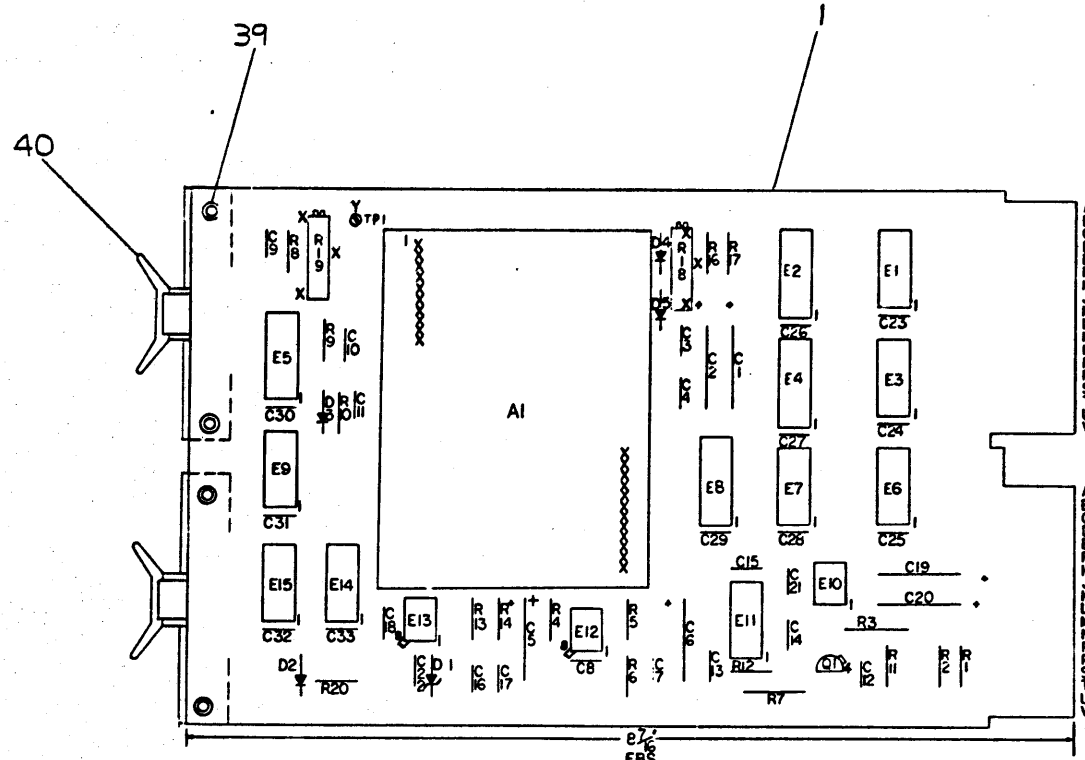
REVISIONS		
CHK	CHANGE NO	REV

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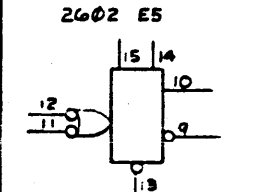
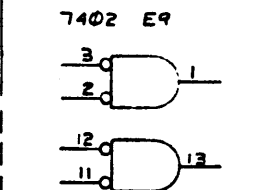
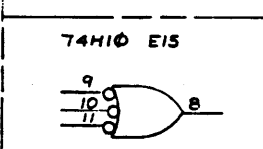
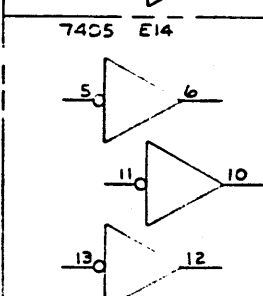
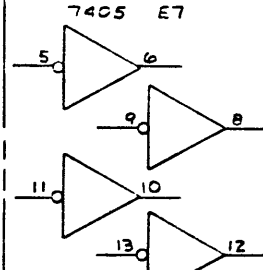
NOTES:

1. CT IS OPTIONAL, DO NOT INSERT.

DIGITAL EQUIP. CORP.



SHAPE GATES



QTY	REF DESIGNATION	DESCRIPTION	PART NO.	ITEM NO.
		X-Y COORDINATE HOLE LOCATION	K-CO-63159-0-4	REF
		ASSY/DRAWING HOLE LAYOUT	D-AH-A3180-0-5	REF
		MODULE ECO HISTORY	B-MH-A3180-0-6	REF
1		ETCHED CIRCUIT BOARD	5010630	1
6	C1, C2, C5, C6, C19, C20	CAP. 6.8uF 10% 35V TANT	1005506	2
20	C3, C4, C8, C10, C13, C14, C15, C16, C22, C23 THRU C33	CAP. .01uF 100V 20% DISC	1001610 01	3
2	C21, C9	CAP. 67pf 5%, 100V DM	1000011	4
1	C8	CAP. 33uF 6%, 100V DM	1000002	5
1	C11	CAP. 82 pf 5% 100V DM	1000015	6
				7
2	C16, C12	CAP. 100pf 5% 100V DM	1000017	8
1	C17	CAP. 180pf 100V 5%	1000020	9
1	D1	DIODE 1N746A 5% 3.3V	1104860	10
3	D2, D4, D1	DIODE D664	1100114	11
1	D3	DIODE MCL1304	1105012	12
1	R1	RES. 209 1% 1/8W (RN55D-9000)	1302685	13
1	R11	RES. 2K 5% 1/4W	1302365	14
2	R3, R7	RES. 133K 1% 1/8W (RN55D-1333)	1305130	15
2	R4, R5	RES. 10K 1% 1/8W (RN55D-10000)	1303312	16
1	R6	RES. 100K 1% 1/8W (RN55D-1000)	1303044	17
1	R20	RES. 330 5% 1/4W	1300295	18
1	R8	RES. 6.8K 5% 1/4W	1301423	19
1	R9	RES. 750 5% 1/4W	1301401	20
3	R10, R16, R17	RES. 1K 5% 1/4W	1300365	21
1	R12	RES. 47 5% 1/4W	1300202	22
2	R13, R14	RES. 1K 1% 1/8W (RN55D-1001)	1303114	23
				24
1	R18	POT 2K 3/4W 10%, 76 PR	1309143-08	25
1	R19	POT 20K 3/4W 10%, 76 PR	1309143-11	26
1	R2	RES. 2K 1% 1/4W (RN55C-2001)	1302715	27
1	Q1	TRANS. 3N169	1510234	28
5	E1, E3, E6, E7, E14	I.C. DEC 7405	1909930	29
1	E15	I.C. DEC 7410	1909057	30
1	E9	I.C. DEC 7402	1909004	31
1	E5	I.C. DEC 2602	1910257	32
3	E4, E2, E8	I.C. DEC 74157	1910655	33
1	E10	I.C. DEC 531	1910461	34
1	E11	I.C. LM310	1910235	35
1	E13	I.C. LM211	1911290	36
1	E12	I.C. LM318	1910735	37
1	A1	DEC DAC (A6000)	A6000	38
4		EYELET	9006732	39
2		HANDLE, FLIP CHIP, AMBER	9008337-0	40
1	TP1	LUG, SPLIT	9006735	41

DEC 318	4	-	-	7	
DEC 211	4	-	-	1	
DEC 310	6	-	-	11	
DEC 531	4	-	-	7	
DEC 74157	-	8	16	-	
DEC 2602	-	8	16	-	
IC TYPE	-VCC	GND	+5V	ANALOG GND	+5VCC

GND AND 5V ARE USUALLY PIN 7 AND 14 RESPECTIVELY. EXCEPTIONS ARE STATED ABOVE.

