FIELD MAINTENANCE PRINT SET

TABLE OF CONTENTS

UNIT VARIATIONS COVERED BY THIS PRINT SET

FPP8-A
Field Maintenance
Print Set

Digital Equipment Corporation
PRINT SET ORDER NO
MPØØØ57

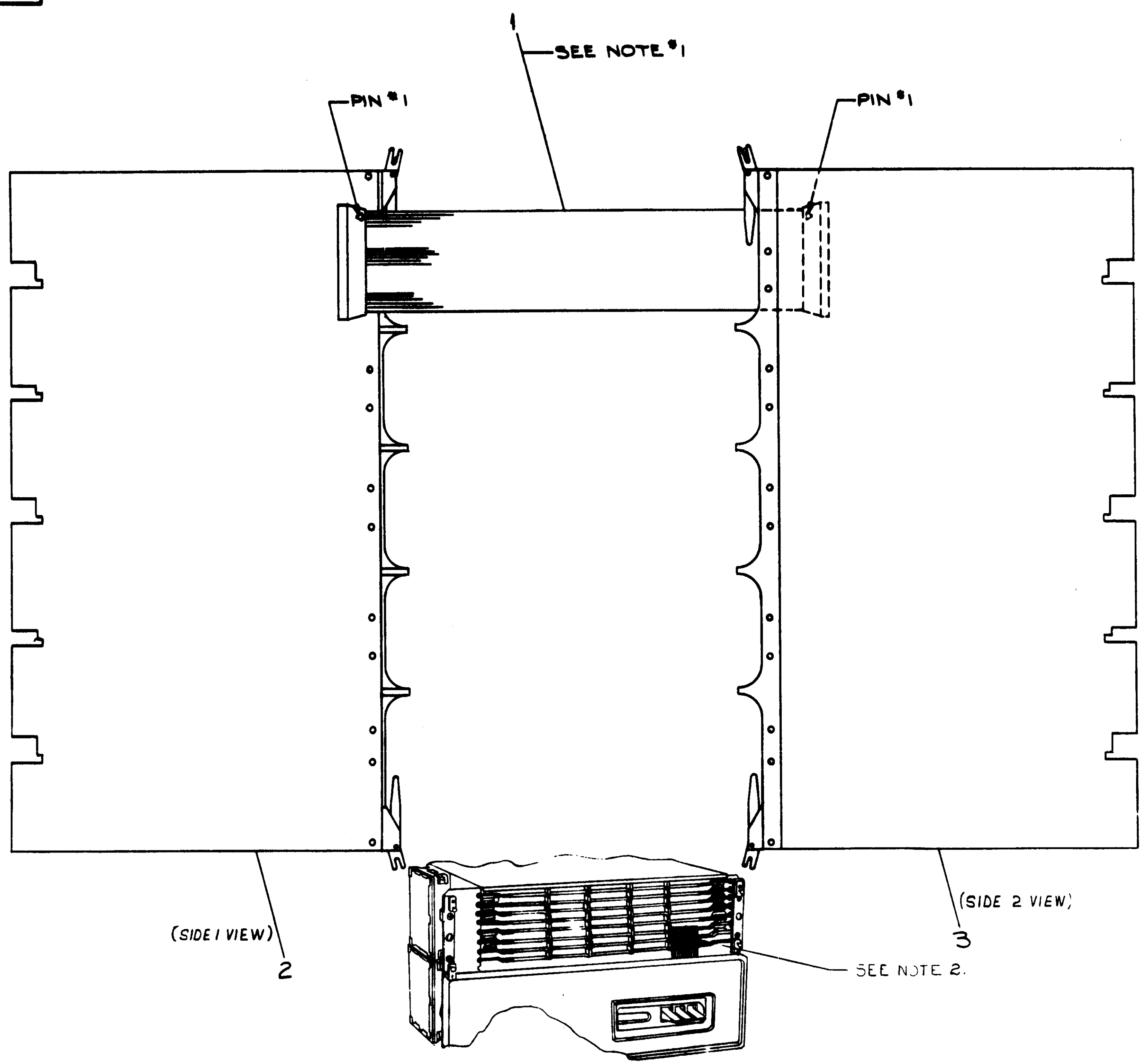
REVISIONS	REV.	CHG. NO.	DATE

USED ON OPTION/MODEL	
SHEET 1 OF 1	

DRN. ROBICHAUD	DATE 3MAR76	TITLE: FPP8-A FIELD MAINTENANCE PRINT SET	digital
CHK'D	DATE		
PROJ. ENG.	DATE		
FIELD SERV. B Eash	DATE 5/24/76	SIZE B / CODE TC / NUMBER FPP8-A-5 / REV.	
		DIST.	

EN-0112-1-8-NOV-(32)

DRB 124 V4.1 12/76



NOTES:

1. CONNECTION OF "CABLE" (ITEM #1) TO BE FROM J1 ON THE "M8410 BD" (ITEM #2) TO J1 ON THE "M8411 BD" (ITEM #3).
2. BC02D PLACEMENT: DOWNWARD, FLUSH AGAINST MODULE HANDLES.

QTY	DESCRIPTION	DWG./PART NO.	ITEM NO.
1	MODULE (M8411)	D-UA-M8411-0-0	3
1	MODULE (M8410)	D-UA-M8410-0-0	2
1	50 COND SIGNAL CABLE (BC02D)	D-IA-BC02D-01	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

ANGLES ±0° 30'

QUANTITY & VARIATION

THIRD ANGLE PROJECTION

REMOVE BURRS AND BREAK SHARP CORNERS

DO NOT SCALE DWG

CHK'D	7 MAY 76
PROJ. ENG.	5/28/76
PROD.	5/29/76
NEXT HIGHER ASSY.	B-DD-FPP8-A
MATERIAL	SEE PARTS LIST
FINISH	—
SCALE	NONE
SHEET	OF 1

FIRST USED ON: FPP8-A

digital

TITLE: FPP8-A UNIT ASSY

SIZE	CODE	NUMBER	REV.
D	UA	FPP8-A-0	

DEC FORM NO. DRD 103-C

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 5/27/76

TITLE FPP8A FIELD SERVICE INSTALLATION & ACCEPTANCE PROCEDURE

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE

ENG	APPD	SIZE	CODE	NUMBER	REV
Bill Eash		A	SP	FPP8-A-1	

DEC 16-(392)-1079A-R873
DRA 107A

SHEET 1 OF 3

ENGINEERING SPECIFICATION — CONTINUATION SHEET

TITLE FPP8A FIELD SERVICE INSTALLATION & ACCEPTANCE PROCEDURE

I. General

This procedure defines the performance standards required of the FPP8A. The acceptance tests are the same for both system installation or add-on of an FPP8A.

II. Inspection

After removing the FPP8A from the packing material (if add-on), inspect the following:

1. Inventory the hardware against shipping list.
2. Inventory the software against the software list, if ordered.
3. Inventory prints against shipping list, if ordered.
4. Check modules (M841Ø, M8411) for loose or broken components.
5. Inspect the cable for cuts or breaks.

III. Installation Procedure

There are no switches and/or jumpers on either of the FPP8A modules.

Install the modules in the top most slots available, below the memories. Connect the BC02D from the M841Ø to the M8411. The cable can be folded and laid against the front of the other modules as shown below.

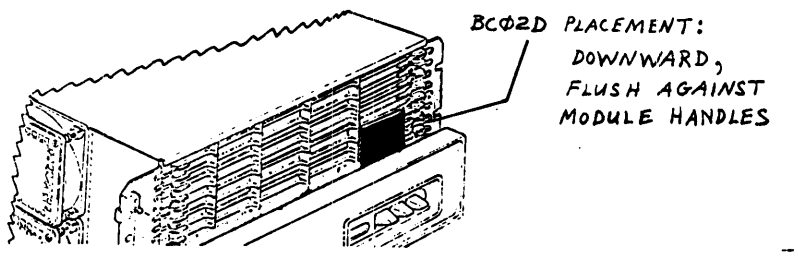
	SIZE	CODE	NUMBER	REV
	A	SP	FPP8-A-1	

DEC FORM NO EN-01022-16-N370-(381)
DRA 108

SHEET 2 OF 3

ENGINEERING SPECIFICATION — CONTINUATION SHEET

TITLE FPP8A FIELD SERVICE INSTALLATION AND ACCEPTANCE PROCEDURE



IV. Acceptance Procedure

Minimum Requirements

1. PDP8A with minimum 8K memory or PDP8E with FPP8E and 8K memory with programmers console.*
2. Paper tape input device
3. Maindec-08-DJFPA and listing
4. Maindec-08-DJFBB and listing
5. Terminal (03-04 device code)

If the FPP8A is an add-on, run the CPU and memory diagnostics to insure that there are no problems.

Run Maindec-08-DJFPA for 5 passes, no errors are acceptable.

Run Maindec-08-DJFBB for 20 minutes, no errors are acceptable. Type B for both instruction test and exercisor.

If there is a means to build DEC X8, a system exercisor should be built and run. This will be a more complete exercise of the system.

* Programmers console is required only when program loading is via paper tape. The CL8 packages will have the Maindecs with the diagnostic console package. Switch register settings are done via 03, 04 terminal. See Maindec listings.

	SIZE	CODE	NUMBER	REV
	A	SP	FPP8-A-1	

DEC FORM NO DEC 16-(381)-1022-N370
DRA 108

SHEET 3 OF 3

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

PARTS LIST

MADE BY ROBICHAUD DATE 3 MAR 76	CHECKED W. Kershner 27 MAY 76 DATE	SECTION 1
ENG DATE [illegible] 5/27/76	PROD R. X. [illegible] DATE 5/28/76	ISSUED SECT. 1

ITEM NO.	DWG NO. / PART NO.	DESCRIPTION	QUANTITY / VARIATION
1	MPØØØ57	*FPP8-A MAINTENANCE PRINT SET	Ø
2	B-PL-FPP8-A-3	*FPP8-A SOFTWARE LIST	Ø
3	EK-FPP8-A-MM-ØØ1	*FPP8-A USER'S MANUAL	Ø

*THIS ITEM IS AN OPTION AND IS TO BE SHIPPED ONLY WHEN PURCHASED AS A SEPARATE ITEM.

TITLE	ASSY NO.	SIZE	CODE	NUMBER	REV	ECO NO.
FPP8-A SHIPPING LIST	B-DD-FPP8-A	A	PL	FPP8-A-2		
	SHEET 1 OF 1	DIST.				

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

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

PARTS LIST

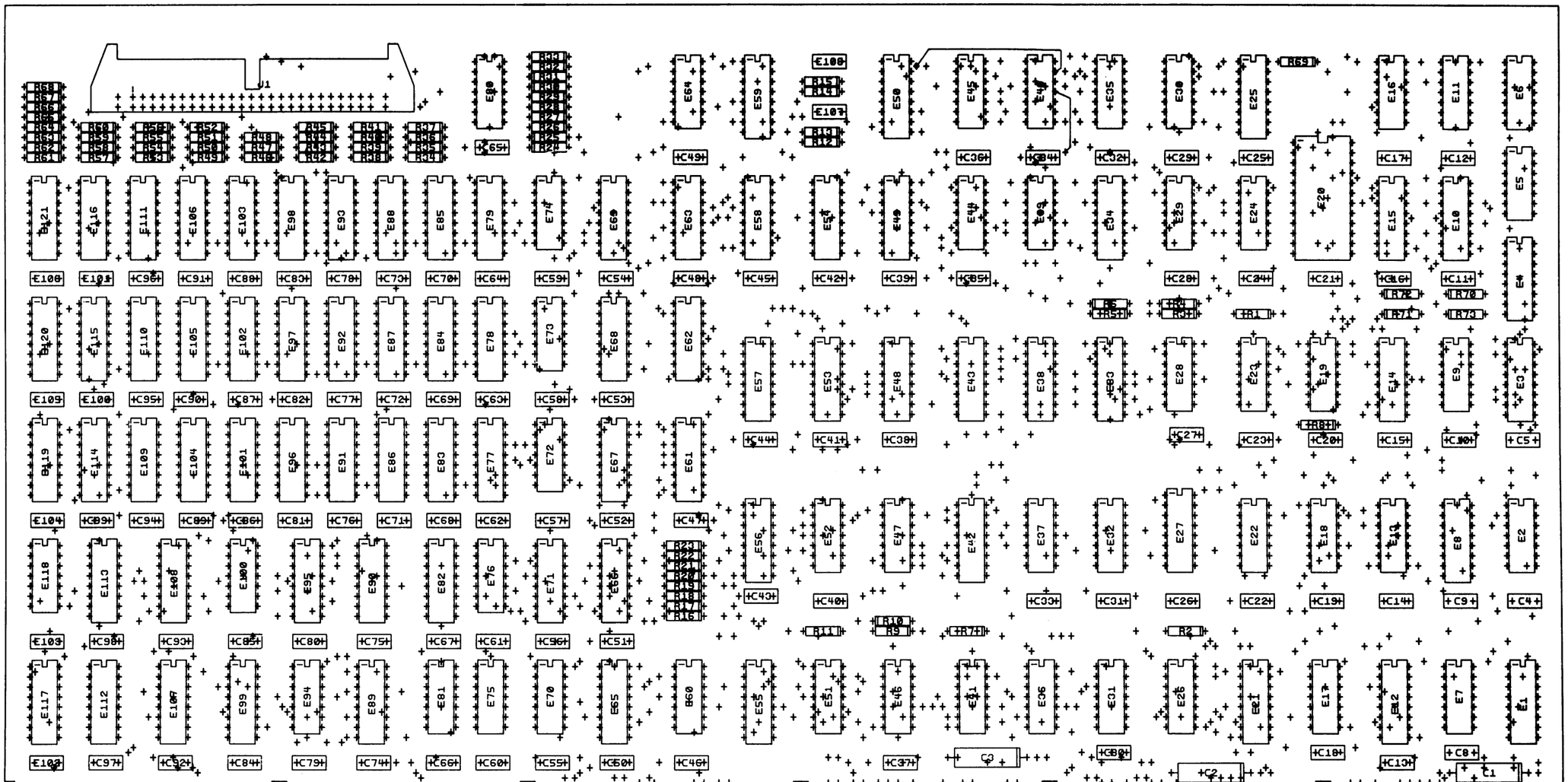
MADE BY ROBICHAUD	CHECKED	SECTION
DATE 3 MAR 76	DATE 11 MAY 76	1
ENG	PROD R. K. Gilson	ISSUED SECT.
DATE [illegible]	DATE 5/28/76	1

ITEM NO.	DWG NO. / PART NO.	DESCRIPTION	QUANTITY / VARIATION
1	ZF226-RB	FPP8-A DIAGNOSTIC KIT	1
		(DOCUMENTS AND PAPER TAPES)	

TITLE	ASSY NO.	SIZE	CODE	NUMBER	REV.	ECO NO.
FPP8-A SOFTWARE LIST	B-DD-FPP8-A	A	PL	FPP8-A-3		
	SHEET 1 OF 1	DIST.				

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

COMPONENT SIDE VIEW



NOTES: JUMPER LIST: LFEED THRU
BETWEEN PINS 15&16 ØF E50 3 PIN13
ØF E40 2 E40PIN11&FEED THRU NEAR
C34 3CUT ETCH-PINS11,13
ØF E40 ØN SIDE 2

CH	CHANGE NO	REV
	M8410-00001	B

ETCH REV. B
P.C. DESIGN DATA BASE REV. B

SIGNATURES	DATE
DRN.	2-21-74
CHK'D.	2-21-74
ENG.	2/19/74
PROJ.ENG.	2/19/74
PROD.	3-19-74
SCALE 2/1	
SHT. 1 OF 3	
NEXT HIGHER ASSY.	

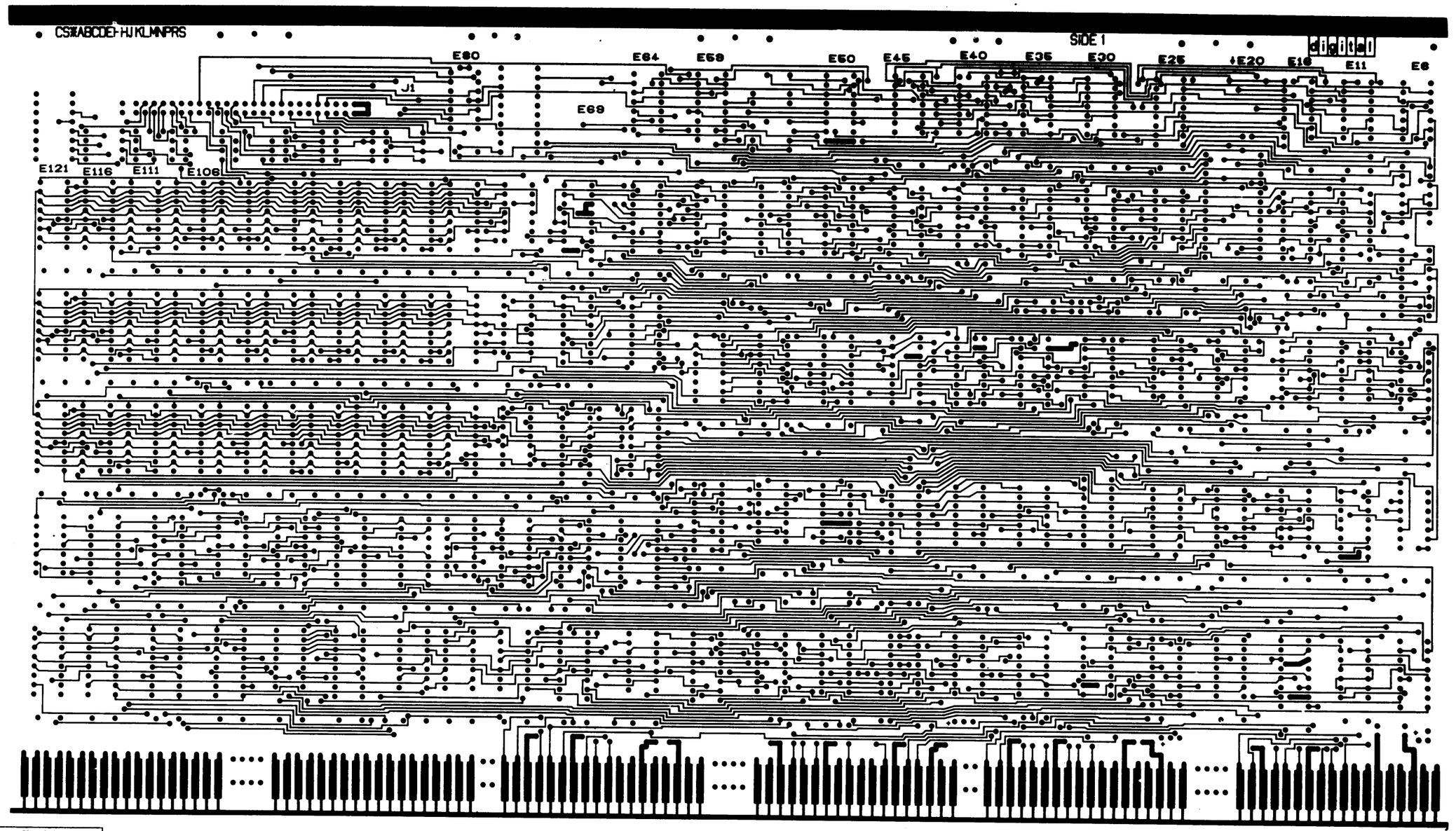
digital

TITLE: FPP8-A CØNTRØL

SIZE	CODE	NUMBER	REV
D	UA	M8410-0-0	B

MS#40500

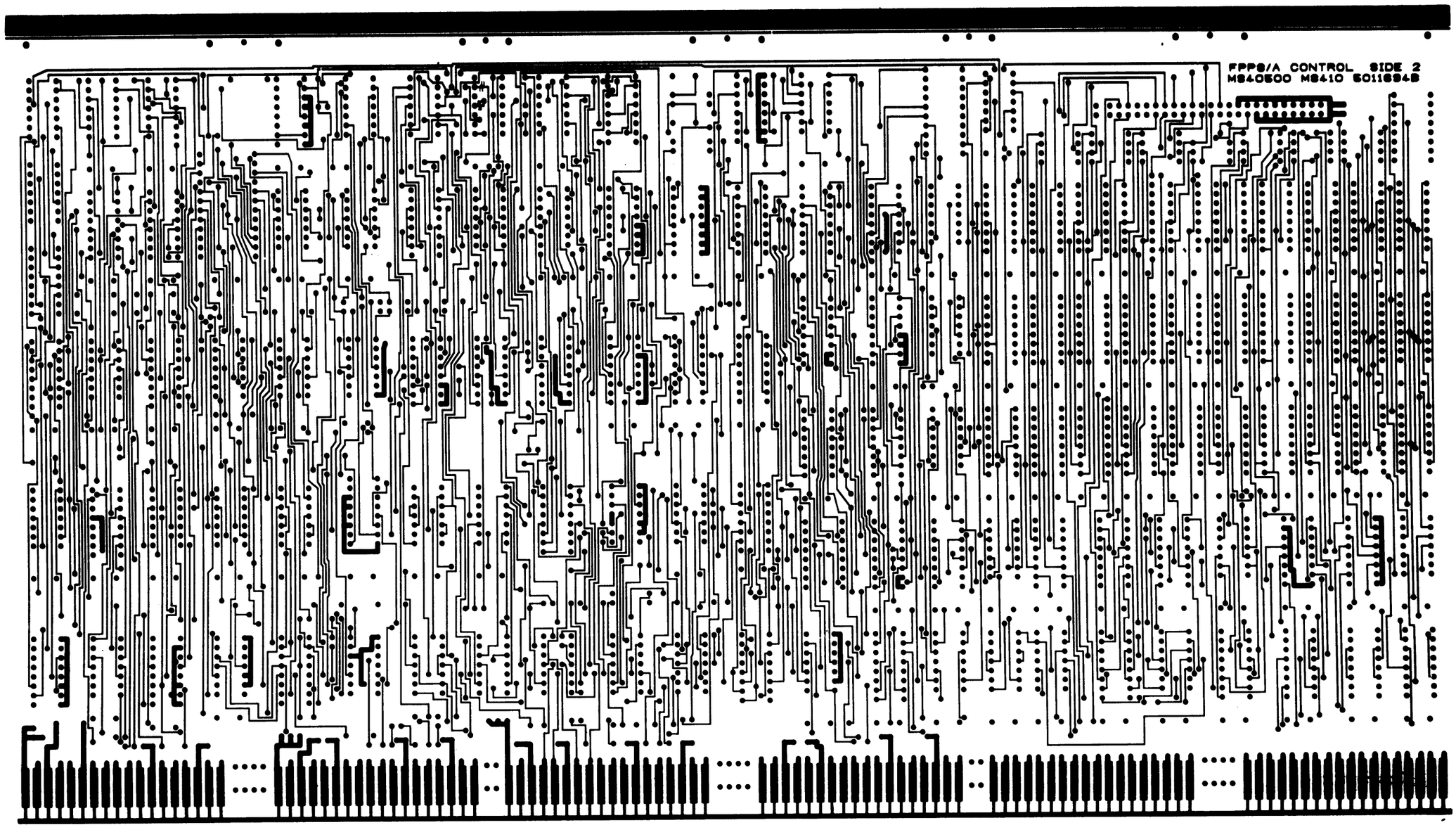
LAYER 1



REVISIONS		
LTR	CHANGE NO.	REV.

TITLE	SIZE	CODE	NUMBER	REV.
FPF8/A CONTROL	D	DUA	M8410-0-0	B
SCALE	SHEET 2 OF 3	DIST		

DUA M8410-0-0 B



REVISIONS		
CHK	CHANGE NO	REV

TITLE	SIZE	CODE	NUMBER	REV.
FPP8/A CONTROL	D	UA	M8410-7-0	B
SCALE 2/1 SHEET 3 OF 3	DIST			

DUA M8410-0-0 B

DIGITAL EQUIPMENT CORPORATION

PARTS LIST

MADE BY JACK MASON	CHECKED	SECTION 1
DATE 4-8-76	DATE 5/14/76	
ENG	PROD	ISSUED SECTION 1
DATE 19 MAY 76	DATE 5-15-76	

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	QUANTITY/VARIATION M841Ø-Ø-Ø	REF DESIGNATION
1	D-MD-5011694-0-0	5011694	ETCHED CIRCUIT BD.	1	
2		1000011	CAP, 47 Mmf, 1ØØV	1	C1Ø8
3		1001610*	CAP, .Ø1 Uf	101	C4, C5, C8 - C1Ø6
4		1002608	CAP, 18 Mmf, 1ØØV	1	C1Ø7
5		1005306	CAP, 6.8 Uf 35V, 10% TANT	3	C1, C2, C3
6		1300316	RES., 47Ø OHMS, 1/4W, 5%	67	R2-R6, R8-R12, R16-R22, R24-R73
7		1300391	RES., 1.5K OHMS, 1/4W, 5%	4	R1, R7, R13, R23
8		1304854	RES., 5.11K OHMS, 1/4W, 1%	2	R14, R15
9		1905547	I.C., DEC 7474	1	E44
10		1909486	IC., DEC 384	4	E5, E13, E22, E26
11		1909686	I.C., DEC 74Ø4	8	E2, E19, E24, E35, E46, E8Ø, E1ØØ, E118
12		1909704	IC., DEC 314	1	E17
13		1909705	I.C., DEC 8881	3	E28, E29, E32
14		1909929	IC., DEC 7417	2	E31, E39
15		1909934	I.C., DEC 8266	3	E54, E62, E66
16		1910091	I.C., DEC 7437	4	E6, E72, E73, E76
17		1910155	I.C., DEC 74Ø8	4	E11, E23, E36, E64
18		1910393	I.C., DEC 7384	1	E47
19		1910436	IC., DEC. 74123	1	E5Ø
20		1910956	I.C., DEC 74S 151	1	E59
21		1911315	I.C., DEC 8234	3	E1, E21, E65

NOTES:

* ANY VARIATION FOR THE .OI CAPS

E.C.O. NO. COOOT

TITLE FPP8-A CONTROL	ASSY NO. D-UA-M841Ø-Ø-Ø	SIZE B	CODE PL	NUMBER M841Ø-Ø-Ø	REV. B
	SHEET 1 OF 4	INSERTION PARTS LIST DATA BASE REV B			

DIGITAL EQUIPMENT CORPORATION

PARTS LIST

MADE BY JACK MASON
DATE 4/8/76
ENG W. Reuchne
DATE 19 MAY 76

CHECKED
DATE 5/14/76
PROD R X
DATE 5-15-76

SECTION 1
ISSUED SECTION 1

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	QUANTITY/VARIATION M841Ø-Ø-Ø	REF DESIGNATION
22		1911469	I.C., DEC 864Ø	3	E7, E41, E6Ø
23		1911521	I.C., DEC 7432	1	E37
24		1911983	I.C., DEC 74S 133	1	E34
25		1912395	I.C., DEC 8136	1	E12
26		1912643	I.C., DEC 8613	6	E3, E14, E89, E99, E1Ø7, E112
27		1912697	I.C., DEC 74LS174	5	E8, E27, E48, E82, E95
28		1912799	I.C., DEC. 74LSØØ	4	E18, E4Ø, E52, E75
29		1912801	I.C., DEC 74LSØ2	3	E9, E3Ø, E7Ø
30		1912807	I.C., DEC 74LS1Ø	2	E81, E94
31		1912815	I.C., DEC 74LS3Ø	2	E51, E74
32		1912819	I.C., DEC 74LS42	4	E1Ø, E15, E9Ø, E117
33		1912824	I.C., DEC 74LS74	2	E16, E45
34		1912843	I.C., DEC 74LS139	1	E113
35		1912844	I.C., DEC 74LS151	2	E42, E61
36		1912847	I.C., DEC 74LS157	2	E33, E1Ø8
37		1912848	I.C., DEC 74LS158	1	E38
38		1912849	I.C., DEC 74LS161	7	E25, E49, E58, E63, E67, E68, E71
39		23124A1	I.C., DEC 32 X 8 PROM	1	E43
40		23125A1	I.C., DEC 32 X 8 PROM	1	E53
41		23126A1	I.C., DEC 32 X 8 PROM	1	E57
42		23127A1	I.C., DEC 32 X 8 PROM	1	E55

NOTES:

E.C.O. NO.

TITLE: FPP8-A CONTROL

ASSY NO. D-UA-M841Ø-Ø-Ø
SHEET 2 OF 4

SIZE B | CODE PL | NUMBER M841Ø-Ø-Ø | REV. B

INSERTION PARTS LIST DATA BASE REV B

DIGITAL EQUIPMENT CORPORATION
PARTS LIST

MADE BY JACK MASON | CHECKED [signature] | SECTION
DATE 4/8/76 | DATE 5/19/76 | 1
ENG W. Kershner | PROD R K Allen | ISSUED SECTION
DATE 14 MAY 76 | DATE 5 19-76 | 1

QUANTITY / VARIATION

NOTES:

ITEM NO	DRAWING NO.	PART NO.	DESCRIPTION	M841Ø-Ø-Ø	REF DESIGNATION
43		23128A1	I.C., DEC 32 X 8 PROM	1	E56
44		2327ØA2	I.C., DEC 256 X 4 PROM	1	E77
45		23271A2	I.C., DEC 256 X 4 PROM	1	E83
46		23272A2	I.C., DEC. 256 X 4 PROM	1	E86
47		23273A2	I.C., DEC 256 X 4 PROM	1	E91
48		23274A2	I.C., DEC 256 X 4 PROM	1	E96
49		23275A2	I.C., DEC 256 X 4 PROM	1	E1Ø1
50		23276A2	I.C., DEC 256 X 4 PROM	1	E1Ø4
51		23277A2	I.C., DEC 256 X 4 PROM	1	E1Ø9
52		23278A2	I.C., DEC 256 X 4 PROM	1	E114
53		23279A2	I.C., DEC 256 X 4 PROM	1	E119
54		2328ØA2	I.C., DEC 256 X 4 PROM	1	E79
55		23281A2	I.C., DEC 256 X 4 PROM	1	E85
56		23282A2	I.C., DEC 256 X 4 PROM	1	E88
57		23283A2	I.C., DEC 256 X 4 PROM	1	E93
58		23284A2	I.C., DEC 256 X 4 PROM	1	E98
59		23285A2	I.C., DEC 256 X 4 PROM	1	E1Ø3
60		23286A2	I.C., DEC 256 X 4 PROM	1	E1Ø6
61		23287A2	I.C., DEC 256 X 4 PROM	1	E111
62		23288A2	I.C., DEC 256 X 4 PROM	1	E116
63		23289A2	I.C., DEC 256 X 4 PROM	1	E121

E.C.O. NO.

TITLE: FPP8-A CONTROL

ASSY NO. D-UA-M841Ø-Ø-Ø | SIZE B | CODE PL | NUMBER M841Ø-Ø-Ø | REV. 8

SHEET 3 OF 4

INSERTION PARTS LIST DATA BASE REV B

DIGITAL EQUIPMENT CORPORATION

PARTS LIST

MADE BY J. MASON
DATE 4/18/76
ENG W. Kershner
DATE 19 MAY 76

CHECKED [signature]
DATE 5/19/76
PROD R.K. Allen
DATE 5-19-76

SECTION 1
ISSUED SECTION 1

NOTES:

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	QUANTITY / VARIATION M8410-0-0	REF DESIGNATION
64		23290A2	I.C., DEC 256 X 4 PROM	1	E78
65		23291A2	I.C., DEC 256 X 4 PROM	1	E84
66		23292A2	I.C., DEC 256 X 4 PROM	1	E87
67		23293A2	I.C., DEC 256 X 4 PROM	1	E92
68		23294A2	I.C., DEC 256 X 4 PROM	1	E97
69		23295A2	I.C., DEC 256 X 4 PROM	1	E102
70		23296A2	I.C., DEC 256 X 4 PROM	1	E105
71		23297A2	I.C., DEC 256 X 4 PROM	1	E110
72		23298A2	I.C., DEC 256 X 4 PROM	1	E115
73		23299A2	I.C., DEC 256 X 4 PROM	1	E120
74		23300A2	I.C., DEC 256 X 4 PROM	1	E69
75		23301A2	I.C., DEC 256 X 4 PROM	1	E4
76		23001C5	I.C., DEC 14 X 48 X 8 FPLA	1	E20
77		1209941-07	CONN., 50 PIN RT. ANG HEADER	1	J1
78		1210711-02	HANDLE ASSY HEX BOARD	1	
79		9006732	EYELET	12	
80		9105740-55	#30 AWG GREEN WIRE	A/R	

E.C.O. NO.

EN-01140A-16-R276(325) DRB 125

TITLE: FPP8-A CONTROL

ASSY NO. D-UA-M8410-0-0
SHEET 4 OF 4

SIZE B | CODE PL | NUMBER M8410-0-0 | REV. B

INSERTION PARTS LIST DATA BASE REV B

MODULE:

GROUND CONNECTIONS		
CONNECTOR	SIDE	FINGERS
A,B,C,D	1	C,F,N,T
	2	C,F,N,T

+5V CONNECTIONS		
CONNECTOR	SIDE	FINGER
A,B,C	2	A

DEVICE CODES
55 + 56

(I O DECODERS)(CBI)

DRN		FIRST USED ON: FPP 8A
CHK		TITLE: FPP8-A CONTROL BD (CBI)
ENG.	JAN 74	
PROJ. ENG.		
PROD. M. C.		
NEXT HIGHER ASSY.	D-UA-M8410-0-0	
SCALE		SIZE D, CODE CS, NUMBER M8410-0-1, REV. B
SHEET 1 OF 7		DIST.

REVISIONS			
CHK	CHANGE NO.	REV.	
	M8410-00001	A	R. BRANNON 6-23-76
			D. WHITE 11/4/76

DEC FORM NO. DRD 102-D

CB3 TO MBRM H

CB4 μPC9 H
CB4 μPC8 H
CB4 μPC7 H
CB4 μPC6 H
CB4 μPC5 H
CB4 μPC4 H
CB4 μPC11 H
CB4 μPC10 H

8238 E1 — DATA 9L, DATA 8L, DATA 7L, DATA 6L, DATA 5L, DATA 4L
8238 E21 — DATA 7L, DATA 6L, DATA 5L, DATA 4L
8238 E63 — DATA 11L, DATA 10L, DATA 9L, DATA 8L

CB1 FMRP L
CB1 B PAUSE L
CB1 FFIST L
CB1 FEXIT H
CB1 FPCOM L
CB1 FPED L
CB7 EXPFL H
CB2 LOAD μPC L
CB4 BTP3 H
CB4 RESET L
CB3 SEL 3Ø L
CB6 μPCTRL 2L
CB6 μPCTRL 3L
CB6 μPCTRL 4L
CE2 LOAD BIT COUNT L
CB2 FETCH NEXT L
CB6 μPI0 IN L
CB6 μPI1 IN L
CB4 CLR CR H
DATA ØL (ARI)

CB2 DP H
CB2 EP H
CB2 FEX H
CB4 μPC CLOCK L
CB3 INST DISP IL
TEST OVF L
DP8,('83) OVFLO H
CB7 FORBIDDEN H
CB7 SIGN H
+5V
R5 470
R3 470
R6 470
R7 1.5K
R73 470
R72 470
R71 470
R70 470

DIV Ø
CB4 μPC 10 H
CB6 BUSY H
CB2 START EX H
CB1 SYNCED μPC 11 H
CB2 NZ SET H
UND FLO
CB1 FEXIT L
CB3 F STOP H
Z TRAP
IE
EXP OVF
CPI INT RQST L
CB2 BUSY L
CB2 LOCKOUT H
CB2 FS H
CB2 PROT H
DATA 8 L (DRI)
DATA 4 L (ASI)
DATA 5 L (AVI)
DATA 6 L (BVI)
DATA 3 L (AVII)
DATA 2 L (AVII)
DATA 1 L (ASI)

74,S42 E10
8613 E3
8613 E14
23301A2 E4 PROM 256x4
74LS174 E8
J1 39
J1 45

(COMMAND & STATUS REGISTERS)(CB2)

REVISIONS		
CHK	CHANGE NO.	REV.

TITLE	SIZE	CODE	NUMBER	REV.
FPP8-A CONTROL BD (CB2)	D	CS	M8410-0-1	B
SCALE 1:1	SHEET 2 OF 7	DIST.		

