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1  *      V75 EMULATION MICROPROGRAM.                                001
2  *                                                                 002
3  *      REGISTERS USED:                                           003
4  *          0 = 620 A REGISTER                                     004
5  *          1 = 620 B REGISTER                                     005
6  *          2 = 620 X REGISTER                                     006
7  *          3-7 = GENERAL PURPOSE REGISTERS                       007
8  *          8 = USED BY HALT LOOP TO HOLD INSTRUCTION REGISTER.  THE 008
9  *          CONSOLE IS WIRED TO REQUEST DISPLAY OF REGISTER 8 WHEN 009
10 *          THE INSTRUCTION REGISTER KEY IS PRESSED.              010
11 *          9 = I/O DEVICE SELECTION REGISTER (LOW ORDER 6 BITS) 011
12 *          E = USED FREELY AS WORKING SPACE, AND REQUIRED BY MULTIPLY 012
13 *          AND DIVIDE INSTRUCTIONS.                               013
14 *          F = USED FREELY AS WORKING SPACE, AND REQUIRED BY MULTIPLY 014
15 *          AND DIVIDE INSTRUCTIONS.                               015
16 *                                                                 016
17 *      ENTER AT X'00 FOR TESTING PURPOSES IN PAGE 1.           017
18 *                                                                 018
19 *      HEXADECIMAL CONSTANTS.                                     019
20 *                                                                 020
000A 21 A      EQU      X'A                                         021
000B 22 B      EQU      X'B                                         022
000C 23 C      EQU      X'C                                         023
000D 24 D      EQU      X'D                                         024
000E 25 E      EQU      X'E                                         025
000F 26 F      EQU      X'F                                         026
27 *                                                                 027
28 *      SPECIAL REGISTERS.                                         028
29 *                                                                 029
0008 30 IH      EQU      8              INSTRUCTION REGISTER (HALT LOOP) 030
0009 31 DR      EQU      9              I/O DEVICE REGISTER           031
000E 32 S1      EQU      E                                         032
000F 33 S2      EQU      F                                         033
34 *                                                                 034
35 *      INTERRUPT MASKS.                                           035
36 *                                                                 036
000E 37 M      EQU      E              ALLOW I/O ONLY IF M/P         037
000F 38 I      EQU      F              ALLOW I/O ALWAYS              038
000C 39 N      EQU      C              DO NOT ALLOW I/O              039
40 * oe                                                                 040
41 *                                                                 041
42 * MACROS PAGE 11 MACROS PAGE 11 512x1                     042
43 *                                                                 043
44 * MACRO ORIGIN AT NEXT MULTIPLE OF P(1).                        044
45 *                                                                 045
46 MORG      MAC                                                     046
47           ORG      ++P(1)-1                                       047
48           ORG      */P(1)*P(1)                                    048
49           EMAC                                                     049
50 *                                                                 050
51 * MACRO ILLEGAL INSTRUCTIONS                                     051
52 *                                                                 052
0002 53 ILLAD   EQU      2              ILLEGAL INSTRUCTION INTERRUPT 053
54 ILLOP      MAC                                                     054
55           GMSK      /N(ILLOP1),LA1,LB3,RF1,FF9,MK1      P-2->P, 0 9 055
56           EMAC                                                     056

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190
191
DF

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58 * INTERRUPT SERVICE. 058
59 * THE STATES WHICH ENABLE THE DECODER ALSO ENABLE INTERRUPTS. IF 059
60 * A SINGLE WORD INSTRUCTION WAS AT THE INTERRUPT ADDRESS, THE NEXT 060
61 * WORD IS IN THE INSTRUCTION BUFFER BUT SHOULD NOT BE PROCESSED. 061
62 * PROCESSING OF THIS WORD IS INHIBITED BY TRANSFERRING TO INTBAS 062
63 * IF CINTF=1 AND IM=6. IF CINTF=0 AND NO INTERRUPT IS PENDING, THE 063
64 * INSTRUCTION IS DECODED. IF AN INTERRUPT IS PENDING AND CINTF=0 064
65 * OR IM NOT =6, CONTROL GOES TO INTBAS+7, WHERE THE INTERRUPT 065
66 * MICROPROGRAM IN I/OCS IS INITIATED. IF THE INTERRUPT WASN'T 066
67 * REALLY AN INTERRUPT, BUT INSTEAD WAS A DMA REQUEST, INTERRUPT 067
68 * PROCESSING MUST BE ABORTED AND THE PIPELINE RESTARTED. IF IT 068
69 * REALLY IS AN INTERRUPT, CONTROL GOES TO INTBAS+1 WHERE INTERRUPT 069
70 * SERVICING IS COMPLETED. 070
71 * 071
72 MORG 16 INTERRUPT HARDWARE USES INTBAS, INTBAS+1, INTBAS+7 072
0000 73 INTBAS EQU * 073
74 MORG 2 /T(SWA50,SS2MI) P(SS2MI+P),TF0,SF2,GF4,IF=3,RF4 074
0000 75 SS2MI GEN /N(SS2MI),SF1,IM8,RF4-- JMP, (AA)->ALU,IF(P),INCP 075
0001 76 ORG INTBAS+1 INTERRUPT SECOND TRY COMES HERE 076
0001 77 INT1 GEN /N(INT2),IM2,RF1,FFF,AAE WAIT(IO),RE-1->P 077
0002 78 SWA50 GEN /F(STA1-2),2(6),FSF,SF1,IME FSEL(13-12),OS(MIL) 078
0003 79 ABORT GMSK /N(ABORT1),IM4,LB2,FFA,MK0 I->IBR 079
0004 80 ABORT1 GMSK /N(SS2MI),IM4,LB2,FFA,MK0 I->IBR FREE 080
81 * HLT1 AND HLT7 ARE REFERENCED WITH INTERRUPTS ENABLED. 081
82 HLT1 GMSK /N(HLT2),1(3),AB2,IM4,LB3,FFA, START I/O AT X'E, 082
83 CMKEFC0 X'103F->ALU 083
0005 84 HLT7 GEN /N(HLT1),LB1,FFA,MF1,WR1,24(IH) DOR->IH 084
0006 85 ORG INTBAS+7 INTERRUPT FIRST TRY COMES HERE 085
0007 86 IWAIT GEN 2(ABORT1),1(7),MT1,GF4,MR1,IME, ENABLE INTERRUPTS, 086
87 CLA1,RF1,FFF,WR1,AAE DISABLE DEC, START IO, P-1->P,RE 087
88 ILLOP1 GMSK /N(ILLOP2),SF1,IM4,LB3,RF3, ILLAD->DOR, IF(ALU) FREE 088
89 C15(-1-ILLAD) INT3 089
90 ILLOP2 GEN /N(INT4),SF1,IM4,LB1,FF9,CF3,WR1, DOR+1->RF, IF(ALU) FREE 090
91 CSH1,BB0,AAE RF1 091
92 INT2 GEN /N(INT3),SF1,IM4,LB1,FFA,MF1,OK IF(ALU),IOR->RF DOR FREE 092
93 CWR1,BB2,AAE LB1,FF9 093
000A 94 INT3 GEN /N(INT4),SF1,IM4,CF3,WR1,AAE IF(ALU),RF+1->RF FREE 094
000B 95 INT4 GEN (GF5,IM7,FFA,MF1,WR1,BBF,AAE IBR->I,DECODE, FREE 095
000C 96 * 1->CINTF,S2->S1 096
C SW1, B30, AAF
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	98	*	V75 CONDITIONAL JUMP INSTRUCTIONS. THESE ARE DIFFERENT FROM	098
	99	*	VARIAN STANDARD INSTRUCTIONS. THE JUMP IF EVEN PARITY AND JUMP	099
	100	*	IF ODD PARITY INSTRUCTIONS ARE NOT IN VARIANS SET.	100
	101	*		101
	102	J11	GEN /F(JISEL),2(7),FS7,GF2,IM1,RF3, FSEL(S-3),WAIT(M),	102
000D 00B9C08083000000	103		C23(*-*) BB->DOR,SAMPLE	103
	104	MORG	2 /I(JP5,*)	104
	105	JP4	GEN /T(JP5,*),TF2,GF3,MR1,RF5,FF9, DOR(RC),DOR(1)->BB(0),	105
000E 707823200591A0ED	106		CWR1,SC1,WF1,BBE,AAD INCS,RD+(RE OR RF)->RD	106
000F 20B9C08018000102	107	JP5	GEN /F(JRN),2(1),FS7,GF2,LA3,SH1,AA2 FSEL(3),RD(RC),SAMPLE	107
	108	MORG	8 REF BY FSEL(S-3) FROM J11	108
	109	JISEL	EQU *	109
0010 00C000000001010E	110	JEP	GEN /N(JP1),FF0,WR1,SH1,AAE 0->RE	110
0011 00C000000001010E	111	JOP	GEN /N(JP1),FF0,WR1,SH1,AAE 0->RE	111
0012 1F202E4600000000	112	JRZ	GEN /T(JMP1,SS1M),TF2,SF3,GF9,IMC CND(ALUZ) IF(MIL), TT	112
0013 1F203A4600000000	113	JRNZ	GEN /T(JMP1,SS1M),TF3,SF2,GF9,IMC CND(-ALUZ) IF(MIL), TF	113
0014 1F202DC600000000	114	JRN	GEN /T(JMP1,SS1M),TF2,SF3,GF7,IMC CND(ALUS) IF(MIL), TT	114
0015 1F2039C600000000	115	JRP	GEN /T(JMP1,SS1M),TF3,SF2,GF7,IMC CND(-ALUS) IF(MIL), TF	115
0016 1F09A24000000000	116	JDPZ	GEN /S(JDPZ1,SS1M),2(1),FS6,TF2,GF9 ALUZ=>FSEL(2)	116
0017 2F09A24000000000	117	JDPNZ	GEN /S(JDPZ1,JMP1),2(1),FS6,TF2,GF9 ALUZ=>FSEL(2)	117
0018 00C800000007010F	118	JP1	GEN /N(JP2),FF0,CF3,WR1,SH1,AAF 1->RF FREE	118
0019 00D0000062AFFF10	119	JP2	GMSK /N(JP3),LB3,RF2,FFA,MKFFF1 -14->SC FREE	119
	120	JP3	GEN /N(JP4),MR1,FF0,CF3,WR1,SC1,WF1, DOR(RC),DOR(1)->BB(0), FREE	120
001A 007000200007A1ED	121		CSH1,BBE,AAD 1->RD	121

	123	*	INPUT DATA TRANSFER INSTRUCTIONS.			123
	124	*				124
	125	IABM2	GEN	/N(IABM3),1(3),IMF,LB1,FFA,MF1,	START I/O AT X'C,	FREE 125
001B 30E00007A0A9000E	126			CWR1,BB0,24(S1)	DOR->S1	126
	127	IABM3	GMSK	/F(IME1),2(7),FSA,IM2,LB2,FFE,	FSEL(8-6),WAIT(10),	FREE 127
001C 013A800140EFE00E	128			CMKFE00,16(S1)	IR & X'1FF V S1	128
	129	INAB2	GEN	/N(IAB),SF1,IM8,LB1,RF7,FFE,MF1,	IF(P),INCP,	FREE 129
001D 00F0040427E90000	130			CWR1,BB0,AA0	DOR V A -> A,DOR	130
	131	IAB	GEN	/N(IWAIT),1(M),GF5,IM6,LB1,FFA,	IBR->I,DEC,INTRPT,	FREE 131
001E E038014320A90001	132			CMF1,WR1,BB0,AA1	DOR->B	132
001F 01C0040424A80000	133	IME2	GEN	/N(SS2M),SF1,IM8,RF4,LB1,FFA,MF1	IF(P),INCP,DOR->ALU	FREE 133
	134		MORG	8 REF BY FSEL(8-6)		134
	135	IME1	GEN	/N(IME2),SF1,IME,LB1,RF3,FFA,MF1,	OS(MIL),IOR->DOR,	135
0020 00F8040723A80820	136			CXF1,BB2	RESET CINTF	136
	137	INA	GEN	/N(SS3M),SF1,IM8,LB1,RF4,FFE,MF1,	IF(P),INCP,IOR V A -> A	137
0021 0380040424E90020	138			CWR1,BB2,AA0		138
	139	INB	GEN	/N(SS3M),SF1,IM8,LB1,RF4,FFE,MF1,	IF(P),INCP,IOR V B -> B	139
0022 0380040424E90021	140			CWR1,BB2,AA1		140
0023 00E8000023E80021	141	INAB1	GEN	/N(INAB2),LB1,RF3,FFE,MF1,BB2,AA1	IOR V B -> DOR	141
	142		ILLOP			142
0024 0040000069900010	143	CIA	GEN	/N(SS3M),SF1,IM8,LB1,RF4,FFA,MF1,	IF(P),INCP,IOR->A	143
	144			CWR1,BB2,AA0		144
0025 0380040424A90020	145	CIB	GEN	/N(SS3M),SF1,IM8,LB1,RF4,FFA,MF1,	IF(P),INCP,IOR->B	145
	146			CWR1,BB2,AA1		146
0026 0380040424A90021	147	CIAB	GEN	/N(IAB),SF1,IM8,LB1,RF7,FFA,MF1,	IF(P),INCP,IOR->A,DOR	147
0027 00F0040427A90020	148			CWR1,BB2,AA0		148

	150	*	DIVIDE INSTRUCTION.		150
	151	*			151
	152	MORG	2	/T(DIV2,DIV1)	152
0028 01480000006701FF	153	DIV1 GEN	/N(DIV2),FF6,CF3,WR1,SH1,BBF,AAF -RF->RF		153
	154	DIV2 GEN	/T(DIV4,DIV3),TF2,GFA,FF2,CF3, DSB=>DIV4,-RF->RE		154
0029 51582280002701FE	155		CWR1,SH1,BBF,AAE		155
	156	MORG	2	/T(DIV4,DIV3)	156
002A 0198000003000001	157	DIV3 GEN	/N(DIV7),RF3,AA1 B->DOR		157
002B 0168000010010001	158	DIV4 GEN	/N(DIV5),LA2,WR1,AA1 B(L)->B,0->DLA0		158
	159	MORG	4	BE CAREFUL: /S(DIV13&DIV14,DIV12) SELECTS DSB	159
	160	DIV13 GEN	/S(SS3M,DIV15),2(8),FSF,TF3,SF2, FSEL(15) IF NO QS		160
002C 53C3F8C404000000	161		CGFF,IM8,RF4 IF(P) IF NO QS, INCP		161
002D 0178008003260110	162	DIV5 GEN	/N(DIV6),GF2,RF3,FF2,CF3,SH1,BB1 -B->DOR,SAMPLE FREE		162
002E	163	ORG	DIV13+2 REF BY FSEL(DSB)		163
	164	DIV14 GEN	/S(SS3M,DIV15),2(8),FSF,TF2,SF3, FSEL(15) IF QS,		164
	165		CGFF,IM8,RF4,FF6,CF3,WR1,SH1,BB0, IF(P) IF QS, INCP		165
002E 53C3EFC404670100	166		CAA0 -A->A		166
002F 019800000023A100	167	DIV6 GEN	/N(DIV7),FF2,CF1,WR1,SC1,WF1,SH1 DOR(RT),CARRY-A->A FREE		167
	168	MORG	4	/T(DIV9,DIV10), /T(DIV11,DIV10)	168
	169	DIV10 GEN	/T(DIV11,*),TF2,GFC,MR1,LA2,RF5, DIVIDE STEP		169
0030 01882320159192F0	170		CFF9,WR1,SC1,XF2,SH2,BBF		170
	171	DIV11 GEN	/S(DIV13,DIV12),2(6),FS2,TF3,GFD, FSEL(DSB) IF R0(15)=0		171
0031 A130834020A90001	172		CLB1,FFA,MF1,WR1,BB0,AA1 DOR->B		172
0032 0180048000000000	173	DIV9 GEN	/N(DIV10),SF1,GF2 SET OVERFLOW		173
0033 01A80080009190E0	174	DIV7 GEN	/N(DIV8),GF2,FF9,WR1,SC1,XF2,BBE FIRST DIVIDE STEP FREE		174
	175	MORG	2	/S(DIV13,DIV12)	175
	176	DIV12 GEN	/T(DIV14,DIV13),TF2,GFA,FF9,WR1, DSB=>DIV14,A+RF->A		176
0034 61702280009100F0	177		CBBF,AA0		177
	178	DIV8 GMSK	/T(DIV9,DIV10),TF3,GFD,LB3,RF2, R0(15)=>DIV10,-14->SC FREE		178
0035 0190334062A000E0	179		CFFA,MKE		179

