

**KE11-E extended
instruction set
(EIS) option
engineering drawings**

digital equipment corporation • maynard, massachusetts

THIS IS PRINT SET

SEQUENCE

B-DD-KE11-E (S
D-UA-KE11-E-Ø
D-BD-KE11-E-BD
D-FD-KE11-E-FD
D-CS-M7238-Ø-1
A-SL-KE11-E-SL

[illegible]

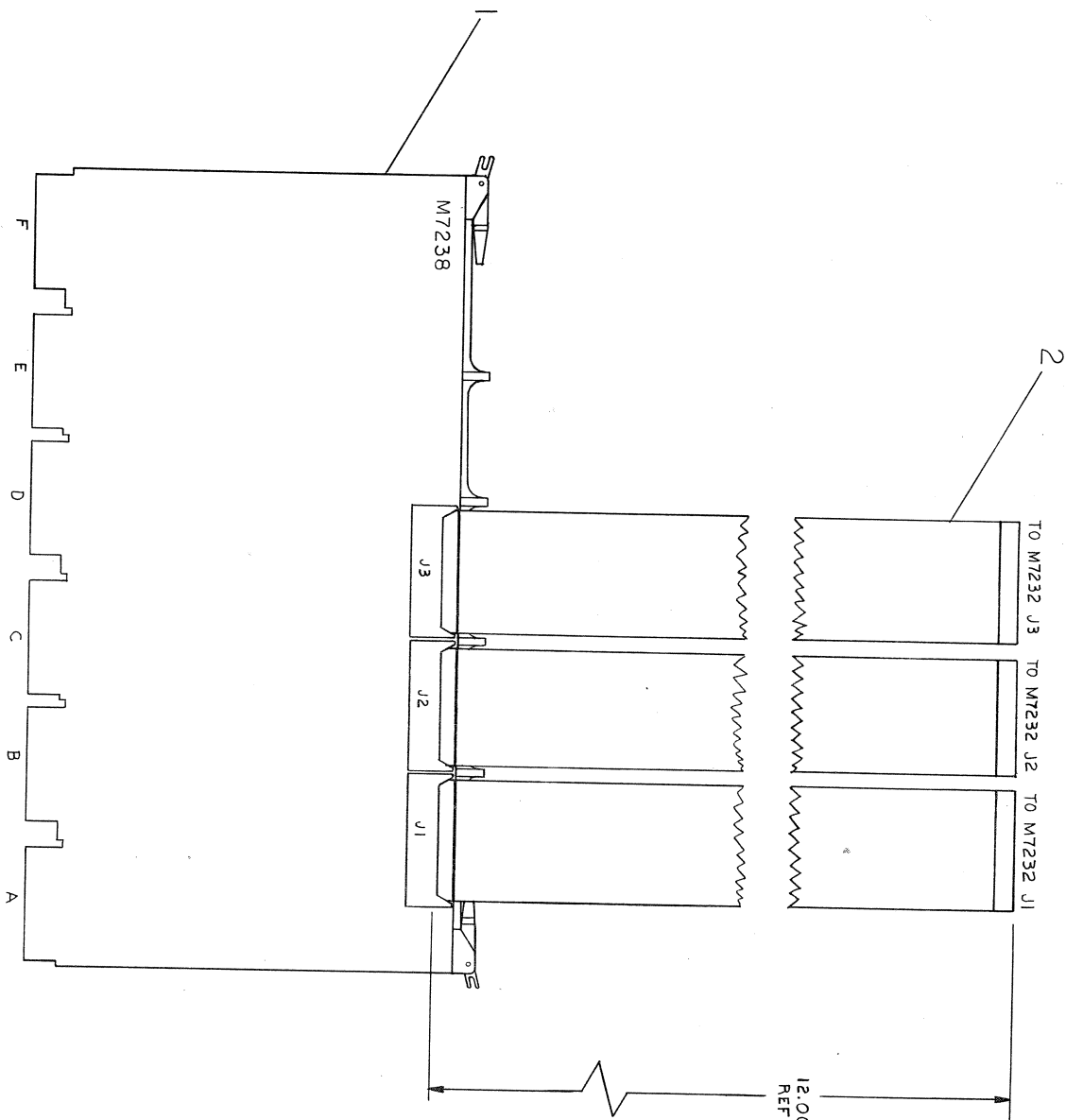
REVISIONS					
DATE	CHG. NO.	REV			
9702	KELL-E-1	A			