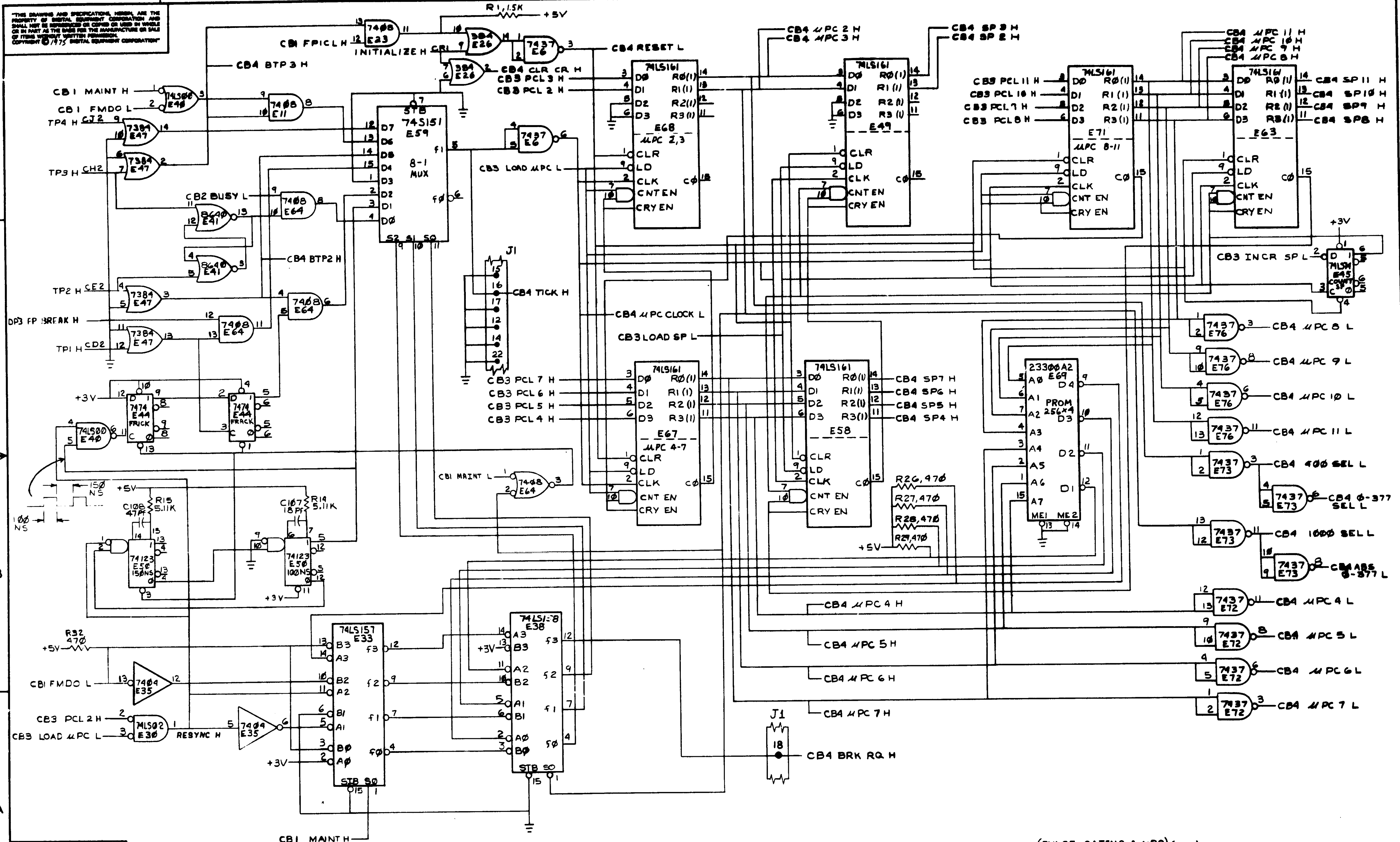
CB3 F STOP H
74LS174 E48
MD0 L AK1
DP3 F P EREAK H
MD1 L AL1
MD 2 L AM1
MD 3 L AP1
CB4 RESET L
CB2 DF H
CB4 CLOCK L
CB7 SIGN
MD 4 L BK1
MD 5 L BL1
MD 6 L BM1
MD 7 L BP1
MD 8 L DK1
CB3 INST DISP 1 H
CB2 FETCH NEXT L
MD 9 L DL1
MD 10 L DM1
MD 11 L DP1
+5V
R13, 1.5K
23125A1 E53
23126A1 E57
PROM 32×8
ENB
R65 470
R66 470
R67 470
R68 470
R64 470
R63 470
R61 470
R62 470
R8 470
R4 470
23124A1 E43
23161C5 E20 14×48×8 FPLA
74S133 E34
74LS00 E18
74LS08 E40
74S04 E35
74S04 E19
74S04 E24
7417 E39
384 E5
384 E13
384 E22
74LS02 E30
7408 E36
CB3 TO MEM
CB6 μPCTRL 1 L
CB6 μPCTRL 0 L
8266 E54
8266 E62
8266 E66
CB4 SP 3 H
CB4 SP 2 H
CB4 SP 7 H
CB4 SP 11 H
CB6 μP3 IN L
CB6 μP2 IN L
CB6 μP7 IN L
CB6 μP6 IN L
CB6 μP5 IN L
CB6 μP4 IN L
CB6 μP11 IN L
CB6 μP10 IN L
CB6 μP9 IN L
CB6 μP8 IN L
CB4 SP 6 H
CB4 SP 5 H
CB4 SP 4 H
CB4 SP 10 H
CB4 SP 9 H
CB4 SP 8 H
CB3 PCL 3 H
CB3 PCL 2 H
CB3 PCL 7 H
CB3 PCL 6 H
CB3 PCL 5 H
CB3 PCL 4 H
CB3 PCL 11 H
CB3 PCL 10 H
CB3 PCL 9 H
CB3 PCL 8 H
74LS139 E113
ENB1
CB3 SEL 30 L
74LS42 E15
NO JUMP L
CB3 INST DISP 1 H
CB3 INST DISP 1 L
SUB L
C SUB L
8881 E32
INS DISP 2 L
INS DISP 3 L
RETURN
CB2 FETCH NEXT L
CB6 μPCTRL 2 L
CB6 μPCTRL 3 L
CB6 μPCTRL 4 L
CB2 EP H
CB2 DP H
CB2 FS H
DP8 OVFLO H
DP1 Z IN H
CB7 MOVE OK H
CB7 NORMED H
74LS151 E42
CB3 TO MEM H
CB2 NZ SET H
CB7 TEMPZERO H
CB7 TEMPSGN H
CB7 FORBIDDEN H
CB7 SIGN H
74LS151 E61
CB7 FAC ZERO L
CB7 FAC SIGN H
CB2 START EX H
8881 E28
+5V
R33 470
CB3 LOAD MPC L
74LS161 E25
CB4 RESET L
CB2 LOAD BIT COUNT L
CB4 MPC CLOCK L
7437 E6
7408 E11
CB3 INCR SP L
CB3 LOAD SP L

(INSTRUCTION DECODER)(CB3)

REVISIONS
CHK | CHANGE NO. | REV.

TITLE FPP8-A CONTROL BD (CB3)
SIZE D CODE CS NUMBER M8410-0-1 REV. B
SCALE — SHEET 3 OF 7 DIST.

DEC FORM NO. DRD 138


CB1 FPICL H
INITIALIZE H
R1, 1.5K
+5V
CB4 RESET L
CB4 CLR CR H
CB3 PCL 3 H
CB3 PCL 2 H
CB4 BTP 3 H
CB1 MAINT H
CB1 FMDO L
TP4 H
TP3 H
74S151 E59 8-1 MUX
74LS161 E68 µPC 2,3
74LS161 E49
74LS161 E71 µPC 8-11
74LS161 E63
CB4 µPC 2 H
CB4 µPC 3 H
CB4 SP 3 H
CB4 SP 2 H
CB3 PCL 11 H
CB3 PCL 10 H
CB3 PCL 9 H
CB3 PCL 8 H
CB4 µPC 11 H
CB4 µPC 10 H
CB4 µPC 9 H
CB4 µPC 8 H
CB4 SP 11 H
CB4 SP 10 H
CB4 SP 9 H
CB4 SP 8 H
CB3 LOAD µPC L
CB2 BUSY L
CB4 BTP2 H
TP2 H
DP3 FP BREAK H
TP1 H
J1
CB4 TICK H
CB4 µPC CLOCK L
CB3 LOAD SP L
CB3 INCR SP L
74LS74 E45 COUNT SP
+3V
CB3 PCL 7 H
CB3 PCL 6 H
CB3 PCL 5 H
CB3 PCL 4 H
74LS161 E67 µPC 4-7
74LS161 E58
CB4 SP7 H
CB4 SP6 H
CB4 SP5 H
CB4 SP4 H
23300A2 E69 PROM 256×4
CB4 µPC 8 L
CB4 µPC 9 L
CB4 µPC 10 L
CB4 µPC 11 L
CB4 400 SEL L
CB4 0-377 SEL L
CB4 1000 SEL L
CB4 ABS 0-377 L
CB4 µPC 4 L
CB4 µPC 5 L
CB4 µPC 6 L
CB4 µPC 7 L
7474 E44 FRICK
7474 E44 FRACK
CB1 MAINT L
150 NS
100 NS
R15 5.11K
C108 47PF
R14 5.11K
C107 18PF
74123 E50 150NS
74123 E50 100NS
R26, 470
R27, 470
R28, 470
R29, 470
CB4 µPC 4 H
CB4 µPC 5 H
CB4 µPC 6 H
CB4 µPC 7 H
CB4 BRK RQ H
R32 470
74LS157 E33
74LS158 E38
CB1 FMDO L
CB3 PCL 2 H
CB3 LOAD µPC L
RESYNC H
CB1 MAINT H

(PULSE GATING & µPC) (CB4)

REVISIONS		
CHK	CHANGE NO.	REV.

TITLE FPP8-A CONTROL BD (CB4)

SIZE D | CODE CS | NUMBER M8410-0-1 | REV. B

SCALE — | SHEET 4 OF 7 | DIST.

DEC FORM NO. DRD 138

J1

+5V R32 470 — 7404 E80 — CB5 ARITH ØH
R24 470 — 7404 E80 — CB5 ARITH 1H
R31 470 — 7404 E80 — CB5 ARITH 2H
R25 470 — 7404 E80 — CB5 ARITH 3H

+5V R34 470, R35 470 — CB5 ALOC Ø L
CB5 ALOC 1 L
+5V R36 470, R37 470 — CB5 ALOC 2 L
CB5 ALOC 3 L

+5V R38 470, R39 470, R40 470, R41 470
CB5 ALOC 4 L
CB5 BRLOC Ø L
CB5 BRLOC 1 L
CB5 BRLOC 2 L

R42 470, R43 470, R44 470, +5V R45 470
CB5 BRLOC 3 L
CB5 BR LOC 4 L
CB5 BWLOC Ø L
CB5 BWLOC 1 L

+5V R46 470, R47 470
CB5 BWLOC 2 L
CB5 CARRY BIT L

R49 470, R48 470, 7404 E80
CB5 WRITE A H
CB5 WRITE B H

CB4 1ØØØ SEL L
CB4 4ØØ SEL L

23290A2 A7 E78 — PROM 256×4 — D4 D3 D2 D1 — ME1 ME2
23291A2 A7 E84
23292A2 A7 E87
23293A2 A7 E92
23294A2 A7 E97

23280A2 A7 E79
23281A2 A7 E85
23282A2 A7 E88
23283A2 A7 E93
23284A2 A7 E98

23270A2 A7 E77
23271A2 A7 E83
23272A2 A7 E86
23273A2 A7 E91
23274A2 A7 E96

CB4 ABS Ø-377 L
CB4 Ø-377 SEL L

CB4 μPC 11 L
CB4 μPC 10 L
CB4 μPC 9 L
CB4 μPC 8 L
CB4 μPC 7 L
CB4 μPC 6 L
CB4 μPC 5 L
CB4 μPC 4 L

REVISIONS		
CHK	CHANGE NO.	REV.

(CONTROL ROM) (CB5)

TITLE: FPP8-A CONTROL BD (CB5)
SIZE CODE: D CS
NUMBER: M8410-Ø-1
REV: F
SCALE: — / —
SHEET 5 OF 7
DIST.

DEC FORM NO. DRD 138

R51 470Ω
R50 470Ω
R56 470Ω
R52 470Ω
74S04 E118
J1
CBG EXTEND H
CBG DB CTRL 1 L
CBG DB CTRL 2 L
CBG READ A H
+5V
R58 470Ω
R57 470Ω
R54 470Ω
R55 470Ω
CBG B SEL L
CBG μPCTRL 4 L
CBG μP 2 IN L
CBG μP 3 IN L
R60 470Ω
R59 470Ω
R64 470Ω
R65 470Ω
CBG μPCTRL 0 L
CBG μPCTRL 1 L
CBG μPCTRL 2 L
CBG μPCTRL 3 L
CBG μP 4 IN L
CBG μP 5 IN L
CBG μP 6 IN L
CBG μP 7 IN L
23295A2 A7 E102 PROM 256×4 D4 D3 D2 D1 A7 A6 A5 A4 A3 A2 A1 A0 ME1 ME2
23296A2 A7 E105
23297A2 A7 E108
23298A2 A7 E115
23299A2 A7 E120
CBG μP 8 IN L
CBG μP 9 IN L
CBG μP 10 IN L
CBG μP 11 IN L
CB4 1000 SEL L
CB4 400 SEL L
23285A2 A7 E103
23286A2 A7 E106
23287A2 A7 E111
23288A2 A7 E116
23289A2 A7 E121
CB4 0-377 SEL L
23275A2 A7 E101
23276A2 A7 E104
23277A2 A7 E109
23278A2 A7 E114
23279A2 A7 E119
CB4 ABS 0-377 L
CB4 μPC 11 L
CB4 μPC 10 L
CB4 μPC 9 L
CB4 μPC 8 L
CB4 μPC 7 L
CB4 μPC 6 L
CB4 μPC 5 L
CB4 μPC 4 L
7417 E39
CBG BK CMD 0 L
CBG BK CMD 1 L
CBG BK CMD 2 L
NOR E74
CB6 BUSY H

REVISIONS		
CHK	CHANGE NO.	REV.

(CONTROL ROM)(CB6)

TITLE FPP8-A CONTROL BD (CB6)
SIZE/CODE D CS NUMBER M8410-0-1 REV. B
SCALE 1/1 SHEET 6 OF 7 DIST.

DEC FORM NO. DRD 138

CB7 FACZERO L

DP4 ZEROS L

DP4 SGN L

CB4 RESET L

CB4 μ PC CLOCK L

CB2 EP H

DP4 EXSGN H

CB7 FACSIGN H

CB7 EXPFL H

CB7 FORBIDDEN H

CB7 TEMPZERO H

CB7 NORMED H

CB7 TEMPSGN H

CB7 MOVE OK H *

SCRATCH L

FAC L

TEMP L

CB7 SIGN H

CB5 A LOC 3 L

CB5 A LOC 2 L

CB5 A LOC 1 L

CB5 A LOC 0 L

CB5 WRITE B H

CB5 WRITE A H

CB6 B SEL L

CB6 BW LOC 2 L

CB6 BW LOC 1 L

CB6 BW LOC 0 L

CB5 A LOC 4 L

DP4 NMD H

DP4 ONES L

FLAGS' CHART

IC	PIN#	FUNCTION
E89	4	FAC M = Ø
	7	FAC N = Ø
	10	FAC P = Ø
	13	FAC R = Ø
E99	4	FAC S = Ø
	13	SCRAT.M OR TEMP 1 = Ø
E112	4	SCRAT.N OR TEMP 2 = Ø
	7	SCRAT.P OR TEMP 3 = Ø
	10	SCRAT.R OR TEMP 4 = Ø
	13	SCRAT.S OR TEMP 5 = Ø

* IE: BITS Ø-12 OF FRACTION ARE ALL ZEROS OR ALL ONES

REVISIONS

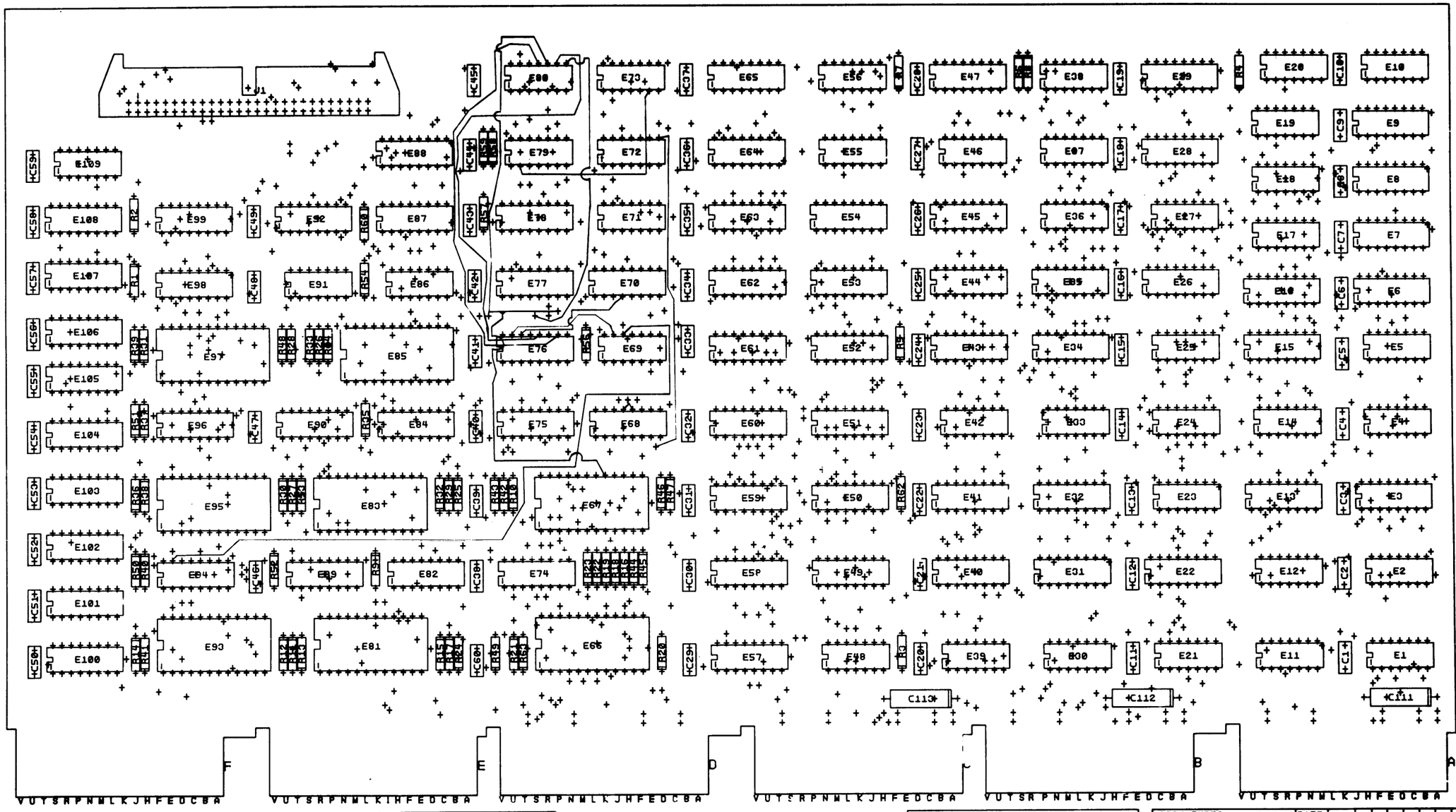
CHK	CHANGE NO.	REV.

(REGISTER FLAGS) (CB7)

TITLE	SIZE	CODE	NUMBER	REV.
FPP8-A CONTROL BD (CB7)	D	CS	M8410-Ø-1	B

SCALE — SHEET 7 OF 7 DIST.

COMPONENT SIDE VIEW



NOTES:
1. JUMPER LIST: CONNECT E73-6 TO E79-2
2. CONNECT E72-8 TO FEED THRU BETWEEN E68-7 &
3. " E66-12 & 13
4. CUT ETCH BETWEEN E68-13 & FEED THRU UNDER E68
5. " " " E79-2 & " " AS SHOWN-SI
6. " " " E71 & E72-9 AS SHOWN-SIDE 1
7. CONNECT E80-10 TO FEEDTHRU OFF E76-10, THEN FROM FEEDTHRU TO E67-17

CHK	CHANGE NO	REV

JUMPER LIST (CONT.)

1. CUT ETCH BETWEEN E76-12 & FEED THRU-SIDE 1
2. CUT ETCH BETWEEN E76-10 & FEEDTHRU-SIDE 1
3. CUT ETCH BETWEEN E76-15 & FEEDTHRU-SIDE 2
4. CUT ETCH BETWEEN E76-14 & C91 " CONNECT E80-8 TO FEEDTHRU OFF E76-12
5. CUT ETCH BETWEEN E76-15 & FEEDTHRU NEAR R56-S2
6. CONNECT E76-15 TO E69-13
7. " E69-12 TO E94-15
8. " E76-4 TO E76-14
9. " E76-12 TO E80-9
10. " E76-10 TO E80-11

ETCH REV. D
P.C. DESIGN DATA BASE REV. D

SIGNATURES	DATE
DRN.	7-23-76
CHK'D.	7-27-76
ENG.	10/21/76
PROJ.ENG.	
PROD.	8-30-76

digital

TITLE: FPP8-A DATA PATH

SCALE 2/1 | SHT. 3 OF 3 | NEXT HIGHER ASSY.

SIZE	CODE	NUMBER	REV
D	UA	M8411-0-0	C

MS# 40501

M8411-0-0 DUA

CSWABCDEFHJKLMNPRS

SIDE 1

digital

E80 E73 E65 E56 E47 E38 E28 E20 E10

J1

E108 E99 E92 E91 E88

S0 S4 S3 E89 E82 E93 E81

DUAL M8411-0-0

REVISIONS		
CHK	CHANGE NO	REV

TITLE	SIZE	CODE	NUMBER	REV
[illegible]	D	07	[illegible]	
SCALE	SHEET 2 OF 3	DIST		

DEC FORM NO DRD 137

DUA M8411-0-0 C

SIDE 2

FPPB-A DATA PATH M8411 5011695D MS40501

DUA M8411-0-0 C

REVISIONS		
CHK	CHANGE NO	REV

TITLE	SIZE	CODE	NUMBER	REV.
	D	4	-7-0	
SCALE 1	SHEET 3 OF 3	DIST		

DEC FORM N-
MAR 1/67

DIGITAL EQUIPMENT CORPORATION

PARTS LIST

MADE BY JACK MASON	CHECKED [illegible]	SECTION 1
DATE 4/7/76	DATE 5/19/76	
ENG W.K. [illegible]	PROD R.X. [illegible]	ISSUED SECTION 1
DATE 19 MAY 76	DATE 5-15-76	

NOTES:

* ANY VARIATION FOR THE .01 CAPS

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	QUANTITY/VARIATION M8411-Ø-Ø	REF DESIGNATION
1	D-MD-5011695-0-0	5011695	ETCHED CIRCUIT BOARD	1	
2		1001610 *	CAP. .Ø1 Uf,	6Ø	C1-C6Ø
3		1005306	CAP. 6.8 Uf, 35V, 1Ø% TANT	3	C111, C112, C113
4		1300316	RES. 470 OHMS, 1/4W, 5%	59	R1, R2, R5-R54, R56-R6Ø, R62, R63
5		1300391	RES. 1.5K OHMS, 1/4W, 5%	2	R3, R4
6		1909486	I.C., DEC 384	1	E39
7		1909686	I.C., DEC 74Ø4	5	E27, E55, E69, E73, E8Ø
8		1909704	I.C., DEC 314	1	E4
9		1909705	I.C., DEC 8881	6	E11, E17, E25, E3Ø, E33, E42
10		1910091	I.C., DEC 7437	1	E56
11		1910155	I.C., DEC 74Ø8	2	E12, E36
12		1910532	I.C., DEC 74SØØ	2	E86, E1Ø9
13		1910550	I.C., DEC 74S174	3	E76, E98, E1Ø8
14		1912097	I.C., DEC 74S182	1	E82
15		1911315	I.C., DEC 8234	5	E49, E51, E52, E53, E54
16		1911469	I.C., DEC 864Ø	8	E1, E2, E5, E1Ø, E14, E19, E21, E48
17		1911527	I.C., DEC 8Ø97	3	E5Ø, E89, E9Ø
18		1911711	I.C., DEC 8T1Ø	5	E3, E13, E22, E29, E31
19		1911983	I.C., DEC 74S133	1	E8
20		1912395	I.C., DEC 8136	2	E32, E41
21		1912646	I.C., DEC 74LS253	10	E57 - E64, E68, E74

E.C.O. NO.

TITLE: FPP8-A DATA PATH BD.

ASSY NO. D-UA-M8411-Ø-Ø

SHEET 1 OF 3

SIZE	CODE	NUMBER	REV.
B	PL	M8411-Ø-Ø	C

INSERTION PARTS LIST DATA BASE REV D

DIGITAL EQUIPMENT CORPORATION

PARTS LIST

MADE BY JACK MASON	CHECKED	SECTION
DATE 4/7/76	DATE 5/19/76	1
ENG	PROD R.K Allen	ISSUED SECTION
DATE 19 MAY 76	DATE 5-19-76	1

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	M8411-Ø-Ø	REF DESIGNATION
22		1912649	I.C., DEC 74LS75	2	E43, E45
23		1912695	I.C., DEC 74LS181	4	E66, E81, E83, E95
24		1912696	I.C., DEC 74LS194	3	E26, E35, E44
25		1912697	I.C., DEC 74LS174	4	E47, E87, E92, E99
26		1912741	I.C., DEC 82S112	4	E67, E85, E93, E97
27		1912786	I.C., DEC 82S21	8	E1ØØ - E1Ø7
28		1912799	I.C., DEC 74LSØØ.	3	E37, E38, E46
29		1912801	I.C., DEC 74LSØ2	2	E18, E91
30		1912807	I.C., DEC 74LS1Ø	2	E2Ø, E71
31		1912808	I.C., DEC 74LS11	1	E23
32		1912819	I.C., DEC 74LS42	1	E28
33		1912824	I.C., DEC 74LS74	2	E4, E72
34		1912829	I.C., DEC 74LS86	1	E79
35		1912834	I.C., DEC 74LS112	2	E4Ø, E7Ø
36		1912847	I.C., DFC 74LS1	1	E84
37		1912848	I.C., DEC 74LS158	6	E6, E7, E9, E15, E16, E34
38		23129A1	I.C., 32 X 8 PROM	1	E94
39		2313ØA1	I.C., 32 X 8 PROM	1	E96
40		23131A1	I.C., 32 X 8 PROM	1	E78
41		23132A1	I.C., 32 X 8 PROM	1	E77
42		23133A1	I.C., 32 X 8 PROM	1	E65

QUANTITY / VARIATION

NOTES:

E.C.O. NO.

TITLE	ASSY NO.	SIZE	CODE	NUMBER	REV.
FPP8-A DATA PATH BD.	D-UA-M8411-Ø-Ø	B	PL	M8411-Ø-Ø	C
	SHEET 2 OF 3	INSERTION PARTS LIST DATA BASE REV D			

DIGITAL EQUIPMENT CORPORATION

PARTS LIST

MADE BY JACK MASON	CHECKED	SECTION 1
DATE 4/7/76	DATE 5/19/76	
ENG M. Kitchens	PROD R. X Allen	ISSUED SECTION 1
DATE 19 MAY 76	DATE 5-25-76	

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	QUANTITY / VARIATION M8411-Ø-Ø	REF DESIGNATION
43		23134A1	I.C., 32 X 8 PROM	1	E75
44		23135A1	I.C., 32 X 8 PROM	1	E88
45		1210711-Ø2	HANDLE ASSY HEX BOARD	1	
46		9006732	EYELET #C54-7	12	
47		1209941-07	CONN, 5Ø PIN RT. ANG HEADER	1	J1

NOTES:

E.C.O. NO.

TITLE	ASSY NO.	SIZE	CODE	NUMBER	REV.
FPP8-A DATA PATH BD.	D-UA-M8411-Ø-Ø	B	PL	M8411-Ø-Ø	C
	SHEET 3 OF 3	INSERTION PARTS LIST DATA BASE REV D			

IF	C (OBUS) LOADED INTO
(CBS) WRITE A = H	A ACCUMULATOR SPECIFIED BY A LOC <Ø:4>
(CBS) WRITE B = H	TEMPORARY SPECIFIED BY BR LOC <Ø:2>
(CBG) DB CTRL 1 L = H AND DB CTRL 2 L = L	DATA BUFFER

		CBS				
	SIGNAL	ARITH Ø	ARITH 1	ARITH 2	ARITH 3	FUNCTION
	J1 PIN #	32	4Ø	38	34	
ADDRESS CALCULATION (15-BIT ARITHMETIC)		L	L	L	L	A+B+CARRY (15 BITS) TO OBUS
		L	L	L	H	(A+B+CARRY)*2 TO OBUS (2*B)
		L	L	H	L	(A+B+CARRY) LOGICALLY RIGHT ROTATED 3 PL. TO OBUS
	*	L	L	H	H	(3*B+CARRY) (15 BITS) TO OBUS (3*B)
	*	L	H	L	L	(3*B+CARRY)*2 TO OBUS (6*B)
		L	H	L	H	A+B+CARRY (12 BITS) TO OBUS
		L	H	H	L	Ø TO OBUS (15 BITS)
		L	H	H	H	A SIGN (ØØØØ OR 7777) TO OBUS
DATA MANIPULATION (12-BIT ARITHMETIC)		H	L	L	L	B TO OBUS (12 BITS)
		H	L	L	H	A+$\overline{B}$+CARRY (12 BITS) TO OBUS (A-B)
		H	L	H	L	EXP SIZE
		H	L	H	H	OVFLO RECOVERY (COMPLEMENT OF SIGN → SIGN, SHIFT RT)
		H	H	L	L	(A+B+CARRY)*2+SHIFT BIT X (12 BITS) TO OBUS
		H	H	L	H	(A+B+CARRY) ÷ 2 + SHIFT BIT X (12 BITS) TO OBUS
		H	H	H	L	DIV FINAL
		H	H	H	H	MUL/DIV STEP

* A READ MUST BE DISABLED

X SHIFT BIT IF EXTEND IS H; SIGN BIT IF EXTEND IS L AND RIGHT SHIFT; Ø IF EXTEND IS L AND LEFT SHIFT

EXTEND = LOW: CARRY BIT TO ALU, ZERO OR SIGN TO VACATED BIT POSITION

EXTEND = HIGH: CARRY FROM LAST OPERATION TO ALU, SHIFTED BIT FROM LAST OPERATION TO VACATED BIT

A LOC <Ø:4> DEFINE ONE OF 32 15-BIT ACCUMULATORS USED FOR READ AND/OR WRITE, IF READ A=1, IF READ A=Ø, A INPUT TO ADDER = Ø

BR LOC <Ø:4> DEFINE ONE OF 8 TEMPORARIES, Ø, ONE OF 3 WORDS FROM DB OR FIR, CONSTANTS AS INPUTS TO ALU.

	CBS					
SIGNAL	BR Ø	BR 1	BR 2	BR 3	BR 4	TO ALU
J1 PIN #	3Ø	37	25	2Ø	19	
	L	H	X	X	X	TEMPORARY DEFINED BY BR <2:Ø>
	L	L	H	H	H	TEMP <1:3>, DB
	L	L	H	H	L	BITS <1:3> = Ø, BITS <4:15> = DATA BUFFER
	L	L	H	L	H	IF FIR 9 = Ø : Ø, FIR <9:11> IF FIR 9 = 1 : Ø, FIR <5:11>
	L	L	H	L	L	Ø, FIR <6:8>
	L	L	L	H	H	NOT USED
	L	L	L	H	L	NOT USED
	L	L	L	L	H	BITS <1:3> OF A TO BITS, <13:15>
	L	L	L	L	L	BITS <1:3> OF A TO BITS, "103" TO BITS <4:12>
	H	H	H	H	H	Ø
	H	H	H	H	L	+1
	H	H	H	L	H	+2
	H	H	H	L	L	+3
	H	H	L	H	H	-1
	H	H	L	H	L	-2
	H	H	L	L	H	-27
	H	H	L	L	L	-73
	H	L	H	H	H	BITS <1:3> OF TEMP Ø. OTHER BITS Ø.
	H	L	H	H	L	+12
	H	L	H	L	H	-12
	H	L	H	L	L	-5
	H	L	L	H	H	-6
	H	L	L	H	L	2000
	H	L	L	L	H	4007
	H	L	L	L	L	-30

A LOC (Ø:9) ALL "H"

ADDRESS	FILE A	FILE B
Ø	FPC	TEMP
1	X Ø	TEMP 1
2	BR	TEMP 2
3	OPADD	TEMP 3
4	APTP	TEMP 4
5	TEMA	TEMP 5
6	FIELD	TEMP 6
7		TEMP 7
1Ø	FACE	
11	FAC M (FAC <Ø:11>)	
12	FAC N (FAC <12:23>)	
13	FAC P (FAC <24:35>)	
14	FAC R (FAC <36:47>)	
15	FAC S (FAC <48:59>)	
16		
17	SC	
2Ø	SCRATCH E	
21	SCRATCH M	
22	SCRATCH N	
23	SCRATCH P	
24	SCRATCH R	
25	SCRATCH S	
26	SCRATCH T	
27		
3Ø	MQE	
31	MQM	
32	MQN	
33	MQP	
34	MQR	
35	MQS	
36		
37		

← B LOC ALL "H"

← B LOC ALL "L"

A LOC (Ø:9) ALL "L"

TRIANGLE INDICATES PIN 1

J1 - CABLE SIGNALS

GND	1	2	GND
CBG EXTEND H	3	4	DPB NMD H
CBG DB CTRL 2 L	5	6	DPB ONES L
DPB ERROS L	7	8	DPB SGN L
CBG DB CTRL 1 L	9	10	DPB EXSGN H
CBG READ A H	11	12	GND
CBS BW LOC 2 L	13	14	GND
GND	15	16	CBG TICK H
GND	17	18	CBG BRK RQ H
CBS BR LOC Ø L	19	20	CBS BR LOC 3
CBS BW LOC Ø L	21	22	GND
CBS BW LOC 1 L	23	24	CBS CARRY BIT L
CBS BR LOC 2 L	25	26	DPB FP BREAK H
CBS A LOC Ø L	27	28	CBI FP IOT L
CBS A LOC 1 L	29	30	CBS BR LOC Ø L
CBS A LOC 2 L	31	32	CBS ARITH Ø H
DPI 2 IN H	33	34	CBS ARITH 3 H
CBG BK CMD Ø L	35	36	CBS WRITE B H
CBS BR LOC 1 L	37	38	CBS ARITH 2 H
CB2 CLOCK OUT H	39	40	CBS ARITH 1 H
CBS A LOC 3 L	41	42	CBS WRITE A H
DPB OVFLO H	43	44	CBG BK CMD 1 L
CB2 PROT H	45	46	CBS A LOC 4 L
CBG BK CMD 2 L	47	48	CBI DB IN IOT H
GND	49	50	GND

DB CONTROL (CBG)

DB CTRL 1 L	DB CTRL 2 L	TO DB
H	H	NO OP
H	L	DB ← Ø
L	H	DB ← ALU
L	L	DB ← MD

MODULE:

GROUND CONNECTIONS		
CONNECTOR	SIDE	FINGERS
A, B, C, D	1	C, F, N, T
	2	C, F, N, T

+5V CONNECTIONS		
CONNECTOR	SIDE	FINGER
A, B, C	2	A

REVISIONS	REV.	CHANGE NO.	CHK.

DRAWN	2/6/76	FIRST USED ON FPP8-A
CHK'D	4/19/76	
ENG.	11/24/76	TITLE: FPP8-A DATA PATH BD.
PROJ. ENG.	9/17/76	
PROD.	5-15-76	
NEXT HIGHER ASSY.		
D-UA-M8411-Ø-Ø		SIZE D, CODE CS, NUMBER M8411-Ø-1, REV. C
SCALE		
SHEET 1 OF 9		DIST.