	181	*	INSTRUCTIONS FORCED TOGETHER BY TEST ADDRESSING				181
	182	*				182	
0036	01C0040404001000	183	SRE81	GEN	/N(SS2M),SF1,IM8,RF4,XF2	IF(P),INCP,J-SIG	FREE 183
0037	0BD8000120A80000	184	HFPT1	GEN	/N(HMEN),IM2,LB1,FFA,ME1	WAIT(IO),DOR->ALU	FREE 184
		185		MORG	4 /T(JMP2,SS2M), /T(SRE80,SS2M)		185
0038	0380040404000000	186	SS2M	GEN	/N(SS3M),SF1,IM8,RF4,FF0,24(*-*)	IF(P),INCP,(AA)->ALU	186
0039	0F20040605000000	187	JMP2	GEN	/N(JMP1),SF1,IMC,RF5	IF(MIL),INC SC	187
003A	01B0000021960100	188	SRE80	GEN	/N(SRE81),LB1,RF1,FF9,CF3,SH1	DOR+1->P	188
003B	01E0000100000000	189	HMEN1	GEN	/N(HMEN2),IM2	WAIT(IO)	FREE 189
		190	HMEN2	GEN	/F(HREN),2(3),FSA,LB1,RF3,FFA,	FSEL(7-6),IOR->DOR	FREE 190
003C	2B1A800023A80020	191			CMF1,BB2		191
003D	01F00040000000008	192	HSTT7	GEN	/N(HSTT8),GF1,24(IH)	IH->ALU,IBR->IR	FREE 192
003E	01F8040400000000	193	HSTT8	GEN	/N(HSTT9),SF1,IM8	IF(P)	FREE 193
003F	40380140000000000	194	HSTT9	GEN	/N(IWAIT),1(4),GF5	IBR->I,DECODE,ETC	FREE 194

	196	*	SINGLE WORD ADDRESSING INSTRUCTIONS.	196
	197	*	PART OF DOUBLE-WORD EXTENDED INSTRUCTIONS.	197
	198	*		198
	199			199
0040	0210041C04000010	200	LDA1 GEN /N(LDB),SF1,AB3,IM8,RF4,BB1,AA0	200
		201	ELDA1 GEN /N(IWAIT),1(M),GF5,LB1,FFA,MF1,	201
0041	E038014020A90010	202	CWR1,BB1,AA0	202
		203	MORG 2 LDB,LDX REF BY FSEL(12)	203
		204	LDB GEN /N(IWAIT),1(I),GF5,IM6,LB1,FFA,	204
0042	F038014320A90011	205	CMF1,WR1,BB1,AA1	205
		206	ELDB1 GEN /N(IWAIT),1(M),GF5,LB1,FFA,MF1,	206
0043	E038014020A90011	207	CWR1,BB1,AA1	207
0044		208	ORG LDA1+4	208
0044	1223840404000000	209	SWA31 GEN /F(LDB),2(4),FSE,SF1,IM8,RF4	209
		210	ELDX1 GEN /N(IWAIT),1(M),GF5,LB1,FFA,MF1,	210
0045	E038014020A90012	211	CWR1,BB1,AA2	211
0046		212	ORG LDB+4	212
		213	LDX GEN /N(IWAIT),1(I),GF5,IM6,LB1,FFA,	213
0046	F038014320A90012	214	CMF1,WR1,BB1,AA2	214
0047	0248020020960110	215	EINR1 GEN /N(INR2),GF8,LB1,FF9,CF3,SH1,BB1	215
0048		216	ORG SWA31+4	216
0048	0238040320A80000	217	INR1 GEN /N(EINR1),SF1,IM6,LB1,FFA,MF1	217
		218	INR2 GEN /F(SS3M),2(8),FSF,SF1,IM8,RF4,	218
0049	03C3C40424960110	219	CLB1,FF9,CF3,SH1,BB1	219
		220	MORG 2 SUB,ANA REF BY FSEL(12)	220
		221	SUB GEN /N(IWAIT),1(I),GFD,IM6,LB1,FF6,	221
004A	F038034320670010	222	CCF3,WR1,BB1,AA0	222
		223	ESUB1 GEN /N(IWAIT),1(M),GFD,LB1,FF6,CF3,	223
004B	E038034020670010	224	CWR1,BB1,AA0	224
004C		225	ORG SUB+2	225
		226	ANA GEN /N(IWAIT),1(I),GF5,IM6,LB1,FFB,	226
004C	F038014320B90010	227	CMF1,WR1,BB1,AA0	227
		228	EANA1 GEN /N(IWAIT),1(M),GF5,LB1,FFB,MF1,	228
004D	E038014020B90010	229	CWR1,BB1,AA0	229
		230	MORG 2 /S(LDA1,SWA26)	230
004E	02A8040685000000	231	SWA26 GEN /N(SWA22),SF1,IMD,RF5	231
		232	EORA1 GEN /N(IWAIT),1(M),GF5,LB1,FFE,MF1,	232
004F	E038014020E90010	233	CWR1,BB1,AA0	233
0050		234	ORG INR1+8	234
0050	0288040404000000	235	ORA1 GEN /N(ORA2),SF1,IM8,RF4	235
		236	ORA2 GEN /N(IWAIT),1(I),GF5,IM6,LB1,FFE,	236
0051	F038014320E90010	237	CMF1,WR1,BB1,AA0	237
		238	MORG 2 ADD,ERA REF BY F.SEL(12)	238
		239	ADD GEN /N(IWAIT),1(I),GFD,IM6,LB1,FF9,	239
0052	F038034320910010	240	CWR1,BB1,AA0	240
		241	EADD1 GEN /N(IWAIT),1(M),GFD,LB1,FF9,WR1,	241
0053	E038034020910010	242	CBB1,AA0	242
0054		243	ORG ORA1+4	243
0054	12A3840404000000	244	SWA35 GEN /F(ADD),2(4),FSE,SF1,IM8,RF4	244
		245	SWA22 GEN /S(LDA1,SWA26),2(C),MT1,FSF,TF3,	245
0055	7267F2C023A80010	246	CGFB,LB1,RF3,FFA,MF1,BB1	246
0056		247	ORG ADD+4 MORG 16 WITH ADD	247
		248	ERA GEN /N(IWAIT),1(I),GF5,IM6,LB1,FF6,	248
0056	F038014320690010	249	CMF1,WR1,BB1,AA0	249
		250	EERA1 GEN /N(IWAIT),1(M),GF5,LB1,FF6,MF1,	250
0057	E038014020690010	251	CWR1,BB1,AA0	251
0058		252	ORG SWA35+4	252

0058	5213C40404000000	253	SWA36	GEN	/F(SUB),2(2),FSF,SF1,IM8,RF4	FSEL(12),IF(P),INCP	253
0059	02A8040680000000	254	SWA21	GEN	/N(SWA22),SF1,IMD	OF(MIL)	FREE 254
		255		MORG	2 REF BY FSEL(12)		255
005A	02D8000020A9001F	256	MUL0	GEN	/N(MUL),LB1,FFA,MF1,WR1,BB1,AAF	MIL->S2	256
		257	MUL	GMSK	/T(MUL4,MUL1),TF2,GFD,LB3,RF2,	R0SIGN=>MUL4,15->SC	FREE 257
005B	26A8234062A000E0	258			CFFA,MK000E		258
005C		259		ORG	SWA36+4		259
005C	52A3800080000000	260	SWA37	GEN	/F(MUL0),2(4),FSE,IM1	FSEL(12),WAIT(M)	260
005D	0FF8000021A80000	261	DORTOP	GEN	/N(RESET),RF1,LB1,FFA,MF1,BB0	DOR->P FOR DEBUGGING	FREE 261
005E		262		ORG	MUL0+4 MORG 16 WITH MUL0		262
		263	DIV0	GEN	/N(DIV),LB1,FFA,MF1,WR1,WF1,BB1,	MIL->S2,MIL15->QS	263
005E	02F8000020A9201F	264			C24(S2)		264
005F	414833C000004000	265	DIV	GEN	/T(DIV2,DIV1),TF3,GFF,VF1,AA0	QS=>DIV1,R0(15)->DSB	FREE 265

267 * SHIFT INSTRUCTIONS AND INSTRUCTIONS CONSTRAINED TO BE 267
268 * NEAR SHIFT INSTRUCTIONS BY ADDRESSING. 268
269 * 269
270 MORG 32 SHIFTS REF BY CND FSEL(8-5), FAIL TO SS4MI 270
0060 C3003F0415010401 271 ASLB GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA2,RF5,WR1,SH4,AA1 271
0061 C3083F0415010101 272 LRLB GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA2,RF5,WR1,SH1,AA1 272
0062 C3103F0410010201 273 ASRB GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA3,RF5,WR1,SH2,AA1 273
0063 C3183F0410010401 274 LSRB GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA3,RF5,WR1,SH4,AA1 274
0064 C3203F0415010400 275 ASLA GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA2,RF5,WR1,SH4 275
0065 C3283F0415010100 276 LRLA GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA2,RF5,WR1,SH1 276
0066 C3303F0410010200 277 ASRA GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA3,RF5,WR1,SH2 277
0067 C3383F0410010400 278 LSRA GEN /T(*,SS3MI),TF3,SF3,GFC,IM8,LA3,RF5,WR1,SH4 278
0068 03A0000013004001 279 LASL GEN /N(LASL1),LA2,RF3,VF1,AA1 279
0069 03B8000003000001 280 LLRL GEN /N(LLRL1),RF3,AA1 280
006A 0390000013004001 281 LASR GEN /N(LASR1),LA2,RF3,VF1,AA1 281
006B 0398000003000001 282 LLSR GEN /N(LLSR1),RF3,AA1 282
283 MORG 4 REF BY FSEL FROM RR4 283
006C 03C0050404000000 284 ROF GEN /N(SS3MI),SF1,GF4,IM8,RF4 RESET OVFL, IF(P),INCP 284
006D 03C0048404000000 285 SOF GEN /N(SS3MI),SF1,GF2,IM8,RF4 SET OVFL, IF(P), INCP 285
286 TSA GMSK /N(TSA1),1(3),AB2,IME,LB3,FFA, START IO 286
006E 3F60001760ADFC00 287 CMKDFC0 287
288 ILLOP 288
006F 0040000069900010 289 289
0070 E038014300000000 290 SS3M GEN 16 REF BY CND FSEL FROM DIV, FSEL FROM MUL,INR 290
291 SHFT1 GEN /N(IWAIT),1(M),GF5,IM6 IBR->I,DECODE, ETC 291
0071 C37A7E4422660100 292 /S(ASLB,SS3MI),2(F),FS9,TF3,SF3, CND(NOT ALUZ) FSEL(8-5)FREE 292
293 * CGF9,IM8,LB1,RF2,FF6,CF3,SH1,BB0 CND(ALUZ) IF(P), 293
294 MORG 2 /T(LASL2,*) -DOR->SHIFT COUNTER 294
0072 13A823001001AA00 295 LASR1 GEN /T(LASL2,*),TF2,GFC,LA3,RF5,WR1,SC1,WF1,XF1,SH2 295
296 LLSR1 GEN /T(*,LASL3),TF3,SF3,GFC,IM8,LA3,RF5,WR1,SC1, 296
0073 33983F041001AC00 297 CWF1,XF1,SH4 297
298 MORG 2 298
299 LASL1 GEN /T(LASL2,*),TF2,GFC,LA2,RF5,WR1, SHFT OVFL => LASL2 299
0074 23A8230015019E00 300 CSC1,XF3,SH6,AA0 (A,DOR)LEFT, INC SC 300
0075 03B0040400000B800 301 LASL2 GEN /N(LASL3),SF1,IM8,SC1,WF1,XF3 IF(P),DOR RT,DSB->DOR15 301
302 MORG 2 /T(*,LASL3) 302
303 LASL3 GEN /N(IWAIT),1(I),GF5,IM6,LB1,FFA, DECODE,IBR->I,EN INT, 303
0076 F038014320A90001 304 CMF1,WR1,AA1 DOR->B 304
305 LLRL1 GEN /T(*,LASL3),TF3,SF3,GFC,IM8,LA2, SHFT OVFL=>LASL3,INC SC 305
0077 33B83F0415018A00 306 CRF5,WR1,SC1,XF1,SH2 (A,DOR) LEFT ROTATE 306
0078 307 ORG SS3M+8 REF BY FSEL, MUST BE MORG 32 WITH SHIFTS 307
0078 F0380143000000000 308 SS3MI GEN /N(IWAIT),1(I),GF5,IM6 IBR->I,DECODE, ETC 308
0079 4BBA8000000000000 309 HLT6 GEN /F(HRDP),2(7),FSA FSEL(8-6) FREE 309
310 MORG 2 /S(SS3M,DIV15) 310
311 DIV15 GEN /F(SS3M),2(8),FSF,SF1,IM8,FF6, FSEL(14),IF(P), 311
007A 03C3C40400670111 312 CCF3,WR1,SH1,BB1,AA1 -B->B 312

	314	*	JUMP AND MARK INSTRUCTION.	314
	315	*		315
	316	JMRK3	GEN /N(SS2M),SF1,IM4,LB1,RF1,FF9,CF3, IF(ALU),MIL+1->P	FREE 316
007B 01C0040221960110	317		CSH1,BB1	317
	318	MORG	2 /T(JMRK1,JMRK5)	318
007C 01C0040404000000	319	JMRK5	GEN /N(SS2M),SF1,IM8,RF4	IF(P),INCP 319
	320	JMRK1	GEN /T(JMRK2,JMRK4),TF3,SF2,GFB,IM2,	MIL15=>JMRK4,P+1->ALU, 320
007D 73F83AC108060000	321		CLA1,CF3	CND(MIL15=0) OS(MIL) 321
	322	MORG	2 /T(JMRK2,JMRK4)	322
007E 03E8040685000000	323	JMRK4	GEN /N(JMRK1),SF1,IMD,RF5	OF(MIL),INC SC 323
007F 03D8000088060000	324	JMRK2	GEN /N(JMRK3),IM1,LA1,CF3	WAIT(M),P+1->ALU 324