USED ON OPTION/MODEL		DRN	DATE	TITLE
KD11-A		<i>[Signature]</i>	9/26/72	EXPANDED INSTRUCTION SET (MUL,DIV,ASH,ASHC)
		CHK'D <i>[Signature]</i>	DATE 9/27/72	
		PROJ ENG: <i>[Signature]</i>	DATE 9/27/72	
		<i>[Signature]</i>	DATE 9/27/72	
		PROD: <i>[Signature]</i>	DATE 9/27/72	
		<i>[Signature]</i>	DATE 9/27/72	
		FIELD SERV: <i>[Signature]</i>	DATE 9/27/72	
		<i>[Signature]</i>	DATE 9/27/72	
SHEET 1 OF 2	DIST	B DD	NUMBER KELL-E	REV A

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NOTES:

1. PLUG M7238 INTO SLOT A-F2 OF KDI1-A SEE D-MU-KDI1-A-MU
2. INSTALL CABLES WITH SHIELD TOWARD M7238 MODULE.
3. CUT W1 ON M7238 MODULE (IR DECODE)
4. CUT W1,W2,W3 ON M7238 MODULE (EIS) WHEN INSTALLING KEII-E OPTION.
5. WHEN INSTALLING KEII-F OPTION IN THE I/O TUCK SLACK BC08R-01 CABLE LOAD DOWN IN FRONT OF SLOT 1 MODULE POSITION.
6. FOR DRAWING DIRECTORY INFORMATION REFER TO DRAWING #B-DD-KEII-E



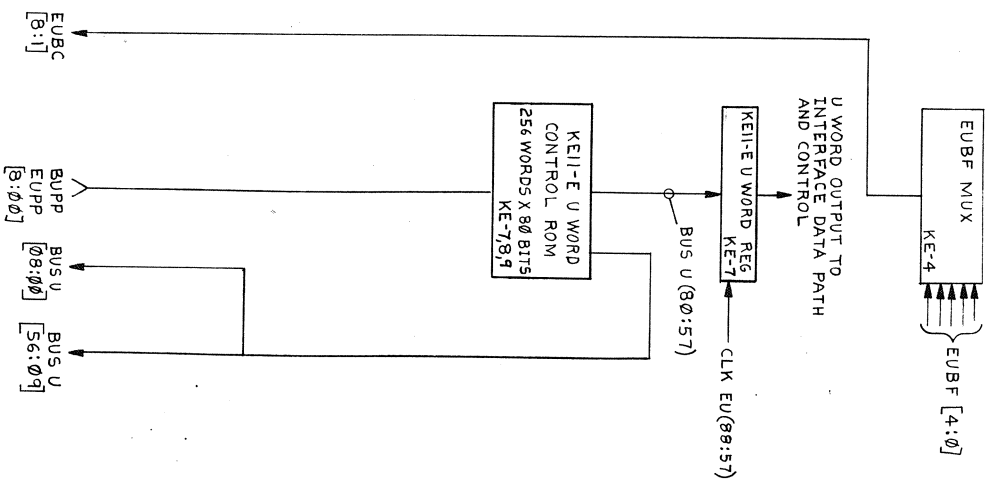
REV. 1
NUMBER 2
0-3-113K
1001215

REVISIONS	
CHK	CHANGE NO.

3	I/O CABLE (BC08R)	C-UA-BC08R-01	2
1	EIS BOARD	D-CS-M7238-0-1	1
QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
DRN	DATE	TITLE	
CHKD	DATE	digital EQUIPMENT CORPORATION	
ENG	DATE	MAYNARD MARCHAND	
PROL ENG	DATE	KEII-E ASSY	
PROL	DATE		
REMOVE BURNS AND BREAK SHARP CORNERS. SURFACE QUALITY			
MATERIAL			
FINISH			
SCALE	NONE	SIZE CODE	NUMBER
SHEET 1 OF 1	DIST. 1	DUA	KEII-E-0

SIZE CODE DUA
NUMBER KEII-E-0
REV. 1

SIGNALS AT THE TOP
(D-BD-KD11-A-BD)