DEC FORM NO. DRD 102-0

M8411-Ø-1 REV C

DATA Ø L (ARI) · MD Ø L AKI · DATA 1 L (ASI) · MD 1 L ALI · DATA 2 L (AUI) · MD 2 L AMI · DATA 3 L (AVI) · MD 3 L API · DATA 4 L (BRI) · MD 4 L BKI · DATA 5 L (BSI) · MD 5 L BLI · DATA 6 L (BUI) · MD 6 L EMI · DATA 7 L (BVI) · MD 7 L BPI · DATA 8 L (DRI) · MD 8 L DKI · DATA 9 L (DSI) · MD 9 L DLI · DATA 10 L (DUI) · MD 10 L DMI · DATA 11 L (DVI) · MD 11 L DPI

8640 E19 · 8640 E2 · 8640 E5 · 8640 E1 · 8640 E14 · 8640 E21

74LS158 E9 · 74LS158 E6 · 74LS158 E15

DP3 MAC (1) H · DP3 PRIORITY TEST L · 74LS00 E37

74LS133 E8 · 7404 E27 · 74LS02 E18 · DPI PRIORITY OK L

74LS158 E7 · 74LS158 E16 · 74LS158 E34

DP6 OBUS 4 L · DP6 OBUS 5 L · DP6 OBUS 6 L · DP6 OBUS 7 L

DP7 OBUS 8 L · DP7 OBUS 9 L · DP7 OBUS 10 L · DP7 OBUS 11 L

DP7 OBUS 12 L · DP7 OBUS 13 L · DP7 OBUS 14 L · DP7 OBUS 15 L

DP8 ALU TO DB EN L · DP8 DB RT EN H · DP8 DB LFT EN H · DP8 DB BIT H

74LS194 E26 · 74LS194 E35 · 74LS194 E44 · S1 S0 DSR · D0 D1 D2 D3 · R0(1) R1(1) R2(1) R3(1) · CLR CLK DSL

DP8 ZERO DB L

DPI DB0 H · DPI DB1 H · DPI DB2 H · DPI DB3 H · DPI DB4 H · DPI DB5 H · DPI DB6 H · DPI DB7 H · DPI DB8 H · DPI DB9 H · DPI DB10 H · DPI DB11 H

J1 39 · DPI Z IN H

DPI B INITIALIZE H · 7437 E56 · DPI B INITIALIZE L

DP3 MAC (1) H · 74LS02 E46 · +3V · J 74LS112 E70 K

7404 E55 · DP3 BTP3 H · J 74LS112 INT ON E40 K

INITIALIZE H · CRI · 8640 E48 · +5V · R3 1.5K

INT RQST L · CPI · 74LS02 E18 · 7408 E12 · 3 SKON+10 F H

J 74LS112 INT SER E40 K

319 E4 · 74LS11 E23 · 12 ION+RTF H

7404 E27 · I/O PAUSE L CDI · 74LS00 E46 · DPI ALLOW B-B BREAKS L

8640 E10 · DPI G PAUSE H

CB2 LOCKOUT H · CB1 FPIOT L · J1 39 28 22 17 15 16 14 12 · +5V · R1 470Ω · R2 470Ω · CB4 TICK H · 74S00 E109 · DPI FILE CLOCK L

7408 E36 · R4 1.5K +5V

+5V · R41 470 · +3V

REVISIONS		
CHK	CHANGE NO.	REV.

(DATA BUFFER) (DPI)

TITLE	SIZE	CODE	NUMBER	REV.
FPP8-A DATA PATH BD (DPI)	D	CS	M8411-Ø-1	C
SCALE —	SHEET 2 OF 9		DIST.	

DEC FORM NO. 090 138

SIZE CODE DCS M8411-Ø-1 REV C

+5V R5,47Ω

74Ø4 E69 — 74Ø8 E36

74S195 E45 FIR4-7 — 8234 E54 — 74S195 E43 FIR8-11 — 8234 E49 — 8234 E51

DP8 ENABLE FIR L — 74Ø4 E55 — 74Ø4 E55

DP2 FIR 5 H

8234 E53 — 8234 E52

DP2,5 AL BII L
DP2,5 AL BIØ L
DP2,5 AL B9 L
DP2,5 AL B8 L
DP2,5 AL B15 L
DP2,5 AL B14 L
DP2,5 AL B13 L
DP2,5 AL B12 L
DP2,5 AL A1 B7 L
DP2,5 AL B6 L
DP2,5 AL B5 L
DP2,5 AL B4 L

+3V

DPI DB Ø H
DPI DB 1 H
DPI DB 2 H
DPI DB 3 H
DPI DB 4 H
DPI DB 5 H
DPI DB 6 H
DPI DB 7 H
DPI DB 8 H
DPI DB 9 H
DPI DBIØ H
DPI DB11 H

745174 E76

+3V
DP8 B RD MSIG H
DP8 B RD LSIG H
DP8 FIR LSB L
DP8 FIR⟨6:8⟩SELECT L
DP8 DB TO ALU L
DPI B INITIALIZE L
DPI FILE CLOCK L

DP2 PROMDIS L
74Ø4 E88 — DP2 B RD MSB L
74Ø4 E88 — DP2 B RD LSB L

8881 E17 — ARI DATA Ø L
8881 E17 — AS! DATA 1 L
8881 E17 — 1Ø AUI DATA 2 L
8881 E17 — 13 AVI DATA 3 L
8881 E25 — 1 BRI DATA 4 L
8881 E25 — 4 BSI DATA 5 L
8881 E25 — 1Ø BUI DATA 6 L
8881 E25 — 13 BVI DATA 7 L
8881 E42 — 1 DRI DATA 8 L
8881 E42 — 4 DSI DATA 9 L
8881 E42 — 1Ø DUI DATA 1Ø L
8881 E42 — 13 DVI DATA 11 L

DP3 DB TO BUS 2 H
DP3 DB TO BUS 1 H

REVISIONS

CHK	CHANGE NO.	REV.

(DATA PATH INPUT MUX) (DP2)

TITLE	SIZE	CODE	NUMBER	REV.
FPP8-A DATA PATH BD (DP2)	D	CS	M8411-Ø-1	C

SCALE — SHEET 3 OF 9 — DIST.

DEC FORM 495 REV 1.00

+3V

TP1 H CD2 4 — 384 E39

DP1 PRIORITY 0 L — 74LS02 E18

TP4 H CT2 — 74S00 E86 — 74LS11 E23

DP1 B INITIALIZE H — 7404 E27

DP1 ALLOW B-B BREAKS L — 74LS00 E46

74LS174 E47: D5 R5(1), D4 R4(1), D3 R3(1), D2 R2(1), D1 F1(1), D0 R0(1), CLR, CLK

7404 E5 — 74LS00 E37

NEW BRK — 7404 E55

BRK RQST — 74S00 E37

CB4 BRK RQ H — J1 13

TP3 H CH2 — 384 E39

DP3 BTP3 H

DPI FILE CLOCK L

TS4 L CP2 — 8640 E48

74LS74 E24 MALC — 8881 E30 — BH2 MA,MS LOAD CONT L

74S00 E86 — 74S08 E36 — J1 45 CB2 PROT H

8881 E30 — BL2 BREAK CYCLE L

8881 E30 — CV1 MS,IR DISABLE L

DP3 MAC(1) H

74LS74 E24 MAC — 7404 E88

8881 E33 — BE2 BRK IN PROG L

8881 E33 — CU1 CPMA DISABLE L

74LS10 E71 — DP3 PRIORITY TEST L

8881 E33

CB6 BKCMD 2L — J1 47 — R8 470 +5V

CB6 BKCMD1 L — J1 44 — R7 470 +5V

CB6 BKCMD0 L — J1 35 — R6 470 +5V

DP2 FIR 5 H — 7404 E27

8TI0 E29: DATA ENA, D0 D1 D2 D3, R0(1) R1(1) R2(1) R3(1), OUT CONT CLK, CLR — (D3) (D2) (D1) (D0)

74LS42A E28: D3 D2 D1 D0 — F9 F8 F7 F6 F5 F4 F3 F2 F1 F0

8TI0 E22: DATA ENA — DP6 OBUS 3 L, DP6 OBUS 2 L, DP6 OBUS 1 L — R0(1) AH2 EMA 2 L; R1(1) AE2 EMA 1 L; R2(1) AD2 EMA 0 L; R3(1)

8TI0 E3: DATA ENA — DP6 OBUS 7 L, DP6 OBUS 6 L, DP6 OBUS 5 L, DP6 OBUS 4 L — R0(1) AJ1 MA 3 L; R1(1) AH1 MA 2 L; R2(1) AE1 MA 1 L; R3(1) AD1 MA 0 L

7408 E36 — 74LS00 E38 — 74LS38 E38 — DP3 DB TO BUS 2 H

74LS10 E20 — DPI G PAUSE H — 74LS00 E38 — 7437 E56 — DP3 DB TO BUS 1 H

8881 E11 — AK2 MD DIR L

J1 48 — CB1 DB IN IOT H

DP8 DB RT EN H — 7404 E27 — 74LS11 E23 — DP3 FP FETCH H

8881 E30 — BK2 BREAK DATA CONT

8TI0 E13: DATA ENA — DP7 OBUS 11 L, DP7 OBUS 10 L, DP7 OBUS 9 L, DP7 OBUS 8 L — R0(1) BJ1 MA 7 L; R1(1) BH1 MA 6 L; R2(1) BE1 MA 5 L; R3(1) BD1 MA 4 L

8TI0 E31: DATA ENA — DP7 OBUS 15 L, DP7 OBUS 14 L, DP7 OBUS 13 L, DP7 OBUS 12 L — R0(1) DJ1 MA 11 L; R1(1) DH1 MA 10 L; R2(1) DE1 MA 9 L; R3(1) DD1 MA 8 L

7404 E88 — J1 26 — DP3 FP BREAK H

8640 E48 — TS2 L CL2

FUNCTION TABLE FOR E28 DECODER

INPUT DATA				FUNCTION — OUTPUT
D0	D1	D2	D3	
X	X	X	H	NO OP
H	H	H	L	READ (F7) *
L	H	H	L	WRITE (F6) *
H	L	H	L	INCREMENT IF FIR 5=1 (F5) *
L	L	H	L	ADM (F4) *
H	H	-	L	READ, IGNORING PROT BIT (F3) **
L	H	L	L	WRITE (F2) **
H	L	L	L	NOT USED
L	L	L	L	INSTR FETCH-READ, DATA TO FIR (F0)

* IF PROT=1, BK EMA NOT LOADED
** USED FOR APT GET & PUT

REVISIONS

CHK	CHANGE NO.	REV.

TITLE: FPP8-A DATA PATH BD (DP3) (DATA BREAK CTRL)(DP3)
SIZE: D | CODE: CS | NUMBER: M8411-0-1 | REV: C
SCALE: — / — | SHEET 4 OF 9 | DIST.

REV C | DCS M8411-0-1

DP6 C BUS 1 L
DP6 OBUS 6 L
DP6 OBUS 7 L
DP4 AL A1 L
DP6 OBUS 2 L
DP6 OBUS 3 L
DP7 OBUS 8 L
DP4 AL A2 L
DP7 OBUS 9 L
DP4 AL A3 L
DP7 OBUS 12 L
DP7 OBUS 13 L
DP4 AL A6 L
DP4 AL A7 L
DP7 OBUS 14 L
DP7 OBUS 15 L
DP4 AL A8 L
DP4 AL A9 L
DP4 AL A12 L
DP4 AL A13 L
DP4 AL A14 L
DP4 AL A15 L
DP8 A READENABLE L
DP6 C BUS 4 L
DP1 FILE CLOCK L
DP6 OBUS 5 L
DP7 OBUS 10 L
DP4 AL A4 L
DP7 OBUS 11 L
DP4 AL A5 L
DP4 AL A10 L
DP4 AL A11 L
DP8 A WRT ENABLE L
DP8 A ADDRESS 4 L
DP8 A ADDRESS 3 L
DP8 A ADDRESS 2 L
DP8 A ADDRESS 1 L
DP8 A ADDRESS Ø L
DP6 OVERFLOW L
DP4 ZEROS L
DP4 ONES L
DP4 NMD H
DP4 SGN L
DP4 EXSGN H

REVISIONS		
CHK	CHANGE NO.	REV.

(REG FILES)(DP4)

TITLE	SIZE	CODE	NUMBER	REV.
FPP8-A DATA PATH BD (DP4)	D	DCS	M8411-Ø-1	C
SCALE — / — SHEET 5 OF 9	DIST.			

DP1 FILE CLOCK L → 7404 E69 → DP5 FILE CLOCK H

DP8 B WRT ENABLE L

+3V → R10 470

DP5 TEMP SIGN L

82S112 E93

+3V
DP6 OBUS 1 L
DP6 OBUS 2 L
DP6 OBUS 3 L
DP2 B RD MSB L
DP8 B RD SEL 4 L
DP8 B RD SEL 3 L
DP8 B RD SEL 2 L
DP8 B WRT SEL 2 L
DP8 B WRT SEL 1 L
DP8 B WRT SEL 0 L

82S112 E67

DP6 OBUS 4 L
DP6 OBUS 5 L
DP6 OBUS 6 L
DP6 OBUS 7 L
DP2 B RD LSB L

82S112 E85

DP7 OBUS 8 L
DP7 OBUS 9 L
DP7 OBUS 10 L
DP7 OBUS 11 L

82S112 E97

DP7 OBUS 12 L
DP7 OBUS 13 L
DP7 OBUS 14 L
DP7 OBUS 15 L

23129A1 M7(0) E94 — PROM 32×8 MK(0)

DP8 B RD SEL 0 L
DP8 B RD SEL 1 L
DP5 AL B1 L
DP5 AL B2 L
DP5 AL B3 L
DP2,5 AL B4 L
DP2,5 AL B5 L
DP2,5 AL B6 L
DP2,5 AL B7 L

DP2 PROM DIS L → 7404 E69

23130A1 M7(0) E96 — PROM 32×8 M1(0)

DP2,5 AL B8 L
DP2,5 AL B9 L
DP2,5 AL B10 L
DP2,5 AL B11 L
DP2,5 AL B12 L
DP2,5 AL B13 L
DP2,5 AL B14 L
DP2,5 AL B15 L

8097 E89

DP4 AL A3 L
DP4 AL A2 L
DP4 AL A1 L

R9 470 → +5V

+5V
C1-C60 .01μF
C111-C113 6.8μF

REVISIONS		
CHK	CHANGE NO.	REV.

(MULTI PORT RAMS & FILES)(DP5)

TITLE	SIZE	CODE	NUMBER	REV.
FPP8-A DATA PATH BD (DP5)	D	DCS	M8411-0-1	C
SCALE — SHEET 6 OF 9	DIST.			

+5V
R13 470
R12 470
R11 470
DP2,5 AL B1 L
DP2,5 AL B2 L
DP2,5 AL B3 L
74LS181 E81
DP4 AL A1 L
DP4 AL A2 L
DP4 AL A3 L
R16 470
R15 470
R14 470
DP8 ALUM15 L
ALU S0L
74LS86 E79
74S04 E86
DP7 ALU13 L
DP7 CLINKH
74LS253 CONT1 CONT0 E74
DP6 OBUS1 L
DP6 12 BIT CARRY H
DP6 OVERFLOW L
DP7 ALU15 L
DP7 ALU14 L
74LS253 E58
DP6 OBUS 3 L
DP6 OBUS 2 L
DP8 LSB SHFT SEL 0 H
DP8 MSB SHFT SEL 1 H
P2 COUT2 74S182 E82
8097 E50 DISA
DPA X3 L
+5V
R20 470
R19 470
R18 470
R17 470
DP2,5 AL B4 L
DP2,5 AL B5 L
DP2,5 AL B6 L
DP2,5 AL B7 L
74LS181 E66
DP4 AL A4 L
DP4 AL A5 L
DP4 AL A6 L
DP4,7 AL A7 L
R24 470
R23 470
R22 470
R21 470
DP8 ALU S3 L
DP8 ALU S2 L
DP8 ALU S1 L
DP8 ALU S0 L
DP8 ALU M L
DP7 LACRY YIN H
DP7 SHFBK L
74LS253 E57
DP6 OBUS 4 L
DP8 LSB SHFT SEL 0 H
DP8 MSB SHFT SEL 1 H
74LS253 E59
DP6 OBUS 6 L
DP6 OBUS 5 L
DP7 ALU8 L
74LS E60
DP6 OBUS 7 L
DP6 ALU6 L
DP6 ALU5 L
DP6 ALU4 L
DP6 ALU7 L

REVISIONS		
CHK	CHANGE NO.	REV.

(ALU & SHIFT 1) (DP6)

TITLE: FPP8-A DATA PATH BD (DP6)		SIZE/CODE: D CS	NUMBER: M8411-Ø-1	REV: C
SCALE: —	SHEET 7 OF 9	DIST.		

R28,47Ø R26 47Ø R27 47Ø R28 47Ø

DP2,5 AL B8 L
DP2,5 AL B9 L
DP2,5 AL B10 L
DP2,5 AL B11 L

DP4 AL A8 L
DP4 AL A9 L
DP4 AL A10 L
DP4 AL A11 L

R29 47Ø R30 47Ø R31 47Ø R32 47Ø +5V

8097 E50 DIS2 — DP8 X3L

DP4,7 AL A7 L

74LS181 E83 — A=B COUT G P — B3 B2 B1 BØ — A3 A2 A1 AØ — S3 S2 S1 SØ M CIN — F3 F2 F1 FØ

COUTX 74S182 E82 — CIN GØ PØ

74LS181 E95 — A=B COUT G P — B3 B2 B1 BØ — A3 A2 A1 AØ — S3 S2 S1 SØ M CIN — F3 F2 F1 FØ

R33 47Ø R34 47Ø R35 47Ø R36 47Ø +5V

DP2,5 AL B12 L
DP2,5 AL B13 L
DP2,5 AL B14 L
DP2,5 AL B15 L

DP4 AL A12 L
DP4 AL A13 L
DP4 AL A14 L
DP4 AL A15 L

R37 47Ø R38 47Ø R39 47Ø R40 47Ø +5V

8097 E90 DIS4 DIS2

DP8 ALU S3 L
DP8 ALU S2 L
DP8 ALU S1 L
DP8 ALU S0 L
DP8 ALU M L

DP8 X3L

DP7 ALU 8 L

DP6 ALU7 L
DP6 ALU6 L

74S182 E82 — G1 P1 — COUTY — DP7 LACRY YIN H

74LS253 E60 — D1 C1 B1 A1 — SI SØ CONT — F1 — DP7 O BUS 8 L

DP8 LSb SHFT SEL 1 H
DP8 LSB SHFT SEL ØH

CONT1 CONTØ — 74LS253 E61 — DØ CØ BØ AØ — F1 — DP7 O BUS 10 L — FØ — DP7 O BUS 9 L

DP6 ALU5 L

DP7 ALU 15 L
DP7 ALU 14 L
DP7 ALU 13 L

CONDI CONDØ — 74LS253 E62 — DØ CØ BØ AØ — F1 — DP7 O BUS 12 L — FØ — DP7 O BUS 11 L

CONT1 CONTØ — 74LS253 E63 — DØ CØ BØ AØ — F1 — DP7 O BUS 14 L — FØ — DP7 O BUS 13 L

COUT POUT 74S182 E82 — G3 P3

74LS157 E84 — B3 A3 B2 A2 B1 A — F3 F2 F1 FØ — STB SØ

+3V

DP8 SLINK L

DP8 CLINK H
DP8 CARRY IN H

DP8 OVF RECOVER H — 74LS86 E79

DP6 ALU4 L

DP8 MULTOP H

CONT1 CONTØ — 74LS253 E64 — DØ CØ BØ AØ — F1 — DP7 SHF BIT L — FØ — DP7 O BUS 15 L

DP7 SHFBK L

(ALU&SHIFT 2) (DP7)

REVISIONS		
CHK	CHANGE NO.	REV.

TITLE	SIZE	CODE	NUMBER	REV.
FPP8-A DATA PATH BD (DP7)	D	CS	M8411-Ø-1	C
SCALE —	SHEET 8 OF 9	DIST.		

DEC FORM NO. DOD 126

SIZE D CS DCS M8411-Ø-1 REV C

DCSM8411-0-1 C

DP8 OVFLO H
DP8 CARRY IN H
DP8 ENABLE FIR L
DP8 A READ ENABLE L
8 MUL/DIV L
DP8 FIR LSB L
DP8 FIR <6:8> SELECT L
DP8 DB TO ALU L
DP8 ALU TO DB EN H
DP8 ZERO DB L
DP8 DB RT EN H
DP8 DB LFT EN H
DP8 B WRT ENABLE L
DP8 A WRT ENABLE L
DP8 SLINK L
DP8 CLINK H
DP8 LSB SHFT SEL 1 H
DP8 LSB SHFT SEL Ø H
DP8 MSB SHFT SEL 1 H
DP8 MSB SHFT SEL Ø H
DP8 OVF RECOVER H
DP8 ALUMIS L
DP8 ALU SØ L
DP8 ALU S1 L
DP8 ALU S2 L
DP8 ALU S3 L
DP8 ALU M L
DP8 X3 L
DP8 A ADDRESS 4 L
DP8 A ADDRESS 3 L
DP8 A ADDRESS 2 L
DP8 A ADDRESS 1 L
DP8 A ADDRESS Ø L
DP8 MULTOP H
DP8 B WRT SEL 2 L
DP8 B WRT SEL 1 L
DP8 B WRT SEL Ø L
DP8 B RD SEL 4 L
DP8 B RD SEL 3 L
DP8 B RD SEL 2 L
DP8 B RD SEL 1 L
DP8 B RD SEL Ø L
DP8 B RD LSIG L
DP8 B RD MSIG L
DP5 FILE CLOCK H
DP7 SHF BIT L
DP6 12 BIT CARRY H
CB6 DB CTRL 2 L
CB6 DB CTRL 1 L
CB5 WRITE B H
CB5 WRITE A H
CB5 CARRY BIT L
DP6 OVERFLOW L
CB5 ARITH 3 H
CB5 ARITH 2 H
CB5 ARITH 1 H
CB5 ARITH Ø H
DP3 FP FETCH H
DP1 FILE CLOCK L
DP1 B INITIALIZE L
CB6 READ A H
DP6 ALU 4 L
DP1 DB11 H
DP1 DBØ H
DP5 TEMP SIGN L
DP1 DB 4 H
DP1 DB 3 H
DP1 DB 2 H
DP1 DB 1 H
DP1 DBØ H
DI4 AIN 4 L
CB5 ALOC 4 L
CB5 ALOC 3 L
CB5 ALOC 2 L
CB5 ALOC 1 L
CB5 ALOC Ø L
CB6 EXTEND H
CB5 BWLOC 2 L
CB5 BWLOC 1 L
CB5 BWLOC Ø L
CB5 BRLOC 4 L
CB5 BRLOC 3 L
CB5 BRLOC 2 L
CB5 BRLOC 1 L
CB5 BRLOC Ø L
DP8 DB BIT H
+5V
+3V

REVISIONS		
CHK	CHANGE NO.	REV.

(PIPE LINE REGISTER) (DP8)

TITLE: FPP8-A DATA PATH BD (DP8)
SIZE: D | CODE: CS | NUMBER: M8411-Ø-1 | REV: C
SCALE: — | SHEET 9 OF 9 | DIST.

DCS M8411-Ø-1 REV C

REV.	NUMBER	CODE	SIZE
	M8410-Ø-8	CS	K

FIRST USED ON OPTION MODEL	QTY.	DESCRIPTION	PART NO.	ITEM NO.
M8410		PARTS LIST		

DRN. K. Lewis	DATE 3-4-76	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
CHK'D.	DATE 5/19/76	
ENG. W. Kechner	DATE 19MAY76	TITLE CONTROL ROM TRUTH LIST
PROJ. ENG.	DATE 5/19/76	
PROD. R. J. Sullivan	DATE 5-19-76	
NEXT HIGHER ASSEMBLY B-DD-M8410-Ø		SIZE K · CODE CS · NUMBER M8410-Ø-8 · REV. *
SCALE		
SHEET 1 OF 18		DIST.

REVISIONS	REV.	CHANGE NO.	CHK

DEC FORM NO. DRB 109

ROM NUMBER 23-XXXA2-00

UPC ADDR	270 AAAA	271 BBBB	272 BCCC	273 CCDD	274 DEFH	275 JJKL	276 MMMM	277 MNPP	278 PPPP	279 PPPP	300 RRRR
0,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LHHH	HHHH	HHLL	HHHH
1,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LHHH	HHHH	HHHL	HHHH
2,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LHHH	HHHH	HHLH	HHHH
3,	HHHH	HHLL	HHHH	HHHH	HHHL	LLHL	HHHH	LHHH	HHHH	HHHH	HLLL
6,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LHHH	HHHL	HHHH	HLLL
7,	HHLH	HHLL	HLLH	HLXX	XHLH	HHHH	HHHH	LHHH	HHHH	HHHH	HLLL
10,	HHHH	HHLH	HLLH	HHXX	XHLH	HHHH	HHHH	LHHH	LLHH	HHHH	HLLL
16,	HHHH	HHHH	HHHL	HHXX	XHLH	HHHL	HHHH	LHLH	HHHH	HHHH	HLLL
17,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LHLL	LLHH	HHHH	HLLL
4,	HHHH	HHHH	HHHH	HLXX	XHLH	HHHL	HHHH	HHHH	HHHH	HHHH	HLLL
5,	HHHH	XXXX	XHHH	HHXX	XHHH	LLHH	HHLL	LHHH	HHHH	HHHH	HLHH
10,	HHHH	HHHL	LHHH	HLXX	XHLH	HHHL	HHHH	HHHH	HHHH	HHHH	LLLH
11,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	HHHH	HHHH	HHHH	HLLL
12,	HHHH	XXXX	XHHH	HHXX	XHHH	LLHH	HHLL	LHHH	HHHH	HHHH	HLHH
14,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHLH	LHHH	HHHH	HLHH	LLLH
15,	HHHH	HHHH	HLLH	HHXX	XHLH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHL
20,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHHH	HHHH	HHHH	HHHH	LLLH
21,	LHLH	HLHH	HHLL	LLXX	XHHH	HHHL	HHHH	HHHH	HHHH	HLLL	HLLL
22,	HHHH	HHHH	HHHH	HLXX	XHLH	LLHL	HHHH	HHHH	HHHH	HHHH	HLHH
23,	HHHH	XXXX	XLLH	LHHH	HHHL	HHHH	HHHL	HHHH	HHHH	HHHH	HLHL
24,	HHHH	HHHH	HHHH	HLXX	XHLH	HHHL	HHHH	LHHH	HHHL	HHHL	LLLH
25,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHL
26,	HHHH	HHHH	LLLH	LLXX	XHHH	HHHL	HHLH	LHHH	HLHH	HLHL	LLLH
27,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHHH	HHHH	HHHH	HHHH	LLLH
30,	HHHH	HHHH	HHHH	HLXX	XHLH	HHHL	HHHH	HHHH	HHHH	HHHH	HLLL
31,	HHHH	XXXX	XHHH	HHXX	XHHH	LLHH	HLLH	HHHH	HHHL	HLHL	HLHH
32,	HHHH	HHHH	HLLH	HHXX	XHLH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHL
34,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHLH	LHHH	HHHH	HLHH	LLLH
35,	HHHH	HHHH	LLLH	HHXX	XHLH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHL
36,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHLH	LHHH	HHHH	HLHH	LLLH
37,	HHHH	HHHL	HLLH	HHXX	XHLH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHL
40,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHLH	LHHH	HHHH	HLHH	LLLH
41,	HHHH	HHHH	LLLH	LHHH	HHHL	HHHL	HHHH	HHHH	HHHH	HHHH	LLLH
42,	HHHH	HHHL	LLHH	HHXX	XHLH	HHHH	HHHH	HHHH	HHHH	HHHL	HLLL
43,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHH
44,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHLH	LHHH	HHHH	HLHH	LLLH
45,	HHHH	HHHH	LLLH	LHHH	HHHL	HHHL	HHHH	HHHH	HHHH	HHHH	LLLH
46,	HHHH	HHHL	LLHH	HHXX	XHLH	HHHH	HHHH	HHHH	HHHH	HHLL	HLLL
47,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHH
50,	HHHH	HHHH	HHHH	HHXX	XHHH	HHHL	HHLH	LHHH	HHHH	HLHH	LLLH
51,	HHHH	HHHL	LLLH	HHXX	XHLH	HHHH	HHHH	HHHH	HHHH	HHHH	HLHL
52,	HHHH	HHHL	LHHH	HHXX	XHHH	HLHL	HHHH	HHHH	HHHH	HHHH	LLLH
53,	LHHH	HHHH	HLLL	LLXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHL	HLLL
54,	HHHH	HHHH	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH	HLHH
55,	HHHH	HHHL	LHHH	HLXX	XHLH	HHHL	HHHH	HHHH	HHHH	HHHH	LLLH

H=HIGH, L=LOW, X="DON'T CARE"
(X IS ENCODED IN ROM AS L)

COLUMN	SIGNALS DRIVEN (TO J1)
A	C85 ARITH 0 H--C85 ARITH 3 H (INVERTED)
B	C85 ALOC 0 L--C85 ALOC 4 L
C	C85 BRLOC 0 L--C85 BRLOC 4 L
D	C85 BWLOC 0 L--C85 BWLOC 2 L
E	C85 CARRY BIT L
F	C85 WRITE A H (INVERTED)
H	C85 WRITE B H (INVERTED)
J	C86 DB CTRL 1 L--C86 DB CTRL 2 L
K	C86 EXTEND H (INVERTED)
L	C86 READ A H (INVERTED)

COLUMN	SIGNALS DRIVEN (USED INTERNALLY)
M	C86 UPCTRL 0 L--C86 UPCTRL4 L
N	C86 B SEL L
P	C86 UP2 IN L--C86 UP11 IN L
R	(USED ON DWG. CB4 TO CONTROL PULSE GATING AND TO GENERATE CB4 BRK RQ H

K-CS-M8410-0-0

ROM NUMBER 23-XXXX2-00								
270	271	272	273	274	275	276	277	278	279	300
UPC ADDR	AAAA	BBBB	CCCC	DDDD	EEEE	FFFF	JJJJ	KKKK	MMPP	PPPP	PPPP	RRRR
55,	MMMM	LMMM	MLMM	MMMM	MMMM	MMML	MMML	MMML	MMML	MMML	MMML	MLLL
56,	MMMM	MLMM	MMMM	MMMM	MMMM	LLLL	LMMM	MMMM	MMMM	MMMM	MMML	MLMM
57,	MMMM	MMMM	MMMM	MMMM	MMMM	MMLM	LMMM	MMMM	MMMM	MMML	MMML	MLLM
60,	MMMM	MMMM	MMMM	MMMM	MMMM	MMLL	LMMM	MMMM	MMMM	MMML	MMML	MLML
61,	MMMM	XXXX	XLLM	MMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
62,	MMMM	MMMM	MLLL	LMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
63,	MMMM	MMMM	MMMM	MMMM	MMMM	MMMM	LMMM	MMMM	MMMM	MMML	MMML	MLMM
64,	MMMM	MMMM	MMMM	MMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
65,	MMMM	MMML	LLMM	MMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
66,	MMMM	MMMM	MLXX	LMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
67,	MMMM	MMMM	MLXX	LLMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
70,	MMMM	XXXX	XLLM	MLLL	LMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
71,	MMMM	MMMM	LLLM	LMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
72,	MMMM	MMML	MLLM	MMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
73,	MMMM	MMML	MLLM	MMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
74,	MMMM	MMML	MMMM	MMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
75,	MMMM	XXXX	XMMM	MMMM	MMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
76,	MMMM	MMMM	MMMM	MLXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
77,	MMMM	MMML	LLLM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
100,	MMMM	MMML	MLMM	MMXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
101,	MMMM	MMML	MLMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
102,	MMML	XXXX	XLLM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
103,	MMML	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
104,	MMMM	MMMM	MMMM	MLXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
105,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
106,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
107,	MMMM	MMML	LLMM	MLXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
110,	MMMM	MMML	LLMM	MLXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
111,	MMMM	MMMM	LMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
112,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
113,	MMMM	XXXX	XMMM	MLXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
114,	MMMM	MMMM	MMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
115,	MMMM	XXXX	XLLM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
116,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
117,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
120,	MMMM	MMMM	MMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
121,	MMMM	MMMM	MMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
122,	MLMM	XXXX	XLLM	MLXX	XLML	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
123,	MMMM	MMMM	MMMM	MLXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
124,	MMMM	MMMM	MMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
125,	MMLL	XXXX	XLLM	MLXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
126,	MMMM	MMMM	MMMM	MLXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
130,	MMMM	MMMM	MMMM	MMXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
132,	MMMM	MMMM	LMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL
133,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLM
134,	MMMM	MMML	MLMM	MMXX	XLLM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLMM
135,	MMMM	MMML	LLMM	MLXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLML
136,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMMM	MMML	MMML	MLLL

K-CS-M8410-0-0

ROM NUMBER 23-XXXX2-00								
270	271	272	273	274	275	276	277	278	279	300
UPC ADDR	AAAA	BBBB	CCCC	DDDD	EEEE	FFFF	JJKL	MMMM	MNPP	PPPP	PPPP	RRRR
137,	MLLM	XXXX	XLLM	MLMM	MMMM	LMMM	MMMM	MMML	MMML	MMML	MMML	MLML
140,	MMMM	MMMM	MMMM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
141,	MMMM	MLMM	MMML	LMMM	MMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
142,	MMML	XXXX	XLLM	MLML	MMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
143,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MLLM	MMML	LMML	MMML	MLMM
144,	MMMM	MMML	LLMM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
145,	MLMM	XXXX	XLLM	MMML	MMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
146,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MLLM	MMML	LMML	MMML	MLMM
147,	MMMM	MMML	MLMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
150,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
151,	MMMM	MMML	LLMM	MLXX	XMMM	MMML	LMMM	MLLM	MMML	MLMM	MMML	MLLM
152,	MMLL	XXXX	XLLM	MLML	MMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLMM
153,	MMLL	XXXX	XLLM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
154,	MMLM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
155,	MMLM	XXXX	XLLM	MLMM	MMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
156,	MMMM	MMML	LLMM	LMMM	MMXX	XMLL	LMMM	MMMM	MMML	MMML	MMML	MLMM
157,	MMMM	MMLM	MMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
160,	MMMM	MMMM	MMML	MLLL	LMXX	XMMM	MMML	LMMM	MMML	MMML	MMML	MLLL
161,	LMMM	MMMM	MMML	LMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
162,	MMMM	MMLM	MMML	MLLM	MMXX	XMMM	MMML	LMMM	MMML	MMML	MMML	MLMM
163,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
164,	MMMM	MMLM	MMML	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
165,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MLLM	MMML	MLML	MMML	MLLM
166,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLMM
167,	MMLM	MMLM	LMLM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
170,	MMMM	MMLM	MMML	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
171,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
172,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLMM
200,	MMMM	MMML	LLMM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
201,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
202,	MMMM	MLMM	MLLM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
203,	MMMM	MLMM	LLLM	MLXX	XLLM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLMM
204,	MMMM	MMML	LMMM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
205,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
206,	MMMM	XXXX	XMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
207,	MMMM	MLML	MLLM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLMM
210,	MMMM	MMML	LMMM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
211,	MMMM	MMML	LLMM	LMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
212,	MMMM	MMML	LMMM	LMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
213,	MMMM	MLLM	MLLM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLMM
214,	MMMM	MMML	LMMM	LLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML
215,	MMMM	MMML	LLLM	LMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLL
216,	MMMM	MLML	MLLM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLLM
220,	MMMM	MLMM	MMMM	MMXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLMM
221,	MMMM	MMML	LLMM	MLXX	XMMM	MMML	LMMM	MMMM	MMML	MMML	MMML	MLML