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326 * DOUBLE WORD IMMEDIATE INSTRUCTIONS. NOTE THAT THESE INSTRUCTIONS
327 * ARE DIFFERENT FROM VARIAN'S SINCE AN M-FIELD EQUAL TO ZERO OR 8
328 * DOES NOT CAUSE UNPREDICTABLE RESULTS. IN ADDITION, BITS 7, 1
329 * AND 0 ARE USED SIMILARLY TO THE USAGE FOR DOUBLE-WORD EXTENDED
330 * ADDRESSING INSTRUCTIONS. WHEN BITS 1 AND 0 ARE EQUAL TO 00, 01
331 * OR 10, INDEXING AND INDIRECT ADDRESSING ARE PERFORMED. THUS,
332 * NEGATIVE OPERANDS ARE NOT POSSIBLE. WHEN BITS 1 AND 0 ARE EQUAL
333 * TO 11, THE ACTION IS THE SAME AS VARIAN'S ACTION. NOTE THAT THE
334 * VARIAN ASSEMBLER ASSEMBLES BITS 1 AND 0 AS 00, NOT 11. THIS
335 * PROGRAM MAY BE MADE TO EXECUTE PROGRAMS SO ASSEMBLED BY
336 * EXCHANGING IMMREL(X'168) AND IMMNI(X'16B), AND BY EXCHANGING
337 * IMRL AND IMNI BELOW.
338 *
339 MORG 32 REF BY CND FSEL, FAIL TO IMIND
0080 340 IMMBAS EQU *
341 * THE FOLLOWING INSTRUCTION IMPLEMENTS AN INDEXED SHIFT CAPABILITY.
342 * BITS 8-5 OF THE ADDRESS WORD SHOULD BE SET AS FOR SHIFT
343 * INSTRUCTIONS. NOTE THAT ERRATIC RESULTS OCCUR IF THE CONTENTS
344 * OF BITS 8-5 > X'B. SINCE THIS INSTRUCTION CANNOT DO 0 -> CINTF,
345 * ERRATIC RESULTS WILL OCCUR IF INDEXED SHIFTS ARE THE TARGET
346 * OF INTERRUPTS. INTERRUPTABILITY IS AS FOR SHIFTS.
347 IXSHFT GMSK /N(SHFT1),TF0,SF2,GF3,IM8,RF7, IF(P),INCP,IBR->I
0080 038808C4077001F0 348 CFF7,MK001F DOR&X'1F->DOR,SAMPLE
349 * NEXT 8 INSTRUCTIONS ALL DO: 0 -> CINTF.
350 ILDA GEN /N(SS2M),LB1,RF4,FFA,MF1,WR1,XF1, INCP, DOR->A
0081 01C0000024A90800 351 CBB0,AA0
352 ILDB GEN /N(SS2M),LB1,RF4,FFA,MF1,WR1,XF1, INCP, DOR->B
0082 01C0000024A90800 353 CBB0,AA0
354 ILDX GEN /N(SS2M),LB1,RF4,FFA,MF1,WR1,XF1, INCP, DOR->X
0083 01C0000024A90802 355 CBB0,AA2
356 IINR GEN /F(IST2),2(1),FS1,GF8,LB1,RF3, FSEL(CINTF), DOR+1->DOR
0084 6488420023960900 357 CFF9,CF3,XF1,SH1,BB0 SAMPLE OVERFLOW
0085 6488400003000800 358 ISTA GEN /F(IST2),2(1),FS1,RF3,XF1,AA0 FSEL(CINTF),A->DOR
0086 6488400003000801 359 ISTB GEN /F(IST2),2(1),FS1,RF3,XF1,AA1 FSEL(CINTF),B->DOR
0087 6488400003000802 360 ISTX GEN /F(IST2),2(1),FS1,RF3,XF1,AA2 FSEL(CINTF),X->DOR
0088 6488400003000900 361 ISTZ GEN /F(IST2),2(1),FS1,RF3,XF1,SH1 FSEL(CINTF),0->DOR
362 * NEXT 7 INSTRUCTIONS ALL DO: 0->CINTF, INCP
363 IORA GEN /N(SS2M),LB1,RF4,FFE,MF1,WR1,XF1, A V DOR -> A
0089 01C0000024E90800 364 CBB0,AA0
365 IADD GEN /N(SS2M),GF8,LB1,RF4,FF9,WR1,XF1, A+DOR->A,SAMPLE OVFL
008A 01C0020024910800 366 CBB0,AA0
367 IERA GEN /N(SS2M),LB1,RF4,FF6,MF1,WR1,XF1, A XOR DOR -> A
008B 01C0000024690800 368 CBB0,AA0
369 ISUB GEN /N(SS2M),GF8,LB1,RF4,FF6,CF3,WR1, A-DOR->A,SAMPLE OVFL
008C 01C0020024670800 370 CXF1,BB0,AA0
371 IANA GEN /N(SS2M),LB1,RF4,FFB,MF1,WR1,XF1, A&DOR->A
008D 01C0000024B90800 372 CBB0,AA0
373 IMUL GEN /N(MUL),LB1,RF4,FFA,MF1,WR1,XF1, DOR->RF
008E 02D8000024A9080F 374 CBB0,AAF
375 IDIV GEN /N(DIV),LB1,RF4,FFA,MF1,WR1,WF1, DOR->RF, ALU15->QS
008F 02F8000024A9280F 376 CXF1,BB0,AAF
377 MORG 16 REF BY CND FSEL, FAIL TO IMIND
0090 378 IMXC EQU * IMMEDIATE INSTRUCTION INDEX COMPUTATION
379 * NEXT 3 INSTRUCTIONS DO C.FSEL(6-3) (QS=0), C.OF(A) (QS=1)
380 IMRL GEN /S(IMMBAS,IMIND),2(F),FS7,TF3, P+DOR->DOR
0090 C479FFC2AB900000 381 CSF3,GFF,IMS,LA1,LB1,RF3,FF9,BB0
382 IMIX GEN /S(IMMBAS,IMIND),2(F),FS7,TF3, X+DOR->DOR

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0091	C479FFC2A3900002	383			CSF3,GFF,IM5,LB1,RF3,FF9,BB0,AA2		383
		384	IMIB	GEN	/S(IMMBAS,IMIND),2(F),FS7,TF3,	B+DOR->DOR	384
0092	C479FFC2A3900001	385			CSF3,GFF,IM5,LB1,RF3,FF9,BB0,AA1		385
		386	IMNI	GEN	/F(IMMBAS),2(F),FS7,LB1,RF3,FFA,	MIL->DOR, FSEL(6-3)	386
0093	0479C00023A80010	387			CMF1,BB1		387
		388		MORG	2 REF BY FSEL(7)		388
		389	IMPRE	GEN	/F(IMXC),2(3),FS4,LB1,RF3,	FSEL(1-0),	389
0094	0499000023A82010	390			CFFA,MF1,MF1,BB1	MIL->DOR,MIL15->QS	390
		391	IMPOST	GEN	/S(IMXC,IMPST1),2(3),FS4,TF3,GFB,	C.FSEL(1-0) (MIL15=0),	391
0095	549932C023A80010	392			CLB1,RF3,FFA,MF1,BB1	MIL->DOR	392
		393		MORG	2 /T(IMPST1,IMIND1)		393
		394	IMIND1	GEN	/S(IMMBAS,IMIND),2(F),FS7,TF3,	C.FSEL(6-3) (MIL15=0),	394
0096	C479FCC2A3A80010	395			CSF3,GF3,IM5,LB1,RF3,FFA,MF1,BB1	C.OF(A) (MIL15=1),	395
		396	*			MIL->DOR	396
		397	IMPST1	GEN	/S(IMXC,IMIND),2(3),FS4,TF3,SF3,	C.FSEL(1-0) (MIL15=0),	397
0097	44993EC2A3A80010	398			CGFB,IM5,LB1,RF3,FFA,MF1,BB1	C.OF(A) (MIL15=0),	398
		399	*			MIL->DOR	399
		400		MORG	2 /S(IMXC,IMIND)		400
0098	348833C085000000	401	IMIND	GEN	/T(IMPST1,IMIND1),TF3,GFF,IM1,RF5	WAIT(M),QS=>IMIND1,INCS	401
0099	0380040424A80000	402	IST4	GEN	/N(SS3M),SF1,IM8,LB1,RF4,FFA,MF1	IF(P),INCP,DOR->ALU FREE	402
		403		MORG	2 /S(IMXC,IMPST1)		403
009A	04C00402A0A80000	404	IMPST1	GEN	/N(IMIND),SF1,IM5,LB1,FFA,MF1,BB0	OF(ALU),DOR->ALU	404
009B	351A800818000000	405	RR1	GEN	/F(RR2),TS3,2(3),FSA,MRO,AB1,LA3	I(5-3)->BB,FSEL(7-6), FREE	405
		406	*			GET BYTA READY FOR SBT1	406
		407		MORG	2 REF BY FSEL(CINTF)		407
009C	0558040300000000F	408	IST2	GEN	/N(IST3),SF1,IM6,AAF	OS(ALU),RF->ALU	408
009D	0558040500000000	409	IST1	GEN	/N(IST3),SF1,IMA	OS(P)	409

	411	*	V75 REGISTER - REGISTER AND BYTE INSTRUCTIONS.	411
	412	*		412
009E 04F8008098000100	413	LBT2	GEN /N(LBT3),GF2,IM1,LA3,SH1,24(*-*)	AA(RC),SAMPLE,WAIT(M) FREE 413
	414	LBT3	GEN /F(LBT4),2(1),FS2,SF3,GF7,IM8,	FSEL(BYTA),MIL->DOR, FREE 414
009F 65088DC427000010	415		CRF7,LB1,BB1	CND(ALUS) IF(P), INCP 415
	416	MORG	16 REF BY FSEL WITH REG SEL FROM	RR1. 416
00A0 250A400003000000	417	RR2	GEN /F(RR5),2(1),FS9,RF3,FF0,24(*-*)	AA->DOR,FSEL(5) 417
	418	RRAD	GEN /N(SS3MI),SF1,GF6,IM8,RF4,FF9,	IF(P),INCP,AA+BB->AA, 418
00A1 03C0058404910000	419		CWR1,23(*-*),24(*-*)	SAMPLE OVERFLOW 419
	420	RRSB	GEN /N(SS3MI),SF1,GF6,IM8,RF4,FF6,	IF(P),INCP,AA-BB->AA, 420
00A2 03C0058404670000	421		CCF3,WR1,23(*-*),24(*-*)	SAMPLE OVERFLOW 421
00A3 03C0040404A90000	422	RRT	GEN /N(SS3MI),SF1,IM8,RF4,FFA,MF1,WR1	IF(P),INCP,BB->AA 422
	423	MORG	2 REF BY FSEL(5) FROM RR2	423
00A4 0599C01000000000	424	RR5	GEN /F(RR4),2(3),TS0,FS7,MR0,AB2,BB0	FSEL(4-3),I(2-0)->AA 424
	425	RR3	GEN /F(LDR1-4),2(7),TS0,FS7,SF1,IM8,	I(2-0)->AA,1->BB, 425
00A5 0589C41407000810	426		CRF7,MR0,AB2,XF1,BB1,AA0	IF(P),INCP,FSEL(5-3), 426
	427	*		I5=1,R0->DOR,0->CINTF 427
	428	MORG	2 /T(LBT1,LBSBI1), /T(SBT1,LBSBTI)	428
00A6 0538041E80000000	429	LBSBI1	GEN /N(LBSBI2),SF1,IM0,AB3	OF(MIL),HOLD AA&BB 429
00A7 4509C01880000000	430	LBSBI2	GEN /F(LBT1),2(1),FS7,AB3,IM1	FSEL(3),WAIT(M),HOLD 430
	431	MORG	2 REF BY FSEL(3) FROM LBSBI2	431
	432	LBT1	GEN /N(LBT2),SF1,IM5,AB3,LB1,LA3,FF9,	IF(ALU),MIL+AA(RA) 432
00A8 04F0041AB8900200	433		CSH2,23(*-*),24(*-*)	HOLD AA&BB 433
	434	SBT1	GEN /F(SBT2),2(1),FS2,SF1,IM7,LB1,	FSEL(BYTA),BS(ALU), 434
00A9 55088403B8900200	435		CLA3,FF9,SH2,23(*-*),24(*-*)	MIL+AA(RA) 435
	436	MORG	2 REF BY FSEL(BYTA) FROM SBT1	436
00AA 04C8000027A80070	437	SBT2	GEN /N(IST4),RF7,LB1,FFA,MF1,BB7	ORLS->DOR,INCP 437
00AB 04C8000024A80000	438	IST3	GEN /N(IST4),LB1,RF4,FFA,MF1,BB0	INCP,DOR->ALU 438
	439	MORG	2 REF BY FSEL(BYTA) FROM LBT3	439
	440	LBT4	GEN /N(LBT5),SF1,IM8,RF3,LB1,FFA,MF1,	OLSE->DOR,IF(P) FSEL 440
00AC 0568040423A80050	441		CBB5	441
	442	LBT5	GEN /N(IWAIT),1(M),GF5,IM6,LB1,FFA,	ORZF->R0,IBR->I,DECODE,FSEL 442
00AD E038014320A90060	443		CMF1,WR1,BB6,AA0	SEL&RST CINTF,INTRPT 443
00AE 05C8000080000000	444	OME2	GEN /N(OAR1),IM1	WAIT(M) FREE 444
	445	OABM2	GMSK /F(OME3),2(3),FSA,IM2,LB2,FFE,	FSEL(7-6),WAIT(IO), FREE 445
00AF 659A800140EFE00E	446		CMKFE00,16(S1)	I&X'1FF V S1 -> ALU 446
	447	MORG	16 REF BY FSEL WITH REG SEL FROM	RR5. 447
00B0 6319000000000000	448	RR4	GEN /F(RDF),2(3),FS4	FSEL(1-0) 448
	449	INCR	GEN /N(SS3MI),SF1,GF6,IM8,RF4,LB1,	IF(P),INCP,DOR+1->AA, 449
00B1 03C0058424910200	450		CFF9,WR1,SH2,23(*-*),24(*-*)	SAMPLE OVERFLOW 450
	451	DECR	GEN /N(SS3MI),SF1,GF6,IM8,RF4,LB1,	IF(P),INCP,DOR-1->AA, 451
00B2 03C0058424970200	452		CFF9,CF3,WR1,SH2,23(*-*),24(*-*)	SAMPLE OVERFLOW 452
00B3 03C0040404090000	453	COMR	GEN /N(SS3MI),SF1,IM8,RF4,FF0,MF1,WR1	IF(P),INCP,NOT AA->AA 453
00B4	454	ORG	RR4+4 REF BY FSEL(5-3) WITH REG SEL FROM RR3.	I(5)=1. 454
	455	LDR1	GEN /N(SS3M),SF1,IM8,RF4,LB1,FFA,MF1,	IF(P),INCP,MIL->AA 455
00B4 0380040424A90000	456		CWR1,23(*-*),24(*-*)	456
	457	ADR1	GEN /N(SS3M),SF1,GF6,IM8,RF4,LB1,FF9,	IF(P),INCP,MIL+AA->AA, 457
00B5 0380058424910000	458		CWR1,23(*-*),24(*-*)	SAMPLE OVERFLOW 458
00B6 3540320800000000	459	LBT	GEN /T(LBT1,LBSBI1),TF3,GFB,AB3	MILS=>LBSBTI,HOLD AA&BB 459
	460	SBT	GEN /T(SBT1,LBSBI1),TF3,GFB,AB3,LA1,	MILS=>LBSBTI,HOLD AA&BB 460
00B7 3548320809F00000	461		CRF1,FFF	P-1->P (FOR MPLE) 461

	463	*	OUTPUT DATA TRANSFER INSTRUCTIONS.				463
	464	*				464	
	465		MORG	4	REF BY FSEL	465	
00B8 0570040680000800	466	OME1	GEN	/N(OME2),SE1,IMD,XF1	OF(MIL),RESET CINTF	466	
	467	OAR1	GEN	/N(OABM2),1(7),IMF,LB1,FFA,MF1,	START I/O AT X'1C,	467	
00B9 75780007A0A9000E	468			CWR1,BB0,24(S1)	DOR->S1	468	
	469	OBR1	GEN	/N(OABM2),1(7),IMF,LB1,FFA,MF1,	START I/O AT X'1C,	469	
00BA 75780007A0A9000E	470			CWR1,BB0,24(S1)	DOR->S1	470	
	471	OAB1	GEN	/N(OABM2),1(7),IMF,LB1,FFA,MF1,	START I/O AT X'1C,	471	
00BB 75780007A0A9000E	472			CWR1,BB0,24(S1)	DOR->S1	472	
	473		MORG	4	REF BY FSEL	473	
00BC 0F10000124A80010	474	OME3	GEN	/N(SS1M),IM2,LB1,RF4,FFA,MF1,BB1	WAIT(IO),INCP,MIL->ALU	474	
00BD 01C0000100000000	475	OAR2	GEN	/N(SS2M),IM2,AA0	WAIT(IO),A->ALU	475	
00BE 01C0000100000001	476	OBR2	GEN	/N(SS2M),IM2,AA1	WAIT(IO),B->ALU	476	
00BF 01C0000100E80010	477	OAB2	GEN	/N(SS2M),IM2,FFE,MF1,BB1,AA0	WAIT(IO),A V B->ALU	477	