IC PIN LOCATIONS

Author	G. CHEASEK
Checker	...
Designer	A. ADelman
...	...
...	...
...	...
...	...
...	...
...	...
...	...
...	...
...	...
...	...
...	...

FIRST USED ON OPTION MODEL

VT15

ETCH BOARD REV C

DRN	Counter	DATE	4/28/73
PROD		DATE	8/17/73
ENGR		DATE	10/2/73
PROJ. ENGR		DATE	...
PROD. MGR		DATE	...

SEMICONDUCTOR CONVERSION CHART

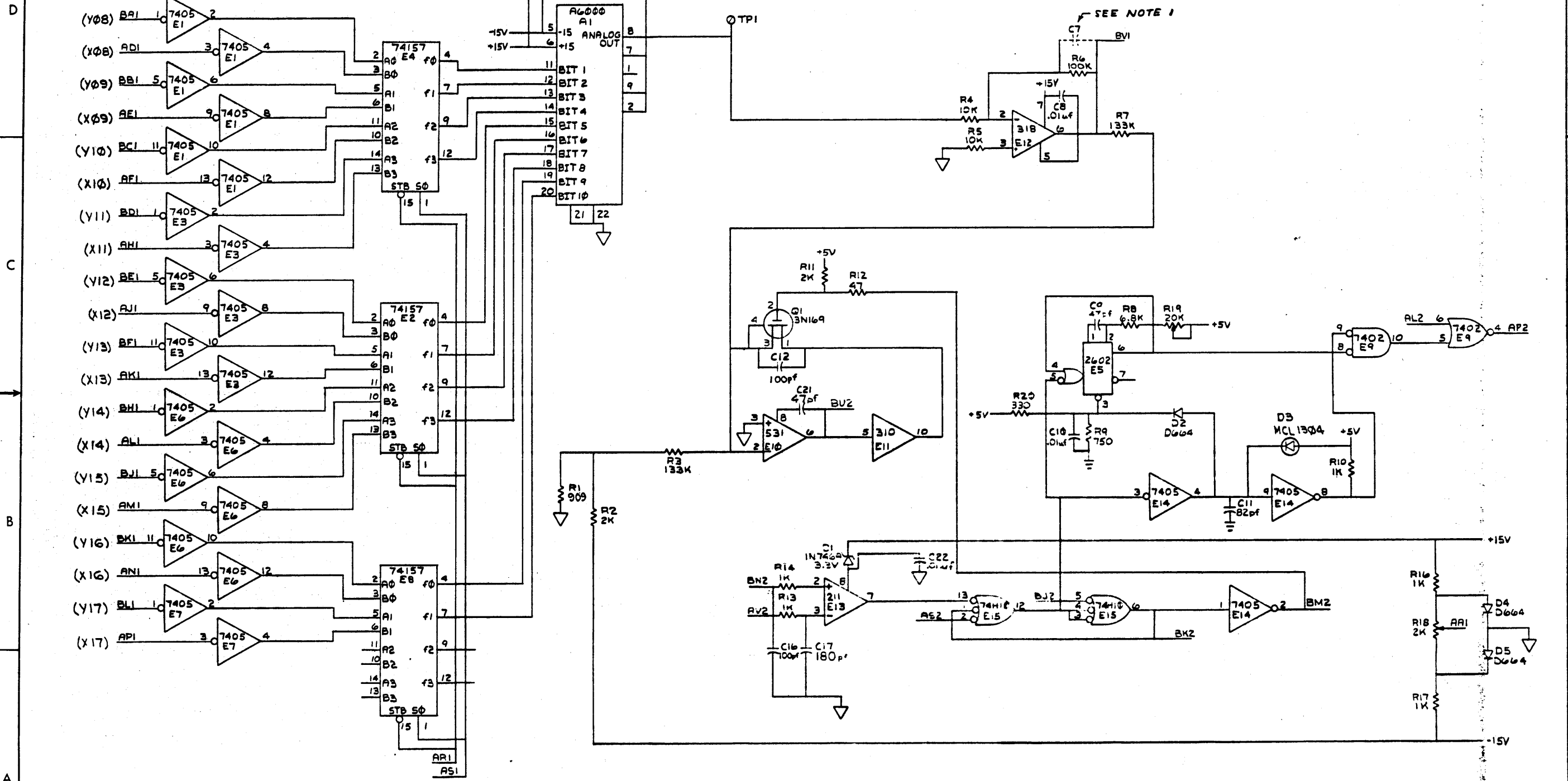
DEC NO.	EIA NO.	DEC NO.	EIA NO.
3N169	NONE	MCL1304	NONE
		D664	1N3600

ARBITRARY INTEGRATOR

SIZE CODE: DCS NUMBER: A3180-0-1 REV: H



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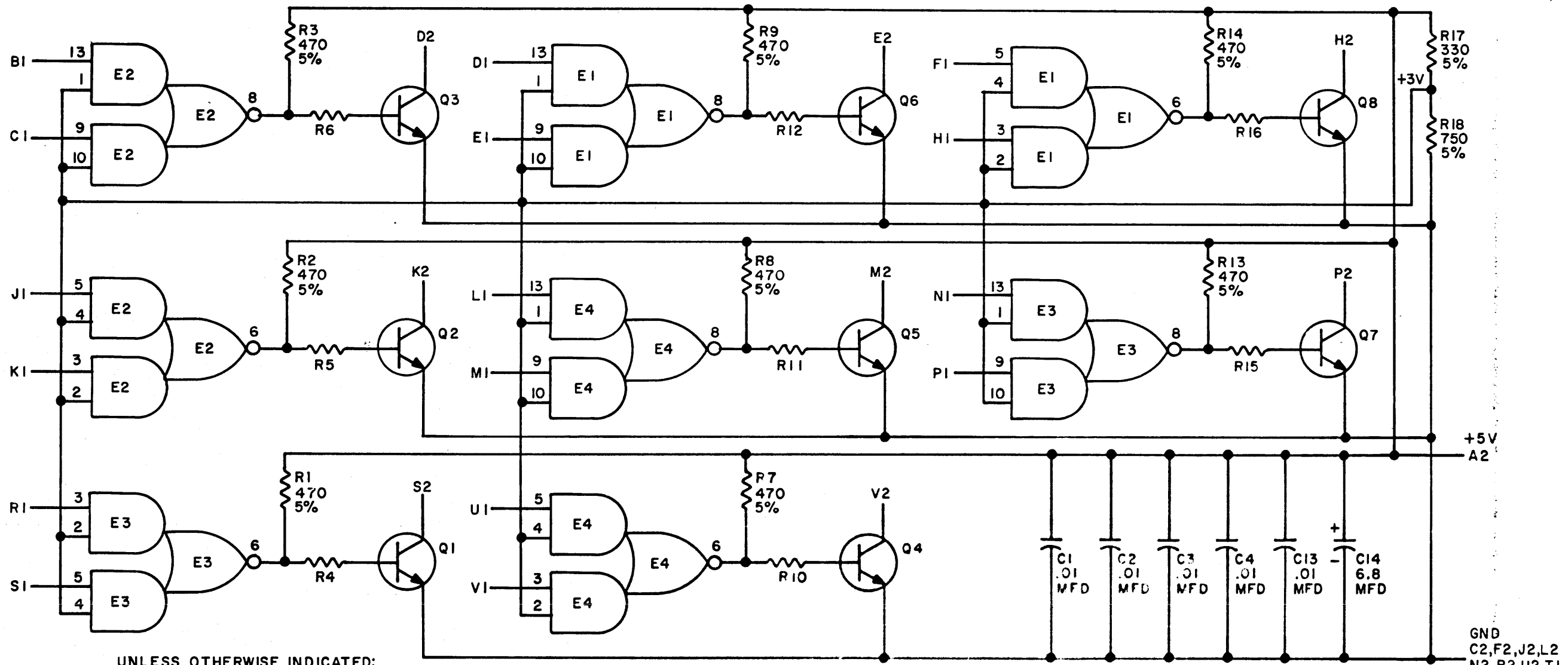