ROM NUMBER 23-XXXA2-04

UPC	270	271	272	273	274	275	276	277	278	279	300
ADDR	AAAA	BBBB	BCCC	CCDD	DEFH	JJKL	MMMM	MNPP	PPPP	PPPP	RRRR
222,	MMMH	MMML	LMMM	MLXX	XMLM	MMMH	MLML	LMMH	LMMH	LMML	MLLM
223,	MMMH	MMML	LLMM	MLXX	XMLM	MMMH	LMML	MMMH	LMMH	LMML	MLLM
224,	MMMH	MLMM	LMMM	MHXX	XMMM	MMMH	MLML	LMMH	MMMH	MMML	MLLL
225,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	MLMM	LMMH	LMML	MLLM	MLMM
226,	MMMH	MMML	LMMM	MLMM	MMRL	MLML	MMMH	MMMH	MMMH	LLLM	LLLM
227,	MMMH	MLML	MMMH	MHXX	XMMM	LMML	MMMH	MMMH	MMMH	MMML	MLLL
230,	MMMH	MMLM	LLMM	MLXX	XMLM	MLML	MMMH	LMMH	MMML	MLML	MLMM
231,	MMMH	MLML	LMMM	MHXX	XMMM	LMML	MMLM	LMMH	LLLL	LMMM	MLML
232,	MMMH	MLLM	MMMH	MHXX	XMMM	LMML	MMLM	LMMH	LLLL	LMMM	MLML
233,	MMMH	MLLM	LMMM	MHXX	XMMM	LMML	MMLM	LMMH	LLLL	LMMM	MLML
234,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	LLLL	LMMH	MMMH	MMMH	MLML
235,	MMMH	MMML	LLMM	MHXX	XMLM	MMMH	MMMH	MMMH	MMMH	MMMH	MLLL
236,	MMMH	XXXX	XMMM	MHXX	XMLM	LLMM	MMLL	LMMH	MMMH	MMMH	MLMM
240,	MMMH	MMML	LLMM	MLXX	XMLM	MMMH	MMMH	MMMH	MMMH	MMMH	MLLL
241,	MLLM	XXXX	XMMM	MMML	LMML	LLMM	MLMM	MMMH	LMLM	MMML	MLMM
242,	MMMH	XXXX	XLLM	MLLL	MMML	MMMH	MMLM	LMMH	MMMH	LMMM	MLML
243,	MMMH	XXXX	XLLM	MLMM	LMML	MMMH	MMLM	LMMH	MMMH	LMMM	MLML
244,	MMMH	XXXX	XLLM	MLML	MMML	MMMH	MLML	MMML	LLLL	MLML	MLML
245,	MMMH	MMML	LMMM	MLXX	XMMM	MMML	MMLM	LMMH	MMMH	LMML	LLLM
246,	MMMH	XXXX	XLLM	MLML	LMML	MMMH	MMLM	LMMH	MMMH	MLML	MLML
247,	MMMH	MMML	LMMM	LMXX	XMMM	MMML	MMLM	LMMH	MMMH	LMML	LLLM
250,	MMMH	XXXX	XLLM	MLLM	MMML	MMMH	MMMH	MMMH	MMMH	MMMH	MLML
251,	MMMH	MMML	LMMM	LLXX	XMMM	MMML	MMLM	LMMH	MMMH	LMML	LLLM
252,	MMMH	XXXX	XLLM	MLLM	LMML	MMMH	MMMH	LMLM	MMML	LLLL	MLML
253,	MMMH	MMML	LMMM	MHXX	XMMM	MLML	MMMH	MMMH	MMMH	MMMH	LLLM
254,	MMMH	LMML	MMMH	MHXX	XMMM	LMML	MMMH	LLLL	LMMM	MMML	MLLL
255,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	MMMH	MMMH	LMML	MLMM	MLMM
256,	MMMH	MMML	LLMM	MLXX	XMLM	MMMH	MMMH	MMMH	MMML	MMMH	MLLL
257,	MLML	MLML	MLMM	MLXX	XMLM	LMMM	MMMH	LMLM	MMML	MMMH	MLMM
260,	MMMH	MMML	LLMM	MLXX	XMLM	MMMH	MMMH	MMMH	MMMH	MMMH	MLLL
261,	MMMH	XXXX	XMMM	MHXX	XMMM	LLMM	MLMM	MMMH	LMML	MLLL	MLLM
262,	MMMH	XXXX	XLLM	MLLL	MMML	MMMH	MMLM	LMMH	MMMH	MMMH	MLML
263,	MMMH	XXXX	XLLM	MLMM	MMML	MMMH	MMMH	MMMH	MMMH	MMMH	MLML
264,	MMMH	MMML	LMMM	MLXX	XMLM	MMML	MMMH	MMMH	MMMH	MMMH	LLLM
265,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	MMMH	MMMH	MMMH	MMMH	MLLL
266,	MMMH	XXXX	XMMM	MHXX	XMMM	LLMM	MLMM	LMMH	MMMH	MMMH	MLMM
267,	LMML	XXXX	XLLM	MLML	MLML	LMMM	MMMH	MMLM	LMLH	MMML	MLML
270,	MMMH	XXXX	XLLM	MLMM	LMML	MMMH	MMMH	MMMH	MMMH	MMMH	MLML
271,	MMMH	MMML	LMMM	LLXX	XMMM	MMML	MMLM	LMMH	MMMH	LMML	LLLM
272,	LMML	XXXX	XLLM	MLLM	LLML	LMMH	MMMH	MMMH	MMMH	MMMH	MLML
273,	MMMH	MMML	LMMM	LMXX	XMMH	MMML	MMLM	LMMH	MMMH	LMML	LLLM
274,	LMML	XXXX	XLLM	MLLM	MLML	LMLM	MMMH	MMMH	MMMH	MMMH	MLML
275,	MMMH	MMML	LMMM	MLXX	XMMM	MMML	MMLM	LMMH	MMMH	LMML	LLLM
276,	LMML	XXXX	XLLM	MLML	LMML	LMLM	MMMH	LMLM	MMML	MLML	MLML
277,	MMMH	MMLH	MMMH	MHXX	XMMM	MMMH	LLLL	LMMH	MMMH	MMMH	LLLM

ROM NUMBER 23-XXXA2-04

UPC	270	271	272	273	274	275	276	277	278	279	300
ADDR	AAAA	BBBB	BCCC	CCDD	DEFH	JJKL	MMMM	MNPP	PPPP	PPPP	RRRR
301,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	MMMH	MMMH	MMMH	MLMM	MLLL
302,	MMMH	XXXX	XMMM	MHXX	XMMM	LLMM	MLMM	LMMH	LLLM	LLLL	MLMM
303,	MMMH	MMLM	LLLM	MLXX	XMLM	MMMH	MMLM	LMMH	LLML	MMML	MLML
304,	MMMH	MMML	MLLM	MMML	LMLL	MMMH	MMLM	LMMH	LLML	MMML	MLML
305,	MMMH	MMML	LLLM	MHXX	XMLM	MMMH	MMMH	LMMH	LLML	MMML	MLML
306,	MMMH	MMML	MLLM	MHXX	XMLM	MMMH	MMMH	MMMH	MMMH	MMMH	MLML
307,	MMMH	MMLM	MMMH	LHXX	XMLM	MMML	MMLM	LMMH	LLML	MMML	LLLM
310,	MMMH	MLMM	MLLM	MLXX	XMLM	MMMH	MMLM	LMMH	LLML	MMML	MLML
311,	MMMH	MLMM	LLLM	MLXX	XMLM	MMMH	MMLM	LMMH	LLML	MMML	MLML
312,	MMMH	MLML	MLLM	MLXX	XMLM	MMMH	MLML	MMMH	MLMM	MLLL	MLML
313,	MMMH	MMML	LMMM	MLXX	XMLM	MMML	MMLM	LMMH	MMMH	LMML	LLLM
314,	MMMH	MLML	LLLM	MLXX	XMLM	MMMH	MMLM	LMMH	MMMH	LMMH	MLML
315,	MMMH	MLLM	MLLM	MLXX	XMLM	MMMH	MMMH	LMMH	MMMH	MLLL	MLML
316,	MMMH	MLLM	LLLM	MLXX	XMLM	MMMH	MMMH	LMMH	LLML	MMML	MLML
317,	MMMH	MMLM	LLLM	MLXX	XMLM	MMMH	MMLM	LMMH	LLML	MMML	MLML
320,	MMMH	MMMH	MLLM	MMLL	LMLL	MMMH	MMMH	LMMH	MLMM	MLLL	MLML
321,	MMMH	MMLM	MMMH	MLMM	LMLL	MMML	MMMH	MMMH	MMMH	MMMH	LLLM
322,	MMLM	MMLM	LMMH	MMMH	MMLL	MMML	MMMH	MMMH	MMMH	MLLL	MLMM
323,	MMMH	MMML	LLMM	MLXX	XMLM	LLMM	MMLL	LMMH	MMMH	MMMH	MLMM
324,	MMMH	MMLM	MMMH	MHXX	XMMM	MLML	MMMH	MMMH	MMMH	MMMH	LLLM
325,	MMMH	MLML	MMMH	MHXX	XMMM	LMML	MMMH	MMMH	MMMH	MMML	MLLL
326,	MMMH	MLLM	LMMH	MHXX	XMMM	LMML	MLML	MMMH	LLML	LLML	MLMM
327,	MMMH	MMLM	MMMH	LLXX	XMLM	MMML	MMLM	LMMH	MLLL	LMML	LLLM
330,	MMMH	MLLM	MMMH	MHXX	XMMM	LMML	MMLM	LMMH	MLLL	LMMH	MLML
331,	MMMH	MLML	LMMH	MHXX	XMMM	LMML	MMMH	MMMH	MMMH	MMMH	MLML
332,	MMMH	MMLM	MMML	MHXX	XMLM	MMML	MMMH	MMMH	MMMH	MMMH	LLLM
333,	MMMH	MMLM	MMML	MHXX	XMLM	MMML	MMMH	MMMH	MMMH	MMMH	MLLL
334,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	MMMH	MMMH	MMMH	MMMH	MLMM
335,	MMMH	MLMM	LMMH	MHXX	XMMM	LMML	MMMH	MMLM	LMMH	MMMH	MLML
336,	MMMH	MMLM	MMML	MHXX	XMLM	MMML	MMMH	MMMH	MMMH	MMMH	LLLM
337,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	MMMH	MMMH	MMMH	MLML	MLLL
340,	MMMH	MLMM	MMMH	MHXX	XMMM	LMML	MMMH	MMMH	MMMH	MMMH	MLMM
341,	MMMH	MMLM	MMML	MHXX	XMLM	MMML	MMMH	MMMH	MMMH	MLML	LLLM
342,	MMMH	MMLM	MMLM	LLXX	XMLM	MMML	MMMH	MMMH	MMMH	MLML	MLLL
343,	MLLM	MMLM	LMMH	MHXX	XMLM	MMMH	MMMH	MMMH	MMMH	MMMH	MLMM
344,	MMMH	MMMH	MMMH	MMML	LMML	MMLM	MLLL	LMMH	MLML	MLML	MLML
345,	MMMH	MMMH	LMMH	MMMH	MMML	LMML	MMLM	MLLL	LMMH	MLML	MLML
346,	MMMH	MMML	MMMH	MMMH	MMML	LMML	MMLM	LMMH	MLLL	MLML	MLML
347,	MMMH	MMML	LMMH	MMMH	MMML	LMML	MMLM	LMMH	MLLL	MLML	MLML
350,	MMMH	MMLM	LMMH	MHXX	XMMM	LMML	MMMH	MMMH	MMMH	MMMH	MLML
351,	MMMH	MMLM	MMLM	LLXX	XLLM	MMML	MMLM	LMMH	MLLL	MLLM	LLLM
352,	MMMH	XXXX	XMMM	MHXX	XMMM	MMMH	MMMH	LMMH	MMMH	MMML	MLML
353,	MMMH	MMML	LMML	MHXX	XMMM	MLML	LMLM	MMMH	LLLL	LMLL	LLLM
354,	MMMH	LMMM	LMMH	MHXX	XMMM	MMMH	LMML	MMMH	MMMH	MMML	MLLL
355,	MMMH	XXXX	XMMM	MHXX	XMMM	MLMM	MMMH	MMMH	LLLL	MMMH	MLMM

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UPC ADDR	270 AAAA	271 BBBB	272 BCCC	273 CCDD	274 DEFH	275 JJKL	276 MMMM	277 MNPP	278 PPPP	279 PPPP	300 RRRR
356,	HHHH	LHHH	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH	HLHL
357,	HHHH	HHHL	LHHL	HLXX	XHHH	HHHL	HHLH	LHHH	LLLL	LHHL	LLLH
360,	HHHH	LHHL	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH	HLHL
361,	HHHH	HHHL	LHHH	HHHH	HHHL	LHHL	HHHH	HHHH	HHHH	HHHH	LLLH
362,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	HHHH	HHHH	HHHL	HLLL
363,	HHHH	HHLH	LLHH	HHXX	XHLH	HHHH	HLHL	HHHH	HHHL	HLHL	HLHH
364,	HHHH	LHHL	LHHH	HHXX	XHHH	LHHL	HHLH	LHHH	LLLL	LHHH	HLHL
365,	HHHH	LHLH	HHHH	HHXX	XHHH	LHHL	HHLH	LHHH	LLLL	LHHH	HLHL
366,	HHHH	LHLH	LHHH	HHXX	XHHH	LHHL	HHLH	LHHH	LLLL	LHHH	HLHL
367,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLL	LHHH	HHHH	HHHH	HLHL
370,	HHHH	HHLH	LHHH	HLXX	XHLH	HHHL	HHHH	HHHH	HHHH	HHHH	LLLH
371,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	HHHH	HHHH	HHHL	HLLL
372,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLL	LHHH	HHHH	HHHH	HLHH
373,	HLLH	XXXX	XHHH	HHXX	XHHH	LHHH	HHHH	HHHH	HHHH	HHHL	HLLL
374,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HLHH	HHHH	LLLL	HHHH	HLHH
375,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LHHH	LLLH	LLLL	HLHL

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UPC ADDR	260 AAAA	261 BBBB	262 BCCC	263 CCDD	264 DEFH	265 JJKL	266 MMMM	267 MNPP	268 PPPP	269 PPPP
1000,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HLHL	LLHH	HLLL	HHHH
1001,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLHH	LLHL	HLHH
1002,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLH	LHHH
1003,	HHHH	HHHH	HHLH	HHXX	XHLH	LHHL	LLLL	LLHH	HHHH	HHHH
1004,	HHHH	HLHH	LHHH	HHHH	HHHL	HHHL	HHLH	LLLH	LLHL	LLHH
1005,	HHLH	HLHH	LHHH	HHHH	HHHL	LHHL	HHHH	LLLH	HHLH	HHLL
1006,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLL	LHHH
1007,	HHHH	HLLL	LLHH	HHXX	XHLH	LHHH	HHHH	LLLH	HHLL	LHHH
1010,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLL	LLHH
1011,	HHLH	HLHH	LHHH	HHHH	HHHL	LHHL	HHHH	LLLH	HHHH	HHLL
1012,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLH	LLHH	HHHH	HHHL
1013,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLL	LLHH	HHHH	HHHH
1014,	HHHH	HLHL	HHHH	HHHH	HHHL	HHHL	HHHH	HLHH	HHHH	HHHH
1015,	HLHL	HHHH	HLHH	HHXX	XHLH	LHHH	HHHH	LLLH	HHHH	LHHL
1016,	HHHH	HLHH	LHLL	HLXX	XHLH	HHHH	HLHH	HLLH	HHLH	LLHL
1017,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLH	LLLH
1020,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HLHH	LLLH	HHHH	LHLL
1021,	HLLH	HLHL	LHHH	HHXX	XHLH	LHHH	LLLH	LLHH	HHHH	HHLH
1022,	HLLH	HLLH	HHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1023,	HLLH	HLLH	LHHH	HHXX	XHLH	LHHH	LLLL	LLHH	HHHH	HHHH
1024,	HHHH	HHHH	HHHH	HLXX	XHLH	HHHL	HHHH	LLLH	HHHH	HHHH
1025,	LHHL	XXXX	XLHH	HLHL	HLHL	LHLH	HHHH	LHLH	HHHL	HLLL
1026,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLH	LHHH
1027,	LHHL	XXXX	XLHH	HHHH	LLHL	LHLH	HHLH	HHHH	HHHH	HHHH
1030,	LHHL	XXXX	XHHL	LHLL	LLHL	HHHH	HHHH	HLHH	HHHH	HHHH
1031,	HHHH	HLLL	LLHL	LLXX	XHLH	LHHH	HLHH	HLLH	HHLL	HLHH
1032,	LHHL	HLHH	HLHL	LLHH	HLHL	LHHL	HHHH	HLHH	HHHH	HHHH
1033,	HHHH	HLHH	HLHL	LLXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1034,	LHHL	HLLL	LLHH	HHLL	LLLL	LHHH	HHHH	LLLH	HHLL	HLHH

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UPC ADDR	280 AAAA	281 BBBB	282 BCCC	283 CCDD	284 DEFH	285 JJKL	286 MMMM	287 MNPP	288 PPPP	289 PPPP
1035,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLH	HLLH	HLLL
1036,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLL	LHLL
1037,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	HHHH	HHHH	HHHH
1040,	HHHH	HHHH	LLLH	LHHH	HHHL	HHHL	HHHH	HLHH	HHHH	HHHH
1041,	HHHH	HHHL	LLHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1042,	HHHH	HLHH	HHHL	LHLL	LHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1043,	HHHH	HLLL	LLHL	LLXX	XHLH	LHHH	HHLH	LLLH	LLHL	LHLL
1044,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HLHH	HLHH	LHLH	LHLL
1045,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLHH	LLLH	HHLL	HHLH
1046,	LHHL	HLLL	LLHL	LLXX	XLLH	LHHH	HHLH	LLLH	HLLH	HLLL
1047,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLHH	LHLH	LHLL
1050,	HLLH	HLHH	LHHH	HHXX	XHLH	LHHH	HLHH	HLLH	HHLH	LLHL
1051,	HLLH	HLHH	HHHH	HHXX	XHLH	LHHH	HLHL	HLLH	HHLH	LLHL
1052,	HLLH	HLHL	LHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1053,	HLLH	HLLH	HHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1054,	HLLH	HLLH	LHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1055,	HLLH	HLHL	HHHH	HHXX	XHLH	LHHH	LLLL	LLHH	HHHH	HHHH
1056,	HLHL	HLHH	HHHH	HLXX	XHLH	LHHH	HLHL	HLLH	HHLH	LLHL
1057,	HLLH	HLHL	LHHH	HHXX	XHLH	LHHH	HHHH	LLLH	HHLH	LHLL
1060,	HHHH	HLHH	LLHH	HLXX	XHLH	LHHH	LLLH	LLHH	HHHH	HHHL
1061,	LHHH	HLHH	LLLL	LHXX	XHLH	LHHL	LLLL	LLHH	HHHH	HHHH
1062,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLH	HHHH	HHHH
1063,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLH	HLLL
1064,	HHHH	HLHH	LHHH	HHHH	HHHL	LHHL	HHLH	LLLH	LLHL	LLHH
1065,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLHH	LLLH	HHHL	LLHL
1066,	LHHL	HLLL	LLHL	LLXX	XLLH	LHHH	HHLH	LLLH	LHLL	HHHH
1067,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLH	HHLL	LHLL
1070,	HHHH	HLHH	LHHH	HHHH	HHHL	LHHL	HHLH	LLLH	LLHL	LLHH
1071,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLL	HHLH	HLLH
1072,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLH	HLHL	LHLL
1073,	HHHH	LHHH	LHHH	HHHH	HHHL	LHHL	HHHH	LLLH	LLLH	LHHH
1074,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HLHL	HLLH	HLHH	HHHL
1075,	HHHH	HLHH	LHHH	HHHH	HHHL	LHHL	HHLH	LLLH	LLHL	LLHH
1076,	HHHH	HLHH	HHHH	HHHH	HHHL	LHHL	LLLH	LLHH	HHHH	HHHH
1077,	HHHH	HLLL	LLHH	HHXX	XHLH	LHHH	HHLH	LLLH	LHLH	HHHH
1100,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLL	HHLH	HLLL
1101,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLH	LLHH	HHHH	HHHH
1102,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LLLL	LLHH	HHHH	HHHH
1103,	HLLL	HLHL	HHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1104,	HHHH	HLHH	LLHH	HHXX	XHLH	LHHH	HLHH	HLLH	HHHH	LHLL
1105,	LHHL	HLLL	LHHL	LHXX	XLLH	LHHH	HLHL	HLLH	HHLL	LHHH
1106,	HLLH	HLHL	LHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1107,	HLLH	HLLH	HHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1110,	HLLH	HLLH	LHHH	HHXX	XHLH	LHHH	HHHH	LLLH	HHLL	LHHH
1111,	HLLH	LHHH	LHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH

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UPC ADDR	280 AAAA	281 BBBB	282 BCCC	283 CCDD	284 DEFM	285 JJKL	286 MMMM	287 MNPP	288 PPPP	289 PPPP
1112,	MLLM	LMML	MMMM	MMXX	XMLM	LMMM	MLML	MLLM	MLMM	LLLM
1113,	MLLM	LMLM	MMMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1114,	MLLM	LMLM	LMMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1115,	MLLM	LMLL	MMMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1116,	MLLM	LMML	LMMM	MMXX	XMLM	LMMM	MMLL	LLMM	MMMM	MMMM
1117,	MMMM	LLMM	MLML	LLXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1120,	MMMM	LMLM	MMMM	MMLL	LMML	LMML	MMMM	MLMM	MMMM	MMMM
1121,	MMMM	LMLL	MLML	LLXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1122,	MMMM	LMML	LMMM	MMLL	LMML	LMML	MMMM	MLMM	MMMM	MMMM
1123,	MMMM	LMLM	LLML	LLXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1124,	MMMM	LMML	MMMM	MMLL	LMML	LMML	MMMM	MLMM	MMMM	MMMM
1125,	MMMM	LMLM	MLML	LLXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1126,	MMMM	LMMM	LMMM	MMLL	LMML	LMML	MMMM	MLMM	MMMM	MMMM
1127,	MMMM	LMML	LLML	LLXX	XMLM	LMMM	LLLL	MLMM	MMMM	MMMM
1130,	LLML	LMMM	LMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM
1131,	MLLL	LMMM	LMMM	MMLL	LMLL	LMML	MMMM	MLMM	MMMM	MMMM
1132,	MMMM	LMML	MLML	LLXX	XMLM	LMMM	MMLL	LLMM	MMMM	MMMM
1133,	MMMM	LMML	LMMM	MMMM	MMML	LMML	MLML	MLLM	MLLM	MLLM
1134,	MMMM	LMLM	LMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1135,	LMML	LMLM	LLMM	MMXX	XLLM	LMMM	MMMM	MLMM	MMMM	MMMM
1136,	MMMM	LMLM	MMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1137,	LMML	LMLM	MLMM	MMXX	XLLM	LMLM	MMMM	MLMM	MMMM	MMMM
1140,	MMMM	LMML	LMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1141,	LMML	LMML	LLMM	MMXX	XLLM	LMLM	MMMM	MLMM	MMMM	MMMM
1142,	MMMM	LMML	MMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1143,	LMML	LMML	MLMM	MMXX	XLLM	LMLM	MMMM	MLMM	MMMM	MMMM
1144,	MMMM	LMMM	LMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1145,	LMML	LMMM	LLMM	MMXX	XLLM	LMLM	MMLL	LLMM	MMMM	MMMM
1146,	LMML	LMML	LLMM	MMXX	XLLM	LMMM	MMMM	LLLM	MLLM	MMLM
1147,	MMMM	MLLL	LMMM	MMXX	XMLM	LMML	MMMM	MLMM	MMMM	MMMM
1150,	MLML	MLLL	LMLM	MLXX	XMLM	LMML	MMMM	MLMM	MMMM	MMMM
1151,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LLMM	LLLM	MLLM	LMLL
1152,	MLML	MLLL	LMLM	LMXX	XMLM	LMML	MMLL	LLMM	MMMM	MMMM
1153,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LLMM	LLLM	MLLL	MLML
1154,	MLML	MLLL	LMLM	LMXX	XMLM	LMML	MMMM	MLMM	MMMM	MMMM
1155,	MLML	MLLL	LMMM	MLXX	XMLM	LMML	MLMM	LLLM	MLLL	MMLM
1156,	LLMM	LMML	LMMM	MMXX	XMLM	LMML	MMMM	MLMM	MMMM	MMMM
1157,	LLMM	LMML	MMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MM..	MMMM
1160,	LLMM	LMMM	LMMM	MMXX	XMLM	LMLL	LLMM	LLLM	MLLM	LLML
1161,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MMLL	LLMM	MMMM	MMMM
1162,	LLMM	LMLM	LMMM	MMXX	XMLM	LMML	MMMM	MLMM	MMMM	MMMM
1163,	LLMM	LMLM	MMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM
1164,	LLMM	LMML	LMMM	MMXX	XMLM	LMLL	MMMM	LLLM	MLLM	LLLL
1165,	MMMM	LMML	MMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1166,	MMMM	LMMM	LLMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM

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UPC ADDR	280 AAAA	281 BBBB	282 BCCC	283 CCDD	284 DEFM	285 JJKL	286 MMMM	287 MNPP	288 PPPP	289 PPPP
1167,	MMMM	LMML	LMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1170,	MMMM	LMML	MLMM	MMXX	XMLM	LMMM	MLML	MLLM	MLLL	LLLM
1171,	MMMM	LMLM	MMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1172,	MMMM	LMML	LLMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1173,	MMMM	LMLM	LMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1174,	MMMM	LMLM	MLMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1175,	MLLM	LMLM	LMMM	MMXX	XMLM	LMMM	MMMM	LLLM	MLLM	LMMM
1176,	MLLM	LMML	LMMM	MMXX	XMLM	LMMM	MMMM	LLLM	MLLM	LMMM
1177,	MMMM	LMMM	LMMM	MMXX	XMMM	LMML	MLMM	MLLM	LMLM	MMMM
1200,	MMMM	LMML	MMMM	MMXX	XMMM	LMML	LMLM	MLLM	LMLM	MMMM
1201,	MMMM	LMML	LMMM	MMXX	XMMM	LMML	MLLL	MLLM	LMMM	LLML
1202,	MMMM	LMLM	MMMM	MMXX	XMMM	LMML	MLLL	LLLM	LMML	LLLL
1203,	MMMM	LMLM	LMMM	MMXX	XMMM	LMML	MLML	MLLM	LMML	LMLM
1204,	LLMM	LMLL	MMMM	MMXX	XMLM	LMML	MLLL	LLLM	LMMM	LMLL
1205,	LLMM	LMLM	LMMM	MMXX	XMLM	LMLL	LLML	LLMM	MMMM	MMMM
1206,	LLMM	LMLM	MMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM
1207,	LLMM	LMML	LMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM
1210,	LLMM	LMML	MMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM
1211,	LLMM	LMMM	LMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM
1212,	MLML	MLLL	LMML	MMXX	XMLM	LMML	MMMM	LLLM	LMMM	MLMM
1213,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LLML	LLMM	MMMM	MMMM
1214,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MMMM	LLLM	LMML	LLLL
1215,	MLML	MLLL	LMLM	LMXX	XMLM	LMML	MMMM	MLMM	MMMM	MMMM
1216,	MMMM	LMML	MMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1217,	MMMM	LMMM	LLMM	MMXX	XMLM	LMMM	LLML	LLMM	MMMM	MMMM
1220,	MMMM	LMML	LMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1221,	MMMM	LMML	MLMM	MMXX	XMLM	LMMM	MLML	MLLM	LMML	LMML
1222,	MMMM	LMLM	MMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1223,	MMMM	LMML	LLMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1224,	MMMM	LMLM	LMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1225,	MMMM	LMLM	MLMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1226,	MMMM	LMLL	MMMM	MMMM	MMML	LMML	MMMM	MLMM	MMMM	MMMM
1227,	MMMM	LMLM	LLMM	MMXX	XMLM	LMMM	MMMM	MLMM	MMMM	MMMM
1230,	MLLM	LMLL	MMMM	MMXX	XMLM	LMMM	MMMM	LLLM	LMMM	MMML
1231,	MLLM	LMML	LMMM	MMXX	XMLM	LMMM	MMMM	LLLM	LMMM	MMML
1232,	LLMM	LMML	LMMM	MMXX	XMLM	LMML	MLLL	LLLM	LMML	LLLM
1233,	LLMM	LMML	MMMM	MMXX	XMLM	LMLL	LLML	LLMM	MMMM	MMMM
1234,	LLMM	LMMM	LMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM
1235,	MLML	MLLL	LMML	MMXX	XMLM	LMML	MMMM	LLLM	LMML	LMLM
1236,	LLML	LMML	LMMM	MMXX	XMLM	LMLL	LLML	LLMM	MMMM	MMMM
1237,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LMLL	MLLM	LMLM	LMMM
1240,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MLMM	LLLM	LMLM	MLLL
1241,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LMLM	LLLM	LMLM	LLMM
1242,	MLML	LMML	LMLL	LMXX	XLMM	LMML	MMMM	MLMM	MMMM	MMMM
1243,	MLML	LMML	MMMM	MMXX	XMLM	LMLL	MMMM	MLMM	MMMM	MMMM

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UPC	280	281	282	283	284	285	286	287	288	289
ADDR	AAAA	BBBB	BCCC	CCDD	DEFH	JJKL	MMMM	MNPP	PPPP	PPPP
1244,	HLHL	LMMM	LMMM	MMXX	XMLH	LMLL	LMLH	HLLH	LMLH	LLML
1245,	HLLH	LMML	LMMM	MMXX	XMLH	LMMM	HLMM	HLLH	LMLH	HLLL
1246,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LMLL	HLLL	MMMM	HLML
1247,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MMLL	LLMM	MMMM	MMMM
1250,	HLHL	HLLL	LMMM	HLXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1251,	LLHL	LMMM	LMMM	MMXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1252,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LLML	LLMM	MMMM	MMMM
1253,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MMLL	LLMM	MMMM	MMMM
1254,	HLHL	LMML	LMLL	LMXX	XMMM	LMML	MMMM	LLLH	LMLH	MMLL
1255,	HLLH	LMML	LMMM	MMXX	XMLH	LMMM	HLMM	HLLH	LMLH	HLLL
1256,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LMLH	HLLH	LMLH	HLLL
1257,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MMMM	LLLH	LMMM	MMML
1260,	MMMM	HLLL	LMMM	MMXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1261,	HLHL	HLLL	LMLH	HLXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1262,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LLMM	LLLH	LMLL	HLMM
1263,	HLHL	HLLL	LMLH	LMXX	XMLH	LMML	MMLL	LLMM	MMMM	MMMM
1264,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	LLMM	LLLH	LLMM	MMMM
1265,	HLHL	HLLL	LMLH	LMXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1266,	HLHL	HLLL	LMMM	HLXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1267,	LLHL	LMMM	LMMM	MMXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1270,	LLHL	LMML	MMMM	MMXX	XMLH	LMLL	HLMM	LLLH	LMLL	LMLL
1271,	LLHL	LMML	LMMM	MMXX	XMLH	LMLL	LLMM	LLLH	LMLL	HLLH
1272,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MMLL	LLMM	MMMM	MMMM
1273,	LLHL	LMML	LMMM	MMXX	XMLH	LMLL	MMMM	HLMM	MMMM	MMMM
1274,	LLHL	LMLH	MMMM	MMXX	XMLH	LMLL	MMMM	HLMM	MMMM	MMMM
1275,	LLHL	LMLH	LMMM	MMXX	XMLH	LMLL	LLMM	LLLH	LMLL	HLLH
1276,	LLHL	LMLL	MMMM	MMXX	XMLH	LMLL	MMMM	HLMM	MMMM	MMMM
1277,	MMMM	XXXX	XMMM	MMXX	XMMM	MMMM	MMLL	LLMM	MMMM	MMMM
1300,	MMMM	LMML	MMMM	MMMM	MMML	LMML	HLHL	HLLH	LLMM	LMMM
1301,	MMMM	LMLH	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1302,	MMMM	LMLL	HLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1303,	MMMM	LMLH	MMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1304,	MMMM	LMLH	LLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1305,	MMMM	LMML	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1306,	MMMM	LMLH	HLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1307,	MMMM	LMML	MMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1310,	MMMM	LMML	LLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1311,	MMMM	LMMM	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1312,	MMMM	LMML	HLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1313,	HLLL	LMMM	LMMM	MMXX	XMLH	LMML	MMMM	LLLH	LMLL	MMML
1314,	MMMM	LMMM	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1315,	MMMM	LMMM	LLMM	HLXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1316,	MMMM	XXXX	XLMM	MMMM	LMML	LMMM	HLHL	HLLH	LLML	LMMM
1317,	MMMM	LMML	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1320,	MMMM	LMML	LLMM	LLXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM

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UPC	280	281	282	283	284	285	286	287	288	289
ADDR	AAAA	BBBB	BCCC	CCDD	DEFH	JJKL	MMMM	MNPP	PPPP	PPPP
1321,	MMMM	XXXX	XLMM	MMML	LMML	LMMM	MMMM	HLMM	MMMM	MMMM
1322,	MMMM	LMLH	MMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1323,	MMMM	LMLH	HLHL	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1324,	MMMM	XXXX	XLMM	MMLH	MMML	LMMM	MMMM	HLMM	MMMM	MMMM
1325,	MMMM	LMLH	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1326,	MMMM	LMLH	LLHL	HLXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1327,	MMMM	XXXX	XLMM	MMLH	LMML	LMMM	MMMM	HLMM	MMMM	MMMM
1330,	MMMM	LMML	MMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1331,	MMMM	LMML	HLMM	LMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1332,	MMMM	XXXX	XLMM	MMML	MMML	LMMM	MMLL	LLMM	MMMM	MMMM
1333,	MMMM	HLMM	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1334,	MMMM	LMML	LLMM	MMXX	XMLH	LMMM	HLHL	HLLH	LLLH	HLLH
1335,	HLLH	LMLL	MMMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1336,	MMMM	HLHL	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1337,	MMMM	LMML	LLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1340,	MMMM	HLLH	MMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1341,	MMMM	LMLH	HLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1342,	MMMM	HLLH	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1343,	MMMM	LMLH	LLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1344,	MMMM	HLHL	MMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1345,	MMMM	LMML	HLMM	MMXX	XMLH	LMMM	MMLL	LLMM	MMMM	MMMM
1346,	HLLH	LMML	LMMM	MMXX	XMLH	LMMM	MMMM	LLLH	LLLH	HLMM
1347,	MMMM	LMMM	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1350,	MMMM	HLMM	LLMM	MMXX	XMLH	LMMM	HLHL	HLLH	LLLH	LLLL
1351,	MMMM	LMML	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1352,	MMMM	HLHL	LLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1353,	MMMM	LMLH	MMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1354,	MMMM	HLLH	HLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1355,	MMMM	LMLH	LMMM	MMMM	MMML	LMML	MMMM	HLMM	MMMM	MMMM
1356,	MMMM	HLLH	LLMM	MMXX	XMLH	LMMM	MMMM	HLMM	MMMM	MMMM
1357,	MMMM	LMML	MMMM	MMMM	MMML	LMML	LMLH	HLLH	LLLL	MMML
1360,	MMMM	HLHL	HLMM	MMXX	XMLH	LMMM	LLLL	LLMM	MMMM	MMMM
1361,	MMMM	HLHL	HLMM	MMXX	XMLH	LMMM	HLMM	HLLH	MMMM	LMLL
1362,	HLLH	HLMM	MMMM	MMLL	LMLL	LMMM	LLLL	LLMM	MMMM	MMMM

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UPC	290	291	292	293	294	295	296	297	298	299
ADDR	AAAA	BBBB	BCCC	CCDD	DEFH	JJKL	MMMM	MNPP	PPPP	PPPP
1400,	MMMM	HLMM	LMMM	MMMM	MMML	LMML	MMMM	LMLL	MMMM	LMLL
1401,	MMMM	HLMM	MMMM	MMLL	LMML	LMML	MMMM	LMLL	MMML	MMLM
1402,	MMMM	HLMM	MMMM	MMLL	LMML	LMML	MMMM	LLLL	MMLL	LMLM
1403,	LLMM	HLMM	LMMM	MMXX	XMMM	LMML	MMMM	LMLL	HLLL	MMLM
1404,	MMMM	XXXX	XLMM	LMXX	XMMM	LMMM	MMMM	LLLL	HLLH	MMMM
1405,	HLHL	HLLL	LMMM	HLXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1406,	LMLL	LMMM	LMMM	MMXX	XMLH	LMML	MMMM	HLMM	MMMM	MMMM
1407,	LLHL	LMML	MMMM	MMXX	XMLH	LMLL	LLML	LLMM	MMMM	MMMM
1410,	LLHL	LMML	LMMM	MMXX	XMLH	LMLL	HLHL	HLLH	LMLH	MMMM
1411,	LLHL	LMLH	MMMM	MMXX	XMLH	LMLL	MMMM	HLMM	MMMM	MMMM
1412,	LLHL	LMLH	LMMM	MMXX	XMLH	LMLL	MMLL	LLMM	MMMM	MMMM