	479	*	BIT TEST INSTRUCTION.		479	
	480	*			480	
	481		MORG	16 REF BY FSEL(3-0)	481	
00C0	068A000063AFFFE0	482	BT20	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFFFE	482
00C1	068A000063AFFFD0	483	BT21	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFFFD	483
00C2	068A000063AFFFB0	484	BT22	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFFFB	484
00C3	068A000063AFF70	485	BT23	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFFF7	485
00C4	068A000063AFFEF0	486	BT24	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFFEF	486
00C5	068A000063AFFDF0	487	BT25	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFFDF	487
00C6	068A000063AFFBF0	488	BT26	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFFBF	488
00C7	068A000063AFF7F0	489	BT27	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFF7F	489
00C8	068A000063AFEFF0	490	BT28	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKEEFF	490
00C9	068A000063AFDFF0	491	BT29	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKFDFF	491
00CA	068A000063AFBFF0	492	BT2A	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKF8FF	492
00CB	068A000063AF7FF0	493	BT2B	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKF7FF	493
00CC	068A000063AEFFF0	494	BT2C	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKEFFF	494
00CD	068A000063ADFFF0	495	BT2D	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKDFFF	495
00CE	068A000063ABFFF0	496	BT2E	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MKBFFF	496
00CF	068A000063A7FFF0	497	BT2F	GMSK	/F(BT30),2(1),FS8,LB3,RF3,FFA,MK7FFF	497
	498		MORG	2 REF BY FSEL(4)	498	
00D0	168A408020B80000	499	BT30	GEN	/F(BT40),2(1),FS9,GF2,LB1,FFB,MF1	499
00D1	168A408020B80001	500	BT31	GEN	/F(BT40),2(1),FS9,GF2,LB1,FFB,MF1,AA1	500
	501		MORG	2 REF BY FSEL(5)	501	
00D2	1F503A4600000000	502	BT40	GEN	/T(BT50,SS1M),TF3,SF2,GF9,IMC	502
00D3	1F502E4600000000	503	BT41	GEN	/T(BT50,SS1M),TF2,SF3,GF9,IMC	503

	505	*	MULTIPLY INSTRUCTION.				505
	506	*					506
	507		MORG	2	/T(MUL4,MUL1)		507
00D4 06C00080009000F1	508	MUL1	GEN	/N(MUL2),GF2,FF9,BBF,AA1	RF+B->ALU,SAMPLE		508
00D5 06B0000013004001	509	MUL4	GEN	/N(MUL5),LA2,RF3,VF1,AA1	B(L)->DOR,B15->DSB		509
	510		MORG	2	/T(MUL3,MUL5)		510
00D6 06C800000039000E	511	MUL5	GEN	/N(MUL6),FF3,MF1,WR1,AAE	ZERO->RE		511
00D7 06B00200009000F1	512	MUL3	GEN	/N(MUL5),GF8,FF9,BBF,AA1	RF+B->ALU,SAMPLE OVFL		512
	513	MUL2	GEN	/T(MUL3,MUL5),TF2,GF9,LA2,RF3,	ALUZ=>MUL3,B(L)->DOR, FREE		513
00D8 36B8224013004001	514			CVF1,AA1	B15->DSB		514
00D9 06D800200000A800	515	MUL6	GEN	/N(MUL7),MR1,SC1,WF1,XF1	DOR(RT),DOR01->BADO FREE		515
	516		MORG	2			516
	517	MUL8	GEN	/T(MUL9,*),TF2,GFC,MR1,LA3,RF5,	MULTIPLY STEP		517
00DA 56F023201D91A800	518			CFF9,WR1,SC1,WF1,XF1			518
	519	MUL7	GEN	/N(MUL8),MR1,RF5,FF9,WR1,SC1,WF1,	FIRST MULTIPLY STEP FREE		519
00DB 06D000200591A800	520			CXF1			520
	521		MORG	2	/T(MUL12,MUL13)		521
	522	MUL13	GEN	/F(SS3M),2(8),FSF,SF1,IM8,RF4,	FSEL(14),IF(P),INCP		522
00DC 03C3C4041C010401	523			CLA3,WR1,SH4,AA1	SHIFT B		523
00DD 06E00000006700F0	524	MUL12	GEN	/N(MUL13),FF6,CF3,WR1,BBF	A=RF->A		524
00DE 06F800001801A800	525	MUL9	GEN	/N(MUL11),LA3,WR1,SC1,WF1,XF1	A,DOR(RT),MULS->DLA15		525
	526	MUL11	GEN	/T(MUL12,MUL13),TF2,GFA,LB1,FFA,	DSB=>MUL12,DOR->B FREE		526
00DF 66E8228020A90001	527			CMF1,WR1,AA1			527

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	529	*	V75 DOUBLE PRECISION AND REGISTER-MEMORY INSTRUCTIONS.	529
	530	*		530
	531	MORG	16 /T(DPRM2,DPRM1) WITH AB2 FOR REG SEL	531
00E0 27A83EC2A3A80010	532	DPRM1 GEN	/T(DPRM4,DPRM3),TF3,SF3, CND(-MILS) FSEL(8-6) TFRS	532
	533		CGFB,IM5,LB1,RF3,FFA,MF1,BB1 CND(MILS) OF(ALU),	533
	534	*	MIL->DOR	534
00E1 27A83EC2A3900010	535	DPRM2 GEN	/T(DPRM4,DPRM3),TF3,SF3, CND(-MILS) FSEL(8-6) TTRS	535
	536		CGFB,IM5,LB1,RF3,FF9,BB1,24(*-*) CND(MILS) OF(ALU),	536
	537	*	MIL+AA->DOR	537
00E2 071800008000000E	538	DST1 GEN	/N(DST2),IM1,FF0,AAE WAIT(M),RE->ALU FREE	538
	539	DST2 GEN	/N(DPRMST),SF1,AB3,IM6,LB1,FF9, OS(ALU),DOR+1->ALU, FREE	539
00E3 072004182096010F	540		CCF3,BB0,SH1,AAF F->AA	540
00E4 01C0001804000000	541	DPRMST GEN	/N(SS2M),AB3,RF4,FF0,24(*-*) INCP,AA->ALU,HOLD AA FREE	541
	542	DADSB1 GEN	/F(DADD2),2(1),FS7,GF2,IM1,RF3, RF+RF->DOR,SAMPLE FREE	542
00E5 3709C080839000FF	543		CFF9,BBF,AAF WAIT(M)	543
	544	MORG	2 REF BY FSEL FROM DADSB1	544
00E6 670A82002093A01E	545	DADD2 GEN	/F(DPDOR1),2(1),FSA,GF8,LB1,FF9, RE+MIL+CARRY->RE, FSEL	545
	546		CCF1,WR1,SC1,WF1,BB1,AAE DOR(RC),SAMPLE OVERFLOW	546
	547	DSUB2 GEN	/F(DPDOR1),2(1),FSA,GF8,LB1,FF6, RE-MIL+CARRY->RE, FSEL	547
00E7 670A82002063A01E	548		CCF1,WR1,SC1,WF1,BB1,AAE DOR(RC),SAMPLE OVERFLOW	548
	549	DLD1 GEN	/F(DPDOR1),2(1),FSA,LB1,FFA,MF1, MIL->RE FREE	549
00E8 670A800020A9001E	550		CWR1,BB1,AAE	550
	551	DAN1 GEN	/F(DPDOR1),2(1),FSA,LB1,FFB,MF1, RE & MIL->RE FREE	551
00E9 670A800020B9001E	552		CWR1,BB1,AAE	552
	553	DOR1 GEN	/F(DPDOR1),2(1),FSA,LB1,FFE,MF1, RE V MIL->RE FREE	553
00EA 670A800020E9001E	554		CWR1,BB1,AAE	554
	555	DER1 GEN	/F(DPDOR1),2(1),FSA,LB1,FF6,MF1, RE XOR MIL->RE FREE	555
00EB 670A80002069001E	556		CWR1,BB1,AAE	556
	557	MORG	2 REF BY FSEL FROM DLD1,DADD2,DSUB2,DAN1,DOR1,DER1	557
	558	DPDOR1 GEN	/N(DPRER0),SF1,IM8,LB1,RF4,FFA, IF(P),INCP,DOR->R1 FSEL	558
00EC 0770040424A90001	559		CMF1,WR1,BB0,AA1	559
	560	DPDOR5 GEN	/N(DPRER4),SF1,IM8,LB1,RF4,FFA, IF(P),INCP,DOR->R5 FSEL	560
00ED 0778040424A90005	561		CMF1,WR1,BB0,AA5	561
	562	DPRER0 GEN	/N(IWAIT),1(M),GF5,IM6,FFA,MF1, IBR->I,DECODE,INTRPT, FREE	562
00EE E038014300A900E0	563		CWR1,BBE,AA0 SEL&RST CINTF,RE->R0	563
	564	DPRER4 GEN	/N(IWAIT),1(M),GF5,IM6,FFA,MF1, IBR->I,DECODE,INTRPT, FREE	564
00EF E038014300A900E4	565		CWR1,BBE,AA4 SEL&RST CINTF,RE->R4	565
	566	MORG	16 REF BY FSEL FROM DPRM4	566
00F0 07C8040224A80000	567	RMLD GEN	/N(RM1),SF1,IM4,LB1,RF4,FFA,MF1 OF(ALU),INCP,DOR->ALU FSEL	567
	568	RMST GEN	/N(DPRMST),TS3,SF1,AB2,IM6,LB1, OS(ALU),DOR->ALU, FSEL	568
00F1 3720041320A80000	569		CFFA,MF1,BB0 I(5-3)->AA	569
00F2 07C8040224A80000	570	RMAD GEN	/N(RM1),SF1,IM4,LB1,RF4,FFA,MF1 OF(ALU),INCP,DOR->ALU FSEL	570
00F3 07C8040224A80000	571	RMSB GEN	/N(RM1),SF1,IM4,LB1,RF4,FFA,MF1 OF(ALU),INCP,DOR->ALU FSEL	571
	572	MORG	2 FAIL OF CND FSEL TO RMLD ETC.	572
00F4 0700000085000000	573	DPRM3 GEN	/N(DPRM1),IM1,RF5 WAIT(M),INCS IF	573
00F5 07BA840208060000	574	DPRM4 GEN	/F(RMLD),2(7),FSA,SF1,IM4,LA1,CF3 IF(ALU),P+1->ALU TT	574
00F6	575	ORG	RMLD+6	575
00F6 07E0000000A9000E	576	DPR0RE GEN	/N(DPR1RF),FFA,MF1,WR1,BB0,AAE R0->RE FSEL	576
00F7 07E3000000A9004E	577	DPR4RE GEN	/N(DPR5RF),FFA,MF1,WR1,BB4,AAE R4->RE FSEL	577
00F8	578	ORG	RMLD+8 REF BY FSEL WITH REG SEL FROM RM1, 1 IMPOSSIBLE	578
	579	RMLD1 GEN	/N(IWAIT),1(M),GF5,IM6,LB1,FFA, IBR->I,DECODE,INTRPT, FSRs	579
00F8 E038014320A90000	580		CMF1,WR1,23(*-*),24(*-*) SEL&RST CINTF,MIL->AA	580
	581	*	RM1 IS NOT REFERENCED BY FIELD SELECTION.	581
	582	RM1 GEN	/F(RMLD1-8),TS3,2(B),FSA,SF1,AB2, IF(P),INCP,I(5-3)->AA, FREE	582
00F9 37DA841404000010	583		CIM8,RF4,BB1 1->BB,FSEL(7-6)	583
00FA	584	ORG	RMLD1+2	584
	585	RMAD1 GEN	/N(IWAIT),1(M),GFD,IM6,LB1,FF9, IBR->I,DECODE,INTRPT, FSRs	585

00FA	E038034320910000	586			CWR1,23(*-*),24(*-*)	SEL&RST CINTF,	586
		587	*			MIL+AA->AA,SAMPLE OVFL	587
		588	RMSB1	GEN	/N(IWAIT),1(M),GFD,IM6,LB1,FF6,	IBR->I,DECODE,INTRPT, FSRs	588
00FB	E038034320670000	589			CCF3,WR1,23(*-*),24(*-*)	SEL&RST CINTF,	589
		590	*			AA-MIL->AA,SAMPLE OVFL	590
00FC	07F0000000A9001F	591	DPR1RF	GEN	/N(OP1),FFA,MF1,WR1,BB1,AAF	R1->RF	FREE 591
00FD	07F0000000A9005F	592	DPR5RF	GEN	/N(OP1),FFA,MF1,WR1,BB5,AAF	R5->RF	FREE 592
00FE	07F80402A0960100	593	DP1	GEN	/N(OP2),SF1,IM5,LB1,FF9,CF3,SH1	OF(ALU),DOR+1->ALU	FREE 593
		594	DP2	GEN	/F(DLD),2(7),FS7,SF1,IM5,LB1,FFA,	OF(ALU),DOR->ALU,	FREE 594
00FF	0839C402A0A80000	595			CMF1,BB0	FSEL(5-3)	595
		596		MORG	8 REF BY FSEL FROM DP2		596
0100	07400000A7A80010	597	DLD	GEN	/N(DLD1),IM1,LB1,RF7,FFA,MF1,BB1	WAIT(M),INCP,MIL->DOR	FSEL 597
0101	0710040100000000E	598	DST	GEN	/N(DST1),SF1,IM2,AAE	OVR(OS),RE->ALU	FSEL 598
		599	DADD	GEN	/N(DADSB1),LB1,RF4,FF9,WR1,BB1,	RF+MIL->RF,INCP	FSEL 599
0102	072800002491001F	600			CAAF		600
		601	DSUB	GEN	/N(DADSB1),LB1,RF4,FF6,CF3,WR1,	RF-MIL->RF,INCP	FSEL 601
0103	072800002467001F	602			CBB1,AAF		602
		603	DAN	GEN	/N(DAN1),IM1,LB1,RF7,FFB,MF1,	RF&MIL->RF,INCP,	FSEL 603
0104	07480000A7B8001F	604			CBB1,AAF	WAIT(M)	604
		605	DOR	GEN	/N(DOR1),IM1,LB1,RF7,FFE,MF1,	RF V MIL->RF,INCP,	FSEL 605
0105	07500000A7E8001F	606			CBB1,AAF	WAIT(M)	606
		607	DER	GEN	/N(DER1),IM1,LB1,RF7,FF6,MF1,	RF XOR MIL->RF,INCP,FSEL	607
0106	07580000A768001F	608			CBB1,AAF	WAIT(M)	608
		609		ILLOP			FSEL 609
0107	0040000069900010	610	*		DPRM CAN'T DO IF(P) BECAUSE THE MEMORY LATCH ISN'T A TRUE-D		610
		611	*		LATCH, SO THE TESTS AT DPRM1, DPRM2 DO NOT WORK PROPERLY IF THE		611
		612	*		MEMORY IS ACTIVE.		612
		613	DPRM	GEN	/I(DPRM2,DPRM1),TS0,TF3,GF9,	ALUZ=>DPRM1,WAIT(M),	FREE 613
0108	0708325080000810	614			CAB2,IM1,XF1,BB1	0->CINTF,I(2-0)->AA	614

	616	*	EXECUTE REMOTE INSTRUCTION.				616
	617	*					617
0109	C038014300000000	618	SS3	GEN	/N(IWAIT),1(N),GF5,IM6	DECODE, EN INTS, ETC	FREE 618
		619		MORG	2 /T(XEC1,XEC3)		619
010A	0860040404000000	620	XEC3	GEN	/N(SS2),SF1,IM8,RF4	IF(P),INCP	620
010B	687022C000000000	621	XEC1	GEN	/T(XEC2,SS2),TF2,GF8	MIL15=>XEC2	621
		622		MORG	2 /T(XEC2,SS2), FSEL(STEP)		622
010C	0848040404000000	623	SS2	GEN	/N(SS3),SF1,IM8,RF4	IF(P),INCP	623
010D	0BB8000084000000	624	HSTT4	GEN	/N(HSTT5),IM1,RF4	WAIT(M),INCP	624
010E	0858040605000000	625	XEC2	GEN	/N(XEC1),SF1,IMC,RF5	IF(MIL),INC SC	625