FIRST USED ON OPTION/MODEL		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP 11					
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES TOLERANCES			PARTS LIST		
DECIMALS	ANGLES	DRAWN <i>Barthelme</i>	DATE 9-10-72	 DIGITAL EQUIPMENT CORPORATION MAYNARD MASSACHUSETTS	
XXX + .005		QTY. 1	DATE 9-10-72		
XX = .02	±.0° 30'	ENG. <i>Barthelme</i>	DATE 9-10-72		
.X = .01		PROG. ENG. <i>Barthelme</i>	DATE 9-10-72		
		DATE 9-10-72			
REMOVE BURRS AND BREAK SHARP CORNERS SURFACE QUALITY		PROOF <i>Barthelme</i>	DATE 9-10-72		
MATERIAL					
					
FINISH					
SCALE					
B-D-D-KEII-E					
NONE					
SIZE/CODE					
D BD					
KEII-E-BD					
NUMBER					
REV.					
A					

CCN		FCL	FUB	MHR			FRD	ERD	SRO		SBR			CVM			NZM		CCC		GPC			CEE	CNT		FUB			CBR	
CON1	CON Ø	FCL BUS	EUBF4	SMSR	SHSR1	SHRPF	STRFADM	STRDM	SRODM	SRODM Ø	SORI	SOR Ø	SCVM2	SCVM1	SCVM Ø	SNZM1	SNZM Ø	CLK N2	CLK V	CLKC	GPC2	GPC1	GPC Ø	CLK UPB8	LCNT	ECNT	EUBF3	EUBF2	EUBF1	EUBF Ø	CLK BA
U88(1)H	U87(1)H	U86(1)H	U85(1)H	U84(1)H	U83(1)H	U82(1)H	U81(1)H	U80(1)H	U79(0)H	U78(1)H	U77(1)H	U76(1)H	U75(0)H	U74(1)H	U73(0)H	U72(1)H	U71(0)H	U70(0)H	U69(0)H	U68(0)H	U67(0)H	U66(0)H	U65(0)H	U64(0)H	U63(0)H	U62(0)H	U61(0)H	U60(0)H	U59(0)H	U58(0)H	U57(0)H

FUBC BUT CHART (KEIL-F)
EUBC (4:1)

CONSTANTS (KEIL-F)				
GPC 6	COH1	CON2	CONSTANT (OCTAL)	
H	L	L	400	
H	L	H	244	
H	H	L	6	
H	H	H	30	
L	L	L	200	

FUBC BUT CHART (KEN-F)						
EUBC (4:1)						
ZTB	32	31	50	FIN	BUT	
FUB-4	EUB-2	FUB-5	FUB-0		(FUBC)	
H	—	—	—	L	—	
L	L	L	L	00	AAGA	
L	L	L	H	01	MSR01	
L	L	H	L	02	ZB + EPS (2)	
L	L	H	H	03	COUNT > 30	
L	H	L	L	04	NORMALIZED	
L	H	L	H	05	MSR00	
L	H	H	L	06	—	
L	H	H	H	07	—	

EUBC (:::) BUT CAART					
EUBF A	EUBF B	EUBF Z	EUBF I	EUBF Ø	BUT
L	L	L	L	H	NOOP
L	L	L	L	H	D15
L	L	L	H	L	SOLID
L	L	L	H	H	BR15
L	L	H	L	L	D=Ø
L	L	L	H	L	DR15
L	L	L	H	L	NOT USED
L	L	H	H	H	DIV QUIT
L	L	L	L	L	COUNT = Ø
L	L	L	L	H	OVLFL+UNFL+STORE
L	H	L	H	L	ORØØ * B15
L	H	L	H	L	BR(Ø5;ØØ)
L	H	H	L	L	ZØ * FPS (Z)
L	H	L	L	H	FINSTR I
L	H	H	M	L	FINSTR II
L	H	H	H	H	FINSTR I