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UPC	290	291	292	293	294	295	296	297	298	299
ADDR	AAAA	BBBB	BCCC	CCDD	DEFM	JJKL	MMMM	NNPP	PPPP	PPPP
1470,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HMLM	LLLL	HHHH	MLML
1471,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HMLM	LLLL	HHHH	MLML
1472,	HHHH	HMLM	LLHM	MLXX	XMLM	LHHH	LMLM	MLLL	HMLM	LHHM
1473,	MLML	HMLM	LHHM	HHHH	HHML	LHML	LHML	LLLL	HMLM	LHHM
1474,	HHHH	MLLL	LLHL	LLXX	XMLM	LHHH	HMLM	LLLM	MLHM	LHML
1475,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	MLML	MLLL	MLML	LMLM
1476,	HHHH	HMLM	LHHH	HHXX	XHHM	LHHM	LLLL	HLHM	HHHH	HHHH
1477,	LLLL	LMHL	LLHM	LMLL	LMHL	HHHL	MLLL	LLLM	MLLM	LLLM
1500,	HHHH	LMHL	HHHH	MMLL	LMHL	LMHL	HMLM	LLLM	MLML	LMHL
1501,	HHHH	MLLM	HHHH	HHXX	XHHM	HHHH	MLHM	HHHH	HHHH	HHHH
1502,	LLLL	LMLM	LLHM	MMLL	LMLM	HMHL	MMLL	LLLM	LLLM	MLLL
1503,	HHHH	LMHL	LHHH	MMLL	LMHL	LMHL	MMLL	LLLL	HMLM	LMHL
1504,	HHHH	MLML	HHHH	HHXX	XHHM	LHHL	HHHH	MLHM	HHHH	HHHH
1505,	LLLL	LMLM	LLHL	MMLL	LMLM	HMHL	MMLL	LLLL	MLLM	LLHM
1506,	HHHH	LMHL	HHHH	MMLL	LMHL	LMHL	MMLM	LLLL	HMLL	LMHL
1507,	HHHH	MLML	HHHH	HHXX	XHHM	LHHL	HHHH	MLHM	HHHH	HHHH
1510,	LLLL	LMLL	MLML	LLLL	LMLM	HMHL	MMLL	MLLL	MLLM	LMLL
1511,	HHHH	LMLM	LHHH	MMLL	LMHL	LMHL	MMLM	LLLM	MLHM	LLLL
1512,	HHHH	MLHM	LHHH	HHXX	XHHM	LHHL	HHHH	HLHM	HHHH	HHHH
1513,	LLLL	LLHM	HHHH	MMLL	LMLM	HMHL	MMLL	MLLL	MLLM	LMLM
1514,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LMHL	MLLL	MLML	MMLM
1515,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	MMLM	LLLM	MLLL	LLLL
1516,	MLML	MLLL	LLHL	LHXX	XMLM	LHHL	HHHH	MLHM	HHHH	HHHH
1517,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	MLHM	MLLL	HMHL	HHHH
1520,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LLHL	LLHM	HHHH	HHHH
1521,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	LLLL	HMLM	MLLL
1522,	LMHL	LMLM	LLHL	MLXX	XLLM	LMHL	MMLM	LLLL	MLML	MLML
1523,	LMHL	LMLM	LLHL	MLXX	XLLM	LMHL	MMLM	LLLL	MLML	MLML
1524,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	LLLL	MLHM	LLHL
1525,	LMHL	LMLM	MLML	HHXX	XLLM	LMLL	MLHM	LLLL	MLML	LHHM
1526,	LMHL	LMHL	MLHM	LHXX	XLLM	LMHL	HHHH	MLHM	HHHH	HHHH
1527,	LMHL	LMHH	LLHM	MLXX	XLLM	LMLL	MMLL	LLLM	HHHH	HHHH
1530,	LMHL	LMHL	LLHM	LLXX	XLLM	LMLL	HHHH	MLHM	HHHH	HHHH
1531,	LMHL	LMHL	MLHM	LHXX	XLLM	LMLL	MMMM	LLLL	MLML	MLLL
1532,	HHHH	MLML	HHHH	HHXX	XHHM	LMHL	LLLL	MLHM	HHHH	HHHH
1533,	LLLL	LMHL	LLHM	LMLL	LMLM	HMHL	MMLL	MLLL	MLLM	LLLM
1534,	HHHH	LMHL	HHHH	MMLL	LMHL	LMHL	MMLM	LLLL	MLML	MLML
1535,	HHHH	MLHM	LHHH	HHXX	XHHM	LMHL	HHHH	MLHM	HHHH	HHHH
1536,	LLLL	LMLM	HHHH	MMLL	LMLM	HMHL	MMLL	MLLL	MLLM	LLML
1537,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	LLLL	MLHM	LLHM
1540,	HHHH	MMLM	LLHM	MLXX	XMLM	LHHH	LMLM	MLLL	MMLM	LHHM
1541,	MLLL	MMLM	LHHH	HHHH	HMML	LMHL	LMHL	LLLL	MMLM	LHHM
1542,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	MMLM	LLLM	MLML	LMHL
1543,	HHHH	MLHM	LHHH	HHXX	XHHM	LMHL	LLLL	MLHM	HHHH	HHHH
1544,	LLLL	LMHL	MLHM	LHLL	LMLM	HMLL	MMLL	MLLL	MLLL	HMHH

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UPC	290	291	292	293	294	295	296	297	298	299
ADDR	AAAA	BBBB	BCCC	CCDD	DEFM	JJKL	MMMM	NNPP	PPPP	PPPP
1413,	HHHH	LMHH	LLHM	HHXX	XMLM	LMHH	MMLM	LLLM	LLLM	MLHM
1414,	MLML	LMHL	MLHM	LHXX	XMLM	LMHL	MMMM	MLHM	HHHH	HHHH
1415,	MLML	LMHH	LLHM	MLXX	XMLM	LMLL	MMMM	MLHM	HHHH	HHHH
1416,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LLHL	LLHM	HHHH	HHHH
1417,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LLHL	LLHM	HHHH	HHHH
1420,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	MLHM	HHHH	HHHH
1421,	HHHH	LMHH	LMHH	MMML	LMHL	HHHH	MLHM	LLLM	LLLM	LMHH
1422,	HHHH	MLLL	LLHL	LLXX	XMLM	LMHH	LMLM	MLLL	HMLM	LMLL
1423,	HHHH	LMHH	MLHL	LLXX	XMLM	LMHH	MMLM	LLLM	LLHL	LMLL
1424,	LMHL	MLLL	LLHL	LMLL	LLLL	LMHL	LMHL	LLLL	HMLM	LLHL
1425,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	MLHM	HHHH	HHHH
1426,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	MLLM	LLLL	HMLM	LLLL
1427,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LLHM	LLLM	HMLL	LMLM
1430,	LMHL	MLLL	LLHL	LLXX	XLLM	LMHH	MMMM	MLHM	HHHH	HHHH
1431,	LMHL	MLLL	LMLL	LLXX	XLLM	LMHL	MLHL	MLLL	HMHL	LMLL
1432,	LMHL	MLLL	LMHL	LLXX	XLHM	LMHL	HHHH	MLHM	HHHH	HHHH
1433,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	MLHM	HHHH	HHHH
1434,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LMLL	LLLL	HMLL	HHHH
1435,	HHHH	MLHM	HHHH	HMHL	LMHL	HHHH	MMLM	LLLM	LLHM	LLHM
1436,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	MMLL	MLLL	MLLL	LMLL
1437,	MLML	LMLM	LLHL	MLXX	XMLM	LMHL	MLML	MLLL	HMLL	MMLL
1440,	MLML	LMLM	LLHL	HHXX	XMLM	LMHL	HHHH	MLHM	HHHH	HHHH
1441,	MLML	LMHL	LLHM	LLXX	XMLM	LMLL	HHHH	MLHM	HHHH	HHHH
1442,	MLML	LMHL	MLHM	LHXX	XMLM	LMLL	HHHH	MLHM	HHHH	HHHH
1443,	MLML	LMHH	LLHM	MLXX	XMLM	LMLL	HHHH	MLHM	HHHH	HHHH
1444,	HHHH	MLLL	LLHL	LHXX	XMLM	LMHH	HHHH	MLLM	HHHH	HHHH
1445,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	MLLM	LLLL	HMLL	LMHH
1446,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HMLM	LLLL	MLLL	LLLL
1447,	HHHH	MLLL	LMHH	MMLL	LMHL	LMHH	LLHM	HMLL	HMLM	LMHL
1450,	MLLM	XXXX	XHHH	HHXX	XHHM	LMHH	MMLM	LLLM	MLHM	LMHL
1451,	HHHH	LMHH	LLHM	MLXX	XMLM	LMHH	MMHH	HLHM	HHHH	HHHH
1452,	HHHH	MLHM	MLHL	LLXX	XMLM	LMHH	MMLM	LLLM	LLLM	MLLL
1453,	HHHH	MLHM	LHHH	HHML	LMLM	MMLL	LLLM	LLHM	LLHL	LLHM
1454,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	LLLL	HMLM	MLLM
1455,	HHHH	MLLL	LLHL	LHXX	XMLM	LMHH	MMLM	LLLM	LLHM	LLHM
1456,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LLHM	LLLL	MLLM	MLLM
1457,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	LLHM	LLLL	HMLL	LLHL
1460,	HHHH	MLHM	HHHH	HMHL	LMHL	HHHH	MLHM	HHHH	HHHH	HHHH
1461,	HHHH	MLLL	LLHL	LLXX	XMLM	LMHH	MMHH	LLLL	HMLM	MLLM
1462,	LMHL	MLLL	LMLL	LLXX	XLHM	LMHL	MLML	MLLL	MMLL	MLHM
1463,	LMHL	MLLL	LMHL	LLXX	XLLM	LMHH	MMHH	MLHM	HHHH	HHHH
1464,	HHHH	XXXX	XHHH	HHXX	XHHM	MMHH	MMHH	MLHM	HHHH	HHHH
1465,	HHHH	XXXX	XHHH	HHXX	XHHM	MMHH	LMLL	LLLL	HMLL	LMLL
1466,	HHHH	XXXX	XHHH	HHXX	XHHM	HHHH	HHHH	LLLL	HMLL	LLLM
1467,	MLML	LMHL	MLHM	LHXX	XMLM	LMHL	HHHH	LLLL	HMLM	MMLL

ROM NUMBER 23-XXXA2-04

UPC	296	291	292	293	294	295	296	297	298	299
ADDR	AAAA	BBBB	BCCC	CCDD	DEFH	JJKL	MMMM	MNPP	PPPP	PPPP

1022,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	HLLL	LLLL
1023,	LHHL	HLLL	LLHL	LHXX	XLLH	LHHL	HHHH	LLLL	HLHH	LLLL
1024,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	HLHL	LHLL
1025,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLL	LLLH	HLLL	LHLL
1026,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	HLHH	HHHH
1027,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHHL	HHHH

1028,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHHL	HLLH
1029,	HHHH	LHHL	HLHH	HHXX	XHLH	LHHH	LHLH	LLLL	LHLH	HLHH
1030,	HHHH	LHLH	HLLH	HHXX	XHLH	LHHH	HHHL	LHHL	HLHH	HHHH
1031,	LLLL	LHLH	LLHH	HLLL	LHLH	HHHL	HHLL	HLLH	LHLL	HHLH
1032,	LLLL	LHLH	LLHH	HLLL	LHLH	HHHL	HHLH	LLLL	HLHH	HLHH
1033,	HHHH	LLHH	HLLH	HLXX	XHLH	HHHH	HHLL	LLLH	HLHH	HHHH
1034,	LLLL	LHLH	LLHH	LLLL	LHLH	HHHL	HHLL	HLLH	LHLL	HLHH
1035,	HHHH	LLHH	HLLH	HLXX	XHLH	HHHH	HHLH	LLLL	HLHH	HHHH
1036,	LLLL	LHLH	LLHH	LLLL	LHLH	HHHL	HHLH	LLLL	LHLL	HLHH
1037,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLH	LLLL	LHLL	HLHH
1040,	LLHL	HLLH	XLLH	HLXX	XHHH	LHHH	HHHH	HLHH	HHHH	HHHH
1041,	LLHL	LHHL	LHHH	HHXX	XHLH	HHHL	HHLL	HLHH	HHHH	HHHH
1042,	LLHL	XXXX	XLLH	HLXX	XHHH	LHHH	HHHH	HLHH	HHHH	HHHH
1043,	LLHL	LHHL	LHHH	HHXX	XHLH	LHHL	HHHH	LLLL	LHHH	LLHH
1044,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LHLL	LLLL	LHLH	LHHH
1045,	HHHH	XXXX	XHLL	LHXX	XLHH	LHHH	HLHH	HLLL	LLLH	LLLH
1046,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	HLLH	HLHL
1047,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLL	LLLH	LHLL	HHLH
1050,	HHHH	XXXX	XHLL	LHXX	XLHH	LHHH	HLHH	HLLL	LHLH	LLLH
1051,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LHLL	HLLL	LHLH	LLHH
1052,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LHHL	LHHL	HLHH	HHHH
1053,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHLH	HLHL
1054,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHLH	LHHH
1055,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHHL	HHLL
1056,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HLHH	HLHH	HHHH	HHHH
1057,	HHHH	HHLH	LHHH	HHXX	XHHH	LHHL	LLLH	LLHH	HHHH	HHHH
1060,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LLLL	LHHL	HHHL
1061,	LLLL	LHLH	LLHL	HLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1062,	LLLL	LHLH	HLHL	HHLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1063,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1064,	LLLL	LHHL	HLHH	LHLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1065,	LLLL	LHHH	LLHH	HLLL	LHLH	HHHL	HHHH	LLLH	HHHH	HHHH

1066,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHHL	HHHL
1067,	HHHH	HLLL	LHHH	HHLL	HHHL	LHHL	HHLH	LLLH	LLHH	LLHH
1070,	HHHH	HLHH	HHHH	HHHL	LHHL	LHHL	LLLH	HHLH	LHHH	LHHH
1071,	HHHH	HLLL	LLHH	HHXX	XHLH	LHHH	HHLH	LLLH	LLHL	LHLL
1072,	HHHH	XXXX	XLHH	HLLL	LHHL	LHHH	LHHL	HLLL	LHHL	HLHH
1073,	HLHL	HHLH	LLHH	HLXX	XHLH	LHHL	LLLH	HLHH	HHHH	HHHH
1074,	HHHH	XXXX	XHHH	HLXX	XHHH	LHHH	HLLL	HLHL	LHHL	LHLL
1075,	LLLL	LHHL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1076,	HHHH	LLHH	HLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1077,	LLLL	LHLL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL

1042,	HHHH	LHHL	HHHH	HHXX	XHHH	LHHL	LLLL	LLHH	HHHH	HHHH
1040,	HHHH	HLHL	HHHH	HHXX	XHHH	LHHL	LLLL	LLHH	HHHH	HHHH
1047,	LLLL	LHHL	HLHH	LHLL	LHLH	HHHL	HHLL	HLLL	LLHH	HHHH
1050,	HHHH	LHHL	LHHH	HHXX	XHLH	LHLL	HHHH	HLHH	HHHH	HHHH
1051,	LLHL	LHHL	HHHH	HHXX	XHLH	LHLL	HHHH	LLLL	HLHH	LLHH
1052,	LLLL	LHLL	HLHL	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1053,	LLLL	LHHL	HLHH	LLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1054,	LLLL	LHLH	HLHH	LLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1055,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1056,	LLLL	LHLH	HLLH	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1057,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1060,	LLHL	HHLH	LHHH	HHXX	XHLH	LHHH	HLHH	HLLL	LHLH	LLLH
1061,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LHLL	LLLL	LHLH	LHHH
1062,	HHHH	HLLL	LHHH	HHHL	LHHL	LHHL	HHLH	LLLH	LLHH	LLHH
1063,	HHHH	HLHH	HHHH	HHHL	LHHL	LHHL	LLLH	HHLH	LHHH	LHHH
1064,	HLLH	LHHL	HHHH	HHXX	XHLH	LHHH	HLHH	HHLL	HLLL	LHHH
1065,	HLLH	LHHL	LHHH	HHXX	XHLH	LHHH	HLHH	HHLL	HLLL	LHHH
1066,	LLHL	HHLH	LHHH	HHXX	XHLH	LHLH	LHLH	HHLL	LHLL	HHLH
1067,	LLLL	LHHL	HLHH	LHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1070,	HHHH	HLHH	HHHH	HHHL	LHHL	LHHL	LLLH	HHLH	LHHH	LHHH
1071,	HHHH	HLLL	LLHH	HHXX	XHLH	LHHH	HHLH	LLLH	LLHL	LHLL
1072,	HHHH	XXXX	XLHH	HLLL	LHHL	LHHH	LHHL	HLLL	LHHL	HLHH
1073,	HLHL	HHLH	LLHH	HLXX	XHLH	LHHL	LLLH	HLHH	HHHH	HHHH
1074,	HHHH	XXXX	XHHH	HLXX	XHHH	LHHH	HLLL	HLHL	LHHL	LHLL
1075,	LLLL	LHHL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1076,	HHHH	LLHH	HLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1077,	LLLL	LHLL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL

1021,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LHLL	LLLL	LHHL	HLLH
1020,	HHHH	LHHL	HLHH	HHXX	XHLH	LHHH	LHLH	LLLL	LHLH	HLHH
1017,	HHHH	HHLH	LHHH	HHXX	XHHH	LHHL	HHHH	HLHH	HHHH	HHHH
1016,	HHHH	LLHH	LHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1015,	HHHH	LHHH	LLHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1014,	HHHH	LLHH	HHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1013,	HHHH	LHHL	LLHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1012,	HHHH	LLHL	HHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1011,	HHHH	LHLH	HLHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1010,	HHHH	LLHL	LHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1007,	HLLH	LHLL	HHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1006,	HHHH	LHLH	LLLH	HLXX	XHLH	HHHH	HHHH	HLHH	HHHH	HHHH
1005,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLL	HLLL	HLHH	HLHH
1004,	HHHH	LLHL	LLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1003,	LLLL	LHLH	HLHL	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHLL
1002,	HHHH	LLHL	HLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1001,	LLLL	LHLH	LLHL	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHLH
1000,	HHHH	LLHH	LLLH	HLXX	XHLH	HHHH	HHHH	HLHH	HHHH	HHHH

ROM NUMBER 23-XXXA2-04

UPC	296	291	292	293	294	295	296	297	298	299
ADDR	AAAA	BBBB	BCCC	CCDD	DEFH	JJKL	MMMM	MNPP	PPPP	PPPP

1043,	HHHH	LHHL	HHHH	HHXX	XHHH	LHHL	LLLL	LLHH	HHHH	HHHH
1040,	HHHH	HLHL	HHHH	HHXX	XHHH	LHHL	LLHH	LLHH	HHHH	HHHH
1047,	LLLL	LHHL	HLHH	LHLL	LHLH	HHHL	HHLL	HLLL	HLHH	LLHH
1050,	HHHH	LHHL	LHHH	HHXX	XHLH	LHHL	HHHH	HLHH	HHHH	HHHH
1051,	LLHL	LHHL	HHHH	HHXX	XHLH	LHLL	HHHH	LLLL	HLHH	LLHH
1052,	LLLL	LHLL	HLHH	LLLL	LHLH	HHHL	HHLL	HLLL	LHHL	HLHH
1053,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHHH	HLHH	HLHH	HHHH
1054,	LLLL	LHLH	HLHH	LLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1055,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	LHHL	LLLL	LHHL	HLLH
1056,	LLLL	LHLH	HLLH	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1057,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLH	LLLL	HLHH	HLHH
1060,	HLLH	LHLH	XLLH	HLXX	XHHH	LHHH	HHHH	HLHH	HHHH	HHHH
1061,	LLHL	LHHL	HHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1062,	LLLL	LHLH	LLHH	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHLH
1063,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLH	LLLL	HLHH	HLHH
1064,	LLLL	LHHL	HLHH	LHLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1065,	LLLH	LHHH	LLHH	HLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH

1066,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHHL	HHHL
1067,	HHHH	HLLL	LHHH	HHLL	HHHL	LHHL	HHLH	LLLH	LLHH	LLHH
1070,	HHHH	HLHH	HHHH	HHHL	LHHL	LHHL	LLLH	HHLH	LHHH	LHHH
1071,	HHHH	HLLL	LLHH	HHXX	XHLH	LHHH	HHLH	LLLH	LLHL	LHLL
1072,	HHHH	XXXX	XLHH	HLLL	LHHL	LHHH	LHHL	HLLL	LHHL	HLHH
1073,	HLHL	HHLH	LLHH	HLXX	XHLH	LHHL	LLLH	HLHH	HHHH	HHHH
1074,	HHHH	XXXX	XHHH	HLXX	XHHH	LHHH	HLLL	HLHL	LHHL	LHLL
1075,	LLLL	LHHL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1076,	HHHH	LLHH	HLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1077,	LLLL	LHLL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL

1042,	HHHH	LHHL	HHHH	HHXX	XHHH	LHHL	LLLL	LLHH	HHHH	HHHH
1040,	HHHH	HLHL	HHHH	HHXX	XHHH	LHHL	LLHH	LLHH	HHHH	HHHH
1047,	LLLL	LHHL	HLHH	LHLL	LHLH	HHHL	HHLL	HLLL	LLHH	HHHH
1050,	HHHH	LHHL	LHHH	HHXX	XHLH	LHLL	HHHH	HLHH	HHHH	HHHH
1051,	LLHL	LHHL	HHHH	HHXX	XHLH	LHLL	HHHH	LLLL	HLHH	LLHH
1052,	LLLL	LHLL	HLHL	HLLL	LHLH	HHHL	HHLL	HLLL	LHHL	HLHH
1053,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHHH	HLHH	HLHH	HHHH
1054,	LLLL	LHLH	HLHH	LLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1055,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	LHHL	LLLL	LHHL	HLLH
1056,	LLLL	LHLH	HLLH	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1057,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLH	LLLL	HLHH	HLHH
1060,	HLLH	LHLH	XLLH	HLXX	XHHH	LHHH	HHHH	HLHH	HHHH	HHHH
1061,	LLHL	LHHL	HHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1062,	LLLL	LHLH	LLHH	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHLH
1063,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLH	LLLL	HLHH	HLHH
1064,	LLLL	LHHL	HLHH	LHLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH
1065,	LLLH	LHHH	LLHH	HLLL	LHLH	HHHL	HHHH	HLHH	HHHH	HHHH

1066,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHLH	LLLL	LHHL	HHHL
1067,	HHHH	HLLL	LHHH	HHLL	HHHL	LHHL	HHLH	LLLH	LLHH	LLHH
1070,	HHHH	HLHH	HHHH	HHHL	LHHL	LHHL	LLLH	HHLH	LHHH	LHHH
1071,	HHHH	HLLL	LLHH	HHXX	XHLH	LHHH	HHLH	LLLH	LLHL	LHLL
1072,	HHHH	XXXX	XLHH	HLLL	LHHL	LHHH	LHHL	HLLL	LHHL	HLHH
1073,	HLHL	HHLH	LLHH	HLXX	XHLH	LHHL	LLLH	HLHH	HHHH	HHHH
1074,	HHHH	XXXX	XHHH	HLXX	XHHH	LHHH	HLLL	HLHL	LHHL	LHLL
1075,	LLLL	LHHL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL
1076,	HHHH	LLHH	HLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1077,	LLLL	LHLL	HHHH	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHHL

1021,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	LHLL	LLLL	LHHL	HLLH
1020,	HHHH	LHHL	HLHH	HHXX	XHLH	LHHH	LHLH	LLLL	LHLH	HLHH
1017,	HHHH	HHLH	LHHH	HHXX	XHHH	LHHL	HHHH	HLHH	HHHH	HHHH
1016,	HHHH	LLHH	LHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1015,	HHHH	LHHH	LLHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1014,	HHHH	LLHH	HHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1013,	HHHH	LHHL	LLHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1012,	HHHH	LLHL	HHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1011,	HHHH	LHLH	HLHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1010,	HHHH	LLHL	LHHH	HHHH	HHHL	LHHL	HHHH	HLHH	HHHH	HHHH
1007,	HLLH	LHLL	HHHH	HHXX	XHLH	LHHH	HHHH	HLHH	HHHH	HHHH
1006,	HHHH	LHLH	LLLH	HLXX	XHLH	HHHH	HHHH	HLHH	HHHH	HHHH
1005,	LLLL	LHHL	LLHH	LLLL	LHLH	HHHL	HHLL	HLLL	HLHH	HLHH
1004,	HHHH	LLHL	LLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1003,	LLLL	LHLH	HLHL	HHLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHLL
1002,	HHHH	LLHL	HLLH	HLXX	XHLH	HHHH	LLLL	HLHH	HHHH	HHHH
1001,	LLLL	LHLH	LLHL	HLLL	LHLH	HHHL	HHLL	HLLL	LHLL	HHLH
1000,	HHHH	LLHH	LLLH	HLXX	XHLH	HHHH	HHHH	HLHH	HHHH	HHHH

ROM NUMBER 23-XXXA2-00

UPC ADDR	290 AAAA	291 BBBB	292 BCCC	293 CCDD	294 DEFH	295 JJKL	296 MMMM	297 MNPP	298 PPPP	299 PPPP
1711,	HHHH	HLLH	HHLH	LHXX	XHLH	LHHH	HHHH	HHHH	HHHH	HHHH
1712,	HHHH	HHLH	LHLL	HLLH	LHLL	LHHH	HHHH	HHHH	HHHH	HHHH
1713,	HHHH	HLLH	LHHL	LHXX	XHLH	LHHH	HHHH	HHHH	HHHH	HHHH
1714,	HHHH	HLLL	LHLL	LHLL	HHLL	LHHH	HHHH	HHHH	HHHH	HHHH
1715,	HHHH	LHHH	HHLL	LLXX	XHLH	LHHH	HHHH	HHHH	HHHH	HHHH
1716,	HHHH	HHHL	HHHL	LLLL	LHLL	LHHH	HHHH	HHHH	HHHH	HHHH
1717,	HLLH	XXXX	XHHH	HHXX	XHHH	LHHH	HHHH	HHHH	HHHH	HHHH
1720,	HLLH	XXXX	XHHH	HHXX	XHHH	LHHH	HHLH	LHLH	LLHL	LHLL
1721,	HHHH	LHLL	HHHH	HHXX	XHHH	LHHL	HHLH	LHLH	LLHH	LLHH
1722,	HHHH	HHHH	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1723,	HHHH	HHHH	LHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1724,	HHHH	HHHL	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1725,	HHHH	HHHL	LHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1726,	HHHH	HHLH	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1727,	HHHH	HHLH	LHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1730,	HHHH	HLLL	LHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1731,	HHHH	HLHH	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1732,	HHHH	XXXX	XLHL	LHXX	XHHH	LHHH	HHHH	HHHH	HHHH	HHHH
1733,	HHHH	XXXX	XLHL	LLXX	XHHH	LHHH	HHHH	HHHH	HHHH	HHHH
1734,	HHHH	LHHH	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1735,	HHHH	HLLL	LLHH	LLXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1736,	HHHH	LHLH	LHLH	HLXX	XLHH	LHHL	HHHH	HHHH	HHHH	HHHH
1737,	HLHL	HHHH	LLHH	HLXX	XLHH	LHHL	HHHH	HHHH	HHHH	HHHH
1740,	HHLH	LHHH	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1741,	HHLH	HLLL	LLLH	HLXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1742,	HLLH	LHHH	HHHH	HHXX	XHLH	LHHH	HHHH	HHHH	HHHH	HHHH
1743,	HHLH	LHHH	HHHH	HHXX	XHLH	LHHL	HHHH	HHHH	HHHH	HHHH
1744,	HHHH	LHLH	HHLL	LHXX	XLLH	LHHH	HHHH	HHHH	HHHH	HHHH
1745,	HHHL	LHLH	HHLH	HLHH	HHHL	LHHL	HHHH	HHHH	HHHH	HHHH
1746,	HHLL	XXXX	XLHH	HHHH	LHHL	LHHH	HHHH	HHHH	HHHH	HHHH
1747,	HLHH	HLHH	LLHH	HLXX	XHLH	LHHH	HHHH	HHHH	HHHH	HHHH
1750,	HHLH	HLHH	LHHH	HHXX	XHLH	LHHL	HHHH	HHHH	HHHH	HHHH
1751,	HHLH	HHLH	LHLH	HHXX	XHLH	LHHL	HHHH	HHHH	HHHH	HHHH
1752,	HHLH	HHHH	HHHH	HHXX	XHLH	LHHL	HHHH	HHHH	HHHH	HHHH
1753,	LHHH	HHHH	HLLL	LLXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1754,	LHHL	XXXX	XHHH	HHXX	XLHH	LHHH	HHHH	HHHH	HHHH	HHHH
1755,	LHHL	LHLL	HHHL	HHXX	XLHH	LHHL	HHHH	HHHH	HHHH	HHHH
1756,	LHLL	HLHH	LHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1757,	LLHH	LHLL	HHLL	HLXX	XLLH	LHHH	HHHH	HHHH	HHHH	HHHH
1760,	LLHH	LHLL	HHHH	HHXX	XHLH	LHLL	HHHH	HHHH	HHHH	HHHH
1761,	LLHH	LHLL	HHHH	HHXX	XHLH	LHLL	HHHH	HHHH	HHHH	HHHH
1762,	LLHH	LHLL	HHHH	HHXX	XHLH	LHLL	HHHH	HHHH	HHHH	HHHH
1763,	HLHL	XXXX	XHHL	HHXX	XHHH	LHHH	HHLH	LHHH	HLLL	HLHL
1764,	HLHL	HHLH	HHHL	HHXX	XHLH	LHHH	HHHH	HHHH	HHHH	HHHH
1765,	HLHL	HHLH	HHHL	HHXX	XHLH	LHHL	HHHH	HHHH	HHHH	HHHH

ROM NUMBER 23-XXXA2-00

UPC ADDR	290 AAAA	291 BBBB	292 BCCC	293 CCDD	294 DEFH	295 JJKL	296 MMMM	297 MNPP	298 PPPP	299 PPPP
1766,	HLLH	XXXX	XHHH	HHXX	XHHH	LHHH	HHLH	LHHH	HLLL	HLHL
1767,	HHHH	HHLL	HLHH	HHXX	XHLH	LHHH	HHHH	HHHH	HHHH	HHHH
1770,	HLLH	XXXX	XHHH	HHXX	XHHH	LHHH	HHHH	HHHH	HHHH	HHHH
1771,	HHHH	HHLL	HHHH	HHXX	XHHH	LHHL	HHHH	HHHH	HHHH	HHHH
1772,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	HHHH	HHHH	HHHH
1773,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	HHHH	HHHH	HHHH
1774,	HHHH	XXXX	XHHH	HHXX	XHHH	HHHH	HHHH	LHHH	HHHH	HHHL

REV.	NUMBER	CODE	SIZE
	M8410-0-9	CS	K

FIRST USED ON OPTION MODEL
M8410

QTY.	DESCRIPTION	PART NO.	ITEM NO.

PARTS LIST

DRN. K. Davis	DATE 3-5-76	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
CHKD. [illegible]	DATE 5/19/76		
ENG. W. Kershner	DATE 19MAY76	TITLE CONTROL ROM OPERATIONS' LIST	
PROJ. ENG. [illegible]	DATE 5/19/76		
PROD. R. Kaplan	DATE 5-13-76		
NEXT HIGHER ASSEMBLY B-DD-M8410-0		SIZE K / CODE CS / NUMBER M8410-0-9	REV. *
SCALE			
SHEET 1 OF 26		DIST.	