627	*	SET I/O DEVICE SELECTION REGISTER. THIS IS NOT A VARIAN	627
628	*	INSTRUCTION. THIS INSTRUCTION PLACES 6 BITS IN REGISTER DR,	628
629	*	WHICH ARE SUBSEQUENTLY INCLUSIVE-OR'ED WITH ALL DEVICE SELECTION	629
630	*	SPECIFICATIONS SENT TO THE I/O BUS. THE OCTAL FORM FOR THIS	630
631	*	INSTRUCTION IS:	631
632	*	107TDD WHERE	632
633	*	T=0: DD->DR T=4: X->DR	633
634	*	T=1: A->DR T=5: A V X -> DR	634
635	*	T=2: B->DR T=6: B V X -> DR	635
636	*	T=3: A V B -> DR T=7: A V B V X -> DR	636
637	*		637
010F F038014320A90009	638	SETXIT GEN /N(IWAIT),1(1),GF5,IM6,LB1,FFA, DECODE,IBR->I,EN INT FREE	638
	639	CMF1,WR1,BB0,24(DR) DOR->DR	639
	640	MORG 8 REFERENCED BY FSEL(8-6)	640
0110 0878040447AFFC00	641	SET1 GMSK /N(SETXIT),SF1,IM8,LB2,RF7,FFA, I&0'77->DOR	641
	642	CMKFFC0 IF(P),INCP	642
0111 08780404677003F9	643	SETA GMSK /N(SETXIT),SF1,IM8,LB3,RF7,FF7, DR&0'77->DOR	643
	644	CMK3F,16(DR) IF(P),INCP	644
0112 08780404677003F1	645	SE1B GMSK /N(SETXIT),SF1,IM8,LB3,RF7,FF7, B&0'77->DOR	645
	646	CMK3F,AK1 IF(P),INCP	646
0113 08880000000E90019	647	SETAB GEN /N(SETA),FFE,MF1,WR1,BB1,24(DR) B V DR -> DR	647
	648	SETX GMSK /N(SETXIT),SF1,IM8,LB3,RF7,FF7, X&0'77->DOR	648
0114 08780404677003F2	649	CMK3F,AK2 IF(P),INCP	649
0115 08880000000E90029	650	SETAX GEN /N(SETA),FFE,MF1,WR1,BB2,24(DR) X V DR -> DR	650
0116 08A80000000A90019	651	SETBX GEN /N(SETAX),FFA,MF1,WR1,BB1,24(DR) B->DR	651
0117 08A80000000E90019	652	SETABX GEN /N(SETAX),FFE,MF1,WR1,BB1,24(DR) B V DR -> DR	652

654	*	EXTERNAL CONTROL INSTRUCTION.				654	
655	*					655	
0118 18C80007A0A9000E	656	EXC2	GEN	/N(EXC3),1(1),IMF,LB1,FFA,MF1,	START IO,DOR->S1	FREE 656	
0119 0860000140EFE00E	657			CWR1,BB0,24(S1)		657	
	658	EXC3	GMSK	/N(SS2),IM2,LB2,FFE,MKFE00,16(S1)	WAIT(IO),I&O'777 V S1	FREE 658	
011A 0860000140E7E009	659	EXC22	GMSK	/N(SS2),IM2,LB2,FFE,MK7E00,	I&X'81FF V DR, WAIT(IO)	FREE 659	
	660			C16(DR)		660	
	661	*	SENSE INSTRUCTION.				661
	662	*					662
011B 18E00007A0A9080E	663	SEN2	GEN	/N(SEN3),1(1),IMF,LB1,FFA,MF1,	START I/O AT X'4,	FREE 663	
	664			CWR1,XF1,BB0,24(S1)	DOR->S1,RESET CINTF	664	
011C 08E8000140EFE00E	665	SEN3	GMSK	/N(SEN4),IM2,LB2,FFE,MKFE00,	WAIT(IO),	FREE 665	
	666			C16(S1)	I&X'1FF V S1 ->ALU	666	
011D 1F702C4604000000	667	SEN4	GEN	/T(SEN5,SS1M),TF2,SF3,GF1,IMC,RF4	I/O SENSE=>SEN5,INCP,	FREE 667	
	668	*			IF(MIL) IF I/O SENSE	668	
	669	MORG	2	/T(SEN6,SEN7)		669	
011E 0F70040605000000	670	SEN7	GEN	/N(SEN5),SF1,IMC,RF5	IF(MIL),INCSC	670	
011F 0380040400000000	671	SEN6	GEN	/N(SS3M),SF1,IM8	IF(P)	671	

	673	*	DOUBLE-WORD EXTENDED INSTRUCTIONS. NOTE THAT THESE INSTRUCTIONS	673
	674	*	ARE DIFFERENT FROM VARIAN'S SINCE AN M-FIELD EQUAL TO ZERO OR 8	674
	675	*	DOES NOT CAUSE UNPREDICTABLE RESULTS.	675
	676	*		676
	677	MORG	32 ELDA ETC REF BY CND FSEL, FAIL TO DEIND	677
0120	678	EXTBAS EQU	*	678
	679	DLBX GEN	/N(DL1),SF1,IM5,LB1,RF4,FF9,CF3, OF(ALU), DOR+1->ALU,	679
0120	680		CSH1,BB0 INCP	680
0121	681	ELDA GEN	/N(ELDA1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	681
0122	682	ELDB GEN	/N(ELDB1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	682
0123	683	ELDX GEN	/N(ELDX1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	683
0124	684	EINR GEN	/N(EINR1),SF1,IM6,LB1,RF4,FFA,MF1 OS(A),DOR->ALU, INCP	684
0125	685	ESTA GEN	/N(SS2M),SF1,IM2,AB3,RF4,AA0 OVR(OS),A->AA, INCP	685
0126	686	ESTB GEN	/N(SS2M),SF1,IM2,AB3,RF4,AA1 OVR(OS),B->AA, INCP	686
0127	687	ESTX GEN	/N(SS2M),SF1,IM2,AB3,RF4,AA2 OVR(OS),X->AA, INCP	687
	688	ESTZ GEN	/N(SS2M),SF1,IM2,AB2,RF4,SH1,WR1, UVR(OS), INCP, 0->F, F->AA	688
0128	689		CAAF	689
0129	690	EORA GEN	/N(EORA1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	690
012A	691	EADD GEN	/N(EADD1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	691
012B	692	EERA GEN	/N(EERA1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	692
012C	693	ESUB GEN	/N(ESUB1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	693
012D	694	EANA GEN	/N(EANA1),SF1,IM4,RF1,FF0,CF3,AAE IF(A),S1+1->P	694
012E	695	EMUL GEN	/N(MUL0),IM1,RF4 WAIT(M), INCP	695
012F	696	EDIV GEN	/N(DIV0),IM1,RF4 WAIT(M), INCP	696
	697	MORG	16 REF BY CND FSEL, FAIL TO DEIND	697
	698	DERL GEN	/S(EXTBAS,DEIND),2(F),FS7,TF3, C.FSEL(6-3) (QS=0),	698
0130	699		CSF1,GFF,IM5,LA1,LB1,RF3,FF9,BB0 OF(A),P+DOR->DOR	699
	700	DEIX GEN	/S(EXTBAS,DEIND),2(F),FS7,TF3, C.FSEL(6-3) (QS=0),	700
0131	701		CSF1,GFF,IM5,LB1,RF3,FF9,BB0,AA2 OF(A),X+DOR->DOR	701
	702	DEIB GEN	/S(EXTBAS,DEIND),2(F),FS7,TF3, C.FSEL(6-3) (QS=0),	702
0132	703		CSF1,GFF,IM5,LB1,RF3,FF9,BB0,AA1 OF(A),B+DOR->DOR	703
	704	DENI GEN	/S(EXTBAS,DEIND),2(F),FS7,TF3, C.FSEL(6-3) (QS=0),	704
0133	705		CSF1,GFF,IM5,LB1,FFA,MF1,BB0 OF(A),DOR->ALU	705
	706	MORG	2 REF BY FSEL(7)	706
	707	DEPRE GEN	/F(DERL),2(3),FS4,LB1,RF3, FSEL(1,0),	707
0134	708		CFFA,MF1,WF1,BB1 MIL->DOR,MIL15->QS	708
	709	DEPOST GEN	/S(DERL,DEPST1),2(3),FS4,TF3, C.FSEL(1,0) (MIL15=0),	709
0135	710		CGFB,LB1,RF3,FFA,MF1,BB1 MIL->DOR	710
	711	MORG	2 /T(DEPST1,DEIND1)	711
	712	DEIND1 GEN	/S(EXTBAS,DEIND),2(F),FS7,TF3, C.FSEL(6-3) (MIL15=0),	712
0136	713		CSF1,GFB,IM5,LB1,RF3,FFA,MF1,BB1 OF(A),MIL->DOR	713
	714	DEPST1 GEN	/S(DERL,DEIND),2(3),FS4,TF3,SF3, C.FSEL(1,0) (MIL15=0),	714
0137	715		CGFB,IM5,LB1,RF3,FFA,MF1,BB1 CND(MIL15=1) OF(ALU),	715
	716	*	MIL->DOR	716
	717	MORG	2 /S(EXTBAS,DEIND)	717
0138	718	DEIND GEN	/T(DEPST1,DEIND1),TF3,GFF,IM1,RF5 WAIT(M),QS=>DEIND1,INCS	718
	719	DL1 GEN	/N(ELDB1),SF1,IM8,LB1,RF4,FFA, IF(P),INCP,MIL->X	719
0139	720		CMF1,WR1,BB1,AA2	720
	721	MORG	2 /S(DERL,DEPST1)	721
013A	722	DEPST1 GEN	/N(DEIND),SF1,IM5,LB1,FFA,MF1,BB0 OF(ALU),DOR->ALU	722

	724	*	SKIP IF REGISTER EQUAL. THIS CODE IS SOMEWHAT DIFFERENT FROM	724
	725	*	VARIAN'S SINCE SETTING OF MORE THAN ONE OF THE A, B OR X BITS	725
	726	*	DOES NOT CAUSE UNPREDICTABLE RESULTS.	726
	727	*		727
013B 0A48000089100000	728	SRE5X GEN	/N(SRE60),IM1,LA1,RF1,FF1,BB0 WAIT(M),P V A -> P FREE	728
	729	MORG	4 REF BY FSEL(1-0)	729
013C 4A39FAC2A8900010	730	SRE20 GEN	/S(SRE50,SRE30),2(7),FS7,TF3,SF2, CND(MIL15=0) FSEL(5-3),	730
	731		CGFB,IM5,LB1,LA1,FF9,BB1 CND(MIL15=0) OF(ALU),	731
	732	*	P+MIL->ALU	732
013D 4A39FAC2A0900012	733	SRE21 GEN	/S(SRE50,SRE30),2(7),FS7,TF3,SF2, CND(MIL15=0) FSEL(5-3),	733
	734		CGFB,IM5,LB1,FF9,BB1,AA2 CND(MIL15=0) OF(ALU),	734
	735	*	X+MIL->ALU	735
013E 4A39FAC2A0900011	736	SRE22 GEN	/S(SRE50,SRE30),2(7),FS7,TF3,SF2, CND(MIL15=0) FSEL(5-3),	736
	737		CGFB,IM5,LB1,FF9,BB1,AA1 CND(MIL15=0) OF(ALU),	737
	738	*	B+MIL->ALU	738
013F 4A39F6C680000000	739	SRE23 GEN	/S(SRE50,SRE30),2(7),FS7,TF3,SF1, CND(MIL15=0) FSEL(5-3),	739
	740		CGFB,IMD OF(MIL)	740
	741	MORG	16 SRE5+ REF BY CND FSEL	741
0140 0A48000081000100	742	SRE50 GEN	/N(SRE60),IM1,RF1,SH1 WAIT(M),0->P	742
0141 0A48000081000000	743	SRE51 GEN	/N(SRE60),IM1,RF1,AA0 WAIT(M),A->P	743
0142 0A48000081000001	744	SRE52 GEN	/N(SRE60),IM1,RF1,AA1 WAIT(M),B->P	744
0143 0A48000081100010	745	SRE53 GEN	/N(SRE60),IM1,RF1,FF1,BB1,AA0 WAIT(M),A V B -> P	745
0144 0A48000081000002	746	SRE54 GEN	/N(SRE60),IM1,RF1,AA2 WAIT(M),X->P	746
0145 0A48000081100020	747	SRE55 GEN	/N(SRE60),IM1,RF1,FF1,BB2,AA0 WAIT(M),A V X -> P	747
0146 0A48000081100021	748	SRE56 GEN	/N(SRE60),IM1,RF1,FF1,BB2,AA1 WAIT(M),B V X -> P	748
0147 09D8000001100021	749	SRE57 GEN	/N(SRE5X),RF1,FF1,BB2,AA1 B V X -> P	749
	750	MORG	2 MORG 32 WITH SRE50	750
0148 0A50040680000000	751	SRE30 GEN	/N(SRE40),SF1,IMD OF(MIL)	751
0149 0A58008028680010	752	SRE60 GEN	/N(SRE70),GF2,LB1,LA1,FF6,MF1,BB1 MIL XOR P, SAMPLE FREE	752
	753	MORG	2 MORG 32 WITH SRE50	753
014A 6999000085000000	754	SRE40 GEN	/F(SRE20),2(3),FS4,IM1,RF5 FSEL(1-0),WAIT(M),INCS	754
	755	SRE70 GEN	/T(SRE80,SS2M),TF2,SF2,GF9,IM4, CND(NO ALUZ) IF(ALU), FREE	755
014B 41D02A4221000000	756		CLB1,RF1,BB0 DOR->P	756

	758	*	REGISTER - 10 - REGISTER TRANSFER INSTRUCTIONS.	758
	759	*		759
014C 0AB9040423E80000	760	REG30	GEN /F(REG20),2(7),FS4,SF1,IM8,LB1,RF3,FFE,MF1	FREE 760
014D 0A80058420910500	761	REG41	GEN /N(REG20),SF1,GF6,IM8,LB1,FF9,WR1,SH5	FREE 761
014E 0A80058420910501	762	REG42	GEN /N(REG20),SF1,GF6,IM8,LB1,FF9,WR1,SH5,AA1	FREE 762
014F 0A88058420910501	763	REG43	GEN /N(REG21),SF1,GF6,IM8,LB1,FF9,WR1,SH5,AA1	FREE 763
	764	MORG	16 REF BY CND FSEL(2-0)	764
0150 F038014300000000	765	REG20	GEN /N(IWAIT),1(I),GF5,IM6	765
0151 F038034320910500	766	REG21	GEN /N(IWAIT),1(I),GFD,IM6,LB1,FF9,WR1,SH5	766
0152 F038034320910501	767	REG22	GEN /N(IWAIT),1(I),GFD,IM6,LB1,FF9,WR1,SH5,AA1	767
0153 0A680580A0910501	768	REG23	GEN /N(REG41),SF1,GF6,IM1,LB1,FF9,WR1,SH5,AA1	768
0154 F038034320910502	769	REG24	GEN /N(IWAIT),1(I),GFD,IM6,LB1,FF9,WR1,SH5,AA2	769
0155 0A680580A0910502	770	REG25	GEN /N(REG41),SF1,GF6,IM1,LB1,FF9,WR1,SH5,AA2	770
0156 0A700580A0910502	771	REG26	GEN /N(REG42),SF1,GF6,IM1,LB1,FF9,WR1,SH5,AA2	771
0157 0A780580A0910502	772	REG27	GEN /N(REG43),SF1,GF6,IM1,LB1,FF9,WR1,SH5,AA2	772
	773	***** D E C O D E R *****		773
0158	774	ORG	X'158 DECODER REFERENCES NEXT 8 INSTRUCTIONS	* 774
0158 0AB9240407000100	775	REG18	GEN /S(REG20,REG20),2(7),FS4,TF2,SF1,IM8,RF7,SH1	* 775
0159 0AB9240407000001	776	REG1A	GEN /S(REG20,REG20),2(7),FS4,TF2,SF1,IM8,RF7,AA1	* 776
015A 0AB9240407000002	777	REG1C	GEN /S(REG20,REG20),2(7),FS4,TF2,SF1,IM8,RF7,AA2	* 777
	778	REG1E	GEN /S(REG20,REG20),2(7),FS4,TF2,SF1,IM8,RF7,FFE,	* 778
015B 0AB9240407E80021	779		CMF1,BB2,AA1	* 779
015C 0AB9240407000000	780	REG19	GEN /S(REG20,REG20),2(7),FS4,TF2,SF1,IM8,RF7	* 780
	781	REG1B	GEN /S(REG20,REG20),2(7),FS4,TF2,SF1,IM8,RF7,FFE,	* 781
015D 0AB9240407E80010	782		CMF1,BB1	* 782
	783	REG1D	GEN /S(REG20,REG20),2(7),FS4,TF2,SF1,IM8,RF7,FFE,	* 783
015E 0AB9240407E80020	784		CMF1,BB2	* 784
015F 8A60280407E80021	785	REG1F	GEN /T(REG30,REG20),TF2,SF2,IM8,RF7,FFE,MF1,BB2,AA1	* 785
	786	*****		786