GPC CHART			
GPC2	GPC1	GPC0	FUNCTION
0	0	0	NOOP
0	1	0	BUT (NORMALIZE) TESTS DR00 - KEIL-F ALLOWS ALU CONTROL AS A FUNCTION OF CERTAIN CONDITIONS RATHER THAN DIRECTLY BY THE CONTROL ROM
0	1	1	ENABLES DR15 TO PROVIDE THE CARRY-IN TO THE ALU
1	0	0	ENABLES EPS(C) TO PROVIDE THE CARRY-IN TO THE ALU
1	0	1	ENABLES HS15 TO PROVIDE USB SHIFT INPUT TO THE DRKEIF
1	1	0	USE7N KEIL-F, FORMS CONSTANT 200(8)
1	1	1	USED IN KEIL-F EXECUTES A MICROPROGRAM TEST FOR BUS REQUESTS

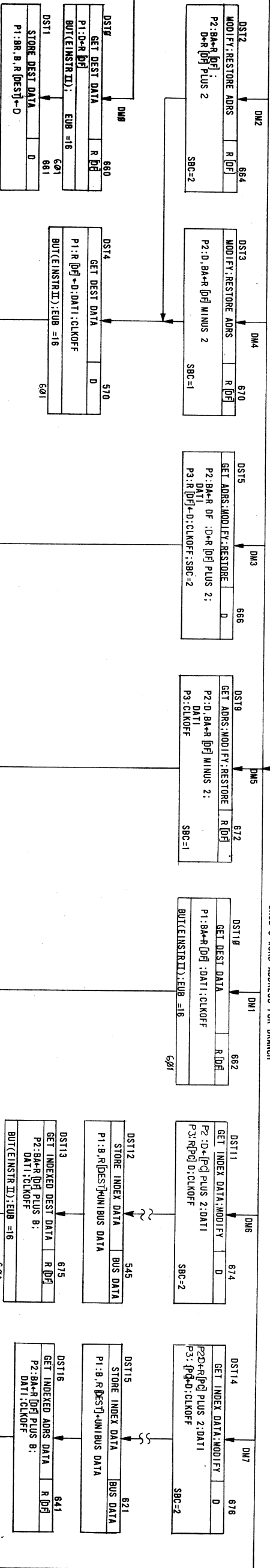
KELL-E KELL-F				
ALU FUNCTIONS				
ALUM	ALUS3	ALUS2	ALUS1	ALU F (FUNCTION)
L	L	L	L	F = A
L	L	L	H	F = MINUS I (2'S COMPLEMENT)
L	L	H	H	F = A MINUS B MINUS I
L	H	L	H	F = A PLUS B
L	H	H	L	F = A PLUS B
H	L	L	L	F = A
H	L	L	H	F = LOGICAL ϕ
H	H	L	H	F = B
H	H	H	L	F = AB

REVISIONS		
CHK	CHANGE NO	REV

FIRST USED ON OPTION/MODEL		QTY.		DESCRIPTION		PART NO.		ITEM NO.	
PDP 11									
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES. TOLERANCES		DRN		DATE		PARTS LIST			
DECIMALS		CHMD		8-8-72		 DIGITAL EQUIPMENT CORPORATION MASSACHUSETTS			
ANGLES		DATE		8-8-72					
.XXX - .005		FNG		8-8-72		TITLE KEIL-E BLOCK DIAGRAM (U WORD & TABLES)			
.XX - .02		FNG		8-8-72					
X - .1		FNG		8-8-72					
REMOVE BURS AND BREAK SHARP CORNERS SURFACE QUALITY		DATE		8-8-72					
MATERIAL		DATE		8-8-72					
NEXT HIGHER ASSY.		DATE		8-8-72					
FINISH		SCALE		NONE		SIZE/CODE		NUMBER	
1/1		1/1		1/1		D BD		KEIL-E-BD	
SHEET 2 OF 2		DIST				REV.		A	