REVISIONS		
CHK	CHANGE NO	REV



REV	C	NUMBER	M622-0-1	CS	B	SIZE
-----	---	--------	----------	----	---	------

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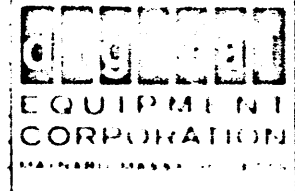
UNLESS OTHERWISE INDICATED:  
 CAPACITORS ARE 100MMF  
 RESISTORS ARE 220; 1/4W; 10%  
 TRANSISTORS ARE DEC3009B  
 IC'S ARE DEC74H50

PIN 7 ON EACH IC = GND  
 PIN 14 ON EACH IC = +5V

REV	CHG NO	CHK
B	00001	
C	00002	

DRN	M. Waller	DATE	2-26-69
CHK'D		DATE	
ENG	R. S. Steel	DATE	5-2-69
PROD.		DATE	

TRANSISTOR & DIODE CONVERSION TABLE	
DEC	EIA
DEC3009B	2N3009



BJS DRIVER M622

NUMBER	M622-0-1	REV	C
CIRCUIT REV.		A	

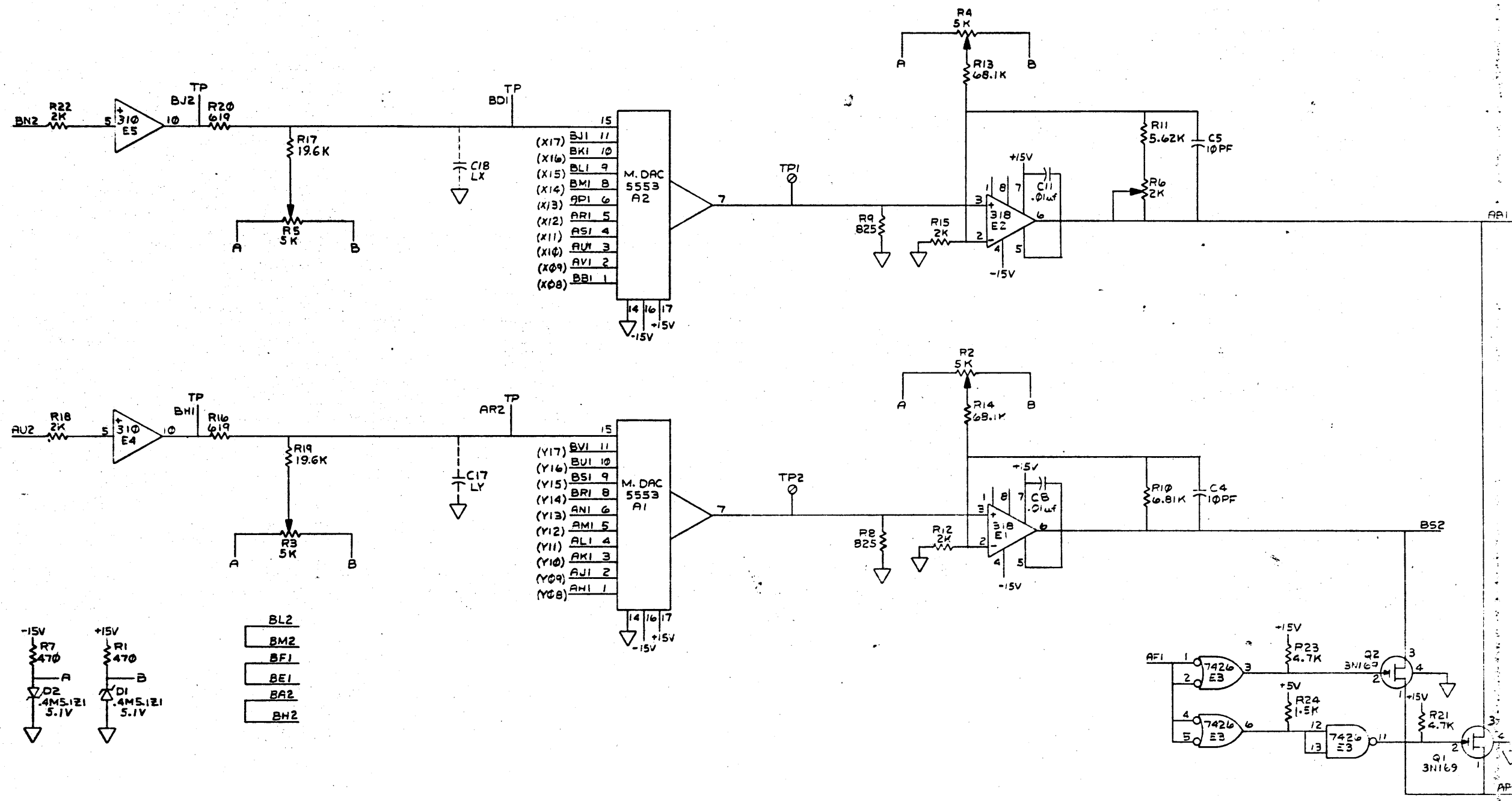




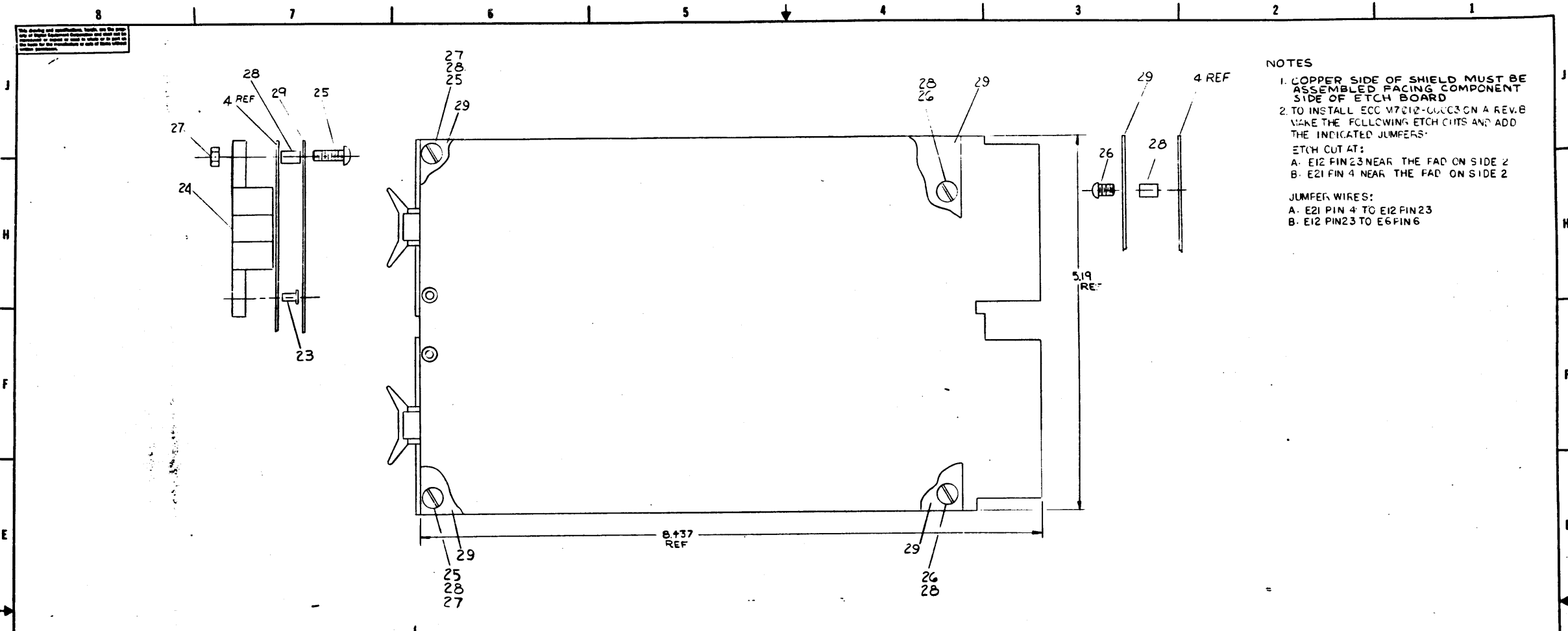
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D  
C  
B  
A

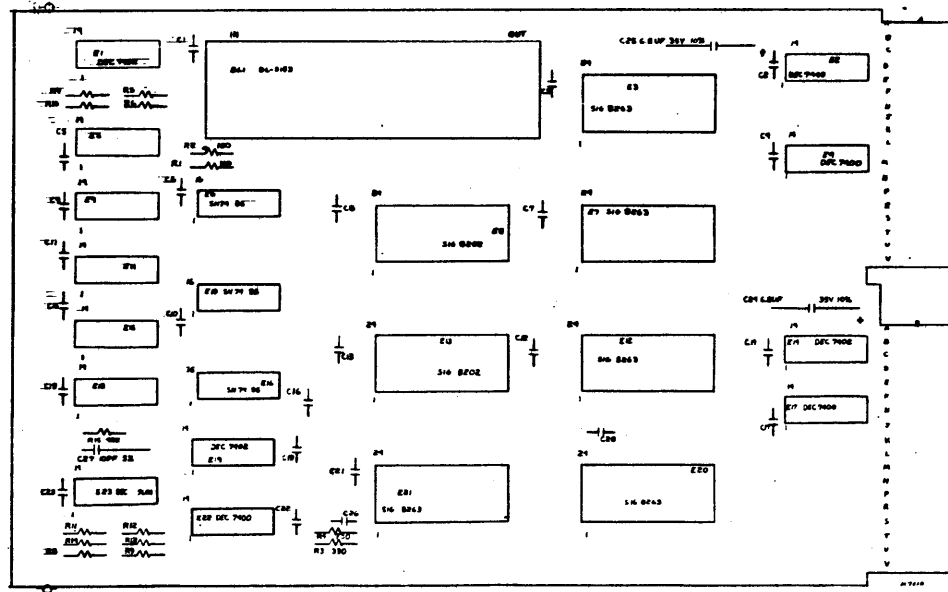
D  
C  
B  
A



REVISIONS		
CH	CHANGE NO	REV



- NOTES**
1. COPPER SIDE OF SHIELD MUST BE ASSEMBLED FACING COMPONENT SIDE OF ETCH BOARD
  2. TO INSTALL ECC M7212-CUCC3 ON A REV. B MAKE THE FOLLOWING ETCH CUTS AND ADD THE INDICATED JUMPERS:
- ETCH CUT AT:
- A. E12 PIN 23 NEAR THE PAD ON SIDE 2
  - B. E21 PIN 4 NEAR THE PAD ON SIDE 2