REVISIONS

REV.	CHANGE NO.	CHK

DEC FORM NO. DRB 109

```
        /FUNCTIONS OF MAIN CONTROL ROM OF FPP FOR EACH ROM ADDRESS
        /D.A.WHITE 3/18/76

        /MICRO PC IS INITIALIZED TO 0.  ADDRESSES 0, 1 AND 2 REPRESENT "HALTED
        /AND FLAG = 0", "HALTED AND FLAG = 1" AND "PAUSED" RESPECTIVELY.

        /ADDRS  NEXT DATA PATH OPERATION                    TIME    CTRL FUNCTION

        *0
0       HALTED, NO OPERATION                                TS3     GO TO, HLTD1 (3)
1       FLAG,   NO OPERATION                                TS3     GO TO, FLAG (1)
2       PAUSED, NO OPERATION                                TS3     GO TO, PAUSED (2)

        *3
        /"DB:=MD" IN THE NEXT LINE IS A KLUDGE.  THE DB IS REALLY
        /LOADED FROM THE DATA LINES OF THE OMNIBUS (THIS STEP ONLY).
3       HLTD1,  DB:=MD; TEMP:=FIELD                         T4      GO TO, HALTED (0)

        ////////////////////////IOT AREA////////////////////////////////
        /FPST AND CONTINUE CONDITION
        *6
6       FCONT,  NO OPERATION                                T4      GO TO, FETCH (20)

        /FPCOM
        *7
7       FPCOM,  FIELD:=(R3R)DB                              T4      GO TO, HALTED (0)

        /FPST AND START CONDITION
        *13
13      FPST,   APTP:=TEMP<1:3>,DB                          T4      GO TO, GETAPT (300)

        /FPMLT IOT GIVEN WHILE FPP IS PAUSED.  BACK UP FPC, EXIT.
        *16
16      FPMLT,  FPC:=FPC[+]M1                               T4      GO TO, EXSTRT (1000

        /JUMP TO MAINTENANCE PROGRAM
        *17
17      MAINT,  NO OPERATION                                T4      GO TO, MAINT1 (1700

        ////////////////////////DATA BREAK AREA//////////////////////////

        /SUBROUTINE--GET SECOND HALF OF 24-BIT INSTRUCTION
        *4
4       INST24, FPC:=FPC[+]K1                               T4      BKCMD:=0
5               DB:=MD                                      BT1     RETURN

        /SUBROUTINE--GET WORD AT NEXT OPADD, BUMP OPADD
        *10
10      NEXTOP, BKMA, OPADD:=OPADD[+]K1                     T3
11      NXTOP1, NO OPERATION                                T4      BKCMD:=0
12              DB:=MD                                      BT1     RETURN

        /BRANCH AND CONDITION TRUE
        *14
14      BRTRUE, BKMA:=FPC                                   T3      SUB, INST24 (4)
15              FPC:=TEMP<1:3>,DB                           T2      EXTEST
```

```
        /PAGE 2
        /FLOATING-POINT INSTRUCTION FETCH

        *20
20      FETCH,  BKMA1:=FPC                                      T3
21      FETCH1, 1:=FACE[EXPSIZE]M30                             T4      BKCMD1:=7
22              FPC1:=FPC[+]K1; DB:=MD                          BT1
23              TEMP1:=FIR<9:11>                                T2      INSTR DISP 1

        /       *       *       *       *       *       *       *       *       /
        /INSTRUCTION DISPATCH 1 DISPATCHES MICRO PC AS FOLLOWS:                  /
        /       INSTRUCTION     ADDRESS         INSTRUCTION     ADDRESS         /
        /       SETX            34              SETB            36              /
        /       LDX             40              ADDX            44              /
        /       JSA             50              JSR             60              /
        /       BRANCH (TRUE)   14              BRANCH (FALSE)  24 AND EXTEST   /
        /       TRAP            74              JNX             26              /
        /       ALN (NOT XR0)   70              ALN (XR0)       1030            /
        /       XTA             72              ATX             1040            /
        /       LTR(0)          1026            LTR(1)          1016            /
        /       JAC             1014            FNORM           1006            /
        /       FNEG            1004            FCLA            1002            /
        /       FPAUSE          2               FEXIT           1000            /
        /       STARTF          1010            STARTD          1012            /
        /       STARTE          1020                                            /
        /       ALL UNDEFINED   EXTEST                                          /
        /ALL DATA REFERENCE INSTRUCTIONS (LEA, LEAI, FLDA, FADD, FSUB, FDIV,     /
        /FMUL, FADDM, FSTA, AND FMULM) DO ONE OF THE FOLLOWING ADDESS CALC:      /
        /       ADDRESS MODE                                    LABEL   ADDRESS /
        /       12 BIT DIRECT (NOT DP)                          DIRFP   100     /
        /       12 BIT DIRECT (DP)                              DIRDP   102     /
        /       24 BIT, NO INCR, NO INDEX                       NINC24  114     /
        /       24 BIT, INCR, NO INDEX                          INC24   112     /
        /       24 BIT, INDEXED                                 X24     110     /
        /       12 BIT INDIRECT, NO INCR, NO INDEX              INDIR   134     /
        /       12 BIT INDIRECT, INCR, NO INDEX                 INCIND  132     /
        /       12 BIT INDIRECT, INDEXED                        XIND    130     /
        ////IN ADDITION, GATING IN MAJOR REGISTERS CAUSES THE FOLLOWING:          /
        ////////INSTRUCTION                                     OPERATION       /
        ////////DIRECT 12-BIT ADDRESSING                       TEMP1:=3*FIR<5:11>      /
        ////////INDIRECT ADDRESSING (ALSO LEAI)                 TEMP1:=3*FIR<9:11>      /
        ////////ALL OTHER INSTRUCTIONS, 24-BIT                                   /
        ////////        ADDRESSING MODE                         TEMP1:=(N3R)FIR<9:11>   /
        /       *       *       *       *       *       *       *       *       /


        /       *       *       *       *       *       *       *       *       /
        /                                                                        /
        /       NOTE CAREFULLY!                                                  /
        /               DO NOT FILL DB AT THE DISPATCHED ADDRESS--               /
        /               THE DATA PATH WILL GET VERY CONFUSED!!!                  /
        /                                                                        /
        /       *       *       *       *       *       *       *       *       /
```



```
        /PAGE 3
        /BRANCH AND CONDITION NOT TRUE
        *24
24      BRNTRU, BKMA, FPC1:=FPC[+]K1                            T3      GO TO, FETCH1 (21)

25      DONE,   NO OPERATION                                    T2      EXTEST

        /JNX---LITTLE HACK--JNX ALWAYS REQUIRES 2 BREAKS, EVEN IF C(XR)=0.
        /REASON IS THAT THE ZFLAG IS LOADED SO LATE IN THE BREAK CYCLE
        /THAT THE FPP HAS ALREADY COMMITTED TO STARTING THE BREAK BEFORE THE
        /FLAG CAN BE TESTED.
        *26
26      JNX,    BKMA1:=X0[+]FIR<6:8>                            T3      SUB, INCXR (105)
27              BKMA1:=FPC                                      T3
30              FPC1:=FPC[+]K1                                  T4      BKCMD1:=0
31              DB1:=MD                                         BT1     IF ZFLG, DONE (25)
32              FPC1:=TEMP<1:3>,DB                              T2      EXTEST

        /SETX
        *34
34      SETX,   BKMA1:=FPC                                      T3      SUB, INST24 (4)
35              X01:=TEMP<1:3>,DB                               T2      EXTEST
        /"EXTEST" DISPATCHES MICRO PC TO EXSTRT IF THE EXF FLAG IS SET,
        /       EITHER OVERFLOW FLAG IS SET, OR THE EXPONENT UNDERFLOW FLAG
        /       IS SET AND THE ZTRAP BIT OF THE COMMAND REGISTER IS SET.
        /       IF NONE OF THESE CONDITIONS OCCURS, "EXTEST" DISPATCHES TO
        /       FETCH.

        /SETB
        *36
36      SETB,   BKMA1:=FPC                                      T3      SUB, INST24 (4)
37              BR1:=TEMP<1:3>,DB                               T2      EXTEST

        /LDX
        *40
40      LDX,    BKMA1:=FPC                                      T3      SUB, INST24 (4)
41              BKMA, TEMP1:=X0[+]FIR<9:11>                     T3
42              OPADD1:=TEMP                                    T4      BKCMD1:=1
43              NO OPERATION                                    BT1     EXTEST

        /ADDX
        *44
44      ADDX,   BKMA1:=FPC                                      T3      SUB, INST24 (4)
45              BKMA, TEMP1:=X0[+]FIR<9:11>                     T3
46              OPADD1:=TEMP                                    T4      BKCMD1:=3
47              NO OPERATION                                    BT1     EXTEST

        /JSA
        *50
50      JSA,    BKMA1:=FPC                                      T3      SUB, INST24 (4)
51              OPADD1:=TEMP<1:3>,DB                            T2
52              BKMA1:=OPADD; DB1:=8                            T3
53              DB1:=1030!FPC<1:3>                              T4      BKCMD1:=1
54              DB1:=FPC                                        BT1
55              BKMA, OPADD1:=OPADD[+]K1                        T3
56              TEMP1:=OPADD[+]K1                               T4      BKCMD1:=1
57              FPC1:=TEMP                                      BT1     EXTEST
```

```
        /PAGE 4
        /JSR
        *60
60      JSR,    BKMA:=FPC                               T3      SUB, INST24 (4)
61              TEMP1:=TEMP<1:3>,DB                     T2
62              BKMA:=BR[+]K1; DB:=0                    T3
63              DB:=1030|FPC<1:3>                       T4      BKCMD:=1
64              DB:=FPC                                 BT1
65              BKMA:=BR[+]K2                           T3
66              OPADD:=TEMP1                            T4      BKCMD:=1
67              FPC:=TEMP1                              BT1     EXTEST
        /ALN
        *70
70      ALN,    BKMA, TEMP:=X0[+]FIR<9:11>              T3      SUB, GETXR (235)
71              TEMP7:=DB                               T2      GO TO, ALN2 (1031)

        /XTA
        *72
72      XTA,    BKMA, TEMP:=X0[+]FIR<9:11>              T3      SUB, GETXR (235)
73              FALN:=DB                                T2      GO TO, XTA1 (1103)

        /TRAP
        *74
74      TRAP,   BKMA:=FPC                               T3
75              NO OPERATION                            T4      BKCMD:=0
76              FPC:=FPC[+]K1; DB:=MD                   BT1     SET TRAP1
77              OPADD:=TEMP<1:3>,DB                     T2      GO TO, EXSTRT (1000)

        //////////ADDRESS CALCULATIONS////////////////////////////////////////
        //AT CONCLUSION OF ALL ADDRESS CALCULATIONS, ADDRESS MUST BE IN TEMP1;
        //DB MUST BE 0.
        /DIRECT ADDRESS CALCULATION
        *100
100     DIRFP,  BKMA, TEMP1:=TEMP[+]BR; DB:=0           T3      INSTR DISP 2

        /OP CALCULATION ADDS 1 BECAUSE BASE PAGE ALWAYS CONTAINS 3-WORD ARG.
        *102
102     DIROP,  BKMA, TEMP1:=TEMP[+]BR+1; DB:=0         T3      INSTR DISP 2

        /       *       *       *       *       *       *       *       /
        /INSTRUCTION DISPATCH 2 DISPATCHES MICRO PC AS FOLLOWS:          /
        /       INSTRUCTION                     LABEL   ADDRESS         /
        /       LEA, LEAI (FP AND EP MODES)     LEAB    256             /
        /       FLDA                            LOAD    200             /
        /       FSTA (NOT DP)                   STOREF  220             /
        /       FSTA (DP)                       STORED  224             /
        /       FSUB                            GETN    260             /
        /       FADD, FADDM, FMUL, FMULM, FDIV  GETARG  240             /
        /       IMUL (SAME OP CODE AS LEA, LEAI                         /
        /                       BUT DP MODE)    GETARG  240             /
        /       NO OTHER INSTRUCTIONS USE THIS DISPATCH                 /
        /       *       *       *       *       *       *       *       /
```



```
        /PAGE 5

103     A24DP,  TEMP2:=[2*]DB                           T4      BKCMD:=0
104             FPC:=FPC[+]K1; DB:=MD                   BT1     GO TO, INDIR1 (156)

105     INCXR,  NO OPERATION                            T4      BKCMD:=2
106             NO OPERATION                            BT1     RETURN

107     FETCH2, BKMA, OPADD:=TEMP7                      T3      GO TO, FETCH1 (21)

        /INDEXED 24-BIT ADDRESS CALCULATION
        *110
110     X24,    BKMA:=X0[+]FIR<6:8>                     T3      GO TO, X24A (116)

        /INCREMENTED, NON-INDEXED 24-BIT ADDRESS CALCULATION
        /       FIR<6:8> MUST BE ZERO OR WE'D NOT BE HERE.  BUMP X0.
        *112
112     INC24,  BKMA:=X0                                T3      SUB, INCXR (105)
113             NO OPERATION                            T2      GO TO, NINC24 (114)

        /ENTER HERE FOR NON-INCREMENTED, NON-INDEXED 24-BIT ADDRESS CALC.
        /GET LAST 12 BITS OF ADDRESS, COMBINE WITH 3 MSB ALREADY IN TEMP.
        *114
114     NINC24, BKMA:=FPC                               T3      SUB, INST24 (4)
115             TEMP1:=TEMP<1:3>,DB                     T2      GO TO, INSDSP (141)

116     X24A,   NO OPERATION                            T4      BKCMD:=2
117             NO OPERATION                            BT1
120             DB:=MD                                  T2      IF NOT EP, A24FP (124)
121             BKMA:=FPC                               T3
122             TEMP2:=[0*]DB                           T4      BKCMD:=0
123             FPC:=FPC[+]K1; DB:=MD                   BT1     GO TO, INDIR1 (156)
124     A24FP,  BKMA:=FPC                               T3      IF DP, A24DP (103)
125             TEMP2:=[3*]DB                           T4      BKCMD:=0
126             FPC:=FPC[+]K1; DB:=MD                   BT1     GO TO, INDIR1 (156)
        /OPADD WILL CONTAIN 15 ADDRESS BITS FROM INSTRUCTION WORD; TEMP2
        //CONTAINS M*C(XR)

        /INDEXED INDIRECT ADDRESS CALCULATION
        //TEMP HOLDS 3*FIR<9:11> AT ENTRY.
        *130
130     XIND,   BKMA:=X0[+]FIR<6:8>                     T3      GO TO, XIND1 (147)

        /INCREMENTED, NON-INDEXED INDIRECT ADDRESS CALCULATION
        //FIR<6:8>=0.  BUMP X0.
        *132
132     INCIND, BKMA:=X0                                T3      SUB, INCXR (105)
133             NO OPERATION                            T2      GO TO, INDIR (134)
```

```
        /PAGE 6
        /ENTER HERE FOR NON-INCREMENTED, NON-INDEXED INDIRECT ADDRESS CALC.
        //TEMP CONTAINS 3*FIN<9:11> AT ENTRY
        *134
134     INDIR,  BKMA, TEMP1:=TEMP[+]BR+1                T3
135             OPADD:=TEMP1                            T4      BKCMD:=4
136             DB:=MD                                  BT1
137             TEMP:=[R3R]DB                           T2      SUB, NEXTOP (10)
140             TEMP1:=TEMP<1:3>,DB                     T2
141     INSDSP, BKMA:=TEMP1; DB:=0                      T3      INSTR DISP 2

142     INDDP,  TEMP2:=[2*]DB                           T4      BKCMD:=0
143             DB:=MD                                  BT1     GO TO, INDP1 (155)

144     INDEP,  BKMA, OPADD:=TEMP1                      T3
145             TEMP2:=[6*]DB                           T4      BKCMD:=0
146             DB:=MD                                  BT1     GO TO, INDP1 (155)

147     XIND1,  TEMP1:=BR[+]TEMP+1                      T4      BKCMD:=2
150             NO OPERATION                            BT1
151             DB:=MD                                  T2      IF EP, INDEP (144)
152             BKMA, OPADD:=TEMP1                      T3      IF DP, INDDP (142)
153             TEMP2:=[3*]DB                           T4      BKCMD:=0
154             DB:=MD                                  BT1
155     INDP1,  TEMP:=[R3R]DB                           T2      SUB, NEXTOP (10)
156     INDIR1, OPADD:=TEMP<1:3>,DB                     T2
157             BKMA, TEMP1:=OPADD[+]TEMP2; DB:=0       T3      INSTR DISP 2

        /FAST EXIT--FILL ONLY FPC AND FIELD LOCATIONS OF APT.
160     FASTX,  BKMA:=APTP; DB:=0                       T3
161             DB:=FPC                                 T4      BKCMD:=5
162             DB:=FPC<1:3>                            BT1
163             BKMA, APTP:=APTP[+]M1                   T3      SUB, EXST1A (166)
164             NO OPERATION                            T2      GO TO, FLAG (1)

165     EXST1,  BKMA, APTP:=APTP[+]K1                   T3
166     EXST1A, NO OPERATION                            T4      BKCMD:=5
167             TEMA:=TEMP<1:3>,0[R3R]TEMA              BT1     RETURN

170     EXST2,  BKMA, APTP:=APTP[+]M1                   T3
171     EXST3,  NO OPERATION                            T4      BKCMD:=1
172             NO OPERATION                            BT1     RETURN
```



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        /PAGE 7
        /FLDA--ALL MODES
        *200
200     LOAD,   OPADD:=TEMP1                            T4      BKCMD:=0
201             DB:=MD                                  BT1     IF DP, LOAD1 (203)
202             FACE:=DB                                T2      SUB, NEXTOP (10)
203     LOAD1,  FACM:=DB                                T2
204             BKMA, OPADD:=OPADD[+]K1                 T3
205             NO OPERATION                            T4      BKCMD:=0
206             DB:=MD                                  BT1     IF NOT EP, LOAD2 (216)
207             FACN:=DB                                T2
210             BKMA:=OPADD[+]K1                        T3      SUB, NXTOP1 (11)
211             FACP:=DB                                T2
212             BKMA:=OPADD[+]K2                        T3      SUB, NXTOP1 (11)
213             FACR:=DB                                T2
214             BKMA:=OPADD[+]K3                        T3      SUB, NXTOP1 (11)
215             FACS:=DB                                T2      EXTEST
216     LOAD2,  FACN:=DB                                T2      EXTEST

        /FSTA--FP AND EP MODES ENTER HERE
        *220
220     STOREF, DB:=FACE                                T4      BKCMD:=1
221             OPADD:=TEMP1                            BT1
222             BKMA, OPADD:=OPADD[+]K1; DB:=0          T3      GO TO, STORED (224)
223     STRD1,  OPADD:=TEMP1                            T2      GO TO, STORE1 (226)
        /FSTA--DP MODE ENTERS HERE.
        *224
224     STORED, DB:=FACM                                T4      BKCMD:=1
225             NO OPERATION                            BT1     IF DP, STRD1 (223)
226     STORE1, BKMA, TEMP, OPADD:=OPADD[+]K1; DB:=0    T3
227             DB:=FACN                                T4      BKCMD:=1
230             TEMA:=TEMP                              BT1     IF NOT EP, DONE (25)
231             DB:=FACP                                T2      SUB, DEPOS2 (370)
232             DB:=FACR                                T2      SUB, DEPOS2 (370)
233             DB:=FACS                                T2      SUB, DEPOS2 (370)
234             NO OPERATION                            T2      EXTEST

        /SUBROUTINE--USED MOSTLY BY INDEX REGISTER OPERATION
235     GETXR,  OPADD:=TEMP                             T4      BKCMD:=0
236             DB:=MD                                  BT1     RETURN

        /GET ARGUMENT, PLACE FRACTION IN TEMP1-TEMP5, AND EXPONENT
        /(IF USED) IN TEMP6.  TEMP1, BKMA ALREADY CONTAIN ADDRESS OF
        /ARGUMENT AT ENTRY.  USED BY FADD, FADDM, FMUL, FMULM, IMUL AND FDIV.
        *240
240     GETARG, OPADD:=TEMP1                            T4      BKCMD:=0
241             DB:=MD; TEMP3:=[0]                      BT1     IF DP, GET1 (243)
242             TEMP6:=DB                               T2      SUB, NEXTOP (10)
243     GET1,   TEMP1:=DB                               T2      SUB, NEXTOP (10)
244             TEMP2:=DB                               T2      IF NOT EP, ARITH (1837)
245             BKMA:=OPADD[+]K1                        T3      SUB, NXTOP1 (11)
246             TEMP3:=DB                               T2
247             BKMA:=OPADD[+]K2                        T3      SUB, NXTOP1 (11)
250             TEMP4:=DB                               T2
251             BKMA:=OPADD[+]K3                        T3      SUB, NXTOP1 (11)
252             TEMP5:=DB                               T2      GO TO, ARITH (1837)
```

```
        /PAGE 8
253     ATXSTR, BKMA:=OPADD; DB:=0                              T3
254             DB:=SCRATCHN                                    T4      BKCMD:=1
255             NO OPERATION                                    BT1     EXTEST

        *256
        /LOAD EFFECTIVE ADDRESS--DO BREAK READ, IGNORE DATA--NECESSARY
        /BECAUSE FPP IS ALREADY COMMITTED TO BREAK AT INSTR. DISP. 2 TIME.
256     LEAB,   OPADD:=TEMP1                                    T4      BKCMD:=0
257             DB, FACN:=(12BIT)TEMP1                          BT1     GO TO, LOADEA (1060)

        /GET 2'S COMPLEMENT OF ARGUMENT.  SIMILAR TO GET ARG. USED BY FSUB.
        *260
260     GETN,   OPADD:=TEMP1                                    T4      BKCMD:=0
261             DB:=MD                                          BT1     IF DP, GETN1 (263)
262             TEMP6:=DB                                       T2      SUB, NEXTOP (10)
263     GETN1,  TEMP:=DB                                        T2
264             BKMA, OPADD:=OPADD(+)K1                         T3
265             NO OPERATION                                    T4      BKCMD:=0
266             DB:=MD                                          BT1     IF EP, GETN2 (270)
267             DB, TEMP2:=(MINUS)DB                            T2      GO TO, GETN5 (1027)
270     GETN2,  TEMP1:=DB                                       T2
271             BKMA:=OPADD(+)K3                                T3      SUB, NXTOP1 (11)
272             DB, TEMP5:=(MINUS)DB                            T2
273             BKMA:=OPADD(+)K2                                T3      SUB, NXTOP1 (11)
274             DB, TEMP4:=(EXT)(MINUS)DB                       T2
275             BKMA:=OPADD(+)K1                                T3      SUB, NXTOP1 (11)
276             DB, TEMP3:=(EXT)(MINUS)DB                       T2      GO TO, GETN4 (1025)


        /GET ACTIVE PARAMETER TABLE
        *300
300     GETAPT, BKMA:=APTP                                      T3
301             NO OPERATION                                    T4      BKCMD:=4
302             DB:=MD                                          BT1     IF FS, APT2 (317)
303             TEMA:=DB                                        T2      SUB, APT1 (321)
304             TEMP7, FPC:=TEMP<1:3>,DB                        T2      SUB, APT1 (321)
305             X0:=TEMP<1:3>,DB                                T2      SUB, APT1 (321)
306             BR:=TEMP<1:3>,DB                                T2
307             BKMA, APTP:=APTP(+)K2                           T3      SUB, APT1B (322)
310             FACE:=DB                                        T2      SUB, APT1 (321)
311             FACM:=DB                                        T2      SUB, APT1 (321)
312             FACN:=DB                                        T2      IF NOT EP, FETCH2 (107)
        /GO TO FETCH UNLESS IN EXTENDED PRECISION.  OTHERWISE PICK UP 3
        / REMAINING WORDS.
313             OPADD, BKMA:=OPADD(+)K1                         T3      SUB, NXTOP1 (11)
314             FACP:=DB                                        T2      SUB, NEXTOP (10)
315             FACR:=DB                                        T2      SUB, NEXTOP (10)
316             FACS:=DB                                        T2      GO TO, FETCH2 (107)

        /FAST START--FS=1.  GET FPC ONLY, THEN GO TO FETCH
317     APT2,   TEMA:=DB                                        T2      SUB, APT1 (321)
320             TEMP7, FPC:=TEMP<1:3>,DB                        T2      GO TO, FETCH2 (107)

321     APT1,   BKMA, TEMP1, APTP:=APTP(+)K1                    T3
322     APT1B,  TEMP, TEMA:=(R3R)TEMA                           T4      BKCMD:=4
323             DB:=MD; OPADD:=TEMP1                            BT1     RETURN
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        /PAGE 9
        /LONG EXIT
324     LONGX,  BKMA:=APTP; DB:=0                               T3
325             DB:=FACN                                        T4      BKCMD:=1
326             DB:=FACS                                        BT1     IF NOT EP, EXIT1 (335)
327             BKMA, APTP:=APTP(+)K3                           T3      SUB, EXST3 (171)
330             DB:=FACR                                        T2      SUB, EXST2 (170)
331             DB:=FACP                                        T2
332             BKMA, APTP:=APTP(+)M1                           T3
333             APTP:=APTP(+)M1                                 T4      BKCMD:=1
334             NO OPERATION                                    BT1
335     EXIT1,  DB:=FACM                                        T2
336             BKMA, APTP:=APTP(+)M1                           T3
337             NO OPERATION                                    T4      BKCMD:=5
340             DB:=FAL                                         BT1
341             BKMA, APTP:=APTP(+)M1                           T3
342             APTP:=APTP(+)M5                                 T4      BKCMD:=5
343             TEMA:=(0)                                       BT1
344     EXIT2,  TEMP, DB:=FPC                                   T2      SUB, EXST1 (165)
345             TEMP, DB:=X0                                    T2      SUB, EXST1 (165)
346             TEMP, DB:=BR                                    T2      SUB, EXST1 (165)
347             TEMP, DB:=OPADD                                 T2      SUB, EXST1 (165)
350             DB:=TEMA                                        T2
351             BKMA, APTP:=APTP(+)M5+1                         T3      SUB, EXST1A (166)
352     EXIT4,  NO OPERATION                                    T2      GO TO, FLAG (1)

        /PUT RESULT IN MEMORY.  USED BY FADDM AND FMULM.
353     DEPOS,  BKMA:=OPADD(+)M1; DB:=0                         T3      IF TEMPZERO, DEPOS5 (373)
354             DB:=SCRATCHM                                    T4      BKCMD:=1
355             NO OPERATION                                    BT1     IF DP, DEPOS1 (360)
356             DB:=SCRATCHE                                    T2
357     DEPOS4, BKMA:=OPADD(+)M2                                T3      SUB, DEPOS3 (371)
360     DEPOS1, DB:=SCRATCHN                                    T2
361             TEMP, BKMA:=OPADD                               T3
362             NO OPERATION                                    T4      BKCMD:=1
363             TEMA:=TEMP                                      BT1     IF NOT EP, DONE (25)
364             DB:=SCRATCHP                                    T2      SUB, DEPOS2 (370)
365             DB:=SCRATCHR                                    T2      SUB, DEPOS2 (370)
366             DB:=SCRATCHS                                    T2      SUB, DEPOS2 (370)
367             NO OPERATION                                    T2      EXTEST

370     DEPOS2, TEMA, BKMA:=TEMA(+)K1                           T3
371     DEPOS3, NO OPERATION                                    T4      BKCMD:=1
372             NO OPERATION                                    BT1     RETURN

373     DEPOS5, DB:=(0)                                         T4      BKCMD:=1
374             NO OPERATION                                    BT1     IF DP, DEPOS1 (360)
375             NO OPERATION                                    T2      GO TO, DEPOS4 (357)
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        /PAGE 10
        *1000
        /GO TO PROPER EXIT ROUTINE
1000    EXSTRT, NO OPERATION                                    FREE*   IF FS, FASTX (160)
1001            NO OPERATION                                    FREE*   GO TO, LONGX (324)

        *1002
        /CLEAR FAC
1002    FCLA,   NO OPERATION                                    FREE*   GO TO, CLRFAC (1050)

1003    JAC2,   DB, FPC:=TEMP<11:5>,0[+]FPC                     FREE*   EXTEST

        /FNEG
        *1004
1004    FNEG,   TEMP:=FACM                                      FREE*   SUB, FTOS1 (1334)
1005            NO OPERATION                                    FREE*   GO TO, NEGATE (1072)

        /NORMALIZE
        *1006
1006    FNORM,  TEMP:=FACE                                      FREE*   IF DP, END (1013)
1007            DB, SC:=TEMP                                    FREE*   GO TO, FNORM1 (1070)

        /ENTER FP MODE
        *1010
1010    STARTF, NO OPERATION                                    FREE*   GO TO, ST24F (1074)

1011    JAC1,   DB, TEMP:=[R3R]FACM                             FREE*   GO TO, JAC2 (1003)

        /STARTD--ENTER 24-BIT, FIXED POINT MODE
        *1012
1012    STARTD, NO OPERATION                                    FREE*   ENTER DP MODE
1013    END,    NO OPERATION                                    FREE*   EXTEST

        /JAC
        *1014
1014    JAC,    TEMP:=FACN                                      FREE*
1015            DB, FPC:=[12BIT]TEMP                            FREE*   GO TO, JAC1 (1011)

        *1016
1016    LTR1,   FACM:=K2000                                     FREE*   IF DP, CLRF1 (1055)
1017            NO OPERATION                                    FREE*   GO TO, LTR2 (1056)

        /STARTE--ENTER 60-BIT MODE; CLEAR FAC LSB IF NOT ALREADY IN EP
        *1020
1020    STARTE, NO OPERATION                                    FREE*   IF EP, END (1013)
1021            DB, FACP:=[0]                                   FREE*   ENTER EP MODE
1022            DB, FACR:=[0]                                   FREE*
1023            DB, FACS:=[0]                                   FREE*   EXTEST

        /BRANCH FALSE AND EXIT FLAG SET
        *1024
1024    EXBRNT, FPC:=FPC[+]K1                                   FREE*   GO TO, EXSTRT (1000)
1025    GETN4,  DB, TEMP2:=[EXT][MINUS]TEMP1                    FREE    GO TO, GETN5 (1027)
```



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        /PAGE 11
        /LTR(0)
        *1026
1026    LTR0,   NO OPERATION                                    FREE*   GO TO, CLRFAC (1050)

1027    GETN5,  DB, TEMP1:=[EXT][MINUS]TEMP                     FREE    INSTR DISP 3
        *1030
        /ALN (XR0)
1030    ALN0,   TEMP7:=[MINUS]M27                               FREE*
1031    ALN2,   DB, SC:=TEMP7                                   FREE*   IF DP, ALN3 (1064)
1032            DB, TEMP:=FACE[MINUS]TEMP7                      FREE*
1033            DB, FACE:=TEMP7                                 FREE*
1034            DB, SC, TEMP7:=[MINUS]TEMP                      FREE*   GO TO, ALN3 (1064)
1035    ALN4,   NO OPERATION                                    FREE*   SUB, SHL (1147)
1036            NO OPERATION                                    FREE*   GO TO, NEG1 (1073)

        /ARITHMETIC DISPATCH
1037    ARITH,  NO OPERATION                                    FREE    INSTR DISP 3

        /       *       *       *       *       *       *       *       *       /
        /INSTRUCTION DISPATCH 3 DISPATCHES ARITHMETIC                           /
        /                               INSTRUCTIONS AS FOLLOWS:                /
        /       INSTRUCTION                                     LABEL   ADDRESS /
        /       FADD, FADDM (DP MODE)                           DPADD   1400    /
        /       FADD, FADDM (NOT DP)                            FADD    1401    /
        /       FMUL, FMULM                                     FMUL    1402    /
        /       FDIV                                            FDIV    1403    /
        /       IMUL                                            IMUL    1404    /
        /       *       *       *       *       *       *       *       *       /

        *1040
        /ATX
1040    ATX,    TEMP:=X0[+]FIR<9:11>                            FREE*
1041            DB, UPADD:=TEMP                                 FREE*
1042            DB, TEMP7:=FACE[+]M27                           FREE*
1043            DB, SC:=TEMP7                                   FREE*   SUB, FTOS (1333)
1044            NO OPERATION                                    FREE*   IF DP, ATXSTR (253)
1045            NO OPERATION                                    FREE*   IF EXPFL, ATX2 (1062)
1046            DB, SC:=[MINUS]TEMP7                            FREE*   SUB, SHL (1147)
1047    ATX3,   NO OPERATION                                    FREE*   GO TO, ATXSTR (253)

        *1050
1050    CLRFAC, DB, FACM:=[0]                                   FREE*   IF DP, CLRF1 (1055)
1051    CLRF2,  DB, FACE:=[0]                                   FREE*   IF NOT EP, CLRF1 (1055)
1052            DB, FACP:=[0]                                   FREE*
1053    CLRF3,  DB, FACR:=[0]                                   FREE*
1054            DB, FACS:=[0]                                   FREE*
1055    CLRF1,  DB, FACN:=[0]                                   FREE*   EXTEST
1056    LTR2,   DB, FACE:=[128IT]K1                             FREE*   IF NOT EP, CLRF1 (1055)
1057            DB, FACP:=[0]                                   FREE*   GO TO, CLRF3 (1053)
```

```
        /PAGE 12
        /LOAD EFFECTIVE ADDRESS
        *1000
1060    LOADEA, DB, FACM:=TEMP1                         FREE*   ENTER DP MODE
1061            DB, FACM:=FACM<1:3>                     FREE*   EXTEST

1062    ATX2,   NO OPERATION                            FREE*   SUB, SHR (1260)
1063            NO OPERATION                            FREE*   GO TO, ATX3 (1047)

        /MORE OF ALIGN
1064    ALN3,   DB, TEMP:=FACM                          FREE*   SUB, FTOS1 (1334)
1065            NO OPERATION                            FREE*   IF EXPFL, ALN4 (1035)
1066            DB, SC:=(MINUS)TEMP/                    FREE*   SUB, SHR (1260)
1067            NO OPERATION                            FREE*   GO TO, NEG1 (1073)

1070    FNORM1, DB, TEMP:=FACM                          FREE*   SUB, FTOS1 (1334)
1071            NO OPERATION                            FREE*   GO TO, FADDB (1446)

1072    NEGATE, NO OPERATION                            FREE*   SUB, COMPS (1133)
1073    NEG1,   DB, TEMP:=SCRATCHM                      FREE*   GO TO, STOF1 (1350)

        /REMAINDER OF STARTF
1074    ST24F,  NO OPERATION                            FREE*   IF NOT EP, ST24F2 (1101)
1075            DB, TEMP:=FACM                          FREE*   SUB, FTOS1 (1334)
1076            DB, TEMP:=FACE                          FREE*   ENTER FP MODE
1077    ST24F1, DB, SC:=TEMP                            FREE*   SUB, RND (1240)
1100            NO OPERATION                            FREE*   GO TO, FADD9 (1447)
1101    ST24F2, NO OPERATION                            FREE*   ENTER FP MODE
1102            NO OPERATION                            FREE*   EXTEST

        /REMAINDER OF XTA--FACN HOLDS C(XR) AT ENTRY
1103    XTA1,   DB, TEMP:=(SIGN)FACN                    FREE*
1104            DB, FACM:=TEMP                          FREE*   IF DP, END (1013)
1105            DB, SC:=(MINUS)M27                      FREE*   IF NOT EP, FNORM1 (1070)
1106            DB, FACP:=(0)                           FREE*
1107            DB, FACN:=(0)                           FREE*
1110            DB, FACS:=(0)                           FREE*   GO TO, FNORM1 (1070)

        //////////////SUBROUTINES//////////////////////////////////////////////
        /SUBROUTINE--CLEAR SCRATCH FRACTION,  ALL MODES
1111    CLRS,   DB, SCRATCHM:=(0)                       FREE*
1112    CLRS2,  DB, SCRATCHN:=(0)                       FREE*   IF NOT EP, CLRS1 (1116)
1113            DB, SCRATCHR:=(0)                       FREE*
1114            DB, SCRATCHS:=(0)                       FREE*
1115            DB, SCRATCHT:=(0)                       FREE*
1116    CLRS1,  DB, SCRATCHP:=(0)                       FREE*   RETURN
```



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        /PAGE 13
        /SUBROUTINE--MOVE TWO WORDS RIGHT.  USED BY MULTIPLY.  ALL MODES.
        //FILL VACATED BITS WITH CONTENTS OF SLINK.
1117    R2MF,   DB, MQM:=TEMP7                          FREE*
1120            DB, TEMP7:=SCRATCHR                     FREE*
1121    R2ME,   DB, SCRATCHT:=TEMP7                     FREE*
1122            DB, TEMP7:=SCRATCHP                     FREE*
1123    R2MB,   DB, SCRATCHS:=TEMP7                     FREE*
1124            DB, TEMP7:=SCRATCHN                     FREE*
1125    R2MA,   DB, SCRATCHR:=TEMP7                     FREE*
1126            DB, TEMP7:=SCRATCHM                     FREE*
1127    R2M,    DB, SCRATCHP:=TEMP7                     FREE    PRESET BIT COUNT
1130            DB, SCRATCHM:=SCRATCHM(SHR)(EXT)        FREE*
1131            DB, TEMP7, SCRATCHM:=(SIGN)SCRATCHM     FREE*
1132            DB, SCRATCHN:=TEMP7                     FREE*   RETURN

        /SUBROUTINE--COMPLEMENT SCRATCH FRACTION.  ALL MODES.
1133    COMPS,  DB, TEMP:=SCRATCHP                      FREE*   IF NOT EP, COMPS1 (1146)
1134            DB, TEMP:=SCRATCHS                      FREE*
1135            DB, SCRATCHS:=(MINUS)TEMP               FREE*
1136            DB, TEMP:=SCRATCHR                      FREE*
1137            DB, SCRATCHR:=(EXT)(MINUS)TEMP          FREE*
1140            DB, TEMP:=SCRATCHP                      FREE*
1141            DB, SCRATCHP:=(EXT)(MINUS)TEMP          FREE*
1142    COMPS2, DB, TEMP:=SCRATCHN                      FREE*
1143            DB, SCRATCHN:=(EXT)(MINUS)TEMP          FREE*
1144            DB, TEMP:=SCRATCHM                      FREE*
1145            DB, SCRATCHM:=(EXT)(MINUS)TEMP          FREE*   RETURN
1146    COMPS1, DB, SCRATCHP:=(MINUS)TEMP               FREE*   GO TO, COMPS2 (1142)