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FLOW PAGE FROM WHICH THIS MICRO PROGRAM ENTRY WAS MADE
EXPANSION
U WORD ADDRESS
DATA DISPLAY OF CONSOLE
U WORD BRANCH TEST (MEMORIC AND EUB CODE)
P1: EPS(N,Z,V,C)*BR
P2: BA+R [Df] PLUS 2
P3: R [Df] PLUS 2
P4: R [Df] PLUS 2
P5: R [Df] PLUS 2
P6: R [Df] PLUS 2
P7: R [Df] PLUS 2
P8: R [Df] PLUS 2
P9: R [Df] PLUS 2
P10: R [Df] PLUS 2
P11: R [Df] PLUS 2
P12: R [Df] PLUS 2
P13: R [Df] PLUS 2
P14: R [Df] PLUS 2
P15: R [Df] PLUS 2
P16: R [Df] PLUS 2
P17: R [Df] PLUS 2
P18: R [Df] PLUS 2
P19: R [Df] PLUS 2
P20: R [Df] PLUS 2
P21: R [Df] PLUS 2
P22: R [Df] PLUS 2
P23: R [Df] PLUS 2
P24: R [Df] PLUS 2
P25: R [Df] PLUS 2
P26: R [Df] PLUS 2
P27: R [Df] PLUS 2
P28: R [Df] PLUS 2
P29: R [Df] PLUS 2
P30: R [Df] PLUS 2
P31: R [Df] PLUS 2
P32: R [Df] PLUS 2
P33: R [Df] PLUS 2
P34: R [Df] PLUS 2
P35: R [Df] PLUS 2
P36: R [Df] PLUS 2
P37: R [Df] PLUS 2
P38: R [Df] PLUS 2
P39: R [Df] PLUS 2
P40: R [Df] PLUS 2
P41: R [Df] PLUS 2
P42: R [Df] PLUS 2
P43: R [Df] PLUS 2
P44: R [Df] PLUS 2
P45: R [Df] PLUS 2
P46: R [Df] PLUS 2
P47: R [Df] PLUS 2
P48: R [Df] PLUS 2
P49: R [Df] PLUS 2
P50: R [Df] PLUS 2
P51: R [Df] PLUS 2
P52: R [Df] PLUS 2
P53: R [Df] PLUS 2
P54: R [Df] PLUS 2
P55: R [Df] PLUS 2
P56: R [Df] PLUS 2
P57: R [Df] PLUS 2
P58: R [Df] PLUS 2
P59: R [Df] PLUS 2
P60: R [Df] PLUS 2
P61: R [Df] PLUS 2
P62: R [Df] PLUS 2
P63: R [Df] PLUS 2
P64: R [Df] PLUS 2
P65: R [Df] PLUS 2
P66: R [Df] PLUS 2
P67: R [Df] PLUS 2
P68: R [Df] PLUS 2
P69: R [Df] PLUS 2
P70: R [Df] PLUS 2
P71: R [Df] PLUS 2
P72: R [Df] PLUS 2
P73: R [Df] PLUS 2
P74: R [Df] PLUS 2
P75: R [Df] PLUS 2
P76: R [Df] PLUS 2
P77: R [Df] PLUS 2
P78: R [Df] PLUS 2
P79: R [Df] PLUS 2
P80: R [Df] PLUS 2
P81: R [Df] PLUS 2
P82: R [Df] PLUS 2
P83: R [Df] PLUS 2
P84: R [Df] PLUS 2
P85: R [Df] PLUS 2
P86: R [Df] PLUS 2
P87: R [Df] PLUS 2
P88: R [Df] PLUS 2
P89: R [Df] PLUS 2
P90: R [Df] PLUS 2
P91: R [Df] PLUS 2
P92: R [Df] PLUS 2
P93: R [Df] PLUS 2
P94: R [Df] PLUS 2
P95: R [Df] PLUS 2
P96: R [Df] PLUS 2
P97: R [Df] PLUS 2
P98: R [Df] PLUS 2
P99: R [Df] PLUS 2
P100: R [Df] PLUS 2



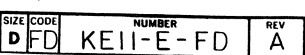
- NOTES:
1. EIS = ASH, ASHC, MUL, DIV
 2. FIS = FAD, FSUB, FMUL, FDIV
 3. CLEAR TRAP FLAG IN K011-A IF:
A) EIS OPTION AND EIS INSTRUCTION
B) FIS OPTION AND EIS OR FIS INSTRUCTION
4. STILL A RESERVED INSTRUCTION, GENERATE TRAP VECTOR 10, ENABLE K011-A ROM AND TRAP.
 5. R0Df INDICATES THE DESTINATION REGISTER SELECTED BY THE IR.
 6. D IN THE DISPLAY IS THE LAST DATA LOADED INTO THE D REGISTER AND MAY NOT BE PERTINENT.
 7. SELECTION OF INTERNAL REGISTERS (R0Sf, R0Df, ETC.) IS RELATED TO THE ACTUAL BIT POSITIONS IN THE IR AND NOT TO THE TERMINOLOGY USED IN THE EIS INSTRUCTION FORMAT.