- JUMPER WIRES:
- A. E21 PIN 4 TO E12 PIN 23
  - B. E12 PIN 23 TO E6 PIN 6



1	SHIELD, COPPER	5009893	29	
4	STANDOFF #ADAX314 LG	9007623	28	
2	KEPNUT #A-40	9006557	27	
2	SCREW #4-40 X 3/8 BN HD	9006401	26	
2	SCREW #4-40 X 5/8 BN HD	9006014-4	25	
2	HANDLE, FLIP CHIP-MAGENTA	9008337-06	24	
2	EYELET #G54-7	9006732	23	
1	25 ONS TAPPED DELAY LINE	1605529	22	
1	GRIPLETS	1210244-0	21	
1	E23	IC DEC 9601	1909373	20
2	E8, E13	IC DEC 8202	1910275	19
5	E3, E7, E12, E20, E21	IC DEC 8263	1910471	18
3	E6, E10, E16	IC DEC 7485	1910224	17
3	E1, E14, E19	IC DEC 7402	1909004	16
5	E5, E9, E11, E15, E18	IC DEC 7401	1905590	15
1	E2	IC DEC 7440	1905579	14
3	E4, E17, E22	IC DEC 7400	1905575	13
1	R4	RES 750 1/4W 5%	1301401	12
1	R15	RES 4.7K 1/4W 5%	1300447	11
10	R5-R14	RES 1K 1/4W 5%	1300365	10
1	R3	RES 330 1/4W 5%	1300295	9
2	R1, R2	RES 100 1/4W 5%	1300229	8
1	C27	CAP 10 PF, 100V, 5%, DM	1000006	7
2	C24, C25	CAP 6.8 UF, 35V, 10% STANT	1005306	6
24	C1-23, C26	CAP .01 UF 100V, 20%, DSC	1001610	5
1		ETCHED CIRCUIT BOARD	5009514	4
REF		MODULE ECO HISTORY	BMM-ATD-0-3	3
REF		ASSY/DRILLING HOLE LOCATION	E-AH-M7010-5	2
REF		X-Y COORD HOLE LOCATION	K-CO-M7010-1	1