THE

	788	*	HALT LOOP PROCESSING. CONTROL GETS HERE VIA HALT OR ILLEGAL	788
	789	*	INSTRUCTION 2 , VIA THE RESET KEY AND VIA THE STEP KEY.	789
	790	*		790
	791		MORG 16 REF BY FSEL(5-4), (5-4)=11 IMPOSSIBLE, REG FLD SELECT	791
0160	0BC8000000000000	792	HREN1 GEN /N(HMEM) NUP (CAN'T CHANGE STAT)	792
0161	0BC8000021A80000	793	HREN2 GEN /N(HMEM),LB1,RF1,FFA,MF1 DOR->P	793
0162	0BC8000020A90000	794	HREN3 GEN /N(HMEM),LB1,FFA,MF1,WR1 DOR->R**	794
	795	*	HMDP1 IS NOT REFERENCED BY FSEL.	795
0163	0B80001884000010	796	HMDP1 GEN /N(HRDP1),IM1,RF4,AB3,BB1 WAIT(M),INCP,"MIL"->BB FREE	796
	797		MORG 4 REF BY FSEL(7-6), (7-6)=10 IMPOSSIBLE	797
0164	0B1A003000000000	798	HREN GEN /F(HREN1),1(0),2(3),FS8,AB2,MR1 FSEL(5-4),(3-0)->AA	798
0165	4028010600000000	799	HMEMA GEN /N(HLT1),1(4),GF4,IMC SAMPLE INTERRUPTS	799
	800	*	HMEN4 IS NOT REFERENCED BY FSEL	800
0166	0BC8000024A80000	801	HMEN4 GEN /N(HMEM),LB1,RF4,FFA,MF1 WAIT(M),INCP,DOR->ALU FREE	801
0167	0B30040500000000	802	HMEN3 GEN /N(HMEN4),SF1,IMA OS(P)	802
	803	***** D E C O D E R *****		803
0168		804	URG X'168 DECODER REFERENCES NEXT 8 INSTRUCTIONS.	804
	805	805	IMMREL GEN /F(IMPRES),2(1),FSB,SF1,IM4,LA1, P+1->S1,IF(A),0->QS,	805
0168	248AC4020807200E	806	CFF0,CF3,WR1,WF1,24(S1) FSEL(7)	806
	807	807	IMMIX GEN /F(IMPRES),2(1),FSB,SF1,IM4,LA1, P+1->S1,IF(A),0->QS,	807
0169	248AC4020807200E	808	CFF0,CF3,WR1,WF1,24(S1) FSEL(7)	808
	809	809	IMMIB GEN /F(IMPRES),2(1),FSB,SF1,IM4,LA1, P+1->S1,IF(A),0->QS,	809
016A	248AC4020807200E	810	CFF0,CF3,WR1,WF1,24(S1) FSEL(7)	810
	811	811	IMMNI GEN /N(IMNI),SF1,IM4,LA1,FF0,CF3, P+1->S1,IF(A)	811
016B	049804020807000E	812	CWR1,24(S1)	812
	813	813	DE#1 GEN /F(DEPRE),2(1),FSB,SF1,IM4,LA1, P+1->S1,IF(A),0->QS,	813
016C	298AC4020807280E	814	CFF0,CF3,WR1,WF1,XF1,AAE FSEL(7),0->CINTF	814
	815	815	DE#2 GEN /F(DEPRE),2(1),FSB,SF1,IM4,LA1, P+1->S1,IF(A),0->QS,	815
016D	298AC4020807280E	816	CFF0,CF3,WR1,WF1,XF1,AAE FSEL(7),0->CINTF	816
	817	817	DE#3 GEN /F(DEPRE),2(1),FSB,SF1,IM4,LA1, P+1->S1,IF(A),0->QS,	817
016E	298AC4020807280E	818	CFF0,CF3,WR1,WF1,XF1,AAE FSEL(7),0->CINTF	818
	819	819	DE#4 GEN /F(DEPRE),2(1),FSB,SF1,IM4,LA1, P+1->S1,IF(A),0->QS,	819
016F	298AC4020807280E	820	CFF0,CF3,WR1,WF1,XF1,AAE FSEL(7),0->CINTF	820
	821	*****		821
	822		MORG 16 REF BY FSEL(5-4), (5-4)=11 IMPOSSIBLE, REG FLD SELECT	822
0170	0B98000023A80000	823	HRDP1 GEN /N(HFPT),LB1,RF3,FFA,MF1 STATUS->DOR	823
0171	0B98000008000000	824	HRDP2 GEN /N(HFPT),LA1,RF3 P->DOR	824
0172	0B98000003000000	825	HRDP3 GEN /N(HFPT),RF3 R**->DOR	825
	826	*	HFPT IS NOT REFERENCED BY FSEL.	826
	827		HFPT GMSK /N(HFPT1),1(7),AB2,IMF,LB3,FFA, START IO @ X'1E FREE	827
0173	71880017E0ABFC00	828	CMKBFC0 X'403F->ALU (DT0)	828
	829		MORG 2 /T(HSTT6,HSTT2)	829
0174	6808C40400000000	830	HSTT2 GEN /F(SS2),2(1),FS3,SF1,IM8 FSEL(STEP),IF(P)	830
0175	01E8000200000008	831	HSTT6 GEN /N(HSTT7),IM4,24(IH) IH->IBR,MIL	831
0176	28A8324000000000	832	HSTT1 GEN /T(HSTT6,HSTT2),TF3,GF9 ALUZ=>HSTT2 FREE	832
0177	0DA0004000000000	833	HSTT5 GEN /N(HLT),GF1 IBR->1 FREE	833
	834		MORG 8 REF BY FSEL(8-6)	834
	835		HRDP GEN /F(HRDP1),1(0),2(3),FS8,MR1,AB2, FSEL(5-4),(3-0)->AA	835
0178	0B9A0030000000030	836	CBB3 STATUS->BB	836
0179	4028010600000000	837	HMEM GEN /N(HLT1),1(4),GF4,IMC SAMPLE INTERRUPTS	837
	838		HSTT GMSK /N(HSTT1),GF2,LB3,FFB,MK01FF, IH&X'FE00,SAMPLE ALU	838
017A	0B80008060R01FF8	839	C16(IH) (WAS IT A HALT INST?)	839
	840		HMEN GMSK /N(HMEN1),1(3),AB2,IMF,LB3,FFA, START IO @ X'E,	840
017B	31080017E0ADFC00	841	CMKDFC0 X'203F->ALU (DTI)	841
	842		ABL10 GMSK /N(ABL20),SF1,GF4,IM6,LB3,RF1, OS(ALU),X'80->P,	842
017C	0C98050361AFF7F0	843	CFFA,MKFF7F RESET OVERFLOW	843
017D	0B18040480000000	844	HMDP GEN /N(HMDP1),SF1,IM9 OF(P)	844

017E 0CA8048361AFF7F0	845 ABL11 GMSK /N(ABL21),SF1,GF2,IM6,LB3,RF1, OS(ALU),X'80->P 845
	846 CEFA,MKFF7F SET OVERFLOW 846
017F 0D88040361AFDA70	847 ABL30 GMSK /N(ABL31),SF1,IM6,LB3,RF1,FFA, OS(ALU),X'258->P 847
	848 CMKFDA7 848

	850	*	INDEXED JUMP INSTRUCTION.	850
	851	*	NOTE THAT THIS VERSION OF IJMP DIFFERS FROM VARIAN'S VERSION	851
	852	*	SINCE BIT 2 MAY BE USED TO INDICATE PRE- OR POST-INDEXING, AS MAY	852
	853	*	BE DONE USING BIT 7 WITH OTHER EXTENDED ADDRESSING INSTRUCTIONS.	853
	854	*	ALSO, BITS 4&5 HAVE THE FOLLOWING MEANING:	854
	855	*	00 - JUMP	855
	856	*	11 - XEC	856
	857	*	01 - JSR,x	857
	858	*	10 - JSR,B	858
	859	*	IJRL,IJIX,IJIB,IJNI,IJIND1 ALL DO CND FSEL (6,4,3) BUT BIT 6 = 1.	859
	860		MORG 16 REF BY CND FSEL(1-0)	860
0180	3C59F7C22B901000	861	IJRL GEN /S(IJXIT,IJIND),2(B),FS7,TF3,SF1, QS=>IJIND,P+DOR->DOR,	861
		862	CGFF,IM4,LA1,LB1,RF3,FF9,XF2,BB0 IF(A),EN JUMP SIGNAL	862
0181	3C59F7C223901002	863	IJIX GEN /S(IJXIT,IJIND),2(B),FS7,TF3,SF1, QS=>IJIND,X+DOR->DOR,	863
		864	CGFF,IM4,LB1,RF3,FF9,XF2,BB0,AA2 IF(A),EN JUMP SIGNAL	864
0182	3C59F7C223901001	865	IJIB GEN /S(IJXIT,IJIND),2(B),FS7,TF3,SF1, QS=>IJIND,B+DOR->DOR	865
		866	CGFF,IM4,LB1,RF3,FF9,XF2,BB0,AA1 IF(A),EN JUMP SIGNAL	866
0183	3C59F7C220A81000	867	IJNI GEN /S(IJXIT,IJIND),2(B),FS7,TF3,SF1, QS=>IJIND,DOR->ALU,	867
		868	CGFF,IM4,LB1,FFA,MF1,XF2,BB0 IF(A),EN JUMP SIGNAL	868
		869	MORG 2 /T(IJPOST,IJIND1)	869
		870	IJIND1 GEN /S(IJXIT,IJIND),2(B),FS7,TF3,SF1, MIL15=>IJIND,MIL->DOR,	870
		871	CGFB,IM4,LB1,RF3,FFA,MF1,WF1,XF2, MIL15->QS,J-SIG,IF(A)	871
0184	3C59F6C223A83010	872	CBB1	872
0185	0C38000063AFFC00	873	HLT2 GMSK /N(HLT3),LB3,RF3,FFA,MKFFC0 0'77->DOR FREE	873
		874	MORG 2 /S(IJXIT,IJIND)	874
0186	2C6833C085000000	875	IJIND GEN /T(IJPOST,IJIND1),TF3,GFF,IM1,RF5 WAIT(M),QS=>IJIND1,INCS	875
		876	HLT3 GEN /N(HLT4),IM2,LB1,FFB,MF1,WR1,BB0, WAIT(I0),DOR&DR->DR FREE	876
0187	0C70000120B90009	877	C24(DR)	877
		878	MORG 8 REF BY CND FSEL(6,4,3) WITH BIT 6 ALWAYS = 1.	878
		879	IJXIT GEN /N(SS3M),SF1,IM4,LB1,RF1,FF9,CF3, IF(A),DOR+1->P	879
0188	0380040221960100	880	CSH1,BB0	880
0189	0C40000008070002	881	IJPX GEN /N(IJXIT),LA1,FF0,CF3,WR1,AA2 P+1->X	881
018A	0C40000008070001	882	IJPB GEN /N(IJXIT),LA1,FF0,CF3,WR1,AA1 P+1->B	882
018B	0848040404000000	883	IJXEC GEN /N(SS3),SF1,IM8,RF4 (SAME AS SS2) IF(P),INCP	883
		884	MORG 2 REF BY FSEL(2)	884
		885	IJPRE GEN /F(IJRL),2(3),FS4,LB1,RF3, FSEL(1-0),	885
018C	0C19000023A82010	886	CFFA,MF1,WF1,BB1 MIL->DOR,MIL15->QS	886
		887	IJPOST GEN /S(IJRL,IJIND),2(3),FS4,TF3,SF3, C.FSEL(1-0) (MIL15=0),	887
018D	3C193EC2A3A80010	888	CGFB,IM5,LB1,RF3,FFA,MF1,BB1 C.OF(ALU) (MIL15=1),	888
		889	*	889
018E	0C78000223A80020	890	HLT4 GEN /N(HLT5),IM4,LB1,RF3,FFA,MF1,BB2 IOR->DOR,ALU->IBR FREE	890
018F	03C8004020A80000	891	HLT5 GEN /N(HLT6),GF1,LB1,FFA,MF1,BB0 DOR->ALU,IBR->IR FREE	891