        /SUBROUTINE--SHIFT SCRATCH LEFT PER SC,  USE WORD MOVE IF POSSIBLE.
        /SC CONTAINS 2'S COMP NUMBER OF SHIFTS ON ENTRY, IS ZERO AT EXIT.
1147    SHL,    DB, SC:=SC                              FREE*
1150    SHL6,   DB, SC:=SC(12BIT)K14                    FREE*
1151            NO OPERATION                            FREE*   IF EXPFL, SHL6A (1153)
1152            DB, SC:=SC(12BIT)M14                    FREE*   RETURN
1153    SHL6A,  NO OPERATION                            FREE*   IF EXPFL, SHL4 (1165)
1154            DB, SC:=SC(12BIT)M14                    FREE*
1155    SHL1,   DB, SC:=SC(12BIT)K1                     FREE*   IF EP, SHL3 (1162)
1156            DB, SCRATCHP:=(SHL)SCRATCHP             FREE*
1157    SHL2,   DB, SCRATCHN:=(SHL)(EXT)SCRATCHN        FREE*
1160            DB, SCRATCHM:=(SHL)(EXT)SCRATCHM        FREE*   IF EXPFL, SHL1 (1155)
1161            NO OPERATION                            FREE*   RETURN
1162    SHL3,   DB, SCRATCHS:=(SHL)SCRATCHS             FREE*
1163            DB, SCRATCHR:=(SHL)(EXT)SCRATCHR        FREE*
1164            DB, SCRATCHP:=(SHL)(EXT)SCRATCHP        FREE*   GO TO, SHL2 (1157)
1165    SHL4,   DB, TEMP:=SCRATCHN                      FREE*
1166            DB, SCRATCHM:=TEMP                      FREE*
1167            DB, TEMP:=SCRATCHP                      FREE*
1170            DB, SCRATCHN:=TEMP                      FREE*   IF NOT EP, SHL5 (1176)
1171            DB, TEMP:=SCRATCHR                      FREE*
1172            DB, SCRATCHP:=TEMP                      FREE*
1173            DB, TEMP:=SCRATCHS                      FREE*
1174            DB, SCRATCHR:=TEMP                      FREE*
1175            DB, SCRATCHS:=(0)                       FREE*   GO TO, SHL6 (1150)
1176    SHL5,   DB, SCRATCHP:=(0)                       FREE*   GO TO, SHL6 (1150)
```

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        /PAGE 14
        /SUBROUTINE--NORMALIZE SCRATCH.  DECREMENT SC ONCE FOR EACH SHIFT.
        /USE WORD MOVE, WHEN POSSIBLE, TO SAVE TIME.
        /ROUND OFF IF NOT IN EP MODE.  DB IS LOADED AT FIRST FIVE STEPS FOR
        /BETTER VISIBILITY OF UN-NORMALIZED ANSWER.

1176    NM1,    DB:=SCRATCHM                                    FREE*   IF DP, RND (1240)
1200            DB:=SCRATCHN                                    FREE*   IF TEMPZERO, RND (1240)
1201    NM11,   DB:=SCRATCHP                                    FREE*   IF MOVE OK, NMI4 (1215)
1202            DB:=SCRATCHR                                    FREE*   IF NORMED, NMI6 (1237)
1203            DB:=SCRATCHS                                    FREE*   IF NOT EP, NMI3 (1232)
1204    NM11A,  DB, SCRATCHT:=[SHL]SCRATCHT                     FREE*   IF NORMED, NMI1B (1213)
1205            DB, SCRATCHS:=[SHL][EXT]SCRATCHS                FREE*   TEST OVFLO
1206            DB, SCRATCHR:=[SHL][EXT]SCRATCHR                FREE*
1207            DB, SCRATCHP:=[SHL][EXT]SCRATCHP                FREE*
1210            DB, SCRATCHN:=[SHL][EXT]SCRATCHN                FREE*
1211            DB, SCRATCHM:=[SHL][EXT]SCRATCHM                FREE*
1212            DB, SC:=SC[12BIT]M1                             FREE*   GO TO, NMI1A (1204)
1213    NMI1B,  NO OPERATION                                    FREE*   TEST OVFLO
1214            NO OPERATION                                    FREE*   GO TO, NMI6 (1237)
1215    NMI4,   DB, SC:=SC[12BIT]M14                            FREE*
1216            DB, TEMP:=SCRATCHN                              FREE*
1217            DB, SCRATCHM:=TEMP                              FREE*   TEST OVFLO
1220            DB, TEMP:=SCRATCHP                              FREE*
1221            DB, SCRATCHN:=TEMP                              FREE*   IF NOT EP, NMI5 (1231)
1222            DB, TEMP:=SCRATCHR                              FREE*
1223            DB, SCRATCHP:=TEMP                              FREE*
1224            DB, TEMP:=SCRATCHS                              FREE*
1225            DB, SCRATCHR:=TEMP                              FREE*
1226            DB, TEMP:=SCRATCHT                              FREE*
1227            DB, SCRATCHS:=TEMP                              FREE*
1230            DB, SCRATCHT:=[0]                               FREE*   GO TO, NMI1 (1201)
1231    NMI5,   DB, SCRATCHP:=[0]                               FREE*   GO TO, NMI1 (1201)
1232    NMI3,   DB, SCRATCHP:=[SHL][EXT]SCRATCHP                FREE*   IF NORMED, NMI3A (1236)
1233            DB, SCRATCHN:=[SHL][EXT]SCRATCHN                FREE*   TEST OVFLO
1234            DB, SCRATCHM:=[SHL][EXT]SCRATCHM                FREE*
1235            DB, SC:=SC[12BIT]M1                             FREE*   GO TO, NMI3 (1232)
1236    NMI3A,  DB, SCRATCHP:=[SHR][EXT]SCRATCHP                FREE*   TEST OVFLO
1237    NMI6,   NO OPERATION                                    FREE*   IF FORBIDDEN, NMI8 (1250)
1240    RND,    NO OPERATION                                    FREE*   IF EP, NMI7 (1247)
1241            NO OPERATION                                    FREE*   IF TEMPSGN, RND1 (1254)
1242            DB:=SCRATCHP[12BIT]K3777+1                      FREE*
1243    RND2,   DB, SCRATCHN:=SCRATCHN[12BIT][EXT]              FREE*
1244            DB, SCRATCHM:=SCRATCHM[12BIT][EXT]              FREE*   IF TEMPZERO, RND4 (1255)
1245            DB, SCRATCHP:=[0]                               FREE*   IF DP, NMI7 (1247)
1246            NO OPERATION                                    FREE*   IF FORBIDDEN, OVREC (1405)
1247    NMI7,   NO OPERATION                                    FREE*   RETURN
1250    NMI8,   DB, SC:=SC[12BIT]K1                             FREE*
1251            DB, SCRATCHM:=[SHR]SCRATCHM                     FREE*
1252            NO OPERATION                                    FREE*   TEST OVFLO
1253            NO OPERATION                                    FREE*   RETURN
1254    RND1,   DB:=SCRATCHP[12BIT]K3777                        FREE*   GO TO, RND2 (1243)
1255    RND4,   DB, SCRATCHP:=[0]                               FREE*   IF DP, NMI7 (1247)
1256            NO OPERATION                                    FREE*   IF TEMPZERO, NMI7 (1247)
1257            NO OPERATION                                    FREE*   GO TO, NMI1 (1201)
```



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        /PAGE 15
        /SUBROUTINE--SHIFT SCRATCH RIGHT PER SC.  USE WORD MOVE IF POSSIBLE.
        /SC CONTAINS 2'S COMPLEMENT OF NUMBER OF SHIFTS ON ENTRY, 0 AT EXIT
1260    SHR,    DB, SC:=SC                                      FREE*
1261    SHR1B,  DB, SC:=SC[12BIT]K14                            FREE*
1262            NO OPERATION                                    FREE*   IF EXPFL, SHR1A (1264)
1263            DB, SC:=SC[12BIT]M14                            FREE*   RETURN
1264    SHR1A,  NO OPERATION                                    FREE*   IF EXPFL, RWM (1300)
1265            DB, SC:=SC[12BIT]M14                            FREE*
1266    SHR1,   DB, SC:=SC[12BIT]K1                             FREE*
1267            DB, SCRATCHM:=[SHR]SCRATCHM                     FREE*
1270            DB, SCRATCHN:=[SHR][EXT]SCRATCHN                FREE*   IF EP, SHR2 (1273)
1271            DB, SCRATCHP:=[SHR][EXT]SCRATCHP                FREE*   IF EXPFL, SHR1 (1266)
1272            NO OPERATION                                    FREE*   RETURN
1273    SHR2,   DB, SCRATCHP:=[SHR][EXT]SCRATCHP                FREE*
1274            DB, SCRATCHR:=[SHR][EXT]SCRATCHR                FREE*
1275            DB, SCRATCHS:=[SHR][EXT]SCRATCHS                FREE    IF EXPFL, SHR1 (1266)
1276            DB, SCRATCHT:=[SHR][EXT]SCRATCHT                FREE*
1277            NO OPERATION                                    FREE*   RETURN
1300    RWM,    DB, TEMP:=SCRATCHN                              FREE*   IF NOT EP, RWM1 (1310)
1301            DB, TEMP:=SCRATCHS                              FREE*
1302            DB, SCRATCHT:=TEMP                              FREE*
1303            DB, TEMP:=SCRATCHR                              FREE*
1304            DB, SCRATCHS:=TEMP                              FREE*
1305            DB, TEMP:=SCRATCHP                              FREE*
1306            DB, SCRATCHR:=TEMP                              FREE*
1307            DB, TEMP:=SCRATCHN                              FREE*
1310    RWM1,   DB, SCRATCHP:=TEMP                              FREE*
1311            DB, TEMP:=SCRATCHM                              FREE*
1312            DB, SCRATCHN:=TEMP                              FREE*
1313            DB, SCRATCHM:=[SIGN]SCRATCHM                    FREE*   GO TO, SHR1B (1261)

        /SUBROUTINE--EXCHANGE SCRATCH AND TEMP FRACTIONS.
1314    EST,    DB, TEMP:=SCRATCHM                              FREE*
1315            DB, SCRATCHM:=TEMP1                             FREE*
1316            DB, TEMP1:=TEMP                                 FREE*   IF NOT EP, EST1 (1330)
1317            DB, TEMP:=SCRATCHP                              FREE*
1320            DB, SCRATCHP:=TEMP3                             FREE*
1321            DB, TEMP3:=TEMP                                 FREE*
1322            DB, TEMP:=SCRATCHR                              FREE*
1323            DB, SCRATCHR:=TEMP4                             FREE*
1324            DB, TEMP4:=TEMP                                 FREE*
1325            DB, TEMP:=SCRATCHS                              FREE*
1326            DB, SCRATCHS:=TEMP5                             FREE*
1327            DB, TEMP5:=TEMP                                 FREE*
1330    EST1,   DB, TEMP:=SCRATCHN                              FREE*
1331            DB, SCRATCHN:=TEMP2                             FREE*
1332            DB, TEMP2:=TEMP                                 FREE*   RETURN
```

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        /PAGE 16
        /SUBROUTINE--MOVE FAC FRACTION TO SCRATCH.
1333    FTOS,   DB, TEMP:=FACM                          FREE*
1334    FTOS1,  DB, SCRATCHM:=TEMP                      FREE*   IF NOT EP, FTOS3 (1346)
1335            DB, SCRATCHT:=[0]                       FREE*
1336            DB, TEMP:=FACP                          FREE*
1337            DB, SCRATCHP:=TEMP                      FREE*
1340            DB, TEMP:=FACR                          FREE*
1341            DB, SCRATCHR:=TEMP                      FREE*
1342            DB, TEMP:=FACS                          FREE*
1343            DB, SCRATCHS:=TEMP                      FREE*
1344    FTOS2,  DB, TEMP:=FACN                          FREE*
1345            DB, SCRATCHN:=TEMP                      FREE*   RETURN
1346    FTOS3,  DB, SCRATCHP:=[0]                       FREE*   GO TO, FTOS2 (1344)

        ////////////////////////MOVE SCRATCH TO FAC AND EXIT///////////////
1347    STUF,   DB, TEMP:=SCRATCHM                      FREE*
1350    STUF1,  DB, FACM:=TEMP                          FREE*   IF NOT EP, STUF2 (1357)
1351            DB, TEMP:=SCRATCHP                      FREE*
1352            DB, FACP:=TEMP                          FREE*
1353            DB, TEMP:=SCRATCHN                      FREE*
1354            DB, FACR:=TEMP                          FREE*
1355            DB, TEMP:=SCRATCHS                      FREE*
1356            DB, FACS:=TEMP                          FREE*
1357    STUF2,  DB, TEMP:=SCRATCHN                      FREE*   IF TEMPZERO, STUF3 (1361)
1360            DB, FACN:=TEMP                          FREE*   EXTEST
1361    STUF3,  DB, FACN:=TEMP                          FREE*   IF DP, END (1015)
1362            DB, TEMP7, FACE:=[0]                    FREE*   EXTEST
```



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        /PAGE 17
        ////////////////////FLOATING POINT ARITHMETIC//////////////////////////
        *1400
        /POINTERS TO THE ARITHMETIC ROUTINES
1400    DPADD,  DB, TEMP:=FACM                          FREE    GO TO, DPLUS (1413)
1401    FADD,   DB, TEMP7:=FACE                         FREE    GO TO, FPLUS (1422)
1402    FMUL,   DB, TEMP7:=FACE                         FREE*   GO TO, FTIMES (1472)
1403    FDIV,   DB:=[SHL]FACM                           FREE    GO TO, FDUO (1562)
1404    IMUL,   DB:=TEMP2                               FREE*   GO TO, IMUL1 (1540)
        /RECOVER FROM OVERFLOW.  USED BY FP AND EP NMI, FADD, FDIV
1405    OVREC,  DB, SC:=SC[12BIT]K1                     FREE*
1406            DB, SCRATCHM:=[OVFREC]SCRATCHM          FREE*
1407            DB, SCRATCHN:=[SHR][EXT]SCRATCHN        FREE*   TEST OVFLO
1410            DB, SCRATCHP:=[SHR][EXT]SCRATCHP        FREE*   IF NOT EP, RND (1240)
1411            DB, SCRATCHR:=[SHR][EXT]SCRATCHR        FREE*
1412            DB, SCRATCHS:=[SHR][EXT]SCRATCHS        FREE*   RETURN

        /////DPADD--ADD FIXED POINT FAC AND TEMP/////
1413    DPLUS,  DB, SCRATCHM:=TEMP                      FREE*   SUB, FTOS2 (1344)
1414            DB, SCRATCHN:=SCRATCHN[12BIT]TEMP2      FREE*
1415            DB, SCRATCHM:=SCRATCHM[12BIT][EXT]TEMP1 FREE*
1416    DPLUS1, NO OPERATION                            FREE*
1417    DPADD0, NO OPERATION                            FREE*   TEST OVFLO
1420    DPADD1, NO OPERATION                            FREE*   IF MEM, DEPOS (353)
1421    DPADD2, DB, TEMP:=SCRATCHM                      FREE*   GO TO, STOF1 (1350)

        ////////FLOATING POINT ADD////////////
        /FIRST TEST FOR ZERO ARGUMENT.
1422    FPLUS,  DB, SC:=TEMP7                           FREE*   IF TEMPZERO, FADD11 (1453)
1423            DB, SCRATCHE:=TEMP7                     FREE*   SUB, FTOS (1333)
1424            DB, TEMP7, SC:=SC[MINUS]TEMP6           FREE*   IF FACZERO, FADD0 (1455)
        /NOW FIND SMALLER EXPONENT.  TEST FOR OVERSHIFT.
1425            NO OPERATION                            FREE*
1426            NO OPERATION                            FREE*   IF OVFLO, FADD1 (1457)
1427            NO OPERATION                            FREE*   IF EXPFL, FPLUS1 (1462)
1430            DB, SC:=[MINUS]TEMP7                    FREE*
1431            DB:=SC[MINUS]M30                        FREE*   IF NOT EP, FPLUS2 (1433)
1432            DB:=SC[MINUS]M73                        FREE*
1433    FPLUS2, NO OPERATION                            FREE*
1434            NO OPERATION                            FREE*   IF SGN, FADD1A (1460)
1435            DB, TEMP6:=FACE                         FREE*   SUB, EST (1314)
        /ALIGN NUMBERS.  SMALLER NUMBER IS IN SCRATCH; SC CONTAINS EXP DIFF.
        /DIFFERENCE IN EXPONENTS IS SMALL ENOUGH THAT A NON-ZERO
        /NUMBER WILL BE IN SCRATCH AFTER THE SHIFT.
1436    FADD4,  NO OPERATION                            FREE*   SUB, SHR (1268)
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                /PAGE 18
                /ADD FRACTIONS
1437    FA,     DB, SCRATCHS:=SCRATCHS[12BIT]TEMP5      FREE*   IF NOT EP, FB (1467)
1440            DB, SCRATCHR:=SCRATCHR[12BIT][EXT]TEMP4 FREE*
1441            DB, SCRATCHP:=SCRATCHP[12BIT][EXT]TEMP3 FREE*
1442            DB, SCRATCHN:=SCRATCHN[12BIT][EXT]TEMP2 FREE*
1443    FADD7,  DB, SCRATCHM:=SCRATCHM[12BIT][EXT]TEMP1 FREE*
1444            DB, SC:=TEMP6                           FREE*
1445            NO OPERATION                            FREE*   IF OVFLO, FADD2 (1470)
                /NORMALIZE RESULT.
1446    FADD8,  NO OPERATION                            FREE*   SUB, NMI (1177)
1447    FADD9,  DB, TEMP7:=SC                           FREE*   IF NZSET, FADD10 (1451)
                /CLEAR SCRATCH IF NON-TRAPPED EXPONENT UNDERFLOW
1450    FADD9A, DB, TEMP7:=[0]                          FREE*   SUB, CLRS (1111)
                /STORE IN EITHER MEMORY OR FAC, DEPENDING ON OP CODE.
1451    FADD10, DB, SCRATCHE:=TEMP7                     FREE*   IF MEM, DEPOS (353)
1452            DB, FACE:=TEMP7                         FREE*   GO TO, STOF (1347)
                /ZEROS IN TEMP.  FAC HOLDS ANSWER.
1453    FADD11, DB, TEMP:=FACM                          FREE*   SUB, FTOS1 (1334)
1454            NO OPERATION                            FREE*   GO TO, FADD8 (1446)
                /FAC IS ZERO OR OVERSHIFT OCCURRED.  TEMP HOLDS ANSWER.
1455    FADD0,  DB, SC:=TEMP6                           FREE*   SUB, EST (1314)
1456            NO OPERATION                            FREE*   GO TO, FADD8 (1446)
                /DIFF IN EXPONENTS SO BIG THAT THE SHIFT SUBTRACTION
                /OVERFLOWED.  SC FLAG TELLS WHICH ARGUMENT LARGER.
1457    FADD1,  NO OPERATION                            FREE*   IF EXPFL, FADD0 (1455)
1460    FADD1A, DB, TEMP7:=FACE                         FREE*
1461            DB, SC:=TEMP7                           FREE*   GO TO, FADD8 (1446)
                /TEST FOR OVERSHIFT, BUT BYPASS EXCHANGE.
1462    FPLUS1, DB:=SC[MINUS]M30                        FREE*   IF NOT EP, FPLUS3 (1464)
1463            DB:=SC[MINUS]M73                        FREE*
1464    FPLUS3, NO OPERATION                            FREE*
1465            NO OPERATION                            FREE*   IF SGN, FADD0 (1455)
1466            NO OPERATION                            FREE*   GO TO, FADD4 (1436)
                /START FP ADD.
1467    FB,     DB, SCRATCHN:=SCRATCHN[12BIT]TEMP2      FREE*   GO TO, FADD7 (1443)
                /RECOVER FROM OVERFLOW.
1470    FADD2,  NO OPERATION                            FREE*   SUB, OVREC (1405)
1471            NO OPERATION                            FREE*   GO TO, FADD9 (1447)

                /////////FLOATING AND FIXED POINT FRACTIONAL MULTIPLY//////////
                /MULTIPLY IS DIRECT MULT OF SIGNED 2'S COMPLEMENT NUMBERS, WITH
                /A CORRECTION FOR NEGATIVE MULTIPLIER.  ENTER WITH TEMP FLAGS
                /SET, CHECK FOR ZERO FACTOR.  EXTEND SIGN OF TEMP1 INTO TEMP.
1472    FTIMES, DB, TEMA:=TEMP1                         FREE*   IF TEMPZERO, FADD9A (1450)
1473            DB, TEMP:=[SIGN]TEMA                    FREE*   IF FACZERO, FADD9A (1450)
1474            DB, SC:=TEMP7                           FREE*   SUB, CLRS (1111)
                /MULTIPLY FRACTIONS
1475            NO OPERATION                            FREE*   IF NOT EP, FMUL4 (1532)
1476            DB:=FACS                                FREE*   PRESET BIT COUNT
1477            SCRATCHP:=SCRATCHP[MDS]TEMP2            FREE*   CSUB, MUL3A (1556)
1500            DB, TEMP7:=SCRATCHN                     FREE*   SUB, R2MA (1125)
1501            DB:=FACR                                FREE*
1502            SCRATCHR:=SCRATCHR[MDS]TEMP3            FREE*   CSUB, MUL4A (1555)
1503            DB, TEMP7:=SCRATCHP                     FREE*   SUB, R2MB (1123)
1504            DB:=FACP                                FREE*
```



```
                /PAGE 19
1505            SCRATCHS:=SCRATCHS[MDS]TEMP4            FREE*   CSUB, MUL5A (1554)
1506            DB, TEMP7:=SCRATCHR                     FREE*   SUB, R2ME (1121)
1507            DB:=FACN                                FREE*
1510            SCRATCHT:=SCRATCHT[MDS]TEMP5            FREE*   CSUB, MUL6A (1553)
1511            DB, TEMP7:=SCRATCHS                     FREE*   SUB, R2MF (1117)
1512            DB:=FACM                                FREE*
1513            MQM:=MQM[MDS]                           FREE*   CSUB, MUL7A (1552)
                /IF MULTIPLIER IS NEGATIVE, A CORRECTION IS REQUIRED.
1514    FMUL2,  NO OPERATION                            FREE*   IF FACSGN, FMUL6 (1522)
                /NORMALIZE (IF NOT DP), ROUND OFF RESULT IF NOT EP MODE.
1515    R,      NO OPERATION                            FREE*   SUB, NMI (1177)
                /ADD EXPONENTS, TEST FOR EXPONENT OVERFLOW.
1516            DB, SC:=SC[12BIT]TEMP6                  FREE*
1517    FMUL3,  NO OPERATION                            FREE*   IF DP, DPADD1 (1420)
1520            NO OPERATION                            FREE*   TEST OVFLO
1521            NO OPERATION                            FREE*   GO TO, FADD9 (1447)

                /CORRECTION FOR NEGATIVE MULTIPLIER--SUBTRACT 2*MULTIPLICAND
1522    FMUL6,  DB, SCRATCHS:=SCRATCHS[MINUS]TEMP5      FREE*   SUB, N (1525)
1523            DB, SCRATCHS:=SCRATCHS[MINUS]TEMP5      FREE*   SUB, N (1525)
1524            NO OPERATION                            FREE*   GO TO, R (1515)
1525    N,      DB, SCRATCHR:=SCRATCHR[MINUS][EXT]TEMP4 FREE*   IF EP, M (1530)
1526            DB, SCRATCHN:=SCRATCHN[MINUS]TEMP2      FREE*
1527    P,      DB, SCRATCHM:=SCRATCHM[MINUS][EXT]TEMP1 FREE*   RETURN
1530    M,      DB, SCRATCHP:=SCRATCHP[MINUS][EXT]TEMP3 FREE*
1531            DB, SCRATCHN:=SCRATCHN[MINUS][EXT]TEMP2 FREE*   GO TO, P (1527)

                /MULTIPLY FRACTIONS--DP OR FP
1532    FMUL4,  DB:=FACN                                FREE*   PRESET BIT COUNT
1533            SCRATCHP:=SCRATCHP[MDS]TEMP2            FREE*   CSUB, MUL3A (1556)
1534            DB, TEMP7:=SCRATCHN                     FREE*   SUB, R2MA (1125)
1535            DB:=FACM                                FREE*
1536            SCRATCHR:=SCRATCHR[MDS]                 FREE*   CSUB, MUL4A (1555)
1537            NO OPERATION                            FREE*   GO TO, FMUL2 (1514)

                /////////////////SIGNED INTEGER MULTIPLY--DP MODE ONLY//////////
1540    IMUL1,  DB, TEMA:=TEMP1                         FREE*   IF TEMPZERO, FADD9A (1450)
1541            DB, TEMP:=[SIGN]TEMA                    FREE*   IF FACZERO, FADD9A (1450)
1542            NO OPERATION                            FREE*   SUB, CLRS (1111)
1543            DB:=FACM                                FREE*   PRESET BIT COUNT
1544            SCRATCHN:=SCRATCHN[MDS]TEMP2            FREE*   CSUB, IMUL2 (1560)
1545            DB:=SCRATCHN                            FREE*   PRESET BIT COUNT
1546            DB:=FACN                                FREE*   TEST OVFLO
1547            SCRATCHN:=SCRATCHN[MDS]TEMP2            FREE*   CSUB, IMUL2 (1560)
1550            DB, SCRATCHM:=SCRATCHM[SHR][EXT]        FREE*
1551            DB, SCRATCHN:=SCRATCHN[SHR][EXT]        FREE*   GO TO, FMUL2 (1514)
```

```
        /PAGE 20
        /MULTIPLY SUBROUTINES
1552    MUL7A,  SCRATCHT:=SCRATCHT[MDS][EXT]TEMP5       FREE*
1553    MUL6A,  SCRATCHS:=SCRATCHS[MDS][EXT]TEMP4       FREE*
1554    MUL5A,  SCRATCHR:=SCRATCHR[MDS][EXT]TEMP3       FREE*
1555    MUL4A,  SCRATCHP:=SCRATCHP[MDS][EXT]TEMP2       FREE*
1556    MUL3A,  SCRATCHN:=SCRATCHN[MDS][EXT]TEMP1       FREE*
1557            SCRATCHM:=SCRATCHM[MDS][EXT]TEMP        FREE*   RETURN

1560    IMUL2,  NO OPERATION                            FREE*   TEST OVFLO
1561            SCRATCHM:=SCRATCHM[MDS][EXT]TEMP1       FREE*   RETURN

        //////////FLOATING AND FIXED POINT DIVIDE//////////
        /SHIFT LINK HOLDS FAC SIGN AT ENTRY.  CHECK FIRST FOR ZERO DIVISOR
        /(SET DIVZERO FLAG AND EXIT); IF IN FP OR EP MODE, MAKE SURE
        /DIVISOR NORMED--IF NOT, DO IT; THEN CHECK FOR ZERO DIVIDEND (ANS
        /ALREADY IN FAC).  XOR FRACTION SIGNS AND MAKE SIGN OF TEMA
        /EQUAL TO SIGN OF RESULT.  SETTING DB=1 AT "FQUO1"
        /FORCES CORRECT FIRST DIVIDE OPERATION, SINCE HARDWARE
        /EXAMINES DB11 TO DETERMINE WHAT TO DO.  THE DIVIDE IS A NON-
        /RESTORING DIVIDE OF A SIGNED DIVISOR AND A POSITIVE DIVIDEND.

1562    FQUO,   DB, TEMA:=[SHR][EXT]                    FREE    IF TEMPZERO, FDIV6 (1630)
1563            DB, SCRATCHP:=[0]                       FREE    IF DP, FQUO2 (1570)
1564            DB, SCRATCHT:=[0]                       FREE    IF NORMED, FQUO2 (1570)
1565            DB, SC:=TEMP6                           FREE*   SUB, EST (1314)
1566            NO OPERATION                            FREE*   SUB, NMI (1177)
1567            DB, TEMP6:=SC                           FREE*   SUB, EST (1314)
1570    FQUO2,  DB, TEMP:=FACE                          FREE*   IF FACZERO, CLRFAC (1650)
1571            DB, SC:=TEMP                            FREE*   SUB, FTOS (1333)
1572            DB, TEMP7:=TEMP1                        FREE*   IF FACSGN, FDIV1 (1624)
1573    FQUO1,  DB, TEMA:=TEMA[12BIT]TEMP1              FREE*   PRESET BIT COUNT
1574            DB:=K1                                  FREE*   IF NOT EP, FDIV10 (1632)
1575            SCRATCHT:=SCRATCHT[MDS]                 FREE*   CSUB, DIV6A (1661)
1576            MQM:=DB                                 FREE*   PRESET BIT COUNT
1577            SCRATCHT:=SCRATCHT[MDS]                 FREE*   CSUB, DIV6A (1661)
1600            MQN:=DB                                 FREE*   PRESET BIT COUNT
1601            SCRATCHS:=SCRATCHS[MDS]TEMP5            FREE*   CSUB, DIV5A (1662)
1602            MQP:=DB                                 FREE*   PRESET BIT COUNT
1603            SCRATCHR:=SCRATCHR[MDS]TEMP4            FREE*   CSUB, DIV4A (1663)
1604            MQK:=DB                                 FREE*   PRESET BIT COUNT
1605            SCRATCHP:=SCRATCHP[MDS]TEMP3            FREE*   CSUB, DIV3A (1664)
        /MOVE QUOTIENT INTO SCRATCH
1606            SCRATCHS:=DB                            FREE*
1607            DB, SCRATCHT:=[0]                       FREE*
1610            DB, TEMP:=MQM                           FREE*
1611            DB, SCRATCHR:=TEMP                      FREE*
1612            DB, TEMP:=MQP                           FREE*
1613            DB, SCRATCHP:=TEMP                      FREE*
1614    FDIV2,  DB, TEMP:=MQM                           FREE*
1615            DB, SCRATCHM:=TEMP                      FREE*
1616            DB, TEMP:=MQN                           FREE*
1617            DB:=TEMA                                FREE*
1620            DB, SCRATCHN:=TEMP                      FREE*   IF TEMPSGN, FDIV4 (1644)
        /NEGATIVE QUOTIENT AT THIS POINT INDICATES DIVIDE OVERFLOW.
1621    FDIV3,  NO OPERATION                            FREE*   IF SGN, FDIV8 (1626)
1622    FDIV9,  NO OPERATION                            FREE*   SUB, NMI (1177)
1623    FDIV5,  DB, SC:=SC[MINUS]TEMP6                  FREE*   GO TO, FMULJ (1517)
```



```
        /PAGE 21
        /COMPLEMENT SCRATCH IF FAC IS NEGATIVE TO MAKE DIVIDEND ALWAYS POS.
1624    FDIV1,  NO OPERATION                            FREE*   SUB, COMPS (1133)
1625            NO OPERATION                            FREE*   GO TO, FQUO1 (1573)

        /COMPLEMENT RESULT IF TEMA NEGATIVE.
1626    FDIV8,  NO OPERATION                            FREE*   SUB, COMPS (1133)
1627            NO OPERATION                            FREE*   GO TO, FDIV9 (1622)

        /DIVISOR IS ZERO.  SET "DIVIDE BY ZERO" FLAG, EXIT.
1630    FDIV6,  NO OPERATION                            FREE*   SET DIV0
1631            NO OPERATION                            FREE*   GO TO, EXSTKT (1000)

        /DO 24-BIT DIVIDE
1632    FDIV10, SCRATCHP:=SCRATCHP[MDS]TEMP3            FREE*   CSUB, DIV3A (1664)
1633            MQM:=DB                                 FREE*   PRESET BIT COUNT
1634            SCRATCHP:=SCRATCHP[MDS]TEMP3            FREE*   CSUB, DIV3A (1664)
1635            MQN:=DB                                 FREE
1636            SCRATCHP:=SCRATCHP[MDS]TEMP3            FREE*   SUB, DIV3A (1664)
1637            SCRATCHP:=SCRATCHP[MDS]TEMP3            FREE*   SUB, DIV3A (1664)
1640            DB:=[SHR]DB                             FREE*
1641            SCRATCHP:=[SHR][EXT]                    FREE*
1642            DB:=[SHR]DB                             FREE*
1643            DB, SCRATCHP:=[SHR][EXT]SCRATCHP        FREE*   GO TO, FDIV2 (1614)

        /OVERFLOW OCCURED.
        /DP MODE: OVERFLOW IS BY AN UNKNOWN AMOUNT.  SET DP OVFLO BIT.
        /FP, EP MODES: OVERFLOW BY ONLY ONE BIT, SINCE DIVISOR IS FORCED
        /TO BE NORMALIZED BEFORE THE DIVIDE.  RECOVER.  RESULTING
        /ANSWER IS CORRECT.
1644    FDIV4,  NO OPERATION                            FREE*   IF SGN, FDIV11 (1650)
1645    FDIV12, DB:=K3777+1                             FREE*   IF DP, FDIV13 (1656)
1646            NO OPERATION                            FREE*   SUB, OVREC (1485)
1647            NO OPERATION                            FREE*   GO TO, FDIV5 (1623)
1650    FDIV11, DB:=K3777+1                             FREE*   IF DP, FDIV13 (1656)
1651            NO OPERATION                            FREE*   IF FORBIDDEN, FDIVSC (1654)
1652            NO OPERATION                            FREE*   SUB, COMPS (1133)
1653            NO OPERATION                            FREE*   GO TO, FDIV12 (1645)
        /OVERFLOW SPECIAL CASE--ANSWER IS EXACTLY 8000 0000.
1654    FDIVSC, NO OPERATION                            FREE*   SUB, NMI8 (1250)
1655            NO OPERATION                            FREE*   GO TO, FDIV5 (1623)
        /AN ADDITION WAS FORCED AT FDIV11 OR FDIV12 THAT WILL ALWAYS
        /OVERFLOW, IN ORDER TO SET DP OVERFLOW BIT
1656    FDIV13, NO OPERATION                            FREE*
1657            DB:=TEMA                                FREE*   TEST OVFLO
1660            NO OPERATION                            FREE*   GO TO, FDIV3 (1621)

        /DIVIDE SUBROUTINES
1661    DIV6A,  SCRATCHS:=SCRATCHS[MDS][EXT]TEMP5       FREE*
1662    DIV5A,  SCRATCHR:=SCRATCHR[MDS][EXT]TEMP4       FREE*
1663    DIV4A,  SCRATCHP:=SCRATCHP[MDS][EXT]TEMP3       FREE*
1664    DIV3A,  SCRATCHN:=SCRATCHN[MDS][EXT]TEMP2       FREE*
1665            SCRATCHM:=SCRATCHM[MDLST][EXT]TEMP1     FREE*   RETURN
```

```
        /PAGE 22
        /MAINTENANCE FIRMWARE
        /IOT 6550 GETS YOU HERE VIA LOCATION 17

        *1700
        /VERIFY THAT CONSTANTS ARE CORRECT
        /
        /=77777
1700    MAINT1, DB, FACE:=M1                                    FREE
        /=00000
1701            DB:=[0]                                         FREE
        /=00001
1702            DB, FPC, TEMP1:=K1                              FREE
        /=77776
1703            DB, FACM:=M2                                    FREE
        /=00002
1704            DB, X0, TEMP2:=K2                               FREE
        /=77773
1705            DB, FACN:=M5                                    FREE
        /=00003
1706            DB, OPADD, TEMP3:=K3                            FREE
        /=77772
1707            DB, FACP:=M6                                    FREE
        /=00014
1710            DB, APTP, TEMP4:=K14                            FREE
        /=77764
1711            DB, FACR:=M14                                   FREE
        /=02000
1712            DB, TEMA, TEMP5:=K2000                          FREE
        /=77751
1713            DB, FACS:=M27                                   FREE
        /=03777
1714            DB, TEMP6, SC:=K3777                            FREE
        /=77750
1715            DB, SCRATCHE:=M30                               FREE
        /=77765
1716            DB, TEMP7, BR:=M73                              FREE

        /REVISION NUMBER FOR THIS MICRO CODE.
        /THE REVISION NUMBER IS A TWO DIGIT NUMBER AND USES THE FOLLOWING
        /CONVERSION TABLE
        /       DIGIT   NUMBER IN DB            DIGIT   NUMBER IN DB
        //      0       0                       5       M2
        //      1       K1                      6       M5
        //      2       K2                      7       M6
        //      3       K3                      8       M27
        //      4       M1                      9       M73
        ////REV NUMBER IN LOCATIONS VMSB AND VLSB

1717    VMSB,   DB:=[0]                                         FREE
1720    VLSB,   DB:=[0]                                         FREE    SUB, FTOS (1333)
        /SUBROUTINE FTOS WILL MOVE FAC TO SCRATCH

        /=0
1721            DB:=SCRATCHT                                    FREE    SUB, EST (1314)
        /SUBROUTINE EST WILL EXCHANGE SCRATCHM-S WITH TEMP1-5
```



```
        /PAGE 23

        /CHECK REGISTERS FOR CORRECT VALUES.