IC TYPE	QTY	QTY	FROM	TO

ETCH BOARD REV B

DATE: 11/10/70

SCALE: 1:1

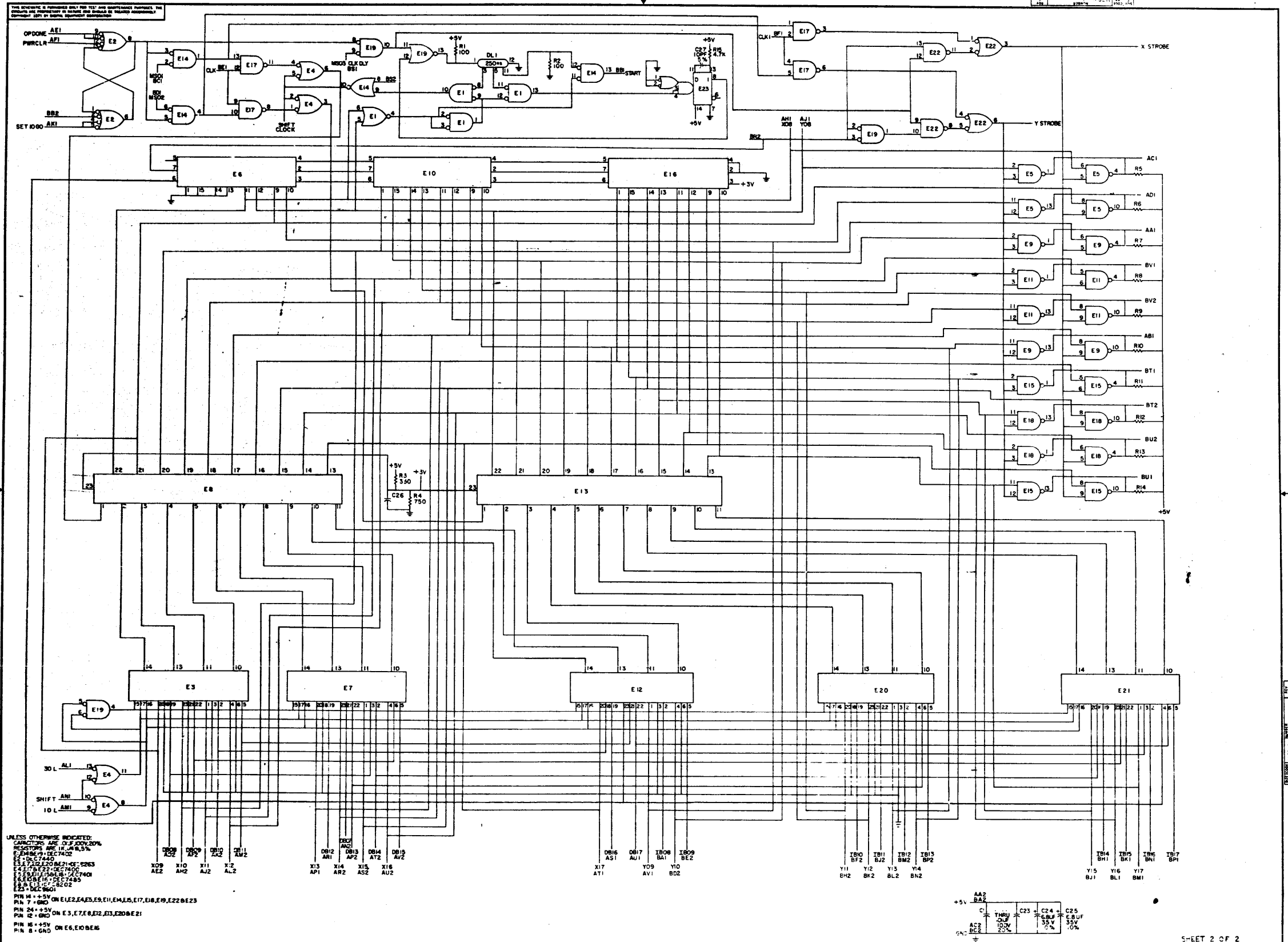
SHEET: 1 OF 1

**EQUIPMENT CORPORATION**

VV15 TIMING AND CONTROL

PROJECT NO. M7010

REV. C



UNLESS OTHERWISE INDICATED:  
 CAPACITORS ARE 0.1µF 50V 20%  
 RESISTORS ARE 1/4W 5%  
 E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, E17, E18, E19, E20, E21, E22, E23  
 E1 - 74100  
 E2 - 74100  
 E3 - 74100  
 E4 - 74100  
 E5 - 74100  
 E6 - 74100  
 E7 - 74100  
 E8 - 74100  
 E9 - 74100  
 E10 - 74100  
 E11 - 74100  
 E12 - 74100  
 E13 - 74100  
 E14 - 74100  
 E15 - 74100  
 E16 - 74100  
 E17 - 74100  
 E18 - 74100  
 E19 - 74100  
 E20 - 74100  
 E21 - 74100  
 E22 - 74100  
 E23 - 74100

DB6	DB7	DB8	DB9	DB10	DB11	DB12	DB13	DB14	DB15	DB16	DB17	DB18	DB19	DB20	DB21	DB22	DB23	DB24	DB25	DB26	DB27	DB28	DB29	DB30	DB31	DB32	DB33	DB34	DB35	DB36	DB37	DB38	DB39	DB40	DB41	DB42	DB43	DB44	DB45	DB46	DB47	DB48	DB49	DB50	DB51	DB52	DB53	DB54	DB55	DB56	DB57	DB58	DB59	DB60	DB61	DB62					
AS1	AS2	AS3	AS4	AS5	AS6	AS7	AS8	AS9	AS10	AS11	AS12	AS13	AS14	AS15	AS16	AS17	AS18	AS19	AS20	AS21	AS22	AS23	AS24	AS25	AS26	AS27	AS28	AS29	AS30	AS31	AS32	AS33	AS34	AS35	AS36	AS37	AS38	AS39	AS40	AS41	AS42	AS43	AS44	AS45	AS46	AS47	AS48	AS49	AS50	AS51	AS52	AS53	AS54	AS55	AS56	AS57	AS58	AS59	AS60	AS61	AS62
Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25	Y26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35	Y36	Y37	Y38	Y39	Y40	Y41	Y42	Y43	Y44	Y45	Y46	Y47	Y48	Y49	Y50	Y51	Y52	Y53	Y54	Y55	Y56	Y57	Y58	Y59	Y60	Y61	Y62