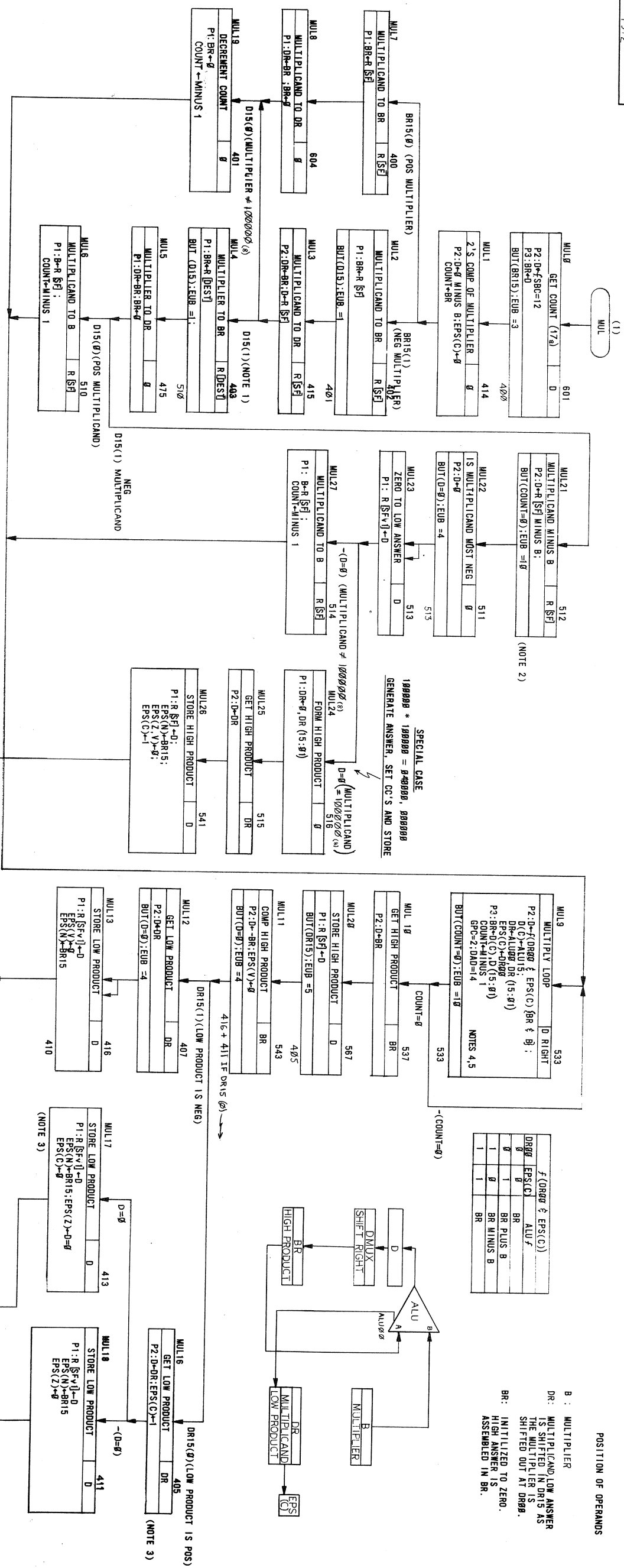
FLOW EXIT INDICATOR
FLOW CONTINUATION PAGE
ADDRESS OF MICROPROGRAM CONTINUATION

REVISIONS		
CHK	CHANGE NO.	REV
KEIIE-00001		A
BUZYNSKI		
11/7/72		

FIRST USED ON OPTION/MODEL		QTY	DESCRIPTION	PART NO.	ITEM NO.
PDP11					
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES TOLERANCES					
DECIMALS	ANGLES	DATE	DATE	DATE	DATE
XX - .06	±0° 30'	2-27-72	2-27-72	2-27-72	2-27-72
XX - .02		2-27-72	2-27-72	2-27-72	2-27-72
XX - .01		2-27-72	2-27-72	2-27-72	2-27-72
REMOVE BURNS AND BREAK SHARP CORNERS SURFACE QUALITY					
MATERIAL					
B-DD-KC11-A					
FINISH					
SCALE					
SHEET 1 OF 5					
DIST					
2					