        /=00001
1722            DB:=FPC                                         FREE
        /=00002
1723            DB:=X0                                          FREE
        /=77750
1724            DB:=BR                                          FREE
        /=00003
1725            DB:=OPADD                                       FREE
        /=00014
1726            DB:=APTP                                        FREE
        /=02000
1727            DB:=TEMA                                        FREE
        /=03777
1730            DB:=SC                                          FREE
        /=77777
1731            DB:=FACE                                        FREE
        /=03777
1732            DB:=TEMP6                                       FREE
        /=77765
1733            DB:=TEMP7                                       FREE
        /=77750
1734            DB:=SCRATCHE                                    FREE

        /CHECK THE ADD FUNCTION
        /03777+77772=03771
1735            DB:=SC[+]TEMP3                                  FREE
        /02000+00014+1=02015
1736            DB:=SCRATCHS[+]K14+1                            FREE
        /77776+[12BITS]2+1=00001
1737            DB:=X0[12BIT]TEMP1+1                            FREE

        /CHECK [R3R]
        /77750=07775
1740            DB:=[R3R]SCRATCHE                               FREE
        /07775+03777=13774    [R3R]=41377
1741            DB:=DB[R3R]SC                                   FREE
        /0 TO SCRATCHE
1742            DB, SCRATCHE:=[0]                               FREE
        /CHECK THAT SCRATCHE IS 0
1743            DB, SCRATCHE:=[R3R]SCRATCHE                     FREE
```

```
        /PAGE 24

        /ADDRESS MULTIPLICATION
        /TIMES 2  (A+B)X2
1744            DB, SCRATCHR:=K3777+1                       FREE
        /(4000+14)*2=10030
1745            DB, TEMP:=SCRATCHR(2*)K14                   FREE

        /TIMES 3
        /10030*3=30110
1746            DB, TEMP1:=(3*)TEMP                         FREE

        /TIMES 6
        /20660*6 = 20660
1747            DB, FACM:=(6*)TEMP1                         FREE

        /R3R TO CHECK MSB OF ADDRESS CALCULATION
        /20660 =  (R3R)  =  02066
1750            DB, FACM:=(R3R)FACM                         FREE

        /CHECK ABILITY TO MASK BITS, ROTATE AND ADD
        /10000 + 2000 =12000  (R3R) =01200
1751            DB, TEMA:=TEMP<11:3>,0(R3R)TEMA             FREE
        /ADD THE RESULT, OR IN THE "OR" STATEMENT BITS, PUT IN BITS 9-11
1752            DB, FPC:=(R3R)FPC                           FREE
1753            DB:=1030!FPC<11:3>                          FREE
        /CHECK SUBTRACT  (MINUS)
        /A + NOT B + CARRY = RESULT
        /0 MINUS 0 = 0
1754            DB:=(MINUS)                                 FREE
        /0-M1=1
1755            DB:=SCRATCHT(MINUS)M1                       FREE

        /OVERFLOW RECOVERY
        /SET SIGN BIT = COMPLEMENT.  REPLACE SIGN BIT AND ALL OTHER BITS
        /SHIFTED RIGHT
        /2000 (OVERFLOW RECOVER) = 5033
1756            DB:=(OVFREC)FACM                            FREE


        //CHECK SHIFT LEFT (12 BITS)
        /2000+1 SHL = 4002
1757            DB, SCRATCHT:=(SHL)K2000+1                  FREE
        / =0000 + BIT IN LINK
1760            DB, SCRATCHT:=(EXT)(SHL)SCRATCHT            FREE
        / =0011
1761            DB, SCRATCHT:=(EXT)(SHL)SCRATCHT            FREE
        / =0022
1762            DB, SCRATCHT:=(EXT)(SHL)SCRATCHT            FREE
```



```
        /PAGE 25

        /DATA BREAK TEST
        /DEPOSIT ALL 1'S IN LOCATION 15
        /NOTE: SUBROUTINE "EXST1" REQUIRES APTP BE 1 LESS THAN
        //LOCATION WHERE BREAK IS TO OCCUR.

1763            DB:=(12BIT)M1                               FREE    SUB, EXST1 (165)

        /DEPOSIT ALL 0 IN LOCATION 7777
        /SET APTP TO 7776
1764            DB, APTP:=(12BIT)M1                         FREE
1765            DB, APTP:=APTP(12BIT)M1                     FREE
1766            DB:=(0)                                     FREE    SUB, EXST1 (165)

        /TEST FIELD LOCATION,  TEMP=10030 AT START.
1767            DB, FIELD:=TEMP                             FREE
1770            DB:=(0)                                     FREE
1771            DB:=FIELD                                   FREE

        /LEAVE ROUTINE WITH INTERRUPT
1772            NO OPERATION                                FREE
1773            NO OPERATION                                FREE
1774            NO OPERATION                                FREE    GO TO, FLAG (1)
```

REV.	NUMBER	CODE	SIZE
	M8410-0-10	CS	K

REVISIONS	CHANGE NO.	REV.
CHK		

FIRST USED ON OPTION MODEL
M8410

QTY.	DESCRIPTION	PART NO.	ITEM NO.
	PARTS LIST		

DRN. K. Davis	DATE 3-5-76	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
CHKD.	DATE 3/7/76	
ENG.	DATE 19 MAY 76	
PROJ. ENG.	DATE 5/19/76	
PROD.	DATE 5-19-76	
NEXT HIGHER ASSEMBLY B-DD-M8417-0		
SCALE — / —		
SHEET 1 OF 2		

TITLE

FPLA
PATTERN SPEC
2300IC5

SIZE	CODE	NUMBER	REV.
K	CS	M8410-0-10	*

DIST.

DEC FORM NO. DRB 109

FPP8A PROGRAMMABLE LOGIC ARRAY DEC P/N 23ØØ1C5
D. A. WHITE 1/15/76, REV 1/19/76 (ADD P/N)

TRUTH TABLE (H=HIGH, L=LOW, "-"=DONT CARE IF INPUT, OR NOT CONNECTED IF OUTPUT):

PROD	INPUT PIN													OUTPUT PIN								INSTRUCTION
TERM	11	10	9	8	7	6	5	4	3	2	1	23	22	21	20	19	18	17	16	15	14	13	
00	H	L	H	H	H	-	-	-	-	-	-	-	-	H	-	-	-	-	L	-	L	L	JNX
01	H	H	L	H	H	L	H	H	H	-	-	-	-	H	-	-	-	-	L	L	L	-	SETX
02	H	H	L	H	H	L	H	H	L	-	-	-	-	H	-	-	-	-	L	L	L	L	SETB
03	H	H	H	H	H	L	H	H	H	-	-	-	-	H	-	-	-	L	-	-	-	-	LDX
04	H	H	H	H	H	L	H	H	L	-	-	-	-	H	-	-	-	L	-	-	L	-	ADDX
05	H	H	L	H	H	L	H	L	H	-	-	-	-	H	-	-	-	L	-	L	-	-	JSA
06	H	H	L	H	H	L	H	L	L	-	-	-	-	H	-	-	-	L	L	-	-	-	JSR
07	H	H	H	H	H	H	H	L	H	-	-	-	-	H	-	L	-	L	-	-	-	-	ATX
08	H	H	H	H	H	H	H	L	L	-	-	-	-	H	-	-	-	L	L	L	-	L	XTA
09	H	L	L	H	H	-	-	-	-	-	-	-	-	H	-	-	-	L	L	L	L	-	TRAP
10	L	H	H	H	H	-	-	-	-	-	-	-	-	H	-	-	-	L	L	L	L	-	TRAP
11	-	-	-	H	L	-	-	-	-	-	-	-	L	H	-	-	-	L	-	-	-	-	DIRPP--DIRECT BASE PAGE ADDRESSING (NOT DP)
12	-	-	-	H	L	-	-	-	-	-	-	-	H	H	-	-	L	-	-	-	-	L	DIRDP--DIRECT BASE PAGE ADDRESSING (DP)
13	-	-	-	L	H	-	-	-	-	-	-	-	-	H	-	-	L	-	-	L	-	-	24-BIT ADDRESSING
14	L	L	H	H	H	-	-	-	-	-	-	-	-	H	-	-	L	-	-	L	-	-	24-BIT ADDRESSING (LEA OR IMUL)
15	-	-	-	L	-	L	H	H	H	-	-	-	-	H	-	-	L	-	-	L	-	L	INCREMENT XR0 (24-BIT OR INDIRECT ADDRESSING)
16	L	L	-	H	H	L	H	H	H	-	-	-	-	H	-	-	L	-	-	L	-	L	INCREMENT XR0 (24-BIT OR INDIRECT, LEA OR IMUL)
17	-	-	-	L	-	H	H	H	H	-	-	-	-	H	-	-	L	-	-	L	L	-	DO NOT INCREMENT (24-BIT OR INDIRECT ADDRESSING)
18	L	L	-	H	H	H	H	H	H	-	-	-	-	H	-	-	L	-	-	L	L	-	DO NOT INCR (24-BIT OR INDIRECT ADDR--LEA, LEAI, IMUL)
19	-	-	-	L	L	-	-	-	-	-	-	-	-	H	-	-	L	-	L	L	-	-	INDIRECT ADDRESSING
20	L	L	L	H	H	-	-	-	-	-	-	-	-	H	-	-	L	-	L	L	-	-	INDIRECT ADDRESSING (LEAI OR IMULI)
21	L	H	L	H	H	H	-	-	-	-	-	-	-	H	-	L	-	-	-	-	-	L	LTR ("OR"ED WITH BRANCH)
22	-	H	L	H	H	H	H	-	-	L	-	-	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--FAC=0
23	-	H	L	H	H	H	H	H	L	-	L	-	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--FAC>=0
24	-	H	L	H	H	H	H	L	H	-	H	-	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--FAC<=0
25	-	H	L	H	H	H	H	L	L	-	-	-	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--ALWAYS
26	-	H	L	H	H	H	L	H	H	H	-	-	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--FAC<>0
27	-	H	L	H	H	H	L	H	L	-	H	-	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--FAC<0
28	-	H	L	H	H	H	L	L	H	H	L	-	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--FAC>0
29	-	H	L	H	H	H	L	L	L	-	-	L	-	H	-	-	-	-	-	L	L	-	BRANCH TRUE--SIGN H NEGATED (JAL TEST)
30	-	H	L	H	H	H	H	H	H	H	-	-	-	H	L	-	-	-	L	-	L	-	BRANCH FALSE--FAC<>0
31	-	H	L	H	H	H	H	H	L	-	H	-	-	H	L	-	-	-	L	-	L	-	BRANCH FALSE--FAC<0
32	-	H	L	H	H	H	H	L	H	H	L	-	-	H	L	-	-	-	L	-	L	-	BRANCH FALSE--FAC>0
33	-	H	L	H	H	H	L	-	H	L	-	-	-	H	L	-	-	-	L	-	L	-	BRANCH FALSE--FAC=0
34	-	H	L	H	H	H	L	H	L	-	L	-	-	H	L	-	-	-	L	-	L	-	BRANCH FALSE--FAC<0
35	-	H	L	H	H	H	L	L	H	-	H	-	-	H	L	-	-	-	L	-	L	-	BRANCH FALSE--FAC>=0
36	-	H	L	H	H	H	L	L	L	-	-	H	-	H	L	-	-	-	L	-	L	-	BRANCH FALSE--SIGN NEGATIVE (JAL TEST)
37	H	H	L	H	H	L	L	-	-	-	-	-	-	H	L	-	-	-	-	-	-	-	UNUSED INSTRUCTION
38	H	H	H	H	H	H	L	L	-	-	-	-	-	H	L	-	-	-	-	-	-	-	UNUSED INSTRUCTION
39	H	H	H	H	H	H	L	H	L	-	-	-	-	H	L	-	-	-	-	-	-	-	UNUSED INSTRUCTION
40	H	H	H	H	H	H	H	L	L	-	-	-	-	H	L	-	-	-	-	-	-	-	UNUSED INSTRUCTION
41	L	H	L	H	H	L	-	-	-	-	-	-	-	H	L	-	-	-	-	-	-	-	UNUSED INSTRUCTION
42	H	H	H	H	H	H	L	H	H	-	-	-	-	H	L	-	-	-	-	-	-	-	NOP
43	H	H	H	H	H	H	L	H	L	-	-	-	-	H	-	L	-	-	L	-	-	-	START
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

DEC PART NUMBER: 23-301A2-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D.A.WHITE
DATE ORIGINATED: 30-MAR-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC BIN DATA	DEC LOC	OCT LOC BIN DATA	DEC LOC	OCT LOC BIN DATA	DEC LOC	OCT LOC BIN DATA
0	000--0000	32	040--0000	64	100--0000	96	140--0000
1	001--0000	33	041--0000	65	101--0000	97	141--0000
2	002--0000	34	042--0000	66	102--0000	98	142--0000
3	003--0000	35	043--0000	67	103--0000	99	143--0000
4	004--0000	36	044--0000	68	104--0000	100	144--0000
5	005--0000	37	045--0000	69	105--0000	101	145--0000
6	006--0000	38	046--0000	70	106--0000	102	146--0000
7	007--0000	39	047--0000	71	107--0000	103	147--0000
8	010--0000	40	050--0000	72	110--0000	104	150--0000
9	011--0000	41	051--0000	73	111--0000	105	151--0000
10	012--0000	42	052--0000	74	112--0000	106	152--0000
11	013--0000	43	053--0000	75	113--0000	107	153--0000
12	014--0000	44	054--0000	76	114--0000	108	154--0000
13	015--0000	45	055--0000	77	115--0000	109	155--0000
14	016--0000	46	056--0000	78	116--0000	110	156--0000
15	017--0000	47	057--0000	79	117--0000	111	157--0000
16	020--0000	48	060--0000	80	120--0000	112	160--0000
17	021--0000	49	061--0000	81	121--0000	113	161--0000
18	022--0000	50	062--0000	82	122--0000	114	162--0000
19	023--0000	51	063--0000	83	123--0000	115	163--0000
20	024--0000	52	064--0000	84	124--0000	116	164--0000
21	025--0000	53	065--0000	85	125--0000	117	165--0000
22	026--0000	54	066--0000	86	126--0000	118	166--0000
23	027--0000	55	067--0000	87	127--0000	119	167--0000
24	030--0000	56	070--0000	88	130--0000	120	170--0000
25	031--0000	57	071--0000	89	131--0000	121	171--0000
26	032--0000	58	072--0000	90	132--0000	122	172--0000
27	033--0000	59	073--0000	91	133--0000	123	173--0000
28	034--0000	60	074--0000	92	134--0000	124	174--0000
29	035--0000	61	075--0000	93	135--0000	125	175--0000
30	036--0000	62	076--0000	94	136--0000	126	176--0000
31	037--0000	63	077--0000	95	137--0000	127	177--0000

REV / REVISIONS / CHANGE NO / CHK	FIRST USED ON OPTION MODEL		DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
	FPP8-A		TITLE 256 X 4 ROM/PROM PATTERN SPEC 23-301A2-00
	DRN. Jack A. Mason	DATE 17 MAY 76	
	CHK'D [signature]	DATE 5/19/76	
	ENG. [signature]	DATE 17 MAY 76	
	PROJ. ENG. [signature]	DATE 5/19/76	SIZE K / CODE CS / NUMBER M8410-0-42 / REV
	PROD. R. K. Allen	DATE 5-19-76	
	NEXT HIGHER ASSEMBLY B-DD-M8410-0		DIST.

DEC PART NUMBER: 23-301A2-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D.A.WHITE
DATE ORIGINATED: 30-MAR-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC BIN DATA	DEC LOC	OCT LOC BIN DATA	DEC LOC	OCT LOC BIN DATA	DEC LOC	OCT LOC BIN DATA
128	200--0111	160	240--0111	192	300--0111	224	340--0111
129	201--0111	161	241--0111	193	301--0111	225	341--0111
130	202--0111	162	242--0111	194	302--0111	226	342--0111
131	203--0111	163	243--0111	195	303--0111	227	343--0111
132	204--0111	164	244--0111	196	304--0111	228	344--0111
133	205--0111	165	245--0111	197	305--0111	229	345--0111
134	206--0111	166	246--0111	198	306--0111	230	346--0111
135	207--0111	167	247--0111	199	307--0111	231	347--0111
136	210--0111	168	250--0111	200	310--1011	232	350--0111
137	211--0111	169	251--0111	201	311--0111	233	351--0111
138	212--0111	170	252--0111	202	312--0111	234	352--0111
139	213--0111	171	253--0111	203	313--0111	235	353--0111
140	214--0111	172	254--0111	204	314--1011	236	354--0111
141	215--0111	173	255--0111	205	315--0111	237	355--0111
142	216--0111	174	256--0111	206	316--0111	238	356--0111
143	217--0111	175	257--0111	207	317--0111	239	357--0111
144	220--1110	176	260--0111	208	320--1011	240	360--0111
145	221--0111	177	261--0111	209	321--0111	241	361--0111
146	222--0101	178	262--0111	210	322--0111	242	362--0111
147	223--0111	179	263--0111	211	323--0111	243	363--0111
148	224--1101	180	264--0111	212	324--1011	244	364--0111
149	225--0110	181	265--0111	213	325--0111	245	365--0111
150	226--0111	182	266--0111	214	326--0111	246	366--0111
151	227--0111	183	267--0111	215	327--0111	247	367--0111
152	230--0111	184	270--0111	216	330--0111	248	370--0111
153	231--0111	185	271--0111	217	331--0111	249	371--0111
154	232--0111	186	272--0111	218	332--0111	250	372--0111
155	233--0111	187	273--0111	219	333--0111	251	373--0111
156	234--1101	188	274--0111	220	334--1011	252	374--0111
157	235--0110	189	275--0111	221	335--0111	253	375--0111
158	236--0111	190	276--0111	222	336--0111	254	376--0111
159	237--0111	191	277--0111	223	337--0111	255	377--0111

DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	TITLE 256 X 4 ROM/PROM PATTERN SPEC 23-301A2-00	SIZE	CODE	NUMBER	REV
		K	CS	M8410-0-42	

DEC PART NUMBER: 23-124A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA
0	00	11000110
1	01	11000110
2	02	11000110
3	03	11000110
4	04	11000110
5	05	11000110
6	06	11000110
7	07	10100110
8	10	10110010
9	11	10110100
10	12	10110110
11	13	10111000
12	14	10111010
13	15	10111100
14	16	11111100
15	17	00111110
16	20	00000000
17	21	00000000
18	22	00000000
19	23	00000000
20	24	00000000
21	25	00000000
22	26	00000000
23	27	00000000
24	30	00000000
25	31	00000000
26	32	00000000
27	33	00000000
28	34	00000000
29	35	00000000
30	36	00000000
31	37	00000000

DEC LOC	OCT LOC	BIN DATA

DEC LOC	OCT LOC	BIN DATA

DEC LOC	OCT LOC	BIN DATA

REVISIONS	CHK

FIRST USED ON OPTION MODEL
FPP8-A

DRN.	Jack L. Mason	DATE 17 MAY 76
CHK'D	D. [illegible]	DATE 5/19/76
ENG.	[illegible]	DATE 5/19/76
PROJ. ENG.	[illegible]	DATE 5/19/76
PROD.	R. K. [illegible]	DATE 5-25-76

NEXT HIGHER ASSEMBLY
B-DD-M841Ø-Ø

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-124A1-00

SIZE	CODE	NUMBER	REV
K	CS	M841Ø-Ø-43	

DIST.

DEC PART NUMBER: 23-125A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 19-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	10010001									
1	01	10010001									
2	02	00000000									
3	03	00000000									
4	04	00000000									
5	05	00000000									
6	06	00000000									
7	07	00000000									
8	10	10011111									
9	11	10101111									
10	12	10011111									
11	13	10011111									
12	14	10011111									
13	15	10001111									
14	16	10011111									
15	17	10111111									
16	20	10011111									
17	21	10011111									
18	22	00000000									
19	23	00000000									
20	24	00000000									
21	25	00000000									
22	26	00000000									
23	27	00000000									
24	30	10011111									
25	31	10101011									
26	32	10011111									
27	33	10011111									
28	34	10011111									
29	35	10001111									
30	36	10011111									
31	37	10111111									

REV	CHK		FIRST USED ON OPTION MODEL		DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS		
			FPP8-A				
			DRN. Jack A. Moon	DATE 17 MAR 76			
			CHK'D	DATE 3/19/76	TITLE 32 X 8 ROM/PROM PATTERN SPEC 23-125A1-00		
			ENG.	DATE 16 MAR 76			
			PROJ. ENG.	DATE 3/19/76			
			PROD. R. K.	DATE 3-25-76	SIZE: K	CODE: CS	NUMBER: M8410-0-44 REV:
			NEXT HIGHER ASSEMBLY		DIST.		
			B-DD-M8410-0				

DEC PART NUMBER: 23-126A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	00000000									
1	01	00000000									
2	02	00000000									
3	03	00000000									
4	04	00000000									
5	05	00000000									
6	06	00000000									
7	07	00000000									
8	10	00000101									
9	11	00000000									
10	12	00000110									
11	13	00000101									
12	14	00000100									
13	15	00000110									
14	16	00000110									
15	17	00000000									
16	20	00000011									
17	21	00000011									
18	22	00000000									
19	23	00000000									
20	24	00000000									
21	25	00000000									
22	26	00000000									
23	27	00000000									
24	30	00000101									
25	31	00000000									
26	32	00000111									
27	33	00000101									
28	34	00000100									
29	35	00000111									
30	36	00000111									
31	37	00000000									

REVISION	CHK		FIRST USED ON OPTION MODEL		DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS			
			FPPR-A					
			DRN. Jack A. Mason	DATE 7MAY76	TITLE 32 X 8 ROM/PROM PATTERN SPEC 23-126A1-00			
			CHK'D [illegible]	DATE [illegible]				
			ENG. [illegible]	DATE				
			PROJ.ENG. [illegible]	DATE				
			PROD. R. K. [illegible]	DATE [illegible]	SIZE K	CODE CS	NUMBER M841Ø-Ø-45	REV
			NEXT HIGHER ASSEMBLY B-DD-M841Ø-Ø		DIST.			

DEC PART NUMBER: 23-127A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	10001111									
1	01	10111111									
2	02	10111111									
3	03	10101101									
4	04	10111111									
5	05	10011110									
6	06	10111111									
7	07	10111111									
8	10	10111111									
9	11	10111110									
10	12	10111111									
11	13	10111111									
12	14	10111111									
13	15	10111111									
14	16	10111111									
15	17	00110010									
16	20	10111111									
17	21	10111111									
18	22	10111111									
19	23	10111111									
20	24	10001111									
21	25	10101110									
22	26	10111111									
23	27	10111111									
24	30	00000000									
25	31	00000000									
26	32	00000000									
27	33	00000000									
28	34	00000000									
29	35	00000000									
30	36	00000000									
31	37	00000000									

REVISION	CHK

FIRST USED ON OPTION MODEL: FPP8-A

DRN. Jack A. Mason DATE 17 MAY 76
CHK'D. [signature] DATE 5/19/76
ENG. [signature] DATE 17 MAY 76
PROJ.ENG. [signature] DATE 5/19/76
PROD. [signature] DATE 5-25-76
NEXT HIGHER ASSEMBLY: B-DD-M8410-0

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-127A1-00

SIZE	CODE	NUMBER	REV
K	CS	M8410-0-46	

DIST.

DEC PART NUMBER: 23-128A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	11111111									
1	01	11011111									
2	02	11111111									
3	03	01111011									
4	04	01110111									
5	05	10111111									
6	06	11111111									
7	07	11111111									
10	10	11111111									
9	11	11111111									
10	12	11111110									
11	13	11111111									
12	14	11101111									
13	15	11111111									
14	16	01111101									
15	17	11111111									
16	20	11111111									
17	21	11111111									
18	22	11111111									
19	23	01111011									
20	24	01110111									
21	25	10111111									
22	26	11111111									
23	27	11111111									
24	30	11111111									
25	31	11111111									
26	32	11111110									
27	33	11111111									
28	34	11101111									
29	35	11111111									
30	36	01111101									
31	37	11111111									

REVISIONS		
REV		
CHK		

FIRST USED ON OPTION MODEL: PP8-A

DRN. Jack A Mason — DATE 17 MAY 76
CHK'D. [signature] — DATE 5/19/76
ENG. [signature] — DATE [illegible]
PROJ. ENG. [signature] — DATE 5/19/76
PROD. R. K. [signature] — DATE 5-25-76
NEXT HIGHER ASSEMBLY: B-DD-M8410-0

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-128A1-00

SIZE	CODE	NUMBER	REV
K	CS	M8410-0-47	

DIST.

DEC PART NUMBER: 23-129A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	01111101									
1	01	01111111									
2	02	11111111									
3	03	11111111									
4	04	11111111									
5	05	11111111									
6	06	11111111									
7	07	11111111									
8	10	11111111									
9	11	11111111									
10	12	11111111									
11	13	11111111									
12	14	11111111									
13	15	11111111									
14	16	11111111									
15	17	11111111									
16	20	10000000									
17	21	11111000									
18	22	11111011									
19	23	10000000									
20	24	10000000									
21	25	10000000									
22	26	11111111									
23	27	11111111									
24	30	10000000									
25	31	10000000									
26	32	10000000									
27	33	10000000									
28	34	11111111									
29	35	11111111									
30	36	11111111									
31	37	11111111									

REV			
PEVISION	CHANGE NO		
CHK			

FIRST USED ON OPTION MODEL
FPP8-A

DRN. Jack S Mason DATE 17 MAR 76
CHK'D [illegible] DATE 3/19/76
ENG. [illegible] DATE [illegible]
PROJ. ENG. [illegible] DATE 3/19/76
PROD. [illegible] DATE 5/22/26
NEXT HIGHER ASSEMBLY
B-DD-M8411-Ø

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-129A1-00

SIZE	CODE	NUMBER	REV
K	CS	M8411-Ø-8	

DIST.

DEC PART NUMBER: 23-130A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

SHEET 1 OF 1

DEC LOC	OCT LOC	BIN DATA
0	00	11100111
1	01	11111111
2	02	11111111
3	03	11111111
4	04	11111111
5	05	11111111
6	06	11111111
7	07	11111111
8	10	11111111
9	11	11111111
10	12	11111111
11	13	11111111
12	14	11111111
13	15	11111111
14	16	11111111
15	17	11111111
16	20	00010111
17	21	00000000
18	22	11111111
19	23	00000101
20	24	00000100
21	25	00001011
22	26	11110011
23	27	11111111
24	30	00111010
25	31	00010110
26	32	00000001
27	33	00000000
28	34	11111100
29	35	11111101
30	36	11111110
31	37	11111111

REVISION	CHK

FIRST USED ON OPTION MODEL: FPP8-A

DRN. Jack I. Mason	DATE 17 MAY 76
CHK'D	DATE 5/19/76
ENG.	DATE
PROJ. ENG.	DATE 5/19/76
PROD.	DATE 5-20-76
NEXT HIGHER ASSEMBLY: 5-DD-M8411-0	

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-130A1-00

SIZE	CODE	NUMBER	REV
K	CS	M8411-0-9	

DIST.

DEC PART NUMBER: 23-131A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	00001111									
1	01	00000101									
2	02	00000000									
3	03	00001111									
4	04	00000101									
5	05	00101011									
6	06	00101011									
7	07	00101011									
8	10	00101011									
9	11	00101011									
10	12	00101011									
11	13	00111010									
12	14	00101001									
13	15	00101010									
14	16	00101001									
15	17	00101001									
16	20	00000000									
17	21	00000000									
18	22	00000000									
19	23	00000000									
20	24	00000000									
21	25	00000000									
22	26	00000000									
23	27	00000000									
24	30	00000000									
25	31	00000000									
26	32	00000000									
27	33	00000000									
28	34	00000000									
29	35	00000000									
30	36	00000000									
31	37	00000000									

REVISION	CHK

FIRST USED ON OPTION MODEL: FPP8-A

DRN. Jack A Mann — DATE 17 MAY 76

CHK'D — DATE 5/19/76

ENG. — DATE 5/19/76

PROJ. ENG. — DATE 5/19/76

PROD. R K Allen — DATE 5-25-76

NEXT HIGHER ASSEMBLY: B-DD-M8411-Ø

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE: 32 X 8
ROM/PROM PATTERN SPEC
23-131A1-00

SIZE	CODE	NUMBER	REV
K	CS	M8411-Ø-1Ø	

DIST.

DEC PART NUMBER: 23-132A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	01101001									
1	01	01101001									
2	02	01101001									
3	03	01001001									
4	04	01001001									
5	05	01101001									
6	06	01111100									
7	07	01110011									
8	10	01111010									
9	11	00100110									
10	12	01110011									
11	13	01111111									
12	14	01101001									
13	15	01101001									
14	16	01101111									
15	17	01101111									
16	20	01101001									
17	21	01101001									
18	22	01101001									
19	23	01001001									
20	24	01001001									
21	25	01101001									
22	26	01111100									
23	27	01111100									
24	30	01111010									
25	31	00100110									
26	32	01101001									
27	33	01111111									
28	34	01101001									
29	35	01101001									
30	36	01101111									
31	37	01101111									

REVISION	CHK

FIRST USED ON OPTION MODEL: FPP8-A

DRN. Jack L Mann	DATE 17 MAY 76	
CHK.	DATE 19 MAY 76	
ENG.	DATE 19 MAY 76	
PROJ. ENG.	DATE 5/19/76	
PROD. R K	DATE 5-19-76	

NEXT HIGHER ASSEMBLY: E-DD-M8411-Ø

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-132A1-00

SIZE	CODE	NUMBER	REV
K	CS	M8411-Ø-11	

DIST.

DEC PART NUMBER: 23-133A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	00000100									
1	01	01111000									
2	02	00000100									
3	03	01111000									
4	04	00000100									
5	05	01111000									
6	06	00000100									
7	07	01111000									
8	10	00000100									
9	11	01111000									
10	12	00000100									
11	13	01111000									
12	14	00000100									
13	15	01111000									
14	16	00000100									
15	17	01111000									
16	20	00000100									
17	21	01111000									
18	22	00000100									
19	23	01111000									
20	24	01111100									
21	25	01111000									
22	26	00000100									
23	27	01111000									
24	30	00000100									
25	31	01111000									
26	32	00000100									
27	33	01111000									
28	34	01111000									
29	35	01111000									
30	36	00000100									
31	37	01111000									

REVISIONS / CHK	FIRST USED ON OPTION MODEL	DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
	FPP8-A	
	DRN. Jack A. Mason DATE 17 MAY 76	TITLE
	CHK'D. Ken Tice DATE 5/19/76	32 X 8
	ENG. W. A. Yo DATE 5/19/76	ROM/PROM PATTERN SPEC
	PROJ. ENG. M. Watts DATE 5/19/76	23-133A1-00
	PROD. R. K. Cahn DATE 5-28-76	SIZE K / CODE CS / NUMBER M8411-0-12 / REV
	NEXT HIGHER ASSEMBLY B-DD-M8411-0	DIST.

DEC PART NUMBER: 23-134A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 05-JAN-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA
0	00	00000000
1	01	00000000
2	02	00000000
3	03	00000000
4	04	00000000
5	05	00000000
6	06	00000000
7	07	00000000
8	10	00000000
9	11	00000110
10	12	00000000
11	13	00001001
12	14	00000000
13	15	00001001
14	16	00000000
15	17	00000110
16	20	00011111
17	21	10000110
18	22	00011111
19	23	10011001
20	24	00011001
21	25	10011001
22	26	00011001
23	27	10000110
24	30	10001111
25	31	10000110
26	32	10001111
27	33	10001001
28	34	10001001
29	35	10001001
30	36	10001001
31	37	10000110

REVISION	CHK

FIRST USED ON OPTION MODEL
FPP8-A

DRN. Jack L Mason	DATE 17 MAY 76	
CHK'D	DATE 5/19/76	
ENG.	DATE	
PROJ. ENG.	DATE 5/19/76	
PROD.	DATE 5/25/76	

NEXT HIGHER ASSEMBLY
B-DD-M8411-Ø

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-134A1-00

SIZE	CODE	NUMBER	REV
K	CS	M8411-Ø-13	

DIST.

DEC PART NUMBER: 23-135A1-00
LEFT COLUMN OF BIN DATA IS MSB

ORIGINATOR: D. A. WHITE
DATE ORIGINATED: 7-APR-76

BINARY DATA "1" = HIGH
BINARY DATA "0" = LOW

DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA	DEC LOC	OCT LOC	BIN DATA
0	00	00000111									
1	01	00000111									
2	02	00000000									
3	03	00000000									
4	04	00000101									
5	05	00000011									
6	06	00000110									
7	07	00010110									
8	10	00011111									
9	11	00011111									
10	12	00011111									
11	13	00011111									
12	14	00011111									
13	15	00011111									
14	16	00011111									
15	17	00011111									
16	20	00000111									
17	21	00000111									
18	22	00000111									
19	23	00000111									
20	24	00000111									
21	25	00000111									
22	26	00000111									
23	27	00010111									
24	30	00000111									
25	31	00000111									
26	32	00000111									
27	33	00000111									
28	34	00000111									
29	35	00000111									
30	36	00000111									
31	37	00000111									

REVISIONS REV	CHK

FIRST USED ON OPTION MODEL
FPP8-A

DRN. Jack A Mann DATE 17 MAY 76
CHK. Bert Beaver DATE 5-19-76
ENG. DATE
PROJ. ENG. DATE 5/19/76
PROD. DATE 5-20-76
NEXT HIGHER ASSEMBLY
B-DD-M8411-Ø

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
32 X 8
ROM/PROM PATTERN SPEC
23-135A1-00

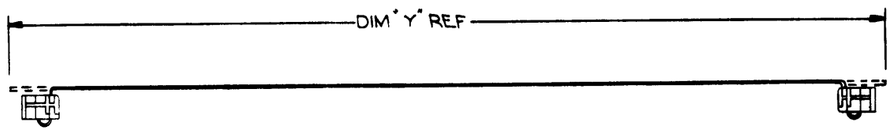
SIZE	CODE	NUMBER	REV
K	CS	M8411-Ø-14	

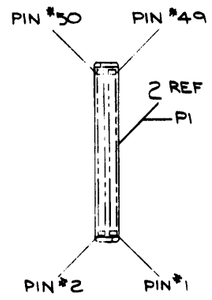
DIST.

LEGEND		
NUMBER	DIM 'X' VARIATION	DIM 'Y' PRECUT (REF)
BCØ2D-Ø1	12 IN ± .5 IN	13.5 IN ± .5 IN

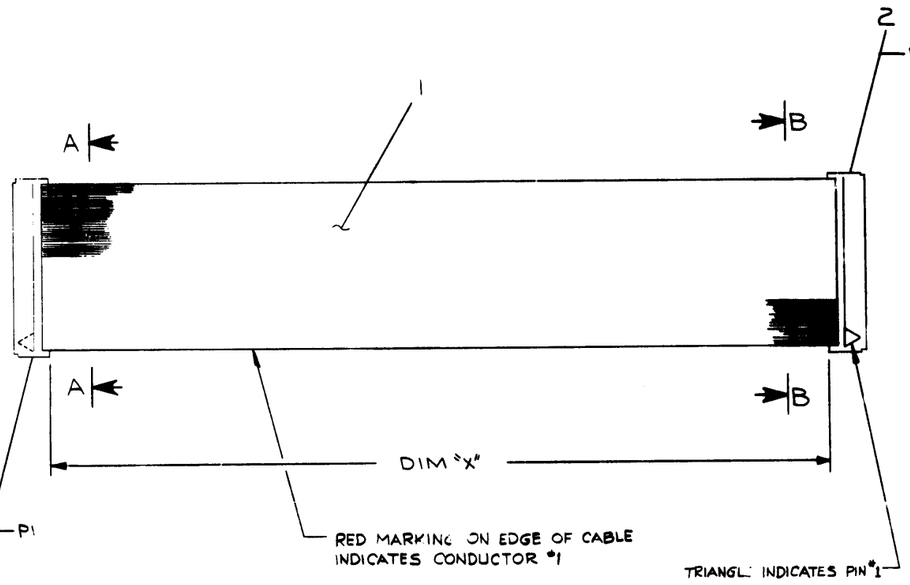
NOTES:

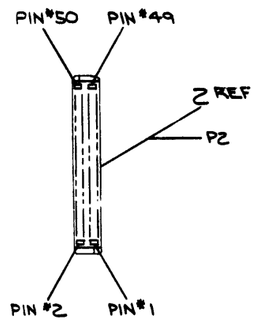
1. CONNECTORS P1 AND P2 ARE TO BE WIRED POINT-TO-POINT (P1-1 TO P2-1, P1-2 TO P2-2, ETC).





VIEW A-A
(REAR VIEW)
WITH ITEM #1 (CABLE) REMOVED





VIEW B-B
(REAR VIEW)
WITH ITEM #1 (CABLE) REMOVED

2	CONN, 50 PIN SOCKET	12116664-00	2
A/R	CABLE, 50 COND FLAT	9107747-04	1
	DESCRIPTION	DWG./PART NO.	ITEM NO.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

ANGLES ±0° 30'	AREAS OF ACCEPTANCE (CHECK ONE)	NOMINAL DIMENSION RANGE INCHES 0 TO 0.2	0.2 TO 1.2	1.2 TO 12.0	12.0 TO 60.0	60.0 TO 80.0
SURFACE QUALITY IN MICROINCHES ✓	MEDIUM ☐	±.005	±.010	±.015	±.031	±.04
	PRECISION ☐	±.012	±.016	±.025	±.04	±.06

QUANTITY & VARIATION

THIRD ANGLE PROJECTION

REMOVE BURRS AND BREAK SHARP CORNERS

DO NOT SCALE DWG

MATERIAL SEE PARTS LIST

FINISH

DRN. CHK'D ENG. PROJ. ENG. PROD. NEXT HIGHER ASSY. D-UA-FPP8-A-Ø

SCALE NONE SHEET OF

FIRST USED ON FPP8-A

TITLE 50 CONDUCTOR SIGNAL CABLE (BCØ2D)

SIZE	CODE	NUMBER	REV.
D	1A	BCØ2D-Ø-Ø	

DIST.

REV.	REVISIONS	CHANGE NO.	CHK.

DEC FORM NO. DRD 100-C