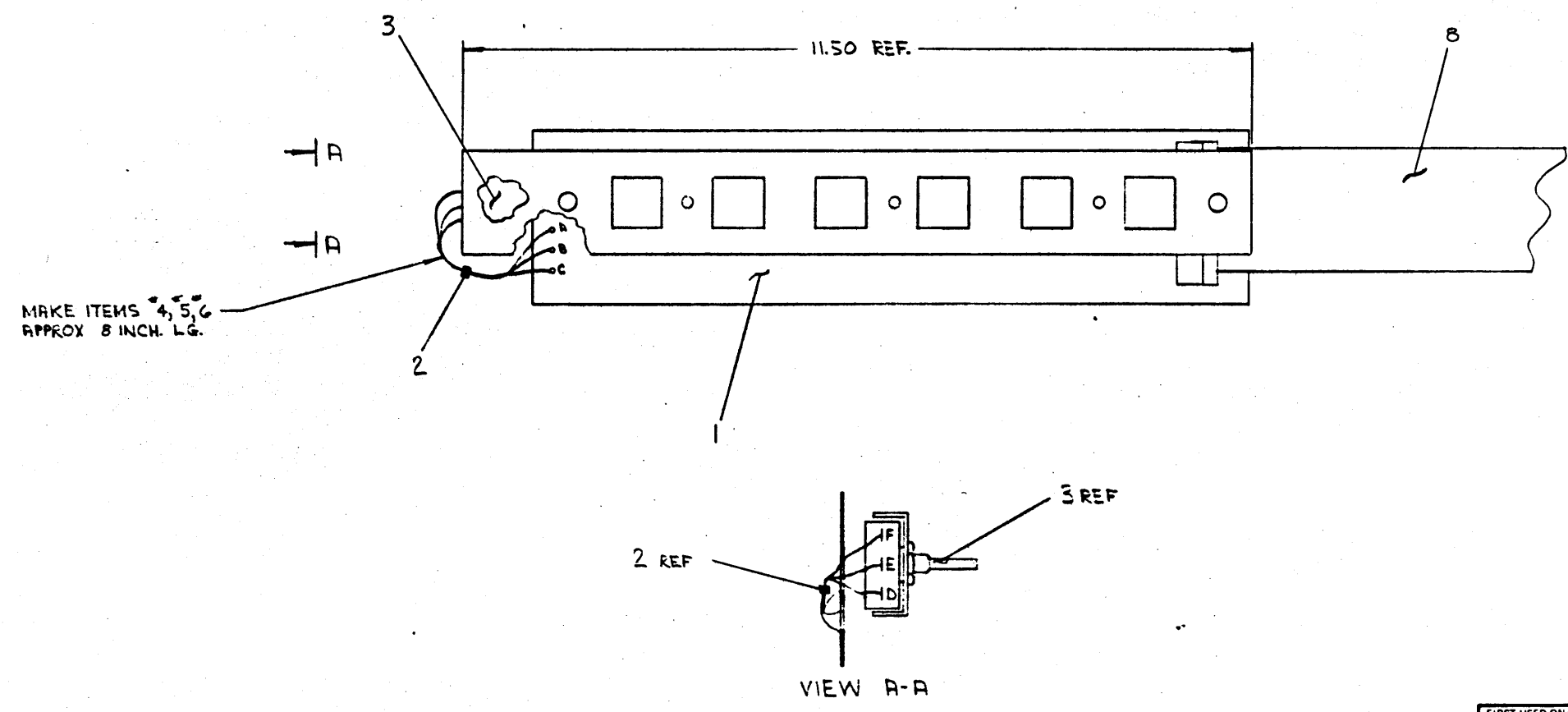
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TH1	TH2	TH3	TH4	TH5	TH6	TH7	TH8	TH9	TH10	TH11	TH12	TH13	TH14	TH15	TH16	TH17	TH18	TH19	TH20	TH21	TH22	TH23	TH24	TH25	TH26	TH27	TH28	TH29	TH30	TH31	TH32	TH33	TH34	TH35	TH36	TH37	TH38	TH39	TH40	TH41	TH42	TH43	TH44	TH45	TH46	TH47	TH48	TH49	TH50	TH51	TH52	TH53	TH54	TH55	TH56	TH57	TH58	TH59	TH60	TH61	TH62

SHEET 2 OF 2

TRANSISTOR & DIODE CONNECTION SHEET	digital	V15 TIMING AND CONTROL
DATE	REV	REV
DESIGNED BY	DESIGNED BY	DESIGNED BY
CHECKED BY	CHECKED BY	CHECKED BY
APPROVED BY	APPROVED BY	APPROVED BY

WIRE TABLE						
ITEM NO.	AWG	COLOR	CONNECTION FROM	WITH	CONNECTION TO	WITH
4	#22	BLK	PCB - C	SOLD.	R1 - D	SOLD., 7
5	#22	ORN	PCB - B	SOLD.	R1 - E	SOLD., 7
6	#22	RED	PCB - A	SOLD.	R1 - F	SOLD., 7