FLOW DIAGRAM
(KEIIE-E DEST)





1. MULTIPLIER IS THE MOST NEGATIVE NUMBER, (1000000), MUST PUT MULTIPLIER IN THE DR
2. BUT COUNT=0 IS USED TO CLOCK THE NPS & BUS REQUEST FLAGS AND TO CLEAR THE BBSY FLAG IN THE N011-A. THIS ALLOWS NPS TO OCCUR WITHOUT DOING A BUS DATA CYCLE IN THE N011-A.
3. $ES(C) \neq 0$ IF: $(DR15:DR) = ALL\ 1's + -DR15 - BR[(S1:0) \neq 0]$
(PSSO) (Q) INDICATES ANSWER MAY BE REPRESENTED BY ONE WORD I.E. HIGH 16 BITS OF ANSWER ARE AN EXTENSION OF MS-OF
4. $LOW\ 16\ BITS\ OF\ THE\ ANSWER.$
 $LOW\ 16\ ALLOWS\ THE\ AU\ FUNCTION\ TO\ BE\ CONTROLLED\ AS\ A\ FUNCTION\ OF\ CERTAIN\ CONDITIONS\ RATHER\ THAN\ DIRECTLY\ BY\ THE\ CONTROL\ ROM\ AU\ FIELD.$
5. $PR2\ 2\ ALLOWS\ THE\ AU\ FUNCTION\ TO\ BE\ CONTROLLED\ AS\ A\ FUNCTION\ OF\ DR000\ AND\ ES\ (C)\ FOR\ MUL.$