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893 * SINGLE WORD ADDRESSING STORE INSTRUCTIONS. 893
894 * AUTOMATIC BOOTSTRAP LOADER FOR TELETYPE AND HIGH-SPEED PAPER TAPE 894
895 * DEPOSITED AT 0200, STARTED WITH X=07000 AT 0212. 895
896 * 896
897 MORG 8 REF BY FSEL(13-12), 00 NOT POSSIBLE. 897
0190 0000000000000000 898 STABX1 EQU * 898
0191 0000000000000000 899 GEN EMPTY WORD ! 899
0192 900 GEN EMPTY WORD ! 900
901 ORG STABX1+2 901
902 STA1 GEN /I(SWA50,SS2MI),IF2,SF3,GF8,AB3, A->ALU,SET AA,INCS 902
0192 00102ED885000000 903 CIM1,RF5,AA0 MIL15=>OVR(OF),->SWA50 903
0193 0CB8040564A7A7E0 904 ABL20 GMSK /N(ABL3),SF1,IMA,LB3,RF4,FFA,MK7A7E 0200 CIB 001 FREE 904
0194 905 ORG STA1+2 905
906 STB1 GEN /I(SWA50,SS2MI),IF2,SF3,GF8,AB3, B->ALU,SET AA,INCS 906
0194 00102ED885000001 907 CIM1,RF5,AA1 MIL15=>OVR(OF),->SWA50 907
0195 0CB8040564A7A600 908 ABL21 GMSK /N(ABL3),SF1,IMA,LB3,RF4,FFA,MK7A60 0200 CIB 037 FREE 908
0196 909 ORG STB1+2 909
910 STX1 GEN /I(SWA50,SS2MI),IF2,SF3,GF8,AB3, X->ALU,SET AA,INCS 910
0196 00102ED885000002 911 CIM1,RF5,AA2 MIL15=>OVR(OF),->SWA50 911
0197 0CC0040564AF7F60 912 ABL3 GMSK /N(ABL4),SF1,IMA,LB3,RF4,FFA,MKF7F6 0201 ASLB 9 FREE 912
913 MORG 8 REF BY FSEL(13-12), 00 NOT POSSIBLE. 913
0198 914 STABX2 EQU * 914
0198 0CC8040564AF7DE0 915 ABL4 GMSK /N(ABL5),SF1,IMA,LB3,RF4,FFA,MKF7DE 0202 LRLB 1 FREE 915
0199 0CD8040564AF6D90 916 ABL5 GMSK /N(ABL6),SF1,IMA,LB3,RF4,FFA,MKF6D9 0203 LLRL 6 FREE 916
019A 917 ORG STABX2+2 917
019A 0000001800000000 918 STA2 GEN /N(SS2MI),AB3,AA0 A->ALU,SET AA 918
019B 0CE8040564AFDEF0 919 ABL6 GMSK /N(ABL7),SF1,IMA,LB3,RF4,FFA,MKFDEF 0204 JBZ FREE 919
019C 920 ORG STA2+2 920
019C 0000001800000001 921 STB2 GEN /N(SS2MI),AB3,AA1 B->ALU,SET AA 921
019D 0CF8040564AFF730 922 ABL7 GMSK /N(ABL8),SF1,IMA,LB3,RF4,FFA,MKFF73 0205 0214 FREE 922
019E 923 ORG STB2+2 923
019E 0000001800000002 924 STX2 GEN /N(SS2MI),AB3,AA2 X->ALU,SET AA 924
019F 0D00040564AA5FF0 925 ABL8 GMSK /N(ABL9),SF1,IMA,LB3,RF4,FFA,MKA5FF 0206 STA 0,X FREE 925
01A0 0D08040564AFDF70 926 ABL9 GMSK /N(ABLA),SF1,IMA,LB3,RF4,FFA,MKFDF7 0207 JAZ FREE 926
01A1 0D10040564AF1FF0 927 ABLA GMSK /N(ABLB),SF1,IMA,LB3,RF4,FFA,MKF1FF 0210 07000->DOR FREE 927
01A2 0D18040564AF59B0 928 ABLB GMSK /N(ABLC),SF1,IMA,LB3,RF4,FFA,MKF59B 0211 IXR FREE 928
929 ABLC GMSK /I(ABLD1,ABLD0),IF2,SF1,IMA,LB3,RF4, 0212 INCR 1 FREE 929
01A3 2D38240564AF5BE0 930 CFFA,MKF5BE 930
931 MORG 2 /I(ABLD1,ABLD0) 931
01A4 0D40040564A7A7E0 932 ABLD0 GMSK /N(ABLE0),SF1,IMA,LB3,RF4,FFA,MK7A7E 0213 CIB 001 932
933 ***** D E C O D E R ***** 933
01A5 934 ORG X'1A5 DECODER REFERENCES NEXT 2 INSTRUCTIONS * 934
01A5 00100402C0AFE000 935 SWA47 GMSK /N(SWA50),SF1,IMS,LB2,FFA,MKFE00 OF(ALU),I&X'1FF->ALU * 935
01A6 02C80402C0AFE000 936 SWA17 GMSK /N(SWA21),SF1,IMS,LB2,FFA,MKFE00 OF(ALU),I&X'1FF->ALU * 936
937 ***** 937
01A7 0D48040564A7EA00 938 ABLD1 GMSK /N(ABLE1),SF1,IMA,LB3,RF4,FFA,MK7EA0 0213 EXC 0537 938
01A8 0D50040564A7D7E0 939 ABLE0 GMSK /N(ABLF),SF1,IMA,LB3,RF4,FFA,MK7D7E 0214 SEN 0201 FREE 939
01A9 0D50040564A7CA00 940 AHLE1 GMSK /N(ABLF),SF1,IMA,LB3,RF4,FFA,MK7CA0 0214 SEN 0537 FREE 940
01AA 0D58040564AFF7F0 941 ABLF GMSK /N(ABLX0),SF1,IMA,LB3,RF4,FFA,MKFF7F 0215 0200 FREE 941
01AB 0D70040564AFDFF0 942 ABLX0 GMSK /N(ABLX1),SF1,IMA,LB3,RF4,FFA,MKFDFF 0216 JMP FREE 942
943 ***** D E C O D E R ***** 943
01AC 944 ORG X'1AC DECODER REFERENCES NEXT 2 INSTRUCTIONS * 944
01AC 0840008040AFFF80 945 RM GMSK /N(DPRM),GF2,LB2,FFA,MKFFF8 I&7, SAMPLE *DECO 945
01AD 04D8001000000000 946 RR GEN /N(RR1),TS0,MK0,AB2 I(2-0)->AA *DECO 946
947 ***** 947
01AE 0D780000E0AFF730 948 ABLX1 GMSK /N(ABLX2),IM1,LB3,FFA,MKFF73 0217 0214 FREE 948
01AF 0D80000020A90002 949 ABLX2 GEN /N(ABLX3),LB1,FFA,MF1,WR1,AA2 DOR->X FREE 949

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0180 0860050261AFF750 950 ABLX3 GMSK /N(SS2),SF1,GF4,IM4,LB3,RF1,FFA,MKFF75 0212->P FREE 950
951 * 951
952 * AUTOMATIC BOOTSTRAP LOADER FOR DISC. 952
953 * DEPOSITED AT 01130, STARTED AT 01130. 953
954 * 954
0181 0D90040564A7EF10 955 ABL31 GMSK /N(ABL32),SF1,IMA,LB3,RF4,FFA,MK7EF1 01130 EXC 0416 FREE 955
0182 0D98040564A77F10 956 ABL32 GMSK /N(ABL33),SF1,IMA,LB3,RF4,FFA,MK77F1 01131 EXC2 0016 FREE 956
0183 0DB8040564A7F710 957 ABL33 GMSK /N(ABL34),SF1,IMA,LB3,RF4,FFA,MK7F71 01132 EXC 0216 FREE 957
958 ***** D E C O D E R ***** 958
0184 959 ORG X'184 DECODER REFERENCES NEXT 2 INSTRUCTIONS * 959
0184 7F88400000000000 960 HLT GEN /F(HLT8),2(1),FS1 FSEL(CINTF) * 960
961 SWA40 GMSK /F(STA2-2),2(6),FSF,SF1,IM6,LB2, FSEL(13-12),OS(ALU), * 961
0185 4CB3C40340AF8000 962 CFFA,MKF800 I&X'7FF->ALU * 962
963 SWA10 GMSK /F(LDA1),2(C),MT1,FSF,SF1,IM5, FSEL(15-13),OS(ALU), * 963
0186 0267C402C3AF8000 964 CLB2,RF3,FFA,MKF800 I&X'7FF->DOR * 964
965 ***** 965
0187 0DC0040564AF5FE0 966 ABL34 GMSK /N(ABL35),SF1,IMA,LB3,RF4,FFA,MKF5FE 01133 TZA FREE 966
0188 0DE0040564A79B10 967 ABL35 GMSK /N(ABL36),SF1,IMA,LB3,RF4,FFA,MK79B1 01134 OAR 0016 FREE 967
968 ***** D E C O D E R ***** 968
0189 969 ORG X'189 DECODER REFERENCES NEXT 3 INSTRUCTIONS * 969
970 JMP GEN /T(JMP1,SS1M),TF2,SF3,GF5,IMC, 620=>JMP1,RESET CINTF,* 970
0189 1F202D4604000800 971 CRF4,XF1 CND(620) IF(MIL), INCP* 971
972 JMRK GEN /T(JMRK1,JMRK5),TF2,SF3,GF5,IMD, 620=>JMRK1, * 972
018A 63E82D4680000800 973 CXF1 CND(620) OF(MIL) * 973
018B 58582D4600000800 974 XEC GEN /T(XEC1,XEC3),TF2,SF3,GF5,IMC,XF1 620=>XEC1,RESET CINTF,* 974
975 * CND(620) IF(MIL) * 975
976 ***** 976
018C 0DE8040564A7DF10 977 ABL36 GMSK /N(ABL37),SF1,IMA,LB3,RF4,FFA,MK7DF1 01135 SEN 0016 FREE 977
018D 0DF0040564AFD9E0 978 ABL37 GMSK /N(ABL38),SF1,IMA,LB3,RF4,FFA,MKFD9E 01136 01141 FREE 978
018E 0DF8040564AFDFF0 979 ABL38 GMSK /N(ABL39),SF1,IMA,LB3,RF4,FFA,MKFDF0 01137 JMP FREE 979
018F 0E00040564AFDA20 980 ABL39 GMSK /N(ABL3A),SF1,IMA,LB3,RF4,FFA,MKFDA2 01140 01133 FREE 980
01C0 0E08040564A7AB10 981 ABL3A GMSK /N(ABL3B),SF1,IMA,LB3,RF4,FFA,MK7AB1 01141 CIA 0016 FREE 981
01C1 0E10040564A2D890 982 ABL3B GMSK /N(ABL3C),SF1,IMA,LB3,RF4,FFA,MK2D89 01142 ANA 01166 FREE 982
01C2 0E18040564AFDF10 983 ABL3C GMSK /N(ABL3D),SF1,IMA,LB3,RF4,FFA,MKFDF1 01143 JANZ FREE 983
01C3 0E20040564AFDA70 984 ABL3D GMSK /N(ABL3E),SF1,IMA,LB3,RF4,FFA,MKFDA7 01144 01130 FREE 984
01C4 0E40040564A7FEE0 985 ABL3E GMSK /N(ABL3F),SF1,IMA,LB3,RF4,FFA,MK7FEE 01145 EXC 0021 FREE 985
986 ***** D E C O D E R ***** 986
01C5 987 ORG X'1C5 DECODER REFERENCES NEXT 3 INSTRUCTIONS * 987
988 SWA44 GMSK /F(STA2-2),2(6),FSF,SF1,IM6,LB2, FSEL(13-12),OS(ALU), * 988
01C5 4CB3C403489FE000 989 CLA1,FF9,MKFE00 I&X'1FF + P -> ALU * 989
990 SWA14 GMSK /F(LDA1),2(C),MT1,FSF,SF1,IM5, FSEL(15-13),OF(ALU), * 990
01C6 0267C402CB9FE000 991 CLB2,LA1,RF3,FF9,MKFE00 I&X'1FF + P -> DOR * 991
01C7 0388008047AFFE00 992 SHFT GMSK /N(SHFT1),GF2,LB2,RF7,FFA,MKFFE0 I(4-0)->DOR,INCP,SAMPL* 992
993 ***** 993
01C8 0E48040564A7F310 994 ABL3F GMSK /N(ABL40),SF1,IMA,LB3,RF4,FFA,MK7F31 01146 EXC 0316 FREE 994
01C9 0E50040564AF5BD0 995 ABL40 GMSK /N(ABL41),SF1,IMA,LB3,RF4,FFA,MKF5BD 01147 INCR 2 FREE 995
01CA 0E58040564A79710 996 ABL41 GMSK /N(ABL42),SF1,IMA,LB3,RF4,FFA,MK7971 01150 OBR 0016 FREE 996
01CB 0E60040564A79AF0 997 ABL42 GMSK /N(ABL43),SF1,IMA,LB3,RF4,FFA,MK79AF 01151 OAR 0020 FREE 997
01CC 0E68040564AF9EE0 998 ABL43 GMSK /N(ABL44),SF1,IMA,LB3,RF4,FFA,MKF9EE 01152 OME 0021 FREE 998
01CD 0E70040564AFD9B0 999 ABL44 GMSK /N(ABL45),SF1,IMA,LB3,RF4,FFA,MKFD9B 01153 01144 FREE 999
01CE 0E80040564A7FEF01000 1000 ABL45 GMSK /N(ABL46),SF1,IMA,LB3,RF4,FFA,MK7FEF 01154 EXC 0020 FREE A00
1001 ***** D E C O D E R ***** A01
01CF 1002 ORG X'1CF DECODER REFERENCES 'DP' * A02
01CF 0840008040AFF801003 1003 DP GMSK /N(DPRM),GF2,LB2,FFA,MKFF8 I&7, SAMPLE *DECO A03
1004 ***** A04
01D0 0E88040564A7FF101005 1005 ABL46 GMSK /N(ABL47),SF1,IMA,LB3,RF4,FFA,MK7FF1 01155 EXC 0016 FREE A05
01D1 0E90040564A7CF101006 1006 ABL47 GMSK /N(ABL48),SF1,IMA,LB3,RF4,FFA,MK7CF1 01156 SEN 0416 FREE A06
01D2 0E98040564AFD9101007 1007 ABL48 GMSK /N(ABL49),SF1,IMA,LB3,RF4,FFA,MKFD91 01157 01156 FREE A07

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01D3 0EA0040564A7AB101008 ABL49 GMSK /N(ABL4A),SF1,IMA,LB3,RF4,FFA,MK7AB1 01160 CIA 0016 FREE A08
01D4 0EB8040564A2D8901009 ABL4A GMSK /N(ABL4B),SF1,IMA,LB3,RF4,FFA,MK2D89 01162 ANA 01166 FREE A09
      1010 ***** D E C O D E R ***** A10
01D5      1011 ORG X'1D5 DECODER REFERENCES NEXT 2 INSTRUCTIONS * A11
      1012 SWA45 GMSK /F(STA2-2),2(6),FSF,SF1,IM6,LB2, FSEL(13-12),OS(ALU), * A12
01D5 4CB3C403409FE0021013 CFF9,MKFE00,AK2 I&X'1FF + X-> ALU * A13
      1014 SWA15 GMSK /F(LDA1),2(C),MT1,FSF,SF1,IM5, FSEL(15-13),OF(ALU), * A14
01D6 0267C402C39FE0021015 CLB2,RF3,FF9,MKFE00,AK2 I&X'1FF + X -> DOR * A15
      1016 ***** A16
01D7 0F80040564AFDF101017 ABL4B GMSK /N(ABL4C),SF1,IMA,LB3,RF4,FFA,MKFDF1 01162 JANZ FREE A17
      1018 ***** D E C O D E R ***** A18
01D8      1019 ORG X'1D8 DECODER REFERENCES NEXT 8 INSTRUCTIONS * A19
01D8 0A890404070001001020 REG10 GEN /F(REG20),2(7),FS4,SF1,IM8,RF7,SH1 * A20
01D9 0A890404070000011021 REG12 GEN /F(REG20),2(7),FS4,SF1,IM8,RF7,AA1 * A21
01DA 0A890404070000021022 REG14 GEN /F(REG20),2(7),FS4,SF1,IM8,RF7,AA2 * A22
01DB 0A89040407E800211023 REG16 GEN /F(REG20),2(7),FS4,SF1,IM8,RF7,FFE,BB2,AA1,MF1 * A23
01DC 0A890404070000001024 REG11 GEN /F(REG20),2(7),FS4,SF1,IM8,RF7 * A24
01DD 0A89040407E800101025 REG13 GEN /F(REG20),2(7),FS4,SF1,IM8,RF7,FFE,BB1,MF1 * A25
01DE 0A89040407E800201026 REG15 GEN /F(REG20),2(7),FS4,SF1,IM8,RF7,FFE,BB2,MF1 * A26
01DF 0A60000007E800211027 REG17 GEN /N(REG30),RF7,FFE,BB2,AA1,MF1 * A27
      1028 ***** A28