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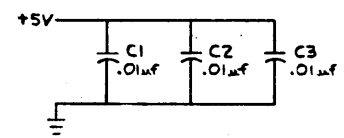
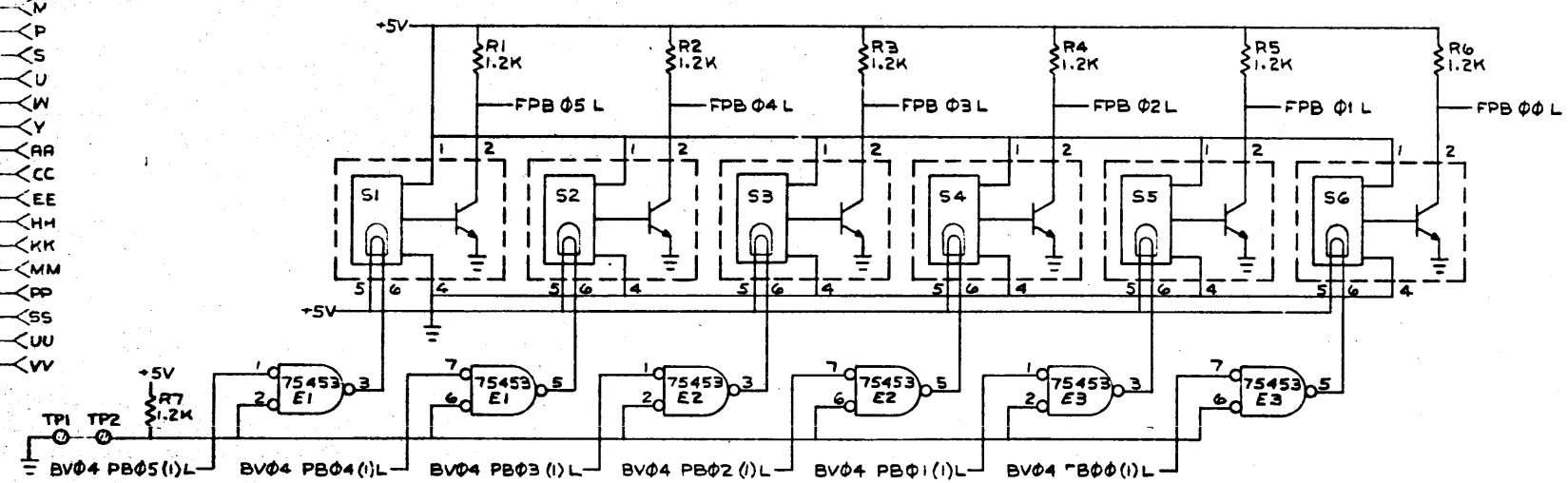
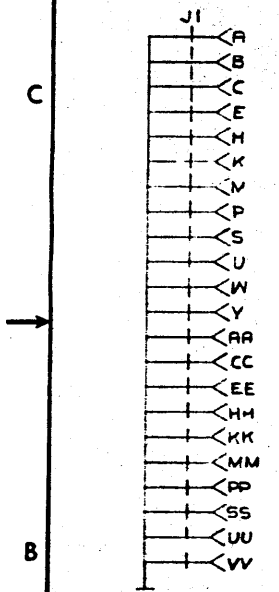
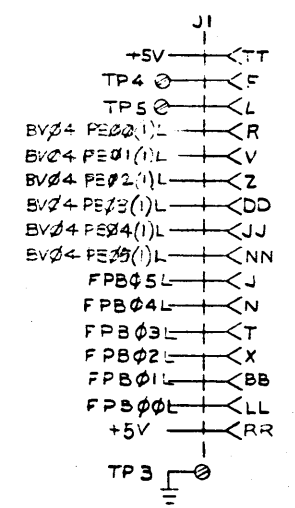
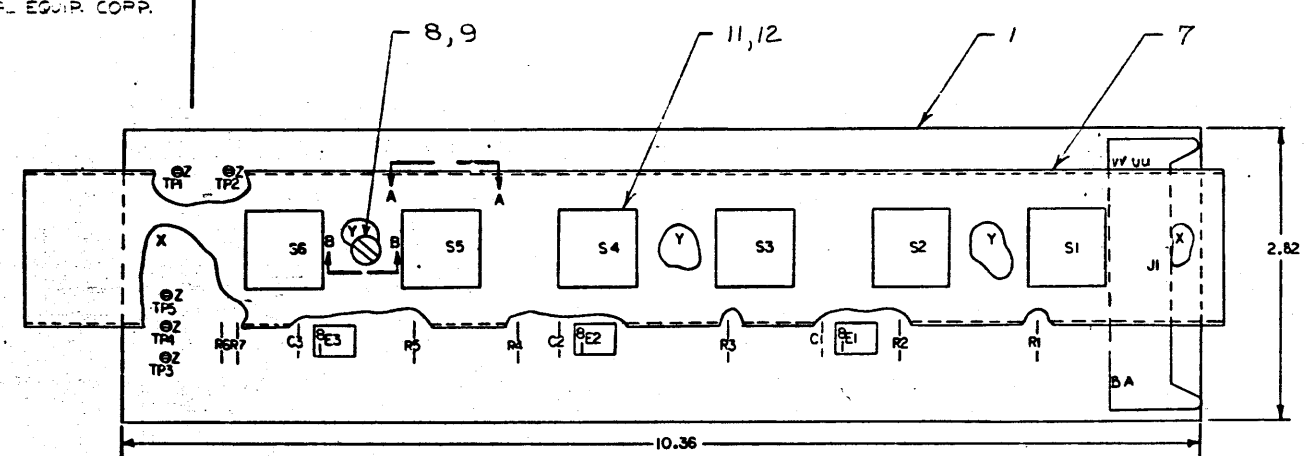
QTY.	DESCRIPTION	PART NO.	ITEM NO.
1	1/8 CABLE	BC08J-06	8
R/R	TUBING SHRINKABLE 1/8 O.D.	9107255-09	7
R/R	#22 AWG STRD INS. (RED)	9107350-22	6
R/R	#22 AWG STRD INS. (ORN)	9107350-33	5
R/R	#22 AWG STRD INS. (BLK)	9107350-00	4
1	POT BENCOR FOR 10K POT	B-110-7407865-0	3
1	TIE WRAP SST-1M	9007031	2
1	SWITCH BOARD ASSY	D-15-5410635-0	1

FIRST USED ON OPTION/MODEL VT07		PARTS LIST	
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES	DRN: <i>Ben Reed</i> DATE: 9/10/73		
TOLERANCES	CHK'D: <i>Ben Reed</i> DATE: 9/13/73		
DECIMALS: .XXX = .005	ENG. DATE: 11-2-73	TITLE SWITCH ASSY VT07	
ANGLES: .XX = .02	PROL ENG: <i>W. Johnson</i> DATE: 5-14-73		
.X = .1	PROD. DATE: 1-21-74	MATERIAL	
REMOVE BURRS AND BREAK SHARP CORNERS SURFACE QUALITY V	NEXT HIGHER ASSY.	SEE PARTS LIST	D-15-VT07-0-0
FINISH: <i>++</i>	SCALE: 1/1	SHEET: 1/1	OF: 1
DAD 7009597-0-0		SIZE CODE: DAD	NUMBER: 7009597-0-0
		DIST:	REV. B

REV	DATE	BY	CHK'D
1	9/10/73	Ben Reed	Ben Reed
2	9/13/73	Ben Reed	Ben Reed
3	11-2-73	W. Johnson	W. Johnson
4	5-14-73	W. Johnson	W. Johnson
5	1-21-74	W. Johnson	W. Johnson

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DIGITAL EQUIP. CORP.

**NOTES:**



X-Y COORDINATE HOLE LOCATION		K-CO-5410685-0-1 REF
ASSY; DRILLING HOLE LAYOUT		D-AH-5410685-0-5 REF
MODULE ECO HISTORY		B-MH-5410685-0-6 REF
1	ETCHED CIRCUIT BOARD	5710684 1
3	C1, C2, C3	CAP. .01uf 100V 20% DISC. 1001610-01 2
1	J1	CONN. 40 PIN AT ANGLE HEADER 1209941 3
6	S1 THRU S6	SWITCH, PUSH BUTTON (LIGHTED) 1211066 4
7	R1 THRU R7	RES. 1.2K 5% 1/4W 1301320 5
3	E1, E2, E3	I.C. DEC 75453 1911036 6
1		BRACKET, SWITCH D-WD-741357-00 7
6		SCR. PHL. HD PAN #6-32 X 3/8 LG 9006022-1 8
3		SPACER #1/4 AF X 7/8 LG. 9006861 9
5	TP1 THRU TP5	SPLIT LUG 9006735 10
6		LAMP 1211068 11
6		KEY CAP 1211564 12

75453	4	8
IC TYPE	GND	+5V
GND AND 5V ARE USUALLY PIN 7 AND 14 RESPECTIVELY EXCEPTIONS ARE STATED ABOVE		
IC PIN LOCATIONS		