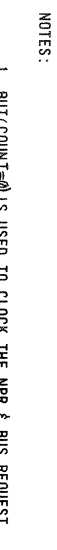
$f(\text{DRQ} \hat{=} \text{EPSC})$		
DRQ	EPSC	Alt f
0	0	BR
0	1	BR PLUS B
1	0	BR MINUS B
1	1	BR

```

POSITION OF OPERANDS
B : MULTIPLIER
DR: MULTIPLICAND, LOW ANSWER
    IS SHIFTED IN DR15 AS
    THE MULTIPLIER IS
    SHIFTED OUT AT DR00.
BR: INITIALIZED TO ZERO.
    HIGH ANSWER IS
    ASSEMBLED IN BR.

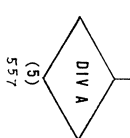
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FIRST USED ON OPTION/MODEL		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP11					
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES. TOLERANCES		PARTS LIST			
DECIMALS	ANGLES	DRN	DATE		
.XXX = .005		CHK'D	DATE		
.XX = .02	± 0° 30'	DATE	DATE		
X = .1		PROL'G	DATE		
REMOVE BURRS AND BREAK SHARP CORNERS SURFACE QUALITY		PROG	DATE		
MATERIAL		TITLE			
NEXT HIGHER ASSY.		FLOW DIAGRAM			
		(1:10L)			
SIZE/CODE		(3)			
NUMBER					
SCALE					
REV.					
FINISH					
SHEET 3 OF 5					
DIST.					

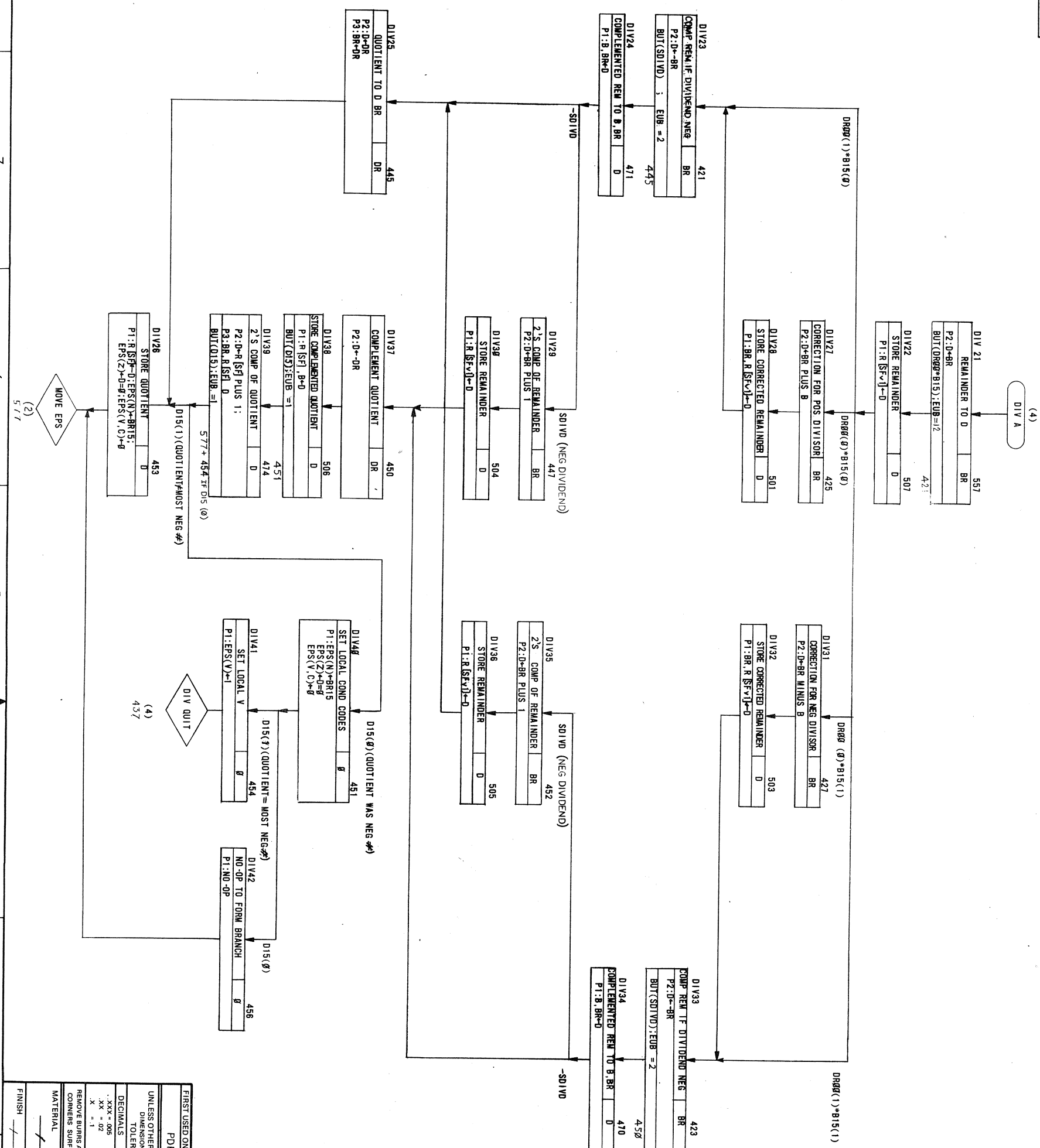


DIVIDE LOOP	D
P2: D ← (COUNT15) * R (14: 00); DR15 ← 0;	
DR ← DR (14: 00); COUNT15	
P3: R ← D; COUNT ← MINUS 1	GPC 2
DAD = 14	
BUT (COUNT = 0); EUB = 10	
	553

COUNT ← 0



REVISIONS		
CHK	CHANGE NO	REV



FIRST USED ON OPTION MODEL		QTY.	DESCRIPTION	PART NO.	ITEM NO.
PDP11			PARTS LIST		
UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES.		DRN.	DATE	 DIGITAL EQUIPMENT CORPORATION MAKING MISCELLANEOUS	
TOLERANCES		CHK'D.	DATE		
DECIMALS	ANGLES	ENG.	DATE		
.XXX - .005	±0° 30'	PROD. ENG.	DATE		
.XX = .02			DATE		
X = .1			DATE		
REMOVE BURRS AND BREAK SHARP CORNERS. SURFACE QUALITY		PROD.	DATE		
MATERIAL		NEXT HIGHER ASSY.			
FINISH		B-DD-KD11-A			
SCALE		5 OF 5			
SHEET		D			
DIST.		KE11-E-FD			
REV.		A			