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1030 * INSTRUCTIONS FORCED TOGETHER BY TEST ADDRESSING. A30
1031 * JDPZ1, SS1M, JMP1, BT50, SEN5 MUST HAVE THE SAME 5 HIGH-ORDER A31
1032 * BITS IN THEIR ADDRESSES. A32
1033 * A33
1034 MORG 16 REF BY CND FSEL(2) FROM JDPZ, JDPNZ A34
01E0 1089C0800000000011035 JDPZ1 GEN /F(JRZ),2(1),FS7,GF2,FF0,AA1 FSEL(3),R1->ALU,SAMPLE A35
01E1 1089C0800000000051036 JDPZ2 GEN /F(JRZ),2(1),FS7,GF2,FF0,AA5 FSEL(3),R5->ALU,SAMPLE A36
1037 MORG 2 T(JMP1,SS1M),T(BT50,SS1M),T(SEN5,SS1M),S(JDPZ1,SS1M) A37
01E2 01C00404000000001038 SS1M GEN /N(SS2M),SF1,IM8 IF(P) A38
1039 ***** D E C O D E R ***** A39
01E3 1040 ORG X'1E3 DECODER REFERENCES 'BT10' * A40
01E3 06790000040008001041 BT10 GEN /F(BT20),2(F),FS4,RF4,XF1 FSEL(3-0),INCP, * A41
1042 * RESET CINTF * A42
1043 ***** A43
1044 MORG 2 S(JDPZ1,JMP1) A44
1045 JMP1 GEN /T(JMP2,SS2M),TF2,GF8,IM5,LB1, MILS=>JMP2,OF(ALU), A45
01E4 41C822C2A1A810101046 CRF1,FFA,MF1,XF2,BB1 MIL->P,JUMP SIGNAL A46
1047 ***** D E C O D E R ***** A47
01E5 1048 ORG X'1E5 DECODER REFERENCES NEXT 3 INSTRUCTIONS * A48
1049 SWA46 GMSK /F(STA2-2),2(6),FSF,SF1,IM6,LB2, FSEL(13-12),OS(ALU), * A49
01E5 4CB3C403409FE0011050 CFF9,MKFE00,AK1 I&X'1FF + B -> ALU * A50
1051 SWA16 GMSK /F(LDA1),2(C),MT1,FSF,SF1,IM5, FSEL(15-13),OF(ALU), * A51
01E6 0267C402C39FE0011052 CLB2,RF3,FF9,MKFE00,AK1 I&X'1FF + B -> DOR * A52
01E7 00680008040008001053 JI GEN /N(JI1),TS0,AB1,RF4,XF1 I(2-0)->BB,INCP, *DECO A53
1054 * RESET CINTF * A54
1055 ***** A55
1056 MORG 2 /T(BT51,BT52) A56
01E8 03800404000000001057 BT52 GEN /N(SS3M),SF1,IM8 IF(P) A57
01E9 0F500406050000001058 BT51 GEN /N(BT50),SF1,IMC,RF5 IF(MIL),INCSC A58
1059 * BT50 MUST BE NEAR SS1M A59
1060 BT50 GEN /T(BT51,BT52),TF2,GF8,LB1,RF1, MILS=>BT51,MIL+1->P, A60
01EA 4F4822C0219611101061 CFF9,CF3,XF2,SH1,BB1 JUMP SIGNAL A61
1062 ***** D E C O D E R ***** A62
01EB 1063 ORG X'1EB DECODER REFERENCES 'SRE10' * A63
1064 SRE10 GEN /F(SRE20),2(3),FS4,IM1,LA1,RF3, F.SEL(1-0),WAIT(M), * A64
01EB 69990000880608001065 CCF3,XF1 P+1->DOR,0->CINTF * A65
1066 ***** A66
01EC 0F680001000000001067 TSA1 GEN /N(TSA2),IM2 WAIT(I0) FREE A67
1068 TSA2 GEN /N(SS3MI),SF1,IM8,LB1,RF4,FFA, IF(P),INCP,IOR->A FREE A68
01ED 03C0040424A900201069 CMF1,WR1,BB2,AA0 A69
1070 * SEN5 MUST BE NEAR SS1M. A70
1071 SEN5 GEN /T(SEN6,SEN7),TF3,GF8,LB1,RF1, MILS=>SEN7,MIL+1->P A71
01EE 78F832C0219601101072 CFF9,CF3,SH1,BB1 A72
1073 ***** D E C O D E R ***** A73
01EF 1074 ORG X'1EF DECODER REFERENCES 'IIMP' * A74
1075 IIMP GEN /F(IJPRE),2(1),FS6,IM1,FF0,WF1, FSEL(2),0->QS, * A75
01EF 6C098000800029001076 CXF1,SH1 0->CINTF * A76
1077 ***** A77
01F0 0F88040564AFDA701078 ABL4C GMSK /N(ABL4D),SF1,IMA,LB3,RF4,FFA,MKFDA7 01163 01130 FREE A78
01F1 0F90040564AFDFF01079 ABL4D GMSK /N(ABL4E),SF1,IMA,LB3,RF4,FFA,MKFDFF 01164 JMP FREE A79
01F2 0FA8040564AFE7F01080 ABL4E GMSK /N(ABL4F),SF1,IMA,LB3,RF4,FFA,MKFE7F 01165 00600 FREE A80
1081 ***** D E C O D E R ***** A81
01F3 1082 ORG X'1F3 DECODER REFERENCES NEXT 2 INSTRUCTIONS * A82
1083 ILLQP * A83
01F3 0040000069900010 A83
01F4 08C0000063EF7FF91084 EXC1 GMSK /N(EXC2),LB3,RF3,FFE,MKF7FF,16(DR) X'800 V DR -> OPR * A84
1085 ***** A85

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01F5 0FB00000E0AF00F01086 ABL4F GMSK /N(ABL50),IM1,LB3,FFA,MKF00F 01166 07760 FREE A86
01F6 0860040261AFDA701087 ABL50 GMSK /N(SS2),SF1,IM4,LB3,RF1,FFA,MKFDA7 01130->P FREE A87
1088 ***** D E C O D E R ***** A88
01F7 1089 ORG X'1F7 DECODER REFERENCES NEXT 7 INSTRUCTIONS * A89
01F7 18D000007000000001090 EXC21 GEN /N(EXC22),1(1),IME START I/O AT 4 * A90
1091 * NOTE - BCS WILL BE DETECTED BY WCS ON MACHINES SO EQUIPPED, * A91
1092 * RATHER THAN CAUSING ILLEGAL INSTRUCTION PROCESSING. * A92
1093 BCS ILLOP * A93

01F8 0040000069900010
01F9 08D8000063EEFF91094 SEN1 GMSK /N(SEN2),LB3,RF3,FFE,MKEFFF,16(DR) X'1000 V DR -> DOR * A94
01FA 00D8000063EDFF91095 IABM1 GMSK /N(IABM2),LB3,RF3,FFE,MKDFFF,16(DR) X'2000 V DR -> DOR * A95
1096 OABM1 GMSK /F(OME1),2(3),FSA,LB3,RF3,FFE, FSEL(7-6), * A96
01FB 459A800063EBFF91097 CMKBFFF,16(DR) X'2000 V DR -> DOR * A97
1098 SETDR GEN /F(SET1),2(7),FSA,FFA,MF1,WR1, FSEL(8-6), A->DR * A98
01FC 08BA800000A900091099 CBB0,24(DR) * A99
1100 SETDRX GEN /F(SET1),2(7),FSA,FFA,MF1,WR1, FSEL(8-6), A->DR * B00
01FD 08BA800000A900091101 CBB0,24(DR) * B01
1102 ***** B02
1103 ***** R E S E T ***** B03
01FE 1104 ORG X'1FE REF BY FSEL(CINTF) * B04
01FE 0FF80000040008001105 HLT8 GEN /N(RESET),RF4,XF1 RESET CINTF, INCP * B05
01FF 1106 ORG X'1FF HARDWARE INTERRUPTS HERE FOR STEP AND RESET * B06
01FF 4030010643A000001107 RESET GEN /N(HLT7),1(4),GF4,IMC,LB2,RF3,FFA INTRPT,I->DOR * B07
1108 ***** B08
1109 END B09

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SYMBOLS

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000A A 017C ABL10 017E ABL11 0193 ABL20 0195 ABL21
0197 ABL3 017F ABL30 0181 ABL31 0182 ABL32 0183 ABL33
0187 ABL34 0188 ABL35 018C ABL36 018D ABL37 018E ABL38
018F ABL39 01C0 ABL3A 01C1 ABL3B 01C2 ABL3C 01C3 ABL3D
01C4 ABL3E 01C8 ABL3F 0198 ABL4 01C9 ABL40 01CA ABL41
01CB ABL42 01CC ABL43 01CD ABL44 01CE ABL45 01D0 ABL46
01D1 ABL47 01D2 ABL48 01D3 ABL49 01D4 ABL4A 01D7 ABL4B
01F0 ABL4C 01F1 ABL4D 01F2 ABL4E 01F5 ABL4F 0199 ABL5
01F6 ABL50 019B ABL6 019D ABL7 019F ABL8 01A0 ABL9
01A1 ABLA 01A2 ABLB 01A3 ABLC 01A4 ABLD0 01A7 ABLD1
01A8 ABLE0 01A9 ABLE1 01AA ABLF 01AB ABLX0 01AE ABLX1
01AF ABLX2 01B0 ABLX3 0003 ABORT 0004 ABORT1 0052 ADD
00B5 ADR1 004C ANA 0064 ASLA 0060 ASLB 0066 ASRA
0062 ASRB 000B B 01F8 BCS 01E3 BT10 00C0 BT20
00C1 BT21 00C2 BT22 00C3 BT23 00C4 BT24 00C5 BT25
00C6 BT26 00C7 BT27 00C8 BT28 00C9 BT29 00CA BT2A
00CB BT2B 00CC BT2C 00CD BT2D 00CE BT2E 00CF BT2F
00D0 BT30 00D1 BT31 00D2 BT40 00D3 BT41 01EA BT50
01E9 BT51 01E8 BT52 000C C 0025 CIA 0027 CIAB
0026 CI8 00B3 COMR 000D D 0102 DADD 00E6 DADD2
00E5 DADSB1 0104 DAN 00E9 DAN1 016C DE#1 016D DE#2
016E DE#3 016F DE#4 00B2 DECR 0132 DEI8 0138 DEIND
0136 DEIND1 0131 DEIX 0133 DENI 0135 DEPOST 0134 DEPRE
013A DEPST1 0137 DEPST1 0106 DER 00E8 DER1 0130 DERL
005F DIV 005E DIV0 0028 DIV1 0030 DIV10 0031 DIV11
0034 DIV12 002C DIV13 002E DIV14 007A DIV15 0029 DIV2
002A DIV3 002B DIV4 002D DIV5 002F DIV6 0033 DIV7
0035 DIV8 0032 DIV9 0139 DL1 0120 DL8X 0100 DLD
00E8 DLD1 0105 DOR 00EA DOR1 005D DOR1OP 01CF DP
00FE DP1 00FF DP2 00EC DPDOR1 00ED DPDOR5 00F6 DPR0RE
00FC DPR1RF 00F7 DPR4RE 00FD DPR5RF 00EE DPRER0 00EF DPRER4
0108 DPRM 00E0 DPRM1 00E1 DPRM2 00F4 DPRM3 00F5 DPRM4

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00E4 DPRMST	0009 DR	0101 DST	00E2 DST1	00E3 DST2
0103 DSUB	00E7 DSUB2	000E E	012A EADD	0053 EADD1
0120 EANA	0040 EANA1	012F EDIV	012B EERA	0057 EERA1
0124 EINR	0047 EINR1	0121 ELDA	0041 ELDA1	0122 ELDB
0043 ELDB1	0123 ELDX	0045 ELDX1	012E EMUL	0129 EORA
004F EORA1	0056 ERA	0125 ESTA	0126 ESTB	0127 ESTX
0128 ESTZ	012C ESUB	0048 ESUB1	01F4 EXC1	0118 EXC2
01F7 EXC21	011A EXC22	0119 EXC3	0120 EXTBAS	000F F
0173 HFPT	0037 HFPT1	0184 HLT	0005 HLT1	0185 HLT2
0187 HLT3	018E HLT4	018F HLT5	0079 HLT6	0006 HLT7
01FE HLT8	017D HMOP	0163 HMOP1	0179 HMEM	0165 HMEMA
0178 HMEN	0038 HMEN1	003C HMEN2	0167 HMEN3	0166 HMEN4
0178 HRDP	0170 HRDP1	0171 HRDP2	0172 HRDP3	0164 HREN
0160 HREN1	0161 HREN2	0162 HREN3	017A HST1	0176 HST11
0174 HST12	010D HST14	0177 HST15	0175 HST16	003D HST17
003E HST18	003F HST19	000F I	001E IAB	01FA IABM1
001R IABM2	001C IABM3	008A IADD	008D IANA	008F IDIV
008B IERA	0008 IH	0084 IINR	0182 IJIB	0186 IJIND
0184 IJIND1	0181 IJIX	01EF IJMP	0183 IJNI	018A IJPB
018D IJPOST	018C IJPRE	0189 IJPX	0180 IJRL	018B IJXEC
0188 IJXIT	0081 ILDA	0082 ILDB	0083 ILDX	0002 ILLAD
0008 ILLOP1	0009 ILLOP2	0020 IME1	001F IME2	0092 IMIB
0098 IMIND	0096 IMIND1	0091 IMIX	0080 IMMBAS	016A IMMIB
0169 IMMIX	016B IMMNI	0168 IMMREL	0093 IMNI	0095 IMPOST
0094 IMPRE	009A IMPST1	0097 IMPSTI	0090 IMRL	008E IMUL
0090 IMXC	0021 INA	0023 INAB1	001D INAB2	0022 INB
00B1 INCR	0048 INR1	0049 INR2	0001 INT1	000A INT2
0008 INT3	000C INT4	0000 INTBAS	0089 IORA	009D IST1
009C IST2	00AB IST3	0099 IST4	0085 ISTA	0086 ISIB
0087 ISTX	0088 ISTZ	008C ISUB	0007 IWAIT	0080 IXSHFT
0017 JDPNZ	0016 JDPZ	01E0 JDPZ1	01E1 JDPZ2	0010 JEP
01E7 JI	000D JI1	0010 JISEL	01B9 JMP	01E4 JMP1
0039 JMP2	01BA JMRK	007D JMRK1	007F JMRK2	007B JMRK3
007E JMRK4	007C JMRK5	0011 JOP	0018 JP1	0019 JP2
001A JP3	000E JP4	000F JPS	0014 JRN	0013 JRNZ
0015 JRP	0012 JRZ	0068 LASL	0074 LASL1	0075 LASL2
0076 LASL3	006A LASR	0072 LASR1	00A6 LBSB11	00A7 LBSB12
0086 LBT	00A8 LBT1	009E LBT2	009F LBT3	00AC LBT4
00AD LBT5	0040 LDA1	0042 LDB	0084 LDR1	0046 LDX
0069 LLRL	0077 LLRL1	006B LLSR	0073 LLSR1	0065 LRLA
0061 LRLB	0067 LSRA	0063 LSR3	000E M	005B MUL
005A MUL0	0004 MUL1	000F MUL11	00DD MUL12	00DC MUL13
0008 MUL2	0007 MUL3	0005 MUL4	0006 MUL5	0009 MUL6
000B MUL7	000A MUL8	000E MUL9	000C N	008B OAB1
00BF OAB2	01FB OABM1	00AF OABM2	0089 OAR1	008D OAR2
008A OBR1	008E OBR2	0088 OME1	00AE OME2	008C OME3
0050 ORA1	0051 ORA2	0108 REG10	010C REG11	0109 REG12
010D REG13	010A REG14	010E REG15	010B REG16	010F REG17
0158 REG18	015C REG19	0159 REG1A	015D REG1B	015A REG1C
015E REG1D	015B REG1E	015F REG1F	0150 REG20	0151 REG21
0152 REG22	0153 REG23	0154 REG24	0155 REG25	0156 REG26
0157 REG27	014C REG30	014D REG41	014E REG42	014F REG43
01FF RESET	01AC RM	00F9 RM1	00F2 RMAD	00FA RMAD1
00F0 RMLD	00F8 RMLD1	00F3 RMSB	00FB RMSB1	00F1 RMST
006C ROF	01AD RR	0094 RR1	00A0 RR2	00A5 RR3
00B0 RR4	00A4 RR5	00A1 RRAD	00A2 RRSB	00A3 RRT
000E S1	000F S2	00B7 SBT	00A9 SBT1	00AA SBT2
01F9 SEN1	011B SEN2	011C SEN3	011D SEN4	01EE SEN5

011F SEN6	011E SEN7	0111 SETA	0113 SETAB	0117 SETABX
011S SETAX	0112 SETB	0116 SETBX	01FC SETDR	01FD SETDRX
0110 SETI	0114 SETX	010F SETXIT	01C7 SHFT	0071 SHFT1
006D S0F	01E8 SRE10	013C SRE20	013D SRE21	013E SRE22
013F SRE23	0148 SRE30	014A SRE40	0140 SRE50	0141 SRE51
0142 SRE52	0143 SRE53	0144 SRE54	0145 SRE55	0146 SRE56
0147 SRE57	0138 SRE5X	0149 SRE60	014B SRE70	003A SRE80
0036 SRE81	01E2 SS1M	010C SS2	0038 SS2M	0000 SS2MI
0109 SS3	0070 SS3M	0078 SS3MI	0192 STA1	019A STA2
0190 STABX1	0198 STABX2	0194 STB1	019C STB2	0196 STX1
019E STX2	004A SUB	01B6 SWA10	01C6 SWA14	01D6 SWA15
01E6 SWA16	01A6 SWA17	0059 SWA21	0055 SWA22	004E SWA26
0044 SWA31	0054 SWA35	0058 SWA36	005C SWA37	01B5 SWA40
01C5 SWA44	01D5 SWA45	01E5 SWA46	01A5 SWA47	0002 SWA50
006E TSA	01EC TSA1	01ED TSA2	01BB XEC	010B XEC1
010E XEC2	010A XEC3			

0 ERRORS ASSEMBLY COMPLETE

/FINI

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