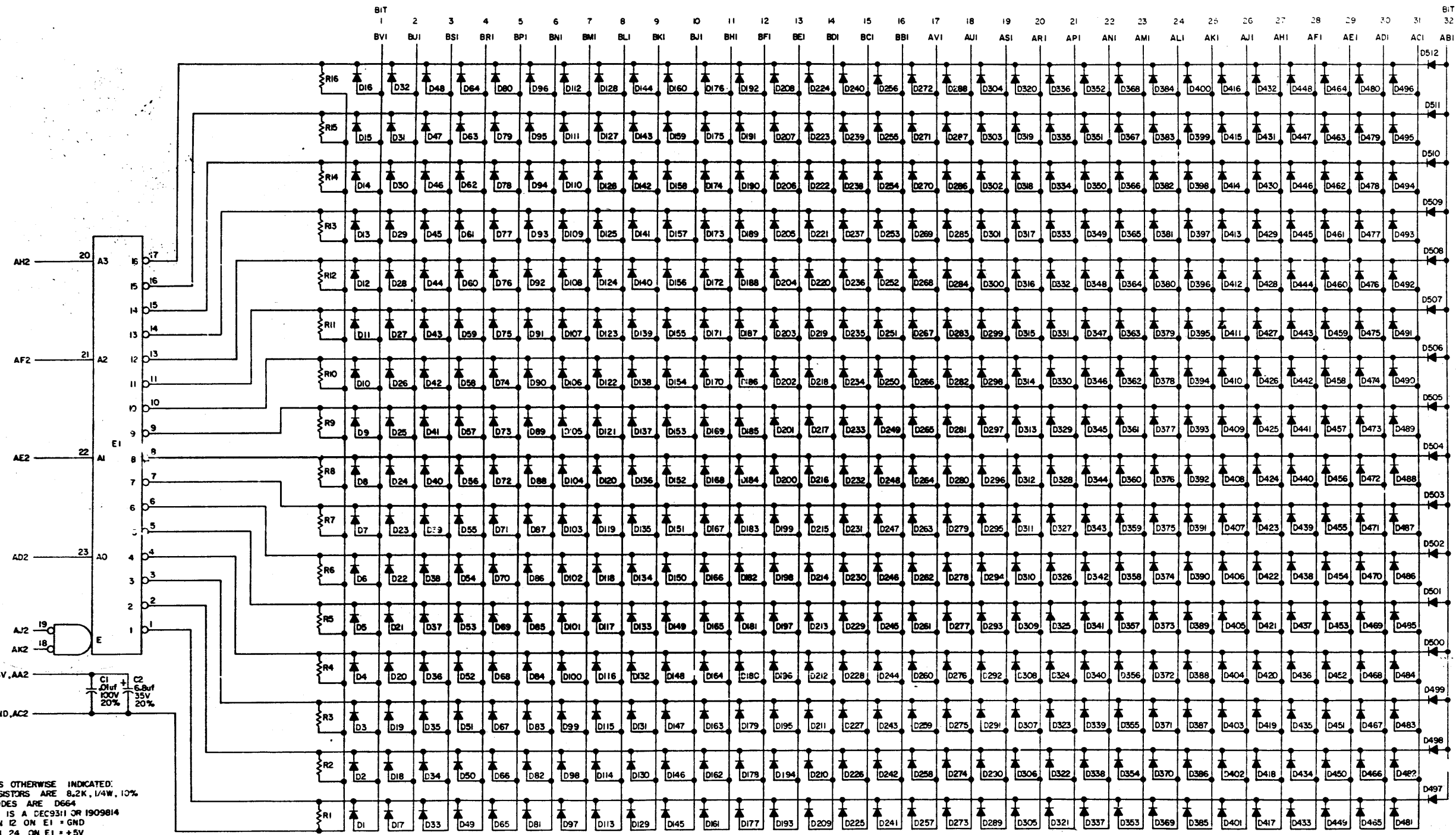
DEC FORM NO. 080 1294

FIRST USED ON OPTION MODEL		PARTS LIST	
QTY	REF DESIGNATION	DESCRIPTION	PART NO. ITEM NO.
	ETCH BOARD REV B		
ORIGINATED	REV	DATE	BY
CHANGE NO.			
REVISIONS			
CHK			
DEC NO.	EIA NO.	DEC NO.	EIA NO.
SEMICONDUCTOR CONVERSION CHART		SCALE NONE	SHEET 1 OF 1
DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS		TITLE PUSH BUTTON BOARD	
SIZE CODE D CS		NUMBER 5410685-0-1	REV. A



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1-7-79 50 0



UNLESS OTHERWISE INDICATED:  
RESISTORS ARE 8.2K, 1/4W, 10%  
DIODES ARE D664  
E1 IS A DEC9311 OR 1909814  
PIN 12 ON E1 = GND  
PIN 24 ON E1 = +5V

REV. A  
NUMBER 6618-0-1  
BIT CORR  
D CS

REVISIONS DATE BY CHECKED APPROVED	DATE	TRANSISTOR & DIODE CONVERSION CHART				TITLE ROM DIODE MATRIX AND DECODE G618 EQUIPMENT CORPORATION PRINTED CIRCUIT REV
	DATE	DIFF	1/4	DEC	1/4	
	DATE	D664	13EC6			
	DATE					
ALLAN RITNEY 3-4-70 DATE						SIZE CODE NUMBER REV D CS 6618-0-1 A

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DRAWING NUMBER	INTL REL	AUTOMATIC WIRE TESTER (AWT) REVISION STATUS																	REV.	
	T24	AK	AL	AM																AM
K-WL-VT15-0-46	AK	AK	AL	AM																
D-AD-7006551-0-0	H	J	J	J																

REVISIONS	CHANGE NO.	REV.	ORIGINATED	VT15-00057	AL
	—	AK		VT15 00059	AM

DRN. <i>R. Gilman</i>	DATE 1-29-75	 <b>EQUIPMENT CORPORATION</b> MAYNARD MASSACHUSETTS						
CHK'D. <i>R. Gilman</i>	DATE 1-29-75							
ENG. <i>H.L. P. P. P.</i>	DATE 2-5-75							
PROJ. ENG. <i>H.L. P. P. P.</i>	DATE 2-5-75							
PROD. <i>H.L. P. P. P.</i>	DATE 2-5-75							
FIRST USED ON		TITLE						
VT15		VT15						
SCALE <i>1/1</i>		AWT REVISION STATUS						
SHEET 1 OF 1		<table style="width: 100%; border: none;"> <tr> <td style="width: 10%;">SIZE CODE</td> <td style="width: 50%;">NUMBER</td> <td style="width: 40%;">REV.</td> </tr> <tr> <td>A WT</td> <td>7006551-0</td> <td>AM</td> </tr> </table>	SIZE CODE	NUMBER	REV.	A WT	7006551-0	AM
SIZE CODE	NUMBER	REV.						
A WT	7006551-0	